As filed with the Securities and Exchange Commission on March 2, 2018

Registration No. 333-

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
WASHINGTON, D.C. 20549

FORM S-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

Homology Medicines, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**2834**	**47-3468154**
(State or other jurisdiction of incorporation or organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification No.)

45 Wiggins Avenue
Bedford, MA 01730
(781) 301-7277

(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

Arthur O. Tzianabos, Ph.D.
President and Chief Executive Officer
Homology Medicines, Inc.
45 Wiggins Avenue
Bedford, MA 01730
(781) 301-7277

(Name, address, including zip code, and telephone number, including area code, of agent for service)

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Approximate date of commencement of proposed sale to the public:
As soon as practicable after this Registration Statement is declared effective.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, check the following box. ☐

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

If this Form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☐	**Accelerated filer**	☐
Non-accelerated filer	☒	**Smaller reporting company**	☐
(Do not check if a smaller reporting company)		**Emerging growth company**	☒

If an emerging growth company, indicate by checkmark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided to Section 7(a)(2)(B) of the Securities Act. ☐

CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities To Be Registered	Proposed Maximum Aggregate Offering Price(1)(2)	Amount of Registration Fee(3)
Common Stock, $0.0001 par value per share	$100,000,000	$12,450

(1) Estimated solely for the purpose of calculating the registration fee pursuant to Rule 457(o) under the Securities Act of 1933, as amended.

(2) Includes the aggregate offering price of additional shares that the underwriters have the option to purchase.

(3) Calculated pursuant to Rule 457(o) based on an estimate of the proposed maximum aggregate offering price.

The Registrant hereby amends this Registration Statement on such date or dates as may be necessary to delay its effective date until the Registrant shall file a further amendment which specifically states that this Registration Statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933 or until the Registration Statement shall become effective on such date as the Commission, acting pursuant to said Section 8(a), may determine.

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The information in this prospectus is not complete and may be changed. We may not sell these securities until the registration statement filed with the Securities and Exchange Commission is effective. This prospectus is not an offer to sell these securities and it is not soliciting an offer to buy these securities in any state where the offer or sale is not permitted.

Subject to Completion
Preliminary Prospectus dated March 2, 2018.

PROSPECTUS

Shares

Common Stock

This is Homology Medicines, Inc.'s initial public offering. We are selling shares of our common stock.

We expect the public offering price to be between $ and $ per share. Currently, no public market exists for the shares. After pricing of the offering, we expect that the shares will trade on the Nasdaq Global Select Market under the symbol "FIXX."

We are an "emerging growth company" under the federal securities laws and are subject to reduced public company disclosure standards. See "Prospectus Summary—Implications of Being an Emerging Growth Company."

Investing in the common stock involves risks that are described in the "Risk Factors" section beginning on page 12 of this prospectus.

	Per Share	Total
Public offering price	$	$
Underwriting discount(1)	$	$
Proceeds, before expenses, to us	$	$

(1) We refer you to "Underwriting" beginning on page 166 for additional information regarding underwriting compensation.

The underwriters may also exercise their option to purchase up to an additional shares from us, at the public offering price, less the underwriting discount, for 30 days after the date of this prospectus.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The shares will be ready for delivery on or about , 2018.

Joint Book-Running Managers

BofA Merrill Lynch **Cowen** **Evercore ISI**

Lead Manager

BTIG

The date of this prospectus is , 2018.

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Neither we nor the underwriters have authorized anyone to provide any information or to make any representations other than those contained in this prospectus or in any free writing prospectus prepared by or on behalf of us or to which we have referred you. We take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. This prospectus is an offer to sell only the shares offered hereby, but only under circumstances and in jurisdictions where it is lawful to do so. The information contained in this prospectus or in any applicable free writing prospectus is current only as of its date, regardless of its time of delivery or any sale of shares of our common stock. Our business, financial condition, results of operations and prospects may have changed since that date.

Through and including , 2018 (25 days after the commencement of this offering), all dealers effecting transactions in these securities, whether or not participating in this offering, may be required to deliver a prospectus. This delivery requirement is in addition to the obligation of dealers to deliver a prospectus when acting as underwriters and with respect to their unsold allotments or subscriptions.

We have proprietary rights to trademarks, trade names and service marks appearing in this prospectus that are important to our business. Solely for convenience, the trademarks, trade names and service marks may appear in this prospectus without the ® and TM symbols, but any such references are not intended to indicate, in any way, that we forgo or will not assert, to the fullest extent under applicable law, our rights or the rights of the applicable licensors to these trademarks, trade names and service marks. All trademarks, trade names and service marks appearing in this prospectus are the property of their respective owners.

For investors outside the United States: Neither we nor the underwriters have done anything that would permit this offering or possession or distribution of this prospectus in any jurisdiction where action for that purpose is required, other than in the United States. Persons outside the United States who come into possession of this prospectus must inform themselves about, and observe any restrictions relating to, the offering of the shares of common stock and the distribution of this prospectus outside the United States.

PROSPECTUS SUMMARY

This summary highlights, and is qualified in its entirety by, the more detailed information and financial statements included elsewhere in this prospectus. This summary does not contain all of the information that may be important to you in making your investment decision. You should read this entire prospectus carefully, especially the "Risk Factors" section beginning on page 12 and our consolidated financial statements and the related notes appearing at the end of this prospectus, before deciding to invest in our common stock.

As used in this prospectus, unless the context otherwise requires, references to "we," "us," "our" and "Homology" refer to the consolidated operations of Homology Medicines, Inc. and its consolidated subsidiaries.

Overview

We are a genetic medicines company dedicated to transforming the lives of patients suffering from rare genetic diseases with significant unmet medical needs by curing the underlying cause of the disease. Our proprietary platform is designed to utilize our human hematopoietic stem cell derived adeno-associated virus vectors, or AAVHSCs, to precisely and efficiently deliver genetic medicines *in vivo* either through a gene therapy or nuclease-free gene editing modality across a broad range of genetic disorders. The unique properties of our proprietary suite of 15 novel AAVHSCs enable us to focus on a method of gene editing called gene correction, either through the replacement of an entire diseased gene in the genome with a whole functional copy or the precise repair of individual mutated nucleotides, by harnessing the naturally occurring deoxyribonucleic acid, or DNA, repair process of homologous recombination, or HR. We believe our HR-driven gene editing approach will allow us to efficiently perform gene correction at therapeutic levels without unwanted on- and off-target modifications, and to directly measure and confirm those modifications in an unbiased manner to ensure only the intended changes are made. By utilizing a natural mechanism of correcting gene defects, we also avoid the need for exogenous nucleases, or bacteria-derived enzymes used in other gene editing approaches to cut DNA, which are known to significantly increase the risk of unwanted modifications. Our diverse set of AAVHSCs allows us to precisely target, via a single intravenous injection, a wide range of disease-relevant tissues, including the liver, central nervous system, or CNS, bone marrow, lung, muscle and eye, across both modalities—gene editing and gene therapy. We believe these advantages will potentially allow us to safely provide transformative cures using either modality.

We have generated compelling preclinical data for our first and lead product candidate, HMI-102, a gene therapy for the treatment of phenylketonuria, or PKU, and are advancing HMI-102 into a Phase 1/2 clinical trial. We expect to initiate the Phase 1/2 trial in PKU patients and to receive initial clinical data in 2019. We continue to advance our gene editing modality and have generated *in vivo* preclinical data showing gene correction efficiencies that are significantly greater than both nuclease-based and other adeno-associated virus, or AAV, based approaches. We expect to nominate a lead gene editing product candidate for the treatment of PKU in 2018. We are a preclinical company and have not yet submitted an investigational new drug application, or IND, for HMI-102 or any other product candidate. We will require additional capital in order to advance HMI-102 beyond our planned Phase 1/2 clinical trial.

Our management team has a successful track record of discovering, developing and commercializing therapeutics with a particular focus on rare diseases. Our genetic medicines platform is based on gene editing and gene therapy technologies resulting from the pioneering work conducted on AAVHSCs in the laboratory of one of our founders, Saswati Chatterjee, Ph.D., of the City of Hope Medical Center in California, or COH. We have a robust intellectual property portfolio with issued composition of matter patents in the United States for our suite of 15 AAVHSCs and we believe the breadth and depth of our intellectual property is a strategic asset that has the potential to provide us with a significant competitive advantage. We continue to build on our intellectual property estate through our ongoing efforts to discover new AAVHSCs. We have internal process development and pilot manufacturing capabilities and are in the planning stage of building a current Good Manufacturing

Practices, or cGMP, manufacturing facility to support our clinical development programs. We recently entered into a collaboration with Novartis Institutes for Biomedical Research, Inc., or Novartis, to develop new genetic medicines using our HR-based gene correction approach in ophthalmology, which leverages our platform technology into a new therapeutic area, and hemoglobinopathy. Since our inception in 2015, we have raised $137 million through preferred stock financings, including investments from 5AM Ventures, ARCH Venture Partners, Deerfield, Temasek, Fidelity Management & Research, or FMR, Novartis, Rock Springs Capital, VIVO, HBM Partners, Maverick and Vida, or affiliates thereof, in addition to others. We believe that our compelling preclinical data, scientific expertise, product development strategy, manufacturing capabilities and robust intellectual property position us as a leader in the development of genetic medicines.

Our Opportunity in Genetic Medicines

We are currently focused on monogenic diseases where the genetic abnormality is known to occur in a single diseased gene. The majority of monogenic diseases harbor thousands of individual mutations within the diseased gene, each resulting in a loss of function. Replacing an entire diseased gene with a whole functional gene is the optimal therapeutic approach for addressing these monogenic disorders. This can be accomplished either through a method of gene therapy called gene transfer in slowly or non-dividing cells, or through a method of gene editing called gene correction in rapidly dividing cells. Gene transfer seeks to introduce a functional copy of a defective gene or gene sequence into a patient's own cells, but not incorporate such copy into the patient's genome. This method results in the expression of the therapeutic protein of interest without changing the genome. Gene editing, on the other hand, seeks to change the course of genetic disease by physically correcting aberrant genes through the replacement, deletion or repair of defective DNA in its native location.

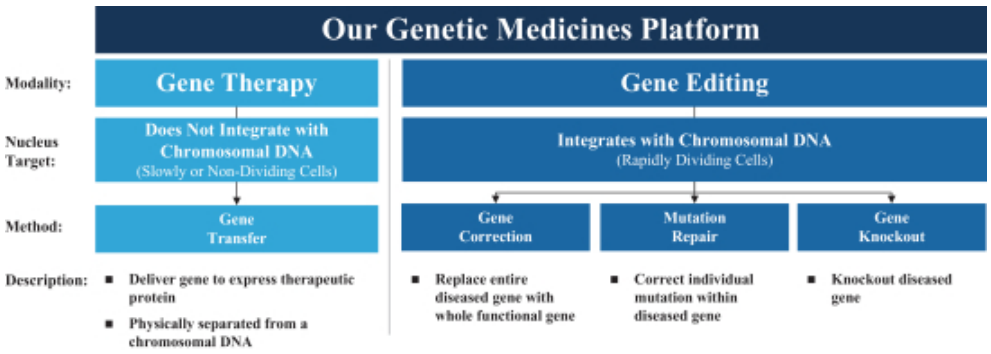
Gene editing technologies to date primarily leverage two independent pathways to modify DNA: homologous recombination, or HR, and non-homologous end joining, or NHEJ. HR is a process in which cells repair DNA through highly precise incorporation of correct DNA sequences complementary to the site of damage. HR has evolved to repair DNA with high fidelity and avoids the introduction of unwanted mutations at the site of correction. NHEJ is a less selective, error-prone process that rapidly joins the ends of broken DNA resulting in a high frequency of insertions or deletions at the break site. Despite high potential for error, the majority of nuclease-based gene editing companies primarily utilize the NHEJ pathway.

The current focus of most nuclease-based gene editing methods is gene knockout, or knocking out a diseased gene to prevent the expression of an undesired protein. Since gene knockout does not result in a fully-corrected gene, this method can only potentially address the minority of monogenic diseases where a diseased protein is overexpressed. In addition to our knockout capabilities, our HR-driven gene correction method allows us to potentially address the significant majority of monogenic diseases by replacing an entire diseased gene with a whole functional gene or by repairing a single mutation to fully correct the defect. Furthermore, while other AAV vectors have been known to deliver homologous DNA to specific regions in the genome and induce the HR pathway, their limited gene correction efficiency of approximately 1% has limited their use as a viable option for *in vivo* therapeutics. In contrast, preclinical studies have provided evidence that our HR-driven gene correction method has achieved *in vivo* therapeutically-relevant efficiencies averaging 19.5%.

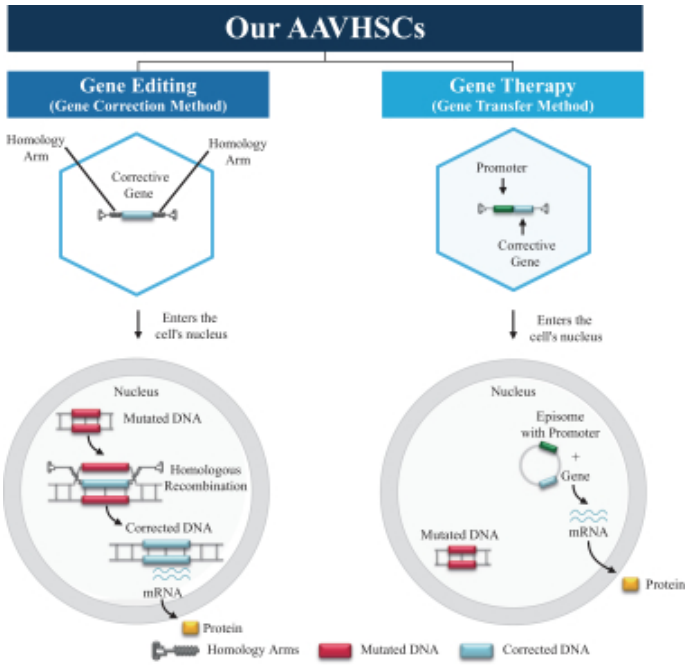
We believe the unique characteristics of our genetic medicines platform will allow us to focus on the HR pathway, enabling precise nuclease-free gene correction and a broader set of disease targets with improved efficiency.

Our Approach

Our unique genetic medicines platform is designed to provide us the flexibility to choose the best suited method from either gene correction or gene transfer for each disease we pursue, based on such factors as the targeted disease biology, the biodistribution of our AAVHSCs to key tissues and the rate of cell division the tissues exhibit. The figure below depicts our platform.



Our novel AAVHSCs are packaged with either a gene editing or traditional gene therapy construct. The gene editing construct includes lengthy guide sequences, or homology arms, which enable the specific alignment to the desired genomic location and then, through the natural process of HR, correct the diseased gene in the genome by replacement with a whole functional copy. Our gene therapy construct includes a functional copy of the gene and a promotor sequence that is designed to enable the gene to be turned on in the cell and ultimately transcribed to express the therapeutic protein of interest without integrating into the genome. The figure below depicts how our AAVHSCs enable each therapeutic modality.



We believe our approach has several key advantages that include:

- our proprietary platform AAVHSCs enable both gene therapy and gene editing modalities;
- ability to perform nuclease-free gene editing mediated by HR with high gene correction efficiency;
- ability to introduce an entire gene into the genome or the precise repair of individual mutated nucleotides in addition to gene knockout;
- high precision and lack of unwanted off-target or on-target DNA modifications;
- ability to target multiple tissues;
- *in vivo* administration with a single component delivery system; and
- ability to target a broad range of patients given the low frequency of preexisting neutralizing antibodies.

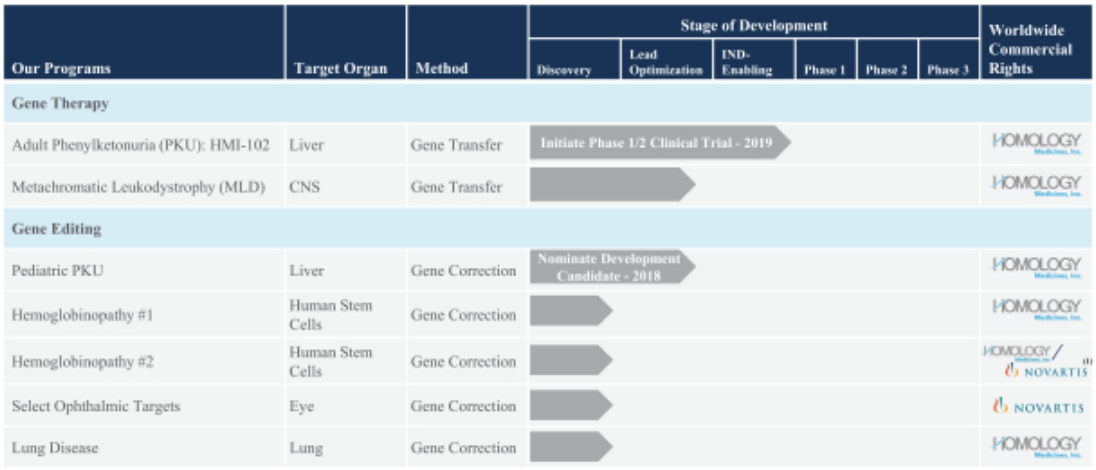
Our Pipeline Strategy

We believe our genetic medicines platform can be applied broadly to treat and potentially cure a wide range of genetic diseases, and we have carefully designed and prioritized our pipeline strategy to maximize this opportunity. We are initially pursuing monogenic diseases where we know exactly what we are seeking to correct and exactly what gene to insert into patients' cells, thus mitigating the uncertainty of the disease biology. We are prioritizing monogenic diseases with significant unmet medical needs, validated regulatory pathways and significant commercial opportunities. We are currently focused on developing product candidates to treat monogenic diseases in the liver, CNS, bone marrow, lung and the eye, given that our AAVHSCs naturally show a high degree of tropism, or ability to preferentially target cells in these organs and organ systems.

We are purposefully deploying our proprietary AAVHSCs in certain indications first with a gene therapy approach followed by a gene editing approach, in order to maximize the likelihood of translating our platform into clinical and commercial success. We are building a deep pipeline across a wide range of diseases and tissue types to leverage the broad potential of our platform. We also intend to selectively partner to expand the indications and accelerate development of programs where collaborators can contribute further disease-specific expertise to our platform.

We are advancing into a Phase 1/2 trial with our lead product candidate, HMI-102, a gene therapy for the treatment of PKU, a rare, inherited metabolic disorder that causes a toxic buildup of the amino acid phenylalanine, or Phe, in the brain. To date, no treatment addresses the core genetic defect in PKU. Our PKU program is initially focused on adults using the gene therapy approach. This strategy is designed to help us further characterize the delivery, safety and manufacturing of our AAVHSCs, and to apply our experiences to our gene editing approach in the pediatric PKU population and to our broader platform. In initial preclinical studies, mice treated with HMI-102 showed a reduction in serum Phe to normal levels within one week and the reduction in serum Phe persisted for more than 16 weeks following a single intravenous administration. In our initial gene correction preclinical studies, we introduced our gene editing construct containing human phenylalanine hydroxylase, or PAH, intravenously targeting the endogenous PAH locus through HR. In treated mice we have observed greater than 50% reduction in serum Phe sustained for at least five months.

The current status of our programs is summarized in the table below:



(1) Homology retains U.S. rights and has licensed the Ex-U.S. rights to Novartis.

Our Strategy

The critical components of our strategy include:

- transform the treatment paradigm for rare genetically-defined diseases with the delivery of single-administration curative therapies;
- advance our pipeline programs through clinical proof of concept and commercialization;
- continue to expand our pipeline in existing and new therapeutic areas;
- strengthen our platform by leveraging our internal discovery and development capabilities and selectively collaborating;
- control manufacturing through our in-house capabilities; and
- continue to strengthen and expand our intellectual property portfolio.

Risk Factors

Our business is subject to a number of risks of which you should be aware before making an investment decision. These risks are discussed more fully in the “Risk Factors” section of this prospectus immediately following this prospectus summary. These risks include the following:

- we are a development-stage company, have incurred significant losses since our inception, expect to incur losses for the foreseeable future and may never achieve or maintain profitability;

- even if this offering is successful, we will need additional funding in order to complete development of our product candidates and commercialize our products, if approved, and if we are unable to raise capital when needed, we could be forced to delay, reduce or eliminate our product development programs or commercialization efforts;

- we are very early in our development efforts, with all of our programs in the research or preclinical stage, and may not be successful in our efforts to use our novel genetic medicines platform to identify additional product candidates and develop marketable products;

- our lead product candidate is based on our novel genetic medicines platform, which uses both nuclease-free gene editing and gene therapy technologies, and to date, no products that utilize gene editing technology have been approved in the United States or in Europe, and there have only been a limited number of human clinical trials involving a gene editing product candidate, none of which utilize our novel gene correction technology;

- our product candidates may cause serious adverse events or side effects or have other properties which may delay or prevent their regulatory approval, limit the commercial profile of an approved label or result in significant negative consequences following marketing approval, if any;

- adverse public perception of genetic medicine, and gene editing in particular, may negatively impact regulatory approval of or demand for our potential products;

- the clinical trial and regulatory approval processes are lengthy, time consuming and inherently unpredictable, and we may incur additional costs or experience delays in completing, or ultimately be unable to complete, the development and commercialization of our product candidates;

- we currently contract with third parties for the manufacture of our research programs and preclinical studies and we intend to establish and scale our internal manufacturing capabilities, both of which increase the risk that we will not have sufficient quantities of our product candidates or that such quantities may not be available at an acceptable cost, which could delay, prevent or impair our development or commercialization efforts;

- our existing collaborations are important to our business and future licenses may also be important to us, and if we are unable to maintain any of these collaborations, or if these arrangements are not successful, our business could be adversely affected; and

- if we are unable to adequately protect our proprietary technology, or obtain and maintain issued patents which are sufficient to protect our product candidates, others could compete against us more directly, which would negatively impact our business.

Implications of Being an Emerging Growth Company

As a company with less than $1.07 billion in revenue during our last fiscal year, we qualify as an “emerging growth company,” as defined in the Jumpstart Our Business Startups Act of 2012, as amended, or JOBS Act. An “emerging growth company” may take advantage of reduced reporting requirements that are otherwise applicable to public companies. These provisions include, but are not limited to:

- being permitted to present only two years of audited financial statements and only two years of related Management’s Discussion and Analysis of Financial Condition and Results of Operations in this prospectus;

- not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, as amended;
- reduced disclosure obligations regarding executive compensation in our periodic reports, proxy statements and registration statements; and
- exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved.

We may remain an emerging growth company until the earlier of (i) the last day of the fiscal year following the fifth anniversary of the completion of this offering, (ii) the last day of the fiscal year in which we have more than $1.07 billion in annual gross revenue, (iii) the last day of the fiscal year in which we are deemed to be a "large accelerated filer," as defined in Rule 12b-2 under the Securities Exchange Act of 1934, as amended, or the Exchange Act, which would occur if the market value of our common stock held by non-affiliates exceeded $700.0 million as of the last business day of the second fiscal quarter of such fiscal year, or (iv) the date on which we issue more than $1 billion of non-convertible debt securities during the prior three-year period.

We have elected to take advantage of certain of the reduced disclosure obligations in the registration statement of which this prospectus is a part and may elect to take advantage of other reduced reporting requirements in future filings. As a result, the information that we provide to our stockholders may be different than you might receive from other public reporting companies in which you hold equity interests.

In addition, the JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. We have elected to take advantage of this extended transition period.

Corporate Information

We were incorporated under the laws of the state of Delaware in 2015. Our principal executive offices are located at 45 Wiggins Avenue, Bedford, MA 01730 and our telephone number is (781) 301-7277. Our website address is *www.homologymedicines.com*. The information contained in, or accessible through, our website does not constitute a part of this prospectus.

The Offering

Common stock offered by us	shares
Common stock to be outstanding after this offering	shares (or shares if the underwriters exercise their option to purchase additional shares in full).
Option to purchase additional shares	The underwriters have a 30-day option to purchase up to additional shares of our common stock at the public offering price less estimated underwriting discounts and commissions.
Use of proceeds	We estimate that the net proceeds from this offering will be approximately $ million (or approximately $ million if the underwriters exercise in full their option to purchase additional shares of common stock), at an assumed public offering price of $ per share, after deducting the estimated underwriting discounts and commissions and the estimated offering expenses payable by us. We anticipate that we will use the net proceeds of this offering to advance our lead and other product candidates, scale-up our manufacturing processes, build-out our internal manufacturing capacity, expand our intellectual property portfolio and pursue additional research and development efforts as set forth under "Use of Proceeds" beginning on page 66 for additional information.
Risk factors	You should carefully read the "Risk Factors" beginning on page 12 and the other information included in this prospectus for a discussion of factors you should consider carefully before deciding to invest in our common stock.
Proposed Nasdaq Global Select Market symbol	"FIXX"

The number of shares of our common stock to be outstanding after this offering is based on 15,273,840 shares of our common stock outstanding as of December 31, 2017, which included 1,395,236 shares of unvested restricted stock subject to repurchase and excludes:

- shares of common stock issuable upon exercise of stock options outstanding under our 2015 Stock Incentive Plan, referred to as our 2015 Plan, as of December 31, 2017, at a weighted-average exercise price of $ per share; and
- additional shares of our common stock reserved for future issuance under our 2018 Incentive Award Plan, referred to as our 2018 Plan, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under our 2018 Plan; and
- shares of our common stock reserved for future issuance under our 2018 Employee Stock Purchase Plan, referred to as our 2018 ESPP, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under our 2018 ESPP.

Unless otherwise indicated, this prospectus reflects and assumes the following:

- a -for- stock split of our common stock, which will become effective prior to the effectiveness of the registration statement of which this prospectus forms a part;
- the automatic conversion of all outstanding shares of our Series A and Series B preferred stock into an aggregate of 127,199,705 shares of our common stock upon the closing of this offering;
- no exercise of outstanding options after December 31, 2017;
- the filing of our restated certificate of incorporation, which will occur upon the closing of this offering; and
- no exercise by the underwriters of their option to purchase additional shares of our common stock.

Summary Consolidated Financial Data

The following tables set forth our summary consolidated financial data for the period indicated. We have derived the consolidated statements of operations data for the years ended December 31, 2017 and 2016 and the consolidated balance sheet data as of December 31, 2017 from our audited consolidated financial statements included elsewhere in this prospectus. Our historical results are not necessarily indicative of the results that should be expected for any future period. You should read the following summary consolidated financial data together with the more detailed information contained in "Selected Consolidated Financial Data," "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our consolidated financial statements and the related notes included elsewhere in this prospectus.

(in thousands, except share and per share data)	Year Ended December 31, 2017	2016
Consolidated Statements of Operations Data:		
Operating expenses:		
Research and development	$ 21,378	$ 5,695
General and administrative	8,279	4,305
Total operating expenses	29,657	10,000
Loss from operations	(29,657)	(10,000)
Other income (expense):		
Change in fair market value of convertible preferred stock tranche liability	(876)	1,929
Interest income	542	24
Total other income (expense)	(334)	1,953
Net loss and net loss attributable to common stockholders—basic and diluted	$ (29,991)	$ (8,047)
Net loss per share attributable to common stockholders—basic and diluted	$ (2.30)	$ (0.80)
Weighted average common shares outstanding—basic and diluted(1)	13,048,943	10,002,586
Pro forma net loss per share attributable to common stockholders—basic and diluted (unaudited)(1)	$ (0.30)	
Pro forma weighted average common shares of common stock outstanding—basic and diluted (unaudited)(1)	97,904,322	

(1) See Note 14 to our consolidated financial statements included elsewhere in this prospectus for an explanation of the method used to calculate the historical and pro forma basic and diluted net loss per common share and the weighted average number of shares used in the computation of the per share amounts.

	As of December 31, 2017		
	Actual	Pro Forma(1) (in thousands)	Pro Forma As Adjusted(2)(3)
Consolidated Balance Sheet Data:			
Cash, cash equivalents and short-term investments	$129,659	$ 129,659	$
Total assets	137,530	137,530	
Accumulated deficit	(40,181)	(40,181)	
Total stockholders' (deficit) equity	(39,454)	98,308	

(1) The pro forma consolidated balance sheet data gives effect to the automatic conversion of all outstanding shares of our Series A and Series B preferred stock into an aggregate of 127,199,705 shares of common stock, which will occur upon the closing of this offering.

(2) Reflects the pro forma adjustments described in footnote (1) and to the issuance and sale of shares of common stock in this offering at an assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

(3) Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) the pro forma as adjusted amount of each of cash and cash equivalents, total assets and total stockholders' equity (deficit) by $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. Similarly, each increase (decrease) of 1.0 million shares in the number of shares offered by us at the assumed initial public offering price would increase (decrease) each of cash and cash equivalents, total assets and total stockholders' equity (deficit) by $ million. The pro forma information discussed above is illustrative only and will be adjusted based on the actual initial public offering price and other terms of our initial public offering determined at pricing.

RISK FACTORS

You should carefully consider the risks and uncertainties described below and the other information in this prospectus before making an investment in our common stock. Our business, financial condition, results of operations or prospects could be materially and adversely affected if any of these risks occurs, and as a result, the market price of our common stock could decline and you could lose all or part of your investment. This prospectus also contains forward-looking statements that involve risks and uncertainties. See "Cautionary Statement Regarding Forward-Looking Statements." Our actual results could differ materially and adversely from those anticipated in these forward-looking statements as a result of certain factors, including those set forth below.

Risks Related to Our Financial Position and Need for Additional Capital

We have incurred significant losses since inception and anticipate that we will incur continued losses for the foreseeable future. If we are unable to achieve and sustain profitability, the market value of our common stock will likely decline. We may never achieve or maintain profitability.

We are a preclinical-stage genetic medicines company with a limited operating history. We have never been profitable and do not expect to be profitable in the foreseeable future. We have incurred net losses in each year since beginning to develop our product candidates, including net losses of approximately $30.0 million for the year ended December 31, 2017. As of December 31, 2017, we had an accumulated deficit of approximately $40.2 million. In addition, we have not commercialized any products and have never generated any revenue from product sales. We have devoted most of our financial resources to research and development, including our preclinical development activities.

We expect to continue to incur significant additional operating losses for the foreseeable future as we seek to advance product candidates through preclinical and clinical development, expand our research and development activities, develop new product candidates, complete clinical trials, seek regulatory approval and, if we receive FDA approval, commercialize our products. Furthermore, the costs of advancing product candidates into each succeeding clinical phase tend to increase substantially over time. The total costs to advance any of our product candidates to marketing approval in even a single jurisdiction would be substantial. Because of the numerous risks and uncertainties associated with genetic medicine product development, we are unable to accurately predict the timing or amount of increased expenses or when, or if, we will be able to begin generating revenue from the commercialization of products or achieve or maintain profitability. Our expenses will also increase substantially if and as we:

- continue our current research programs and our preclinical development of product candidates from our current research programs;
- seek to identify, assess, acquire and/or develop additional research programs and additional product candidates;
- initiate preclinical testing and clinical trials for any product candidates we identify and develop;
- establish a sales, marketing and distribution infrastructure to commercialize any product candidates for which we may obtain marketing approval;
- maintain, expand and protect our intellectual property portfolio;
- further develop our genetic medicines platform;
- hire additional clinical, scientific and commercial personnel;

- add operational, financial and management information systems and personnel, including personnel to support our product development and planned future commercialization efforts, as well as to support our transition to a public reporting company;
- acquire or in-license other commercial products, product candidates and technologies;
- make royalty, milestone or other payments under current and any future in-license agreements;
- validate and build-out a commercial-scale current Good Manufacturing Practices, or cGMP, manufacturing facility; and
- operate as a public company.

Furthermore, our ability to successfully develop, commercialize and license our products and generate product revenue is subject to substantial additional risks and uncertainties. Each of our programs and product candidates will require additional preclinical and clinical development, potential regulatory approval in multiple jurisdictions, securing manufacturing supply, capacity and expertise, building of a commercial organization, substantial investment and significant marketing efforts before we generate any revenue from product sales. These risks are further described under "—Risks Related to Discovery, Development, Clinical Testing, Manufacturing and Regulatory Approval" and "—Risks Related to Commercialization." As a result, we expect to continue to incur net losses and negative cash flows for the foreseeable future. These net losses and negative cash flows have had, and will continue to have, an adverse effect on our stockholders' equity and working capital. The amount of our future net losses will depend, in part, on the rate of future growth of our expenses and our ability to generate revenues. If we are unable to develop and commercialize one or more of our product candidates either alone or with collaborators, or if revenues from any product candidate that receives marketing approval are insufficient, we will not achieve profitability. Even if we do achieve profitability, we may not be able to sustain or increase profitability. If we are unable to achieve and then maintain profitability, the value of our equity securities will be materially and adversely affected.

We will require additional capital to fund our operations, and if we fail to obtain necessary financing, we may not be able to complete the development and commercialization of our product candidates.

We expect to spend substantial amounts to complete the development of, seek regulatory approvals for and commercialize HMI-102. We will require additional capital beyond the proceeds of this offering, which we may raise through equity offerings, debt financings, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements or other sources to enable us to complete the development and potential commercialization of HMI-102 and our other product candidates. In addition, we may not be able to enter into any collaborations that will generate significant cash. Adequate additional financing may not be available to us on acceptable terms, or at all. Our failure to raise capital as and when needed would have a negative effect on our financial condition and our ability to pursue our business strategy. In addition, attempting to secure additional financing may divert the time and attention of our management from day-to-day activities and harm our product candidate development efforts.

Based upon our current operating plan, we believe that the net proceeds from this offering will enable us to fund our operating expenses and capital expenditure requirements for at least the next two years, including the top-line data readout for our planned Phase 1/2 clinical trial for HMI-102, the nomination and advancement of a lead gene editing product candidate, the scale-up of our manufacturing processes, the build-out of our internal manufacturing capacity and the expansion of our intellectual property portfolio. This estimate is based on assumptions that may prove to be wrong, and we could use our available capital resources sooner than we currently expect. Changing circumstances could cause us to consume capital significantly faster than we currently anticipate, and we may need to spend more than currently expected because of circumstances beyond our control. Because the length of time and activities associated with successful development of HMI-102 and our other product candidates is highly uncertain, we are unable to estimate the actual funds we will require for

development and any approved marketing and commercialization activities. Our future funding requirements, both near and long-term, will depend on many factors, including, but not limited to:

- the initiation, progress, timing, costs and results of our planned clinical trials for HMI-102 and our other product candidates;
- the outcome, timing and cost of meeting regulatory requirements established by the FDA and other comparable foreign regulatory authorities;
- the cost of filing, prosecuting, defending and enforcing our patent claims and other intellectual property rights;
- the cost of defending potential intellectual property disputes, including patent infringement actions brought by third parties against us or HMI-102 or any of our product candidates;
- the effect of competing technological and market developments;
- the cost and timing of completion of commercial-scale manufacturing activities;
- the costs of operating as a public company;
- the extent to which we in-license or acquire other products and technologies;
- the cost of establishing sales, marketing and distribution capabilities for HMI-102 in regions where we choose to commercialize our products; and
- the initiation, progress, timing and results of our commercialization of HMI-102, if approved for commercial sale.

We cannot be certain that additional funding will be available on acceptable terms, or at all. If we are unable to raise additional capital in sufficient amounts or on terms acceptable to us, we may have to significantly delay, scale back or discontinue the development or commercialization of HMI-102 or other product candidates or potentially discontinue operations.

Raising additional capital may cause dilution to our stockholders, including purchasers of common stock in this offering, restrict our operations or require us to relinquish rights to our technologies or product candidates.

Until such time, if ever, as we can generate substantial revenue, we may finance our cash needs through a combination of equity offerings, debt financings, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements. We do not currently have any committed external source of funds. In addition, we may seek additional capital due to favorable market conditions or strategic considerations, even if we believe that we have sufficient funds for our current or future operating plans.

To the extent that we raise additional capital through the sale of equity or convertible debt securities, your ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect your rights as a common stockholder. Debt financing and preferred equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through collaborations, strategic alliances or marketing, distribution or licensing arrangements with third parties, we may be required to relinquish valuable rights to our technologies, future revenue streams or product candidates or grant licenses on terms that may not be favorable to us. If we are unable to raise additional

funds through equity or debt financings when needed, we may be required to delay, limit, reduce or terminate our product development or future commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

We have a limited operating history and no history of commercializing genetic medicine products, which may make it difficult to evaluate the prospects for our future viability.

We were established and began operations in 2015. Our operations to date have been limited to financing and staffing our company, developing our technology and identifying and developing our product candidates. We have not yet demonstrated an ability to successfully complete any clinical trials, including large-scale, pivotal clinical trials, obtain marketing approval, manufacture a commercial scale product, or arrange for a third party to do so on our behalf, or conduct sales and marketing activities necessary for successful product commercialization. Typically, it takes about six to ten years to develop a new drug from the time it enters Phase 1 clinical trials to when it is approved for treating patients, but in many cases it may take longer. Consequently, predictions about our future success or viability may not be as accurate as they could be if we had a longer operating history or a history of successfully developing and commercializing genetic medicine products.

In addition, as a business with a limited operating history, we may encounter unforeseen expenses, difficulties, complications, delays and other known and unknown factors. We will eventually need to transition from a company with a research focus to a company capable of supporting commercial activities. We may not be successful in such a transition.

As we continue to build our business, we expect our financial condition and operating results may fluctuate significantly from quarter to quarter and year to year due to a variety of factors, many of which are beyond our control. Accordingly, you should not rely upon the results of any particular quarterly or annual period as indications of future operating performance.

We are heavily dependent on the success of HMI-102, our most advanced product candidate, which is still under preclinical development, and if HMI-102 does not receive regulatory approval or is not successfully commercialized, our business may be harmed.

To date, we have invested a significant portion of our efforts and financial resources in the development of HMI-102. Our future success and ability to generate product revenue is substantially dependent on our ability to successfully develop, obtain regulatory approval for and successfully commercialize this product candidate. We currently have no products that are approved for commercial sale and may never be able to develop marketable products. We expect that a substantial portion of our efforts and expenditures over the next few years will be devoted to HMI-102, which will require additional preclinical and clinical development, management of clinical, preclinical, and manufacturing activities, regulatory approval in multiple jurisdictions, securing manufacturing supply, building of a commercial organization, substantial investment and significant marketing efforts before we can generate any revenues from any commercial sales. Accordingly, our business currently depends heavily on the successful development, regulatory approval and commercialization of HMI-102, which may never occur. We cannot be certain that HMI-102 will be successful in clinical trials, receive regulatory approval or be successfully commercialized even if we receive regulatory approval. Even if we receive approval to market HMI-102 from the FDA or other regulatory bodies, we cannot be certain that our product candidate will be successfully commercialized, widely accepted in the marketplace or more effective than other commercially available alternatives. Additionally, the research, testing, manufacturing, labeling, approval, sale, marketing and distribution of genetic medicine products are and will remain subject to extensive regulation by the FDA and other regulatory authorities in the United States and other countries that each have differing regulations. We are not permitted to market HMI-102 in the United States until it receives approval of a biologics license application, or BLA from the FDA, or in any foreign countries until it receives the requisite approval from such countries.

We have not submitted a BLA to the FDA or comparable applications to other regulatory authorities and do not expect to be in a position to do so for the foreseeable future.

HMI-102 is our most advanced product candidate, and because our other product candidates are based on similar technology, if HMI-102 shows unexpected adverse events or a lack of efficacy in the indications we intend to treat, or if we experience other regulatory or developmental issues, our development plans and business could be significantly harmed. Further, competitors may be developing products with similar technology and may experience problems with their products that could identify problems that would potentially harm our business.

We may not be successful in our efforts to identify additional product candidates.

Part of our strategy involves identifying novel product candidates. The process by which we identify product candidates may fail to yield product candidates for clinical development for a number of reasons, including those discussed in these risk factors and also:

- we may not be able to assemble sufficient resources to acquire or discover additional product candidates;
- competitors may develop alternatives that render our potential product candidates obsolete or less attractive;
- potential product candidates we develop may nevertheless be covered by third parties' patents or other exclusive rights;
- potential product candidates may, on further study, be shown to have harmful side effects, toxicities or other characteristics that indicate that they are unlikely to be products that will receive marketing approval and achieve market acceptance;
- potential product candidates may not be effective in treating their targeted diseases;
- the market for a potential product candidate may change so that the continued development of that product candidate is no longer reasonable;
- a potential product candidate may not be capable of being produced in commercial quantities at an acceptable cost, or at all; or
- the regulatory pathway for a potential product candidate is too complex and difficult to navigate successfully or economically.

In addition, we may choose to focus our efforts and resources on a potential product candidate that ultimately proves to be unsuccessful. As a result, we may fail to capitalize on viable commercial products or profitable market opportunities, be required to forego or delay pursuit of opportunities with other product candidates or other diseases that may later prove to have greater commercial potential, or relinquish valuable rights to such product candidates through collaboration, licensing or other royalty arrangements in cases in which it would have been advantageous for us to retain sole development and commercialization rights. If we are unable to identify additional suitable product candidates for clinical development, this would adversely impact our business strategy and our financial position and share price and could potentially cause us to cease operations.

We will need to expand our organization, and we may experience difficulties in managing this growth, which could disrupt our operations.

As of March 1, 2018, we had 67 employees. We will need to significantly expand our organization, and we may have difficulty identifying, hiring and integrating new personnel. Future growth would impose

significant additional responsibilities on our management, including the need to identify, recruit, maintain, motivate and integrate additional employees, consultants and contractors. Also, our management may need to divert a disproportionate amount of its attention away from our day-to-day activities and devote a substantial amount of time to managing these growth activities. We may not be able to effectively manage the expansion of our operations, which may result in weaknesses in our infrastructure, give rise to operational mistakes, loss of business opportunities, loss of employees and reduced productivity among remaining employees. Our expected growth could require significant capital expenditures and may divert financial resources from other projects, such as the development of product candidates. If our management is unable to effectively manage our growth, our expenses may increase more than expected, our ability to generate and/or grow revenues could be reduced, and we may not be able to implement our business strategy. Our future financial performance and our ability to commercialize our product candidates and compete effectively will depend, in part, on our ability to effectively manage any future growth.

Many of the biotechnology companies that we compete against for qualified personnel and consultants have greater financial and other resources, different risk profiles and a longer history in the industry than we do. If we are unable to continue to attract and retain high-quality personnel and consultants, the rate and success at which we can discover and develop product candidates and operate our business will be limited.

We may be required to make significant payments in connection with our license agreements with each of the City of Hope and the California Institute of Technology.

Under our license agreements with each of City of Hope Medical Center, or COH, and California Institute of Technology, or Caltech, we are subject to significant obligations, including payment obligations upon achievement of specified milestones and royalties on product sales, as well as other material obligations. If these payments become due, we may not have sufficient funds available to meet our obligations or we may have to direct funds from other development efforts, and as a result, our development efforts may be materially harmed.

Risks Related to Discovery, Development, Clinical Testing, Manufacturing and Regulatory Approval

We intend to identify and develop product candidates based on our novel genetic medicines platform, which makes it difficult to predict the time and cost of product candidate development. No products that utilize gene editing technology have been approved in the United States or in Europe, and there have only been a limited number of human clinical trials involving a gene editing product candidate. Moreover, none of those trials has involved our nuclease-free gene editing technology.

We have concentrated our research and development efforts on our genetic medicines platform, which uses both nuclease-free gene editing and gene therapy technologies. Our future success depends on the successful development of this novel therapeutic approach. To date, no product that utilizes gene editing has been approved in the United States or Europe. There have been a limited number of clinical trials of gene editing technologies, however no product candidates have been approved, and none of these clinical trials involved product candidates that utilize our novel gene correction technology. In addition, because our programs are all in the research or preclinical stage, we have not yet been able to assess safety in humans, and there may be long-term effects from treatment with any of our future product candidates that we cannot predict at this time. Any gene correction product candidates we may develop will act at the level of DNA, and, because animal DNA differs from human DNA, it will be difficult for us to test our future product candidates in animal models for either safety or efficacy. Also, animal models may not exist for some of the diseases we expect to pursue. Our genetic medicines platform is based on a suite of 15 proprietary AAVHSCs which we can deploy with either gene editing or gene therapy constructs. Both applications rely on a unique ability of our AAVHSCs to efficiently target multiple tissues in the body. The mechanism of action by which these vectors target particular tissues is still not completely understood. Therefore, it is difficult for us to determine that our vectors will be able to properly integrate corrective DNA in or deliver gene transfer constructs to enough tissue cells to reach therapeutic levels. We cannot be certain that our AAVHSCs will be able to meet safety and efficacy levels needed to be therapeutic in humans or that they will

not cause significant adverse events or toxicities. Furthermore, recent work conducted by a third party in non-human primates suggests that intravenous delivery of certain AAV vectors at very high doses may result in severe toxicity. To date, we have not observed the severe toxicities described in these publications after intravenous administration in non-human primates with our naturally occurring AAVHSC vectors, and we have not seen these toxicities in our product candidates. However, we cannot be certain that we will be able to avoid triggering toxicities in our future pre-clinical or clinical studies. Any such results could impact our ability to develop a product candidate. As a result of these factors, it is more difficult for us to predict the time and cost of product candidate development, and we cannot predict whether the application of our genetic medicines platform, or any similar or competitive gene therapy or gene editing platforms, will result in the identification, development, and regulatory approval of any medicines, or that other genetic medicine technologies will not be considered better or more attractive for the development of medicines. There can be no assurance that any development problems we experience in the future related to our genetic medicines platform or any of our research programs will not cause significant delays or unanticipated costs, or that such development problems can be solved. We may also experience delays in developing a sustainable, reproducible, and scalable manufacturing process or transferring that process to commercial partners. Any of these factors may prevent us from completing our preclinical studies or any clinical trials that we may initiate or commercializing any product candidates we may develop on a timely or profitable basis, if at all.

Because gene therapy and gene editing are novel and the regulatory landscape that governs any product candidates we may develop is uncertain and may change, we cannot predict the time and cost of obtaining regulatory approval, if we receive it at all, for any product candidates we may develop.

The regulatory requirements that will govern any novel gene therapy or gene editing product candidates we develop are not entirely clear and may change. Within the broader genetic medicine field, few have received marketing authorization from the European Commission, and only three gene therapy products have received marketing approval in the United States. Even with respect to more established products that fit into the categories of gene therapies or cell therapies, the regulatory landscape is still developing. Regulatory requirements governing gene therapy products and cell therapy products have changed frequently and will likely continue to change in the future. Moreover, there is substantial, and sometimes uncoordinated, overlap in those responsible for regulation of existing gene therapy products and cell therapy products. For example, in the United States, the FDA has established the Office of Tissues and Advanced Therapies within its Center for Biologics Evaluation and Research, or CBER, to consolidate the review of gene therapy and related products, and the Cellular, Tissue and Gene Therapies Advisory Committee to advise CBER on its review. Gene therapy clinical trials are also subject to review and oversight by an institutional biosafety committee, or IBC, a local institutional committee that reviews and oversees basic and clinical research conducted at the institution participating in the clinical trial. Gene therapy clinical trials conducted at institutions that receive funding for recombinant DNA research from the United States National Institutes of Health, or the NIH, are also subject to review by the NIH Office of Biotechnology Activities' Recombinant DNA Advisory Committee. Although the FDA decides whether individual gene therapy protocols may proceed, the review process and determinations of other reviewing bodies can impede or delay the initiation of a clinical trial, even if the FDA has reviewed the trial and approved its initiation. The same applies in the European Union. The EMA's Committee for Advanced Therapies, or CAT, is responsible for assessing the quality, safety, and efficacy of advanced-therapy medicinal products. The role of the CAT is to prepare a draft opinion on an application for marketing authorization for a gene therapy medicinal candidate that is submitted to the EMA. In the European Union, the development and evaluation of a gene therapy medicinal product must be considered in the context of the relevant European Union guidelines. The EMA may issue new guidelines concerning the development and marketing authorization for gene therapy medicinal products and require that we comply with these new guidelines. As a result, the procedures and standards applied to gene therapy products and cell therapy products may be applied to any gene therapy or gene editing product candidates we may develop, but that remains uncertain at this point.

Adverse developments in pre-clinical or clinical trials conducted by others in the field of gene therapy products, cell therapy products, or products developed through the application of gene editing technology may cause the FDA, the EMA, and other regulatory bodies to revise the requirements for approval of any product

candidates we may develop or limit the use of products utilizing gene editing technologies, either of which could materially harm our business. In addition, the clinical trial requirements of the FDA, the EMA, and other regulatory authorities and the criteria these regulators use to determine the safety and efficacy of a product candidate vary substantially according to the type, complexity, novelty, and intended use and market of the potential products. The regulatory approval process for product candidates such as ours can be more expensive and take longer than for other, better known, or more extensively studied pharmaceutical or other product candidates. Further, as we are developing novel treatments for diseases in which there is little clinical experience with new endpoints and methodologies, there is heightened risk that the FDA, the EMA or comparable foreign regulatory bodies may not consider the clinical trial endpoints to provide clinically meaningful results, and the resulting clinical data and results may be more difficult to analyze. Regulatory agencies administering existing or future regulations or legislation may not allow production and marketing of products utilizing gene editing technology in a timely manner or under technically or commercially feasible conditions. In addition, regulatory action or private litigation could result in expenses, delays, or other impediments to our research programs or the commercialization of resulting products.

The regulatory review committees and advisory groups described above and the new guidelines they promulgate may lengthen the regulatory review process, require us to perform additional preclinical studies or clinical trials, increase our development costs, lead to changes in regulatory positions and interpretations, delay or prevent approval and commercialization of these treatment candidates, or lead to significant post-approval limitations or restrictions. As we advance our research programs and develop future product candidates, we will be required to consult with these regulatory and advisory groups and to comply with applicable guidelines. If we fail to do so, we may be required to delay or discontinue development of any product candidates we identify and develop.

Clinical trials are expensive, time-consuming, difficult to design and implement, and involve an uncertain outcome.

Clinical testing is expensive and can take many years to complete, and its outcome is inherently uncertain. Failure can occur at any time during the clinical trial process. The results of preclinical studies and early clinical trials of our product candidates may not be predictive of the results of later-stage clinical trials. Product candidates in later stages of clinical trials may fail to show the desired safety and efficacy traits despite having progressed through preclinical studies and initial clinical trials. A number of companies in the biotechnology and genetic medicine industries have suffered significant setbacks in advanced clinical trials due to lack of efficacy or adverse safety profiles, notwithstanding promising results in earlier trials. Even if our future clinical trials are completed as planned, we cannot be certain that their results will support the safety and effectiveness of HMI-102 for PKU or any other potential indication. Our future clinical trial results may not be successful.

To date, we have not completed any clinical trials required for the approval of HMI-102. Although we plan to initiate a Phase 1/2 clinical trial in 2019, we may experience delays in conducting any clinical trials and we do not know whether planned clinical trials will begin on time, need to be redesigned, recruit and enroll patients on time or be completed on schedule, or at all. Clinical trials can be delayed or terminated for a variety of reasons, including delays or failures related to:

- the FDA or comparable foreign regulatory authorities disagreeing as to the design or implementation of our clinical studies;
- obtaining regulatory approval to commence a trial;
- reaching an agreement on acceptable terms with prospective CROs and clinical trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and trial sites;

- obtaining institutional review board, or IRB, approval at each site;
- recruiting suitable patients to participate in a trial;
- developing and validating the companion diagnostic to be used in a clinical trial, if applicable;
- having patients complete a trial or return for post-treatment follow-up;
- clinical sites deviating from trial protocol or dropping out of a trial;
- addressing patient safety concerns that arise during the course of a trial;
- adding a sufficient number of clinical trial sites; or
- manufacturing sufficient quantities of product candidate for use in clinical trials.

We may experience numerous unforeseen events during, or as a result of, clinical trials that could delay or prevent our ability to receive marketing approval or commercialize our product candidates or significantly increase the cost of such trials, including:

- we may receive feedback from regulatory authorities that requires us to modify the design of our clinical trials;
- clinical trials of our product candidates may produce negative or inconclusive results, and we may decide, or regulators may require us, to conduct additional clinical trials or abandon development programs;
- the number of patients required for clinical trials of our product candidates may be larger than we anticipate, enrollment in these clinical trials may be slower than we anticipate or participants may drop out of these clinical trials at a higher rate than we anticipate;
- our third-party contractors may fail to comply with regulatory requirements or meet their contractual obligations to us in a timely manner, or at all;
- we or our investigators might have to suspend or terminate clinical trials of our product candidates for various reasons, including non-compliance with regulatory requirements, a finding that our product candidates have undesirable side effects or other unexpected characteristics, or a finding that the participants are being exposed to unacceptable health risks;
- the cost of clinical trials of our product candidates may be greater than we anticipate and we may not have funds to cover the costs;
- the supply or quality of our product candidates or other materials necessary to conduct clinical trials of our product candidates may be insufficient or inadequate;
- regulators may revise the requirements for approving our product candidates, or such requirements may not be as we anticipate; and
- any future collaborators that conduct clinical trials may face any of the above issues, and may conduct clinical trials in ways they view as advantageous to them but that are suboptimal for us.

If we are required to conduct additional clinical trials or other testing of our product candidates beyond those that we currently contemplate, if we are unable to successfully complete clinical trials of our product candidates or other testing, if the results of these trials or tests are not positive or are only modestly positive or if there are safety concerns, we may:

- incur unplanned costs;

- be delayed in obtaining marketing approval for our product candidates or not obtain marketing approval at all;
- obtain marketing approval in some countries and not in others;
- obtain marketing approval for indications or patient populations that are not as broad as intended or desired;
- obtain marketing approval with labeling that includes significant use or distribution restrictions or safety warnings, including boxed warnings;
- be subject to additional post-marketing testing requirements; or
- have the product removed from the market after obtaining marketing approval.

We could encounter delays if a clinical trial is suspended or terminated by us, by the IRBs of the institutions in which such trials are being conducted, by the Data Safety Monitoring Board, or DSMB, for such trial or by the FDA or other regulatory authorities. Such authorities may impose such a suspension or termination due to a number of factors, including failure to conduct the clinical trial in accordance with regulatory requirements or our clinical protocols, inspection of the clinical trial operations or trial site by the FDA or other regulatory authorities resulting in the imposition of a clinical hold, unforeseen safety issues or adverse side effects, failure to demonstrate a benefit from using a drug, changes in governmental regulations or administrative actions or lack of adequate funding to continue the clinical trial. Furthermore, we may rely on CROs and clinical trial sites to ensure the proper and timely conduct of clinical trials and while we would have agreements governing their committed activities, we would have limited influence over their actual performance, as described in "—Risks Related to Our Dependence on Third Parties."

Our most advanced product candidate, HMI-102, is still in preclinical development and will require extensive clinical testing before we are prepared to submit a BLA for regulatory approval. We cannot predict with any certainty if or when we might complete the development of HMI-102 and submit a BLA for regulatory approval of HMI-102 or whether any such BLA will be approved by the FDA. We plan to submit an IND for HMI-102 in PKU, and we cannot provide any assurance that the FDA will authorize us to initiate any of our planned clinical trials on a timely basis, or at all, or that the FDA will agree with the design of our protocol. We may also seek feedback from the FDA or other regulatory authorities on our clinical development program, and the FDA or such regulatory authorities may not provide such feedback on a timely basis, or such feedback may not be favorable, which could further delay our development programs.

If we experience delays in the commencement or completion of our clinical trials, or if we terminate a clinical trial prior to completion, the commercial prospects of HMI-102 could be harmed, and our ability to generate revenues from HMI-102 may be delayed. In addition, any delays in our clinical trials could increase our costs, slow down the development and approval process and jeopardize our ability to commence product sales and generate revenues. Any of these occurrences may harm our business, financial condition and results of operations. In addition, many of the factors that cause, or lead to, a delay in the commencement or completion of clinical trials may also ultimately lead to the denial of regulatory approval of our product candidates.

Adverse public perception of genetic medicine, and gene editing in particular, may negatively impact regulatory approval of, or demand for, our potential products.

Our potential therapeutic products involve editing the human genome. The clinical and commercial success of our potential products will depend in part on public acceptance of the use of gene editing and gene therapy for the prevention or treatment of human diseases. Public attitudes may be influenced by claims that gene therapy and gene editing are unsafe, unethical, or immoral, and, consequently, our products may not gain the acceptance of the public or the medical community. Adverse public attitudes may adversely impact our ability to enroll clinical trials. Moreover, our success will depend upon physicians prescribing, and their patients being

willing to receive, treatments that involve the use of product candidates we may develop in lieu of, or in addition to, existing treatments with which they are already familiar and for which greater clinical data may be available.

In addition, gene editing technology is subject to public debate and heightened regulatory scrutiny due to ethical concerns relating to the application of gene editing technology to human embryos or the human germline. For example, in April 2015, Chinese scientists reported on their attempts to edit the genome of human embryos to modify the gene for hemoglobin beta. This is the gene in which a mutation occurs in patients with the inherited blood disorder beta thalassemia. Although this research was purposefully conducted in embryos that were not viable, the work prompted calls for a moratorium or other types of restrictions on gene editing of human eggs, sperm, and embryos. The Alliance for Regenerative Medicine in Washington has called for a voluntary moratorium on the use of gene editing technologies in research that involved altering human embryos or human germline cells. Similarly, the NIH has announced that it would not fund any use of gene editing technologies in human embryos, noting that there are multiple existing legislative and regulatory prohibitions against such work, including the Dickey-Wicker Amendment, which prohibits the use of appropriated funds for the creation of human embryos for research purposes or for research in which human embryos are destroyed. Laws in the United Kingdom prohibit genetically modified embryos from being implanted into women, but embryos can be altered in research labs under license from the Human Fertilisation and Embryology Authority. Research on embryos is more tightly controlled in many other European countries.

Although we do not use our technologies to edit human embryos or the human germline, such public debate about the use of gene editing technologies in human embryos and heightened regulatory scrutiny could prevent or delay our development of product candidates. More restrictive government regulations or negative public opinion would have a negative effect on our business or financial condition and may delay or impair our development and commercialization of product candidates or demand for any products we may develop. Adverse events in our preclinical studies or clinical trials or those of our competitors or of academic researchers utilizing gene editing technologies, even if not ultimately attributable to product candidates we may discover and develop, and the resulting publicity could result in increased governmental regulation, unfavorable public perception, potential regulatory delays in the testing or approval of potential product candidates we may identify and develop, stricter labeling requirements for those product candidates that are approved, a decrease in demand for any such product candidates and a suspension or withdrawal of approval by regulatory authorities of our product candidates.

A Breakthrough Therapy Designation by the FDA, even if granted for any of our product candidates, may not lead to a faster development or regulatory review or approval process and it does not increase the likelihood that our product candidates will receive marketing approval.

We may seek a Breakthrough Therapy Designation for our product candidates if the clinical data support such a designation for one or more product candidates. A breakthrough therapy is defined as a drug or biologic that is intended, alone or in combination with one or more other drugs or biologics, to treat a serious or life-threatening disease or condition and preliminary clinical evidence indicates that the drug, or biologic in our case, may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. For product candidates that have been designated as breakthrough therapies, interaction and communication between the FDA and the sponsor of the trial can help to identify the most efficient path for clinical development while minimizing the number of patients placed in ineffective control regimens. Biologics designated as breakthrough therapies by the FDA may also be eligible for priority review.

Designation as a breakthrough therapy is within the discretion of the FDA. Accordingly, even if we believe one of our product candidates meets the criteria for designation as a breakthrough therapy, the FDA may disagree and instead determine not to make such designation. In any event, the receipt of a Breakthrough Therapy Designation for a product candidate may not result in a faster development process, review or approval compared to drugs considered for approval under non-expedited FDA review procedures and does not assure ultimate approval by the FDA. In addition, even if one or more of our product candidates qualify as breakthrough

therapies, the FDA may later decide that the product no longer meets the conditions for qualification or decide that the time period for FDA review or approval will not be shortened.

A Fast Track Designation by the FDA, even if granted for any of our product candidates, may not lead to a faster development or regulatory review or approval process, and does not increase the likelihood that our product candidates will receive marketing approval.

We do not currently have Fast Track Designation for any of our product candidates but intend to seek such designation for some or all of our product candidates. If a drug or biologic, in our case, is intended for the treatment of a serious or life-threatening condition and the biologic demonstrates the potential to address unmet medical needs for this condition, the biologic sponsor may apply for FDA Fast Track Designation. The FDA has broad discretion whether or not to grant this designation. Even if we believe a particular product candidate is eligible for this designation, we cannot assure you that the FDA would decide to grant it. Even if we do receive Fast Track Designation, we may not experience a faster development process, review or approval compared to conventional FDA procedures. The FDA may withdraw Fast Track Designation if it believes that the designation is no longer supported by data from our clinical development program. Many biologics that have received Fast Track Designation have failed to obtain approval.

We may also seek accelerated approval for products that have obtained Fast Track Designation. Under the FDA's accelerated approval program, the FDA may approve a biologic for a serious or life-threatening illness that provides meaningful therapeutic benefit to patients over existing treatments based upon a surrogate endpoint that is reasonably likely to predict clinical benefit, or on a clinical endpoint that can be measured earlier than irreversible morbidity or mortality, that is reasonably likely to predict an effect on irreversible morbidity or mortality or other clinical benefit, taking into account the severity, rarity or prevalence of the condition and the availability or lack of alternative treatments. For biologics granted accelerated approval, post-marketing confirmatory trials are required to describe the anticipated effect on irreversible morbidity or mortality or other clinical benefit. These confirmatory trials must be completed with due diligence and, in some cases, the FDA may require that the trial be designed and/or initiated prior to approval. Moreover, the FDA may withdraw approval of any product candidate or indication approved under the accelerated approval pathway if, for example:

- the trial or trials required to verify the predicted clinical benefit of the product candidate fail to verify such benefit or do not demonstrate sufficient clinical benefit to justify the risks associated with the biologic;
- other evidence demonstrates that the product candidate is not shown to be safe or effective under the conditions of use;
- we fail to conduct any required post-approval trial of the product candidate with due diligence; or
- we disseminate false or misleading promotional materials relating to the product candidate.

We intend to seek orphan drug designation for our product candidates, but any orphan drug designations we receive may not confer marketing exclusivity or other expected benefits.

In the United States, orphan drug designation entitles a party to financial incentives such as opportunities for grant funding towards clinical trial costs, tax advantages and user-fee waivers. In addition, if a product that has orphan drug designation subsequently receives the first FDA approval for the disease for which it has such designation, the product is entitled to orphan drug exclusivity. Orphan drug exclusivity in the United States provides that the FDA may not approve any other applications, including a full NDA, to market the same drug for the same indication for seven years, except in limited circumstances The applicable exclusivity period is ten years in Europe. The European exclusivity period can be reduced to six years if a drug no longer meets the criteria for orphan drug designation or if the drug is sufficiently profitable so that market exclusivity is no longer justified.

Even if we, or any future collaborators, obtain orphan drug designation for a product candidate, we, or they, may not be able to obtain or maintain orphan drug exclusivity for that product candidate. We may not be the first to obtain marketing approval of any product candidate for which we have obtained orphan drug designation for the orphan-designated indication due to the uncertainties associated with developing pharmaceutical products. In addition, exclusive marketing rights in the United States may be limited if we seek approval for an indication broader than the orphan-designated indication or may be lost if the FDA later determines that the request for designation was materially defective or if we are unable to assure sufficient quantities of the product to meet the needs of patients with the rare disease or condition. Further, even if we, or any future collaborators, obtain orphan drug exclusivity for a product, that exclusivity may not effectively protect the product from competition because different drugs with different active moieties may be approved for the same condition. Even after an orphan drug is approved, the FDA can subsequently approve the same drug with the same active moiety for the same condition if the FDA concludes that the later drug is clinically superior in that it is shown to be safer, more effective or makes a major contribution to patient care or the manufacturer of the product with orphan exclusivity is unable to maintain sufficient product quantity. Orphan drug designation neither shortens the development time or regulatory review time of a drug nor gives the drug any advantage in the regulatory review or approval process, nor does it prevent competitors from obtaining approval of the same product candidate as ours for indications other than those in which we have been granted orphan drug designation.

We and our contract manufacturers are subject to significant regulation with respect to manufacturing our products. The manufacturing facilities on which we rely may not continue to meet regulatory requirements and have limited capacity.

We currently have relationships with a limited number of suppliers for the manufacturing of our viral vectors and product candidates. We are building a cGMP manufacturing facility and expect it to be available for use in 2019. However, if we experience delays or are unable to establish and scale our internal manufacturing capabilities, we will need to contract with manufacturers that can produce the preclinical, clinical and commercial supply of our products. Each supplier may require licenses to manufacture such components if such processes are not owned by the supplier or in the public domain and we may be unable to transfer or sublicense the intellectual property rights we may have with respect to such activities.

All entities involved in the preparation of therapeutics for clinical studies or commercial sale, including our existing contract manufacturers for our product candidates, are subject to extensive regulation. Components of a finished therapeutic product approved for commercial sale or used in late-stage clinical studies must be manufactured in accordance with cGMP. These regulations govern manufacturing processes and procedures (including record keeping) and the implementation and operation of quality systems to control and assure the quality of investigational products and products approved for sale. Poor control of production processes can lead to the introduction of adventitious agents or other contaminants, or to inadvertent changes in the properties or stability of our product candidates that may not be detectable in final product testing. We or our contract manufacturers must supply all necessary documentation in support of a BLA on a timely basis and must adhere to the FDA's current good laboratory practices, or GLP, and cGMP regulations enforced by the FDA through its facilities inspection program. Some of our contract manufacturers have not produced a commercially-approved product and therefore have not obtained the requisite FDA approvals to do so. Our facilities and quality systems and the facilities and quality systems of some or all of our third-party contractors must pass a pre-approval inspection for compliance with the applicable regulations as a condition of regulatory approval of our product candidates or any of our other potential products. In addition, the regulatory authorities may, at any time, audit or inspect a manufacturing facility involved with the preparation of our product candidates or our other potential products or the associated quality systems for compliance with the regulations applicable to the activities being conducted. If these facilities do not pass a pre-approval plant inspection, FDA approval of the products will not be granted.

The regulatory authorities also may, at any time following approval of a product for sale, audit our manufacturing facilities or those of our third-party contractors. If any such inspection or audit identifies a failure

to comply with applicable regulations or if a violation of our product specifications or applicable regulations occurs independent of such an inspection or audit, we or the relevant regulatory authority may require remedial measures that may be costly and/or time-consuming for us or a third party to implement and that may include the temporary or permanent suspension of a clinical study or commercial sales or the temporary or permanent closure of a facility. Any such remedial measures imposed upon us or third parties with whom we contract could materially harm our business.

If we or any of our third-party manufacturers fail to maintain regulatory compliance, the FDA can impose regulatory sanctions including, among other things, refusal to approve a pending application for a new drug product or biologic product, or revocation of a pre-existing approval. As a result, our business, financial condition and results of operations may be materially harmed.

Additionally, if supply from one approved manufacturer is interrupted, there could be a significant disruption in commercial supply. An alternative manufacturer would need to be qualified through a BLA supplement which could result in further delay. The regulatory agencies may also require additional studies if a new manufacturer is relied upon for commercial production. Switching manufacturers may involve substantial costs and is likely to result in a delay in our desired clinical and commercial timelines.

These factors could cause the delay of clinical studies, regulatory submissions, required approvals or commercialization of our product candidates, cause us to incur higher costs and prevent us from commercializing our products successfully. Furthermore, if our suppliers fail to meet contractual requirements, and we are unable to secure one or more replacement suppliers capable of production at a substantially equivalent cost, our clinical studies may be delayed or we could lose potential revenue.

If we encounter difficulties enrolling patients in our clinical trials, our clinical development activities could be delayed or otherwise adversely affected.

The timely completion of clinical trials in accordance with their protocols depends, among other things, on our ability to enroll a sufficient number of patients who remain in the study until its conclusion. We may encounter delays in enrolling, or be unable to enroll, a sufficient number of patients to complete any of our clinical trials, and even once enrolled we may be unable to retain a sufficient number of patients to complete any of our trials. The enrollment of patients depends on many factors, including:

- the patient eligibility criteria defined in the protocol;
- the size of the patient population required for analysis of the trial's primary endpoints;
- the proximity of patients to study sites;
- the design of the trial;
- our ability to recruit clinical trial investigators with the appropriate competencies and experience;
- clinicians' and patients' perceptions as to the potential advantages of the product candidate being studied in relation to other available therapies, including any new products that may be approved for the indications we are investigating;
- our ability to obtain and maintain patient consents; and
- the risk that patients enrolled in clinical trials will drop out of the trials before completion.

In addition, our clinical trials will compete with other clinical trials for product candidates that are in the same therapeutic areas as our product candidates, and this competition will reduce the number and types of

patients available to us, because some patients who might have opted to enroll in our trials may instead opt to enroll in a trial being conducted by one of our competitors. Since the number of qualified clinical investigators is limited, we expect to conduct some of our clinical trials at the same clinical trial sites that some of our competitors use, which will reduce the number of patients who are available for our clinical trials in such clinical trial site.

Delays or failures in planned patient enrollment or retention may result in increased costs, program delays or both, which could have a harmful effect on our ability to develop HMI-102 or our other product candidates, or could render further development impossible.

Our product candidates may cause serious adverse events or undesirable side effects or have other properties which may delay or prevent their regulatory approval, limit the commercial profile of an approved label, or, result in significant negative consequences following marketing approval, if any.

Serious adverse events or undesirable side effects caused by our product candidates could cause us or regulatory authorities to interrupt, delay or halt clinical trials and could result in a more restrictive label or the delay or denial of regulatory approval by the FDA or other comparable foreign authorities. Results of our clinical trials could reveal a high and unacceptable severity and prevalence of side effects, toxicities or unexpected characteristics, including death. A significant risk in any gene editing product is that the edit will be “off-target” (or “on-target,” but unwanted) and cause serious adverse events, undesirable side effects, toxicities or unexpected characteristics. For example, off-target cuts could lead to disruption of a gene or a genetic regulatory sequence at an unintended site in the DNA, or, in those instances where we also provide a segment of DNA to serve as a repair template, it is possible that following off-target cut events, DNA from such repair template could be integrated into the genome at an unintended site, potentially disrupting another important gene or genomic element. We cannot be certain that off-target editing will not occur in any of our planned or future clinical studies. There is also the potential risk of delayed adverse events following exposure to gene editing therapy, due to the potential for persistent biological activity of the genetic material or other product components used to carry the genetic material.

If unacceptable side effects arise in the development of our product candidates, we, the FDA, the IRBs at the institutions in which our studies are conducted or DSMB, could suspend or terminate our clinical trials or the FDA or comparable foreign regulatory authorities could order us to cease clinical trials or deny approval of our product candidates for any or all targeted indications. Treatment-related side effects could also affect patient recruitment or the ability of enrolled patients to complete the trial or result in potential product liability claims. In addition, these side effects may not be appropriately recognized or managed by the treating medical staff. We expect to have to train medical personnel using our product candidates to understand the side effect profiles for our clinical trials and upon any commercialization of any of our product candidates. Inadequate training in recognizing or managing the potential side effects of our product candidates could result in patient injury or death. Any of these occurrences may harm our business, financial condition and prospects significantly.

If any of our product candidates receives marketing approval, and we or others later identify undesirable side effects caused by any such product, including during any long-term follow-up observation period recommended or required for patients who receive treatment using our products, a number of potentially significant negative consequences could result, including:

- regulatory authorities may withdraw approvals of such product;
- we may be required to recall a product or change the way such product is administered to patients;
- additional restrictions may be imposed on the marketing of the particular product or the manufacturing processes for the product;
- regulatory authorities may require additional warnings on the label, such as a “black box” warning or contraindication;

- we may be required to implement a Risk Evaluation and Mitigation Strategy, or REMS, or create a medication guide outlining the risks of such side effects for distribution to patients;
- the product could become less competitive;
- we could be sued and held liable for harm caused to patients; and
- our reputation may suffer.

Any of these events could prevent us from achieving or maintaining market acceptance of the particular product candidate, if approved, and could significantly harm our business, results of operations and prospects.

The regulatory approval processes of the FDA and comparable foreign authorities are lengthy, time consuming and inherently unpredictable, and if we are ultimately unable to obtain regulatory approval for our product candidates, our business will be substantially harmed.

The time required to obtain approval by the FDA and comparable foreign authorities is unpredictable but typically takes many years following the commencement of clinical trials and depends upon numerous factors, including the substantial discretion of the regulatory authorities. In addition, approval policies, regulations, or the type and amount of clinical data necessary to gain approval may change during the course of a product candidate's clinical development and may vary among jurisdictions. We have not obtained regulatory approval for any product candidate and it is possible that neither HMI-102 nor any other product candidates we may seek to develop in the future will ever obtain regulatory approval. Neither we nor any future collaborator is permitted to market any of our product candidates in the United States until we receive regulatory approval of a BLA from the FDA. It is possible that the FDA may refuse to accept for substantive review any biologic license applications, or BLAs, that we submit for our product candidates or may conclude after review of our data that our application is insufficient to obtain marketing approval of our product candidates.

Prior to obtaining approval to commercialize a product candidate in the United States or abroad, we or our collaborators must demonstrate with substantial evidence from well-controlled clinical trials, and to the satisfaction of the FDA or foreign regulatory agencies, that such product candidates are safe and effective for their intended uses. Results from nonclinical studies and clinical trials can be interpreted in different ways. Even if we believe the nonclinical or clinical data for our product candidates are promising, such data may not be sufficient to support approval by the FDA and other regulatory authorities. The FDA may also require us to conduct additional preclinical studies or clinical trials for our product candidates either prior to or post-approval, or it may object to elements of our clinical development program. Depending on the extent of these or any other FDA-required studies, approval of any BLA or application that we submit may be delayed by several years, or may require us to expend significantly more resources than we have available.

Of the large number of potential products in development, only a small percentage successfully complete the FDA or foreign regulatory approval processes and are commercialized. The lengthy approval process as well as the unpredictability of future clinical trial results may result in our failing to obtain regulatory approval to market our product candidates, which would significantly harm our business, results of operations and prospects.

Even if we obtain FDA approval for HMI-102 in the United States, we may never obtain approval for or commercialize it in any other jurisdiction, which would limit our ability to realize its full market potential.

In order to market any products in any particular jurisdiction, we must establish and comply with numerous and varying regulatory requirements on a country-by-country basis regarding safety and efficacy. Approval by the FDA in the United States does not ensure approval by regulatory authorities in other countries or jurisdictions. However, the failure to obtain approval in one jurisdiction may negatively impact our ability to

obtain approval elsewhere. In addition, clinical trials conducted in one country may not be accepted by regulatory authorities in other countries, and regulatory approval in one country does not guarantee regulatory approval in any other country.

Approval processes vary among countries and can involve additional product testing and validation and additional administrative review periods. Seeking foreign regulatory approval could result in difficulties and increased costs for us and require additional preclinical studies or clinical trials which could be costly and time consuming. Regulatory requirements can vary widely from country to country and could delay or prevent the introduction of our products in those countries. We do not have any product candidates approved for sale in any jurisdiction, including in international markets, and we do not have experience in obtaining regulatory approval in international markets. If we fail to comply with regulatory requirements in international markets or to obtain and maintain required approvals, or if regulatory approvals in international markets are delayed, our target market will be reduced and our ability to realize the full market potential of any product we develop will be unrealized.

Even if we receive regulatory approval of our product candidates, we will be subject to ongoing regulatory obligations and continued regulatory review, which may result in significant additional expense, and we may be subject to penalties if we fail to comply with regulatory requirements or experience unanticipated problems with our product candidates.

Any product candidate for which we obtain marketing approval, along with the manufacturing processes, post-approval clinical data, labeling, packaging, distribution, adverse event reporting, storage, recordkeeping, export, import, advertising and promotional activities for such product, among other things, will be subject to extensive and ongoing requirements of and review by the FDA and other regulatory authorities. These requirements include submissions of safety and other post-marketing information and reports, establishment registration and drug listing requirements, continued compliance with cGMP requirements relating to manufacturing, quality control, quality assurance and corresponding maintenance of records and documents, requirements regarding the distribution of samples to physicians and recordkeeping and GCP requirements for any clinical trials that we conduct post-approval.

The FDA closely regulates the post-approval marketing and promotion of genetic medicines to ensure they are marketed only for the approved indications and in accordance with the provisions of the approved labeling. The FDA imposes stringent restrictions on manufacturers' communications regarding off-label use and if we market our products for uses beyond their approved indications, we may be subject to enforcement action for off-label marketing. Violations of the U.S. federal Food, Drug, and Cosmetic Act, or FDCA, relating to the promotion of prescription drugs may lead to FDA enforcement actions and investigations alleging violations of federal and state health care fraud and abuse laws, as well as state consumer protection laws.

In addition, later discovery of previously unknown adverse events or other problems with our products, manufacturers or manufacturing processes, including adverse events of unanticipated severity or frequency, or with our third-party manufacturers or manufacturing processes, or failure to comply with regulatory requirements, may yield various results, including:

- restrictions on manufacturing such products;
- restrictions on the labeling or marketing of a product;
- restrictions on product distribution or use;
- requirements to conduct post-marketing studies or clinical trials;
- warning letters or holds on clinical trials;

- withdrawal of the products from the market;
- refusal to approve pending applications or supplements to approved applications that we submit;
- recall of products;
- fines, restitution or disgorgement of profits or revenues;
- suspension or withdrawal of marketing approvals;
- refusal to permit the import or export of our products;
- product seizure or detention; or
- injunctions or the imposition of civil or criminal penalties.

The FDA's policies may change and additional government regulations may be enacted that could prevent, limit or delay regulatory approval of HMI-102 or any other product candidate. For example, in December 2016, the 21st Century Cures Act, or Cures Act, was signed into law. The Cures Act, among other things, is intended to modernize the regulation of drugs and biologics and spur innovation and contains provisions applicable to the development of gene therapies, but its ultimate implementation is unclear. If we are slow or unable to adapt to changes in existing requirements or the adoption of new requirements or policies, or if we are not able to maintain regulatory compliance, we may lose any marketing approval that we may have obtained which would adversely affect our business, prospects and ability to achieve or sustain profitability.

We also cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative or executive action, either in the United States or abroad. For example, certain policies of the Trump administration may impact our business and industry. Namely, the Trump administration has taken several executive actions, including the issuance of a number of Executive Orders, that could impose significant burdens on, or otherwise materially delay, FDA's ability to engage in routine regulatory and oversight activities such as implementing statutes through rulemaking, issuance of guidance, and review and approval of marketing applications. It is difficult to predict how these requirements will be implemented, and the extent to which they will impact the FDA's ability to exercise its regulatory authority. If these executive actions impose constraints on FDA's ability to engage in oversight and implementation activities in the normal course, our business may be negatively impacted.

Potential product liability lawsuits against us could cause us to incur substantial liabilities and limit commercialization of any products that we may develop.

The use of our product candidates, including HMI-102, in clinical trials and the sale of any products for which we obtain marketing approval exposes us to the risk of product liability claims. Product liability claims might be brought against us by consumers, health care providers, pharmaceutical companies or others selling or otherwise coming into contact with our products. On occasion, large judgments have been awarded in class action lawsuits based on products that had unanticipated adverse effects. If we cannot successfully defend against product liability claims, we could incur substantial liability and costs. In addition, regardless of merit or eventual outcome, product liability claims may result in:

- impairment of our business reputation and significant negative media attention;
- withdrawal of participants from our clinical trials;
- significant costs to defend the related litigation and related litigation;

- distraction of management's attention from our primary business;
- substantial monetary awards to patients or other claimants;
- inability to commercialize HMI-102 or any other product candidate;
- product recalls, withdrawals or labeling, marketing or promotional restrictions;
- decreased demand for HMI-102 or any other product candidate, if approved for commercial sale; and
- loss of revenue.

Our insurance policies are expensive and protect us only from some business risks, which leaves us exposed to significant uninsured liabilities.

We do not carry insurance for all categories of risk that our business may encounter. Some of the policies we currently maintain include general liability, employment practices liability, property, auto, workers' compensation, umbrella, and directors' and officers' insurance.

Any additional product liability insurance coverage we acquire in the future, may not be sufficient to reimburse us for any expenses or losses we may suffer. Moreover, insurance coverage is becoming increasingly expensive and in the future we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses due to liability. If we obtain marketing approval for HMI-102, we intend to acquire insurance coverage to include the sale of commercial products; however, we may be unable to obtain product liability insurance on commercially reasonable terms or in adequate amounts. A successful product liability claim or series of claims brought against us could cause our share price to decline and, if judgments exceed our insurance coverage, could adversely affect our results of operations and business, including preventing or limiting the commercialization of any product candidates we develop. We do not carry specific biological or hazardous waste insurance coverage, and our property, casualty and general liability insurance policies specifically exclude coverage for damages and fines arising from biological or hazardous waste exposure or contamination. Accordingly, in the event of contamination or injury, we could be held liable for damages or be penalized with fines in an amount exceeding our resources, and our clinical trials or regulatory approvals could be suspended.

We also expect that operating as a public company will make it more difficult and more expensive for us to obtain director and officer liability insurance, and we may be required to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. As a result, it may be more difficult for us to attract and retain qualified people to serve on our Board of Directors, our board committees or as executive officers. We do not know, however, if we will be able to maintain existing insurance with adequate levels of coverage. Any significant uninsured liability may require us to pay substantial amounts, which would adversely affect our cash position and results of operations.

Our employees and independent contractors, including principal investigators, CROs, consultants, vendors, and any third parties we may engage in connection with development and commercialization may engage in misconduct or other improper activities, including noncompliance with regulatory standards and requirements, which could have a material adverse effect on our business.

Misconduct by our employees and independent contractors, including principal investigators, contract research organizations, or CROs, consultants, vendors, and any third parties we may engage in connection with development and commercialization, could include intentional, reckless or negligent conduct or unauthorized activities that violate: (i) the laws and regulations of the FDA, EMA rules and regulations and other similar

regulatory requirements, including those laws that require the reporting of true, complete and accurate information to such authorities; (ii) manufacturing standards; (iii) data privacy, security, fraud and abuse and other healthcare laws and regulations; or (iv) laws that require the reporting of true, complete and accurate financial information and data. Specifically, sales, marketing and business arrangements in the healthcare industry are subject to extensive laws and regulations intended to prevent fraud, misconduct, kickbacks, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, sales commission, customer incentive programs and other business arrangements. Activities subject to these laws could also involve the improper use or misrepresentation of information obtained in the course of clinical trials, creation of fraudulent data in pre-clinical studies or clinical trials or illegal misappropriation of drug product, which could result in regulatory sanctions and cause serious harm to our reputation. It is not always possible to identify and deter misconduct by employees and other third parties, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to comply with such laws or regulations. Additionally, we are subject to the risk that a person or government could allege such fraud or other misconduct, even if none occurred. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business and results of operations, including the imposition of significant civil, criminal and administrative penalties, damages, monetary fines, disgorgements, possible exclusion from participation in Medicare, Medicaid, other U.S. federal healthcare programs or healthcare programs in other jurisdictions, individual imprisonment, other sanctions, contractual damages, reputational harm, diminished profits and future earnings, and curtailment of our operations.

Our business and operations would suffer in the event of system failures.

Our computer systems, as well as those of our CROs and other contractors and consultants, are vulnerable to damage from computer viruses, unauthorized access, natural disasters (including hurricanes), terrorism, war and telecommunication and electrical failures. If such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our product candidate development programs. For example, the loss of preclinical or clinical trial data from completed, ongoing or planned trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. To the extent that any disruption or security breach were to result in a loss of or damage to our data or applications, or inappropriate disclosure of personal, confidential or proprietary information, we could incur liability and the further development of HMI-102 or any other product candidate could be delayed.

In the ordinary course of our business, we collect and store sensitive data, including intellectual property, clinical trial data, proprietary business information, personal data and personally identifiable information of our clinical trial subjects and employees, in our data centers and on our networks. The secure processing, maintenance and transmission of this information is critical to our operations. Despite our security measures, our information technology and infrastructure may be vulnerable to attacks by hackers or internal bad actors, or breached due to employee error, a technical vulnerability, malfeasance or other disruptions. Although, to our knowledge, we have not experienced any such material security breach to date, any such breach could compromise our networks and the information stored there could be accessed, publicly disclosed, lost or stolen. Any such access, disclosure or other loss of information could result in legal claims or proceedings, liability under laws that protect the privacy of personal information, significant regulatory penalties, and such an event could disrupt our operations, damage our reputation, and cause a loss of confidence in us and our ability to conduct clinical trials, which could adversely affect our reputation and delay our clinical development of our product candidates.

Interim "top-line" and preliminary data from our clinical trials that we announce or publish from time to time may change as more patient data become available and are subject to audit and verification procedures that could result in material changes in the final data.

From time to time, we may publish interim "top-line" or preliminary data from our clinical studies. Interim data from clinical trials that we may complete are subject to the risk that one or more of the clinical outcomes may materially change as patient enrollment continues and more patient data become available. Preliminary or "top-line" data also remain subject to audit and verification procedures that may result in the final data being materially different from the preliminary data we previously published. As a result, interim and preliminary data should be viewed with caution until the final data are available. Adverse differences between preliminary or interim data and final data could significantly harm our business prospects.

We may expend our limited resources to pursue a particular product candidate or indication and fail to capitalize on product candidates or indications that may be more profitable or for which there is a greater likelihood of success.

Because we have limited financial and managerial resources, we focus on research programs and product candidates that we identify for specific indications. As a result, we may forego or delay pursuit of opportunities with other product candidates or for other indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to timely capitalize on viable commercial products or profitable market opportunities. Our spending on current and future research and development programs and product candidates for specific indications may not yield any commercially viable products. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through collaboration, licensing or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate.

Risks Related to Healthcare Laws and Other Legal Compliance Matters

Enacted and future healthcare legislation may increase the difficulty and cost for us to obtain marketing approval of and commercialize our product candidates and may affect the prices we may set.

In the United States, the EU and other jurisdictions, there have been, and we expect there will continue to be, a number of legislative and regulatory changes and proposed changes to the healthcare system that could affect our future results of operations. In particular, there have been and continue to be a number of initiatives at the U.S. federal and state levels that seek to reduce healthcare costs and improve the quality of healthcare. For example, in March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, or collectively the ACA, was enacted, which substantially changed the way healthcare is financed by both governmental and private insurers. Among the provisions of the ACA, those of greatest importance to the pharmaceutical and biotechnology industries include the following:

- an annual, non-deductible fee payable by any entity that manufactures or imports certain branded prescription drugs and biologic agents (other than those designated as orphan drugs), which is apportioned among these entities according to their market share in certain government healthcare programs;

- a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturer's outpatient drugs to be covered under Medicare Part D;

- new requirements to report certain financial arrangements with physicians and teaching hospitals, including reporting "transfers of value" made or distributed to prescribers and other healthcare

providers and reporting investment interests held by physicians and their immediate family members;

- an increase in the statutory minimum rebates a manufacturer must pay under the Medicaid Drug Rebate Program to 23.1% and 13.0% of the average manufacturer price for branded and generic drugs, respectively;
- a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted or injected;
- extension of a manufacturer's Medicaid rebate liability to covered drugs dispensed to individuals who are enrolled in Medicaid managed care organizations;
- expansion of eligibility criteria for Medicaid programs by, among other things, allowing states to offer Medicaid coverage to certain individuals with income at or below 133% of the federal poverty level, thereby potentially increasing a manufacturer's Medicaid rebate liability;
- a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research;
- creation of the Independent Payment Advisory Board, which, once empaneled, will have the authority to recommend certain changes to the Medicare program that could result in reduced payments for prescription drugs and those recommendations could have the effect of law unless overruled by a supermajority vote of Congress; and
- establishment of a Center for Medicare Innovation at the Centers for Medicare & Medicaid Services, or CMS, to test innovative payment and service delivery models to lower Medicare and Medicaid spending, potentially including prescription drug spending.

Since its enactment, there have been judicial and Congressional challenges to certain aspects of the ACA, and we expect there will be additional challenges and amendments to the ACA in the future. The current presidential administration and Congress will likely continue to seek to modify, repeal, or otherwise invalidate all, or certain provisions of, the ACA. It is uncertain the extent to which any such changes may impact our business or financial condition.

In addition, other legislative changes have been proposed and adopted in the United States since the ACA was enacted. In August 2011, the Budget Control Act of 2011, among other things, created measures for spending reductions by Congress. A Joint Select Committee on Deficit Reduction, tasked with recommending a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction to several government programs. This includes aggregate reductions of Medicare payments to providers of 2% per fiscal year. These reductions went into effect in April 2013 and, due to subsequent legislative amendments to the statute, will remain in effect through 2025 unless additional action is taken by Congress. In January 2013, the American Taxpayer Relief Act of 2012 was signed into law, which, among other things, further reduced Medicare payments to several types of providers, including hospitals, imaging centers and cancer treatment centers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years. These new laws or any other similar laws introduced in the future may result in additional reductions in Medicare and other health care funding, which could negatively affect our customers and accordingly, our financial operations.

Moreover, payment methodologies may be subject to changes in healthcare legislation and regulatory initiatives. For example, CMS may develop new payment and delivery models, such as bundled payment models. In addition, recently there has been heightened governmental scrutiny over the manner in which manufacturers set prices for their marketed products. We expect that additional U.S. federal healthcare reform measures will be

adopted in the future, any of which could limit the amounts that the U.S. federal government will pay for healthcare products and services, which could result in reduced demand for our product candidates or additional pricing pressures.

Individual states in the United States have also become increasingly aggressive in passing legislation and implementing regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. Legally-mandated price controls on payment amounts by third-party payors or other restrictions could harm our business, results of operations, financial condition and prospects. In addition, regional healthcare authorities and individual hospitals are increasingly using bidding procedures to determine what pharmaceutical products and which suppliers will be included in their prescription drug and other healthcare programs. This could reduce the ultimate demand for our product candidates or put pressure on our product pricing.

In the EU, similar political, economic and regulatory developments may affect our ability to profitably commercialize our product candidates, if approved. In addition to continuing pressure on prices and cost containment measures, legislative developments at the EU or member state level may result in significant additional requirements or obstacles that may increase our operating costs. The delivery of healthcare in the EU, including the establishment and operation of health services and the pricing and reimbursement of medicines, is almost exclusively a matter for national, rather than EU, law and policy. National governments and health service providers have different priorities and approaches to the delivery of health care and the pricing and reimbursement of products in that context. In general, however, the healthcare budgetary constraints in most EU member states have resulted in restrictions on the pricing and reimbursement of medicines by relevant health service providers. Coupled with ever-increasing EU and national regulatory burdens on those wishing to develop and market products, this could prevent or delay marketing approval of our product candidates, restrict or regulate post-approval activities and affect our ability to commercialize our product candidates, if approved.

In markets outside of the United States and EU, reimbursement and healthcare payment systems vary significantly by country, and many countries have instituted price ceilings on specific products and therapies.

We cannot predict the likelihood, nature or extent of government regulation that may arise from future legislation or administrative action in the United States, the EU or any other jurisdiction. If we or any third parties we may engage are slow or unable to adapt to changes in existing requirements or the adoption of new requirements or policies, or if we or such third parties are not able to maintain regulatory compliance, our product candidates may lose any regulatory approval that may have been obtained and we may not achieve or sustain profitability.

Our business operations and current and future relationships with investigators, healthcare professionals, consultants, third-party payors, patient organizations and customers will be subject to applicable healthcare regulatory laws, which could expose us to penalties.

Our business operations and current and future arrangements with investigators, healthcare professionals, consultants, third-party payors, patient organizations and customers, may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations. These laws may constrain the business or financial arrangements and relationships through which we conduct our operations, including how we research, market, sell and distribute our product candidates, if approved. Such laws include:

- the U.S. federal Anti-Kickback Statute, which prohibits, among other things, persons or entities from knowingly and willfully soliciting, offering, receiving or providing any remuneration (including any kickback, bribe, or certain rebate), directly or indirectly, overtly or covertly, in cash or in kind, to induce or reward, or in return for, either the referral of an individual for, or the

purchase, lease, order or recommendation of, any good, facility, item or service, for which payment may be made, in whole or in part, under U.S. federal and state healthcare programs such as Medicare and Medicaid. A person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation;

- the U.S. federal false claims and civil monetary penalties laws, including the civil False Claims Act, which, among other things, impose criminal and civil penalties, including through civil whistleblower or qui tam actions, against individuals or entities for knowingly presenting, or causing to be presented, to the U.S. federal government, claims for payment or approval that are false or fraudulent, knowingly making, using or causing to be made or used, a false record or statement material to a false or fraudulent claim, or from knowingly making a false statement to avoid, decrease or conceal an obligation to pay money to the U.S. federal government. In addition, the government may assert that a claim including items and services resulting from a violation of the U.S. federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the False Claims Act;

- the U.S. federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, which imposes criminal and civil liability for, among other things, knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program, or knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false statement, in connection with the delivery of, or payment for, healthcare benefits, items or services; similar to the U.S. federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation;

- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009 and its implementing regulations, which also imposes certain obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information without appropriate authorization by covered entities subject to the rule, such as health plans, healthcare clearinghouses and healthcare providers as well as their business associates that perform certain services involving the use or disclosure of individually identifiable health information;

- the FDCA, which prohibits, among other things, the adulteration or misbranding of drugs, biologics and medical devices;

- the U.S. Public Health Service Act, which prohibits, among other things, the introduction into interstate commerce of a biological product unless a biologics license is in effect for that product;

- the U.S. federal legislation commonly referred to as the Physician Payments Sunshine Act, enacted as part of the ACA, and its implementing regulations, which requires certain manufacturers of drugs, devices, biologics and medical supplies that are reimbursable under Medicare, Medicaid, or the Children's Health Insurance Program to report annually to the government information related to certain payments and other transfers of value to physicians and teaching hospitals, as well as ownership and investment interests held by the physicians described above and their immediate family members;

- analogous U.S. state laws and regulations, including: state anti-kickback and false claims laws, which may apply to our business practices, including but not limited to, research, distribution, sales and marketing arrangements and claims involving healthcare items or services reimbursed by any third-party payor, including private insurers; state laws that require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the U.S. federal government, or otherwise restrict payments

that may be made to healthcare providers and other potential referral sources; state laws and regulations that require drug manufacturers to file reports relating to pricing and marketing information, which requires tracking gifts and other remuneration and items of value provided to healthcare professionals and entities; and state laws governing the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts; and

- similar healthcare laws and regulations in the EU and other jurisdictions, including reporting requirements detailing interactions with and payments to healthcare providers.

Ensuring that our internal operations and future business arrangements with third parties comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities will conclude that our business practices do not comply with current or future statutes, regulations, agency guidance or case law involving applicable fraud and abuse or other healthcare laws and regulations. If our operations are found to be in violation of any of the laws described above or any other governmental laws and regulations that may apply to us, we may be subject to significant penalties, including civil, criminal and administrative penalties, damages, fines, exclusion from government-funded healthcare programs, such as Medicare and Medicaid or similar programs in other countries or jurisdictions, disgorgement, individual imprisonment, contractual damages, reputational harm, diminished profits and the curtailment or restructuring of our operations. If any of the physicians or other providers or entities with whom we expect to do business are found to not be in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs and imprisonment, which could affect our ability to operate our business. Further, defending against any such actions can be costly, time-consuming and may require significant personnel resources. Therefore, even if we are successful in defending against any such actions that may be brought against us, our business may be impaired.

We are subject to environmental, health and safety laws and regulations, and we may become exposed to liability and substantial expenses in connection with environmental compliance or remediation activities.

Our operations, including our development, testing and manufacturing activities, are subject to numerous environmental, health and safety laws and regulations. These laws and regulations govern, among other things, the controlled use, handling, release and disposal of and the maintenance of a registry for, hazardous materials and biological materials, such as chemical solvents, human cells, carcinogenic compounds, mutagenic compounds and compounds that have a toxic effect on reproduction, laboratory procedures and exposure to blood-borne pathogens. If we fail to comply with such laws and regulations, we could be subject to fines or other sanctions.

As with other companies engaged in activities similar to ours, we face a risk of environmental liability inherent in our current and historical activities, including liability relating to releases of or exposure to hazardous or biological materials. Environmental, health and safety laws and regulations are becoming more stringent. We may be required to incur substantial expenses in connection with future environmental compliance or remediation activities, in which case, the production efforts of our third-party manufacturers or our development efforts may be interrupted or delayed.

Risks Related to Commercialization

We face significant competition in an environment of rapid technological change, and there is a possibility that our competitors may achieve regulatory approval before us or develop therapies that are safer or more advanced or effective than ours, which may harm our financial condition and our ability to successfully market or commercialize any product candidates we may develop.

The development and commercialization of new genetic medicine products is highly competitive. Moreover, the gene editing field is characterized by rapidly changing technologies, significant competition, and a strong emphasis on intellectual property. We will face competition with respect to any product candidates that we may seek to develop or commercialize in the future from major pharmaceutical companies, specialty pharmaceutical companies, and biotechnology companies worldwide. Potential competitors also include academic institutions, government agencies, and other public and private research organizations that conduct research, seek patent protection, and establish collaborative arrangements for research, development, manufacturing, and commercialization.

There are a number of large pharmaceutical and biotechnology companies that currently market and sell products or are pursuing the development of products for the treatment of the disease indications for which we have research programs, including PKU, metachromic leukodystrophy, lung disease, hemoglobinopathies and ophthalmological diseases. Some of these competitive products and therapies are based on scientific approaches that are similar to our approach, and others are based on entirely different approaches.

Our platform and product focus is the development of genetic medicines. There are a number of companies developing nuclease-based gene editing technologies using CRISPR/Cas9, TALENs, meganucleases, Mega-TALs and ZFNs, including bluebird bio, Caribou Biosciences, Cellectis, CRISPR Therapeutics, Editas Medicine, Intellia Therapeutics, Poseida Therapeutics, Precision BioSciences and Sangamo Therapeutics. Additional companies developing gene therapy products include Abeona Therapeutics, Adverum Biotechnologies, Applied Genetic Technologies, Audentes Therapeutics, AveXis, bluebird bio, Nightstar Therapeutics, REGENXBIO, Spark Therapeutics, Ultragenyx Pharmaceutical, uniQure and Voyager Therapeutics. In addition to competition from other gene editing therapies or gene therapies, any products we may develop may also face competition from other types of therapies, such as small molecule, antibody, protein or other therapies.

Many of our current or potential competitors, either alone or with their collaboration partners, have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials, obtaining regulatory approvals, and marketing approved products than we do. Mergers and acquisitions in the pharmaceutical, biotechnology, and gene therapy industries may result in even more resources being concentrated among a smaller number of our competitors. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs. Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are safer, more effective, have fewer or less severe side effects, are more convenient, or are less expensive than any products that we may develop or that would render any products that we may develop obsolete or non-competitive. Our competitors also may obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for ours, which could result in our competitors establishing a strong market position before we are able to enter the market. Additionally, technologies developed by our competitors may render our potential product candidates uneconomic or obsolete, and we may not be successful in marketing any product candidates we may develop against competitors.

In addition, as a result of the expiration or successful challenge of our patent rights, we could face more litigation with respect to the validity and/or scope of patents relating to our competitors' products. The availability of our competitors' products could limit the demand, and the price we are able to charge, for any products that we may develop and commercialize.

The successful commercialization of our product candidates will depend in part on the extent to which governmental authorities and health insurers establish adequate coverage, reimbursement levels and pricing policies. Failure to obtain or maintain coverage and adequate reimbursement for our product candidates, if approved, could limit our ability to market those products and decrease our ability to generate revenue.

The availability and adequacy of coverage and reimbursement by governmental healthcare programs such as Medicare and Medicaid, private health insurers and other third-party payors are essential for most patients to be able to afford prescription medications such as our product candidates, assuming FDA approval. Our ability to achieve acceptable levels of coverage and reimbursement for products by governmental authorities, private health insurers and other organizations will have an effect on our ability to successfully commercialize our product candidates. Assuming we obtain coverage for our product candidates by a third-party payor, the resulting reimbursement payment rates may not be adequate or may require co-payments that patients find unacceptably high. We cannot be sure that coverage and reimbursement in the United States, the EU or elsewhere will be available for our product candidates or any product that we may develop, and any reimbursement that may become available may be decreased or eliminated in the future.

Third-party payors increasingly are challenging prices charged for pharmaceutical products and services, and many third-party payors may refuse to provide coverage and reimbursement for particular drugs or biologics when an equivalent generic drug, biosimilar or a less expensive therapy is available. It is possible that a third-party payor may consider our product candidates as substitutable and only offer to reimburse patients for the less expensive product. Even if we show improved efficacy or improved convenience of administration with our product candidates, pricing of existing third-party therapeutics may limit the amount we will be able to charge for our product candidates. These payors may deny or revoke the reimbursement status of a given product or establish prices for new or existing marketed products at levels that are too low to enable us to realize an appropriate return on our investment in our product candidates. If reimbursement is not available or is available only at limited levels, we may not be able to successfully commercialize our product candidates, and may not be able to obtain a satisfactory financial return on our product candidates.

There is significant uncertainty related to the insurance coverage and reimbursement of newly-approved products. In the United States, third-party payors, including private and governmental payors, such as the Medicare and Medicaid programs, play an important role in determining the extent to which new drugs and biologics will be covered. The Medicare and Medicaid programs increasingly are used as models in the United States for how private payors and other governmental payors develop their coverage and reimbursement policies for drugs and biologics. Some third-party payors may require pre-approval of coverage for new or innovative devices or drug therapies before they will reimburse healthcare providers who use such therapies. We cannot predict at this time what third-party payors will decide with respect to the coverage and reimbursement for our product candidates.

No uniform policy for coverage and reimbursement for products exists among third-party payors in the United States. Therefore, coverage and reimbursement for products can differ significantly from payor to payor. As a result, the coverage determination process is often a time-consuming and costly process that will require us to provide scientific and clinical support for the use of our product candidates to each payor separately, with no assurance that coverage and adequate reimbursement will be applied consistently or obtained in the first instance. Furthermore, rules and regulations regarding reimbursement change frequently, in some cases on short notice, and we believe that changes in these rules and regulations are likely.

Outside the United States, international operations are generally subject to extensive governmental price controls and other market regulations, and we believe the increasing emphasis on cost-containment initiatives in Europe and other countries have and will continue to put pressure on the pricing and usage of our product candidates. In many countries, the prices of medical products are subject to varying price control mechanisms as part of national health systems. Other countries allow companies to fix their own prices for medical products, but monitor and control company profits. Additional foreign price controls or other changes in pricing regulation could restrict the amount that we are able to charge for our product candidates. Accordingly, in markets outside the United States, the reimbursement for our product candidates may be reduced compared with the United States and may be insufficient to generate commercially-reasonable revenue and profits.

Moreover, increasing efforts by governmental and third-party payors in the United States and abroad to cap or reduce healthcare costs may cause such organizations to limit both coverage and the level of reimbursement for newly approved products and, as a result, they may not cover or provide adequate payment for our product candidates. We expect to experience pricing pressures in connection with the sale of our product candidates due to the trend toward managed health care, the increasing influence of health maintenance organizations and additional legislative changes. The downward pressure on healthcare costs in general, particularly prescription drugs and biologics and surgical procedures and other treatments, has become intense. As a result, increasingly high barriers are being erected to the entry of new products.

Even if HMI-102 receives marketing approval, it may fail to achieve market acceptance by physicians, patients, third-party payors or others in the medical community necessary for commercial success.

If HMI-102 receives marketing approval, it may nonetheless fail to gain sufficient market acceptance by physicians, patients, third-party payors and others in the medical community. If it does not achieve an adequate level of acceptance, we may not generate significant product revenues or become profitable. The degree of market acceptance of HMI-102, if approved for commercial sale, will depend on a number of factors, including but not limited to:

- the efficacy and potential advantages compared to alternative treatments;
- effectiveness of sales and marketing efforts;
- the cost of treatment in relation to alternative treatments, including any similar generic treatments;
- our ability to offer our products for sale at competitive prices;
- the convenience and ease of administration compared to alternative treatments;
- the willingness of the target patient population to try new therapies and of physicians to prescribe these therapies;
- the strength of marketing and distribution support;
- the timing of market introduction of competitive products;
- the availability of third-party coverage and adequate reimbursement;
- product labeling or product insert requirements of the FDA, EMA or other regulatory authorities, including any limitations or warnings contained in a product’s approved labeling;
- the prevalence and severity of any side effects; and
- any restrictions on the use of our product together with other medications.

Because we expect sales of HMI-102, if approved, to generate substantially all of our product revenues for a substantial period, the failure of this product to find market acceptance would harm our business and could require us to seek additional financing.

If we are unable to establish sales, marketing and distribution capabilities either on our own or in collaboration with third parties, we may not be successful in commercializing HMI-102, if approved.

We do not have any infrastructure for the sales, marketing or distribution of our products, and the cost of establishing and maintaining such an organization may exceed the cost-effectiveness of doing so.

We expect to build a focused sales, distribution and marketing infrastructure to market HMI-102 in the United States and European Union, if approved. There are significant expenses and risks involved with establishing our own sales, marketing and distribution capabilities, including our ability to hire, retain and appropriately incentivize qualified individuals, generate sufficient sales leads, provide adequate training to sales and marketing personnel, and effectively manage a geographically dispersed sales and marketing team. Any failure or delay in the development of our internal sales, marketing and distribution capabilities could delay any product launch, which would adversely impact the commercialization of HMI-102. Additionally, if the commercial launch of HMI-102 for which we recruit a sales force and establish marketing capabilities is delayed or does not occur for any reason, we would have prematurely or unnecessarily incurred these commercialization expenses. This may be costly, and our investment would be lost if we cannot retain or reposition our sales and marketing personnel.

We do not anticipate having the resources in the foreseeable future to allocate to the sales and marketing of HMI-102 or our other product candidates in certain markets overseas. Therefore, our future sales in these markets will largely depend on our ability to enter into and maintain collaborative relationships for such capabilities, the collaborator's strategic interest in the product and such collaborator's ability to successfully market and sell the product. We intend to pursue collaborative arrangements regarding the sale and marketing of HMI-102, if approved, for certain markets overseas; however, we cannot assure that we will be able to establish or maintain such collaborative arrangements, or if able to do so, that they will have effective sales forces.

If we are unable to build our own sales force or negotiate a collaborative relationship for the commercialization of HMI-102, we may be forced to delay the potential commercialization of HMI-102 or reduce the scope of our sales or marketing activities for HMI-102. If we elect to increase our expenditures to fund commercialization activities ourselves, we will need to obtain additional capital, which may not be available to us on acceptable terms, or at all. We could enter into arrangements with collaborative partners at an earlier stage than otherwise would be ideal and we may be required to relinquish rights to HMI-102 or otherwise agree to terms unfavorable to us, any of which may have an adverse effect on our business, operating results and prospects.

If we are unable to establish adequate sales, marketing and distribution capabilities, either on our own or in collaboration with third parties, we will not be successful in commercializing HMI-102 and may not become profitable and may incur significant additional losses. We will be competing with many companies that currently have extensive and well-funded marketing and sales operations. Without an internal team or the support of a third party to perform marketing and sales functions, we may be unable to compete successfully against these more established companies.

If we obtain approval to commercialize any products outside of the United States, a variety of risks associated with international operations could materially adversely affect our business.

If HMI-102 is approved for commercialization, we intend to enter into agreements with third parties to market it in certain jurisdictions outside the United States. We expect that we will be subject to additional risks related to international pharmaceutical operations, including:

- different regulatory requirements for drug and biologic approvals and rules governing drug and biologic commercialization in foreign countries;
- reduced protection for intellectual property rights;
- foreign reimbursement, pricing and insurance regimes;
- potential noncompliance with the U.S. Foreign Corrupt Practices Act, the U.K. Bribery Act 2010 and similar anti-bribery and anticorruption laws in other jurisdictions; and
- production shortages resulting from any events affecting raw material supply or manufacturing capabilities abroad.

We have no prior experience in these areas. In addition, there are complex regulatory, tax, labor and other legal requirements imposed by both the European Union and many of the individual countries in Europe with which we will need to comply. Many U.S.-based biotechnology companies have found the process of marketing their own products in Europe to be very challenging.

Any product candidates for which we intend to seek approval as biologic products may face competition sooner than anticipated.

The Patient Protection and Affordable Care Act, signed into law on March 23, 2010, includes a subtitle called the Biologics Price Competition and Innovation Act of 2009, or BPCIA, which created an abbreviated approval pathway for biological products that are biosimilar to or interchangeable with an FDA-licensed reference biological product. Under the BPCIA, an application for a biosimilar product may not be submitted to the FDA until four years following the date that the reference product was first licensed by the FDA. In addition, the approval of a biosimilar product may not be made effective by the FDA until 12 years from the date on which the reference product was first licensed. During this 12-year period of exclusivity, another company may still market a competing version of the reference product if the FDA approves a full BLA for the competing product containing the sponsor's own pre-clinical data and data from adequate and well-controlled clinical trials to demonstrate the safety, purity and potency of their product. The law is complex and is still being interpreted and implemented by the FDA. As a result, its ultimate impact, implementation, and meaning are subject to uncertainty. While it is uncertain when such processes intended to implement BPCIA may be fully adopted by the FDA, any such processes could have a material adverse effect on the future commercial prospects for our biological products.

There is a risk that any of our product candidates approved as a biological product under a BLA would not qualify for the 12-year period of exclusivity or that this exclusivity could be shortened due to congressional action or otherwise, or that the FDA will not consider our product candidates to be reference products for competing products, potentially creating the opportunity for generic competition sooner than anticipated. Other aspects of the BPCIA, some of which may impact the BPCIA exclusivity provisions, have also been the subject of recent litigation. Moreover, the extent to which a biosimilar, once approved, will be substituted for any one of our reference products in a way that is similar to traditional generic substitution for non-biological products is not yet clear, and will depend on a number of marketplace and regulatory factors that are still developing.

Risks Related to Our Dependence on Third Parties

We currently contract with third parties for the manufacture of materials for our research programs and preclinical studies. This reliance on third parties increases the risk that we will not have sufficient quantities of such materials, product candidates, or any medicines that we may develop and commercialize, or that such supply will not be available to us at an acceptable cost, which could delay, prevent, or impair our development or commercialization efforts.

We currently rely on third-party manufacturers for the manufacture of our materials for preclinical studies. We do not have a long term supply agreement with any of the third-party manufacturers, and we purchase our required supply on a purchase order basis. We are currently building a cGMP manufacturing facility that will have capability to process both gene therapy and gene editing products, which is expected to be available for cGMP manufacturing in 2019. However, if we experience delays or are unable to establish and scale our internal manufacturing capabilities, we will need to contract with manufacturers that can produce the clinical and commercial supply of our product candidates.

We may be unable to establish any agreements with third-party manufacturers or to do so on acceptable terms. Even if we are able to establish agreements with third-party manufacturers, reliance on third-party manufacturers entails additional risks, including:

- the possible breach of the manufacturing agreement by the third party;
- the possible termination or nonrenewal of the agreement by the third party at a time that is costly or inconvenient for us; and
- reliance on the third party for regulatory compliance, quality assurance, safety, and pharmacovigilance and related reporting.

Third-party manufacturers may not be able to comply with cGMP regulations or similar regulatory requirements outside the United States. Our failure, or the failure of our third-party manufacturers, to comply with applicable regulations could result in sanctions being imposed on us, including fines, injunctions, civil penalties, delays, suspension or withdrawal of approvals, license revocations, seizures or recalls of product candidates or medicines, operating restrictions, and criminal prosecutions, any of which could significantly and adversely affect supplies of our medicines and harm our business, financial condition, results of operations, and prospects.

Any medicines that we may develop may compete with other product candidates and products for access to manufacturing facilities. There are a limited number of manufacturers that operate under cGMP regulations and that might be capable of manufacturing for us. Any performance failure on the part of our existing or future manufacturers could delay clinical development or marketing approval.

Our current and anticipated future dependence upon others for the manufacture of any product candidates we may develop or medicines may adversely affect our future profit margins and our ability to commercialize any medicines that receive marketing approval on a timely and competitive basis.

We intend to rely on third parties to conduct, supervise and monitor our clinical trials. If those third parties do not successfully carry out their contractual duties, or if they perform in an unsatisfactory manner, it may harm our business.

We intend to rely on CROs and clinical trial sites to ensure the proper and timely conduct of our clinical trials, and we expect to have limited influence over their actual performance.

We intend to rely upon CROs to monitor and manage data for our clinical programs, as well as the execution of future nonclinical studies. Our reliance on CROs for clinical development activities limits our control over these activities, but we will remain responsible for ensuring that each of our studies is conducted in accordance with the applicable protocol, legal, regulatory and scientific standards and our reliance on the CROs does not relieve us of our regulatory responsibilities.

We and our CROs will be required to comply with the GLPs and GCPs, which are regulations and guidelines enforced by the FDA and are also required by the Competent Authorities of the Member States of the European Economic Area and comparable foreign regulatory authorities in the form of International Conference on Harmonization guidelines for any of our product candidates that are in preclinical and clinical development. The Regulatory authorities enforce GCPs through periodic inspections of trial sponsors, principal investigators and clinical trial sites. If we or our CROs fail to comply with GCPs, the clinical data generated in our clinical trials may be deemed unreliable and the FDA or comparable foreign regulatory authorities may require us to perform additional clinical trials before approving our marketing applications. We cannot assure you that upon inspection by a given regulatory authority, such regulatory authority will determine that any of our clinical trials comply with GCP regulations. In addition, our clinical trials must be conducted with product produced under cGMP regulations. Accordingly, if our CROs fail to comply with these regulations or fail to recruit a sufficient number of subjects, we may be required to repeat clinical trials, which would delay the regulatory approval process.

Our CROs will not be our employees, and we will not control whether or not they devote sufficient time and resources to our future clinical and nonclinical programs. These CROs may also have relationships with other commercial entities, including our competitors, for whom they may also be conducting clinical trials, or other product development activities which could harm our competitive position. We face the risk of potential unauthorized disclosure or misappropriation of our intellectual property by CROs, which may reduce our trade secret protection and allow our potential competitors to access and exploit our proprietary technology. If our CROs do not successfully carry out their contractual duties or obligations, fail to meet expected deadlines, or if the quality or accuracy of the clinical data they obtain is compromised due to the failure to adhere to our clinical protocols or regulatory requirements or for any other reasons, our clinical trials may be extended, delayed or terminated, and we may not be able to obtain regulatory approval for, or successfully commercialize any product candidate that we develop. As a result, our financial results and the commercial prospects for any product candidate that we develop would be harmed, our costs could increase, and our ability to generate revenues could be delayed.

If our relationship with any CROs terminate, we may not be able to enter into arrangements with alternative CROs or do so on commercially reasonable terms. Switching or adding additional CROs involves substantial cost and requires management time and focus. In addition, there is a natural transition period when a new CRO commences work. As a result, delays occur, which can materially impact our ability to meet our desired clinical development timelines. Though we intend to carefully manage our relationships with our CROs, there can be no assurance that we will not encounter challenges or delays in the future or that these delays or challenges will not have an adverse impact on our business, financial condition and prospects.

We may collaborate with third parties for the development and commercialization of HMI-102. We may not succeed in establishing and maintaining collaborative relationships, which may significantly limit our ability to develop and commercialize HMI-102 successfully, if at all.

We may seek collaborative relationships for the development and commercialization of HMI-102. Failure to obtain a collaborative relationship for HMI-102 may significantly impair the potential for this product candidate. We also will need to enter into collaborative relationships to provide funding to support our other research and development programs. The process of establishing and maintaining collaborative relationships is difficult, time-consuming and involves significant uncertainty, such as:

- a collaboration partner may shift its priorities and resources away from our product candidates due to a change in business strategies, or a merger, acquisition, sale or downsizing;
- a collaboration partner may seek to renegotiate or terminate their relationships with us due to unsatisfactory clinical results, manufacturing issues, a change in business strategy, a change of control or other reasons;
- a collaboration partner may cease development in therapeutic areas which are the subject of our strategic collaboration;
- a collaboration partner may not devote sufficient capital or resources towards our product candidates;
- a collaboration partner may change the success criteria for a product candidate thereby delaying or ceasing development of such candidate;
- a significant delay in initiation of certain development activities by a collaboration partner will also delay payment of milestones tied to such activities, thereby impacting our ability to fund our own activities;
- a collaboration partner could develop a product that competes, either directly or indirectly, with our product candidate;
- a collaboration partner with commercialization obligations may not commit sufficient financial or human resources to the marketing, distribution or sale of a product;
- a collaboration partner with manufacturing responsibilities may encounter regulatory, resource or quality issues and be unable to meet demand requirements;
- a collaboration partner may terminate a strategic alliance;
- a dispute may arise between us and a partner concerning the research, development or commercialization of a product candidate resulting in a delay in milestones, royalty payments or termination of an alliance and possibly resulting in costly litigation or arbitration which may divert management attention and resources; and
- a partner may use our products or technology in such a way as to invite litigation from a third party.

If any collaborator fails to fulfill its responsibilities in a timely manner, or at all, our research, clinical development, manufacturing or commercialization efforts related to that collaboration could be delayed or terminated, or it may be necessary for us to assume responsibility for expenses or activities that would otherwise have been the responsibility of our collaborator. If we are unable to establish and maintain collaborative

relationships on acceptable terms or to successfully transition terminated collaborative agreements, we may have to delay or discontinue further development of one or more of our product candidates, undertake development and commercialization activities at our own expense or find alternative sources of capital. Moreover, any collaborative partners we enter into agreements with in the future may shift their priorities and resources away from our product candidates or seek to renegotiate or terminate their relationships with us. For example, Novartis can terminate its agreement with us for convenience on a target-by-target basis.

We do not have multiple sources of supply for the components used in HMI-102 and our other product candidates. If we were to lose a supplier, it could have a material adverse effect on our ability to complete the development of HMI-102. If we obtain regulatory approval for HMI-102, we would need to expand the supply of its components in order to commercialize them.

We do not have multiple sources of supply for the components used in the manufacturing of HMI-102. We also do not have long-term supply agreements with any of our component suppliers. We are currently evaluating manufacturers that will commercially manufacture HMI-102. It is our expectation that we will only qualify one initial supplier that will need to be approved by the FDA. If for any reason we are unable to obtain product from the manufacturer we select, we would have to qualify new manufacturers. We may not be able to establish additional sources of supply for our product candidates, or may be unable to do so on acceptable terms. Manufacturing suppliers are subject to cGMP quality and regulatory requirements, covering manufacturing, testing, quality control and record keeping relating to our product candidates and subject to ongoing inspections by the regulatory agencies. Failure by any of our suppliers to comply with applicable regulations may result in long delays and interruptions in supply. Manufacturing suppliers are also subject to local, state and federal regulations and licensing requirements. Failure by any of our suppliers to comply with all applicable regulations and requirements may result in long delays and interruptions in supply.

The number of suppliers of the raw material components of our product candidates is limited. In the event it is necessary or desirable to acquire supplies from alternative suppliers, we might not be able to obtain them on commercially reasonable terms, if at all. It could also require significant time and expense to redesign our manufacturing processes to work with another company.

As part of any marketing approval, a manufacturer of HMI-102 is required to be licensed by the FDA prior to commercialization. This licensing process includes inspections by regulatory authorities that must be successful prior to them being licensed. Failure of manufacturing suppliers to successfully complete these regulatory inspections will result in delays. If supply from the approved supplier is interrupted, there could be a significant disruption in commercial supply. An alternative vendor would need to be qualified through a BLA amendment or supplement which could result in further delay. The FDA or other regulatory agencies outside of the United States may also require additional studies if a new supplier is relied upon for commercial production. Switching vendors may involve substantial costs and is likely to result in a delay in our desired clinical and commercial timelines.

If we are unable to obtain the supplies we need at a reasonable price or on a timely basis, it could have a material adverse effect on our ability to complete the development of HMI-102 and our other product candidates or, if we obtain regulatory approval for HMI-102 or our other product candidates, to commercialize them.

If we fail to comply with our obligations in the agreements under which we in-license or acquire development or commercialization rights to products, technology or data from third parties, including those for HMI-102, we could lose such rights that are important to our business.

We are a party to agreements with Caltech for certain AAV vector-related patents owned by Caltech for human therapeutic applications, or the Caltech License, and City of Hope for certain AAV vector-related patents and know-how, and we may enter into additional agreements, including license agreements, with other parties in the future that impose diligence, development and commercialization timelines, milestone payments, royalties, insurance and other obligations on us.

For example, in exchange for the rights granted to us under the Caltech License, we are obligated to pay Caltech up to a total of $7.2 million in milestone payments for the first licensed product, royalties, in the low single-digit percentages, on net sales of licensed products subject to a certain annual minimum royalty, and mid single- to high single-digit percentages of sublicensing revenues. If we fail to comply with our obligations under the Caltech License, or any of our other collaborators, our counterparties may have the right to terminate these agreements, in which event we might not be able to develop, manufacture or market any product candidate that is covered by these agreements, which could materially adversely affect the value of the product candidate being developed under any such agreement. Termination of these agreements or reduction or elimination of our rights under these agreements may result in our having to negotiate new or reinstated agreements with less favorable terms, or cause us to lose our rights under these agreements, including our rights to important intellectual property or technology.

Risks Related to Our Intellectual Property

If we are unable to obtain and maintain patent protection for our technology and products or if the scope of the patent protection obtained is not sufficiently broad, we may not be able to compete effectively in our markets.

We rely upon a combination of patents, trade secret protection and confidentiality agreements to protect the intellectual property related to our proprietary technologies, product candidate development programs and product candidates. Our success depends in large part on our ability to secure and maintain patent protection in the United States and other countries with respect to HMI-102 and any future product candidates. We seek to protect our proprietary position by filing or collaborating with our licensors to file patent applications in the United States and abroad related to our proprietary technologies, development programs and product candidates. The patent prosecution process is expensive and time-consuming, and we may not be able to file and prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner.

It is also possible that we will fail to identify patentable aspects of our research and development output before it is too late to obtain patent protection. The patent applications that we own or in-license may fail to result in issued patents with claims that cover our proprietary products and technology, including HMI-102 or any other product candidate in the United States or in other foreign countries, in whole or in part. Alternately, our existing patents and any future patents we obtain may not be sufficiently broad to prevent others from using our technology or from developing competing products and technologies. There is no assurance that all potentially relevant prior art relating to our patents and patent applications has been found, which can prevent a patent from issuing from a pending patent application or later invalidate or narrow the scope of an issued patent. Even if patents do successfully issue and even if such patents cover HMI-102 or any future product candidate, third parties may challenge their validity, enforceability or scope thereof, which may result in such patents being narrowed, invalidated, or held unenforceable. Any successful challenge to these patents or any other patents owned by or licensed to us could deprive us of rights necessary for the successful commercialization of any product candidates or companion diagnostic that we may develop. Further, if we encounter delays in regulatory approvals, the period of time during which we could market a product candidate and companion diagnostic under patent protection could be reduced.

If the patent applications we hold or have in-licensed with respect to our development programs and product candidates fail to issue, if their validity, breadth or strength of protection is threatened, or if they fail to provide meaningful exclusivity for HMI-102 or any future product candidate, it could dissuade companies from collaborating with us to develop product candidates, encourage competitors to develop competing products or technologies and threaten our ability to commercialize future product candidates. Any such outcome could have a materially adverse effect on our business.

The patent position of biotechnology and pharmaceutical companies is highly uncertain, involves complex legal and factual questions, and is characterized by the existence of large numbers of patents and

frequent litigation based on allegations of patent or other intellectual property infringement or violation. In addition, the laws of jurisdictions outside the United States may not protect our rights to the same extent as the laws of the United States. For example, European patent law restricts the patentability of methods of treatment of the human body more than United States law does. Changes in either the patent laws or interpretation of the patent laws in the United States and other countries may diminish the value of our patents or narrow the scope of our patent protection. Since patent applications in the United States and other jurisdictions are confidential for a period of time after filing, we cannot be certain that we were the first to file for patents covering our inventions. As a result, the issuance, scope, validity, enforceability and commercial value of our patent rights are highly uncertain. Our pending and future patent applications may not result in the issuance of patents, or may result in the issuance of patents which fail to protect our technology or products, in whole or in part, or which fail to effectively prevent others from commercializing competitive technologies and products.

The issuance of a patent is not conclusive as to its inventorship, scope, validity or enforceability, and our owned and licensed patents may be challenged in the courts or patent offices in the United States and abroad. Such challenges may result in loss of exclusivity or freedom to operate or in patent claims being narrowed, invalidated or held unenforceable, in whole or in part, which could limit our ability to stop others from using or commercializing similar or identical technology and products, or limit the duration of the patent protection of our technology and products. Thus, even if our patent applications issue as patents, they may not issue in a form that will provide us with meaningful protection, prevent competitors from competing with us or otherwise provide us with any competitive advantage. Moreover, patents have a limited lifespan. In the United States, the natural expiration of a patent is generally 20 years after it is filed. Various extensions may be available; however the life of a patent, and the protection it affords, is limited. Without patent protection for our current or future product candidates, we may be open to competition from generic versions of such products. Given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized. As a result, our owned and licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing products similar or identical to ours.

Third parties may assert claims against us alleging infringement of their patents and proprietary rights, or we may need to become involved in lawsuits to defend or enforce our patents, either of which could result in substantial costs or loss of productivity, delay or prevent the development and commercialization of our product candidates, prohibit our use of proprietary technology or sale of products or put our patents and other proprietary rights at risk.

Our commercial success depends, in part, upon our ability to develop, manufacture, market and sell our product candidates without alleged or actual infringement, misappropriation or other violation of the patents and proprietary rights of third parties. Litigation relating to infringement or misappropriation of patent and other intellectual property rights in the pharmaceutical and biotechnology industries is common, including patent infringement lawsuits, interferences, oppositions and reexamination proceedings before the U.S. Patent and Trademark Office, or USPTO, and corresponding foreign patent offices. The various markets in which we plan to operate are subject to frequent and extensive litigation regarding patents and other intellectual property rights. In addition, many companies in intellectual property-dependent industries, including the biotechnology and pharmaceutical industries, have employed intellectual property litigation as a means to gain an advantage over their competitors. Numerous United States, EU and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we are developing product candidates, and as the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our product candidates may be subject to claims of infringement of the intellectual property rights of third parties. Some claimants may have substantially greater resources than we do and may be able to sustain the costs of complex intellectual property litigation to a greater degree and for longer periods of time than we could. In addition, patent holding companies that focus solely on extracting royalties and settlements by enforcing patent rights may target us.

We may be subject to third-party claims including infringement, interference or derivation proceedings, post-grant review and inter partes review before the USPTO or similar adversarial proceedings or litigation in other jurisdictions. Even if such claims are without merit, a court of competent jurisdiction could hold that these third-party patents are valid, enforceable and infringed, and the holders of any such patents may be able to block our ability to commercialize the applicable product candidate unless we obtained a license under the applicable patents, or until such patents expire or are finally determined to be invalid or unenforceable. Similarly, if any third-party patents were held by a court of competent jurisdiction to cover aspects of our compositions, formulations, or methods of treatment, prevention or use, the holders of any such patents may be able to prohibit our use of those compositions, formulations, methods of treatment, prevention or use or other technologies, effectively blocking our ability to develop and commercialize the applicable product candidate until such patent expires or is finally determined to be invalid or unenforceable or unless we obtained a license.

In addition, defending such claims would cause us to incur substantial expenses and, if successful, could cause us to pay substantial damages if we are found to be infringing a third party's patent rights. These damages potentially include increased damages and attorneys' fees if we are found to have infringed such rights willfully. Further, if a patent infringement suit is brought against us or our third-party service providers, our development, manufacturing or sales activities relating to the product or product candidate that is the subject of the suit may be delayed or terminated. As a result of patent infringement claims, or in order to avoid potential infringement claims, we may choose to seek, or be required to seek, a license from the third party, which may require payment of substantial royalties or fees, or require us to grant a cross-license under our intellectual property rights. These licenses may not be available on reasonable terms or at all. Even if a license can be obtained on reasonable terms, the rights may be nonexclusive, which would give our competitors access to the same intellectual property rights. If we are unable to enter into a license on acceptable terms, we could be prevented from commercializing one or more of our product candidates, or forced to modify such product candidates, or to cease some aspect of our business operations, which could harm our business significantly. We might also be forced to redesign or modify our product candidates so that we no longer infringe the third-party intellectual property rights, which may result in significant cost or delay to us, or which redesign or modification could be impossible or technically infeasible. Even if we were ultimately to prevail, any of these events could require us to divert substantial financial and management resources that we would otherwise be able to devote to our business. In addition, if the breadth or strength of protection provided the patents and patent applications we own or in-license is threatened, it could dissuade companies from collaborating with us to license, develop or commercialize current or future product candidates.

If we or one of our licensors were to initiate legal proceedings against a third party to enforce a patent covering one of our product candidates, the defendant could counterclaim that our patent is invalid or unenforceable. In patent litigation in the United States and in Europe, defendant counterclaims alleging invalidity or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, for example, lack of novelty, obviousness or non-enablement. Third parties might allege unenforceability of our patents because during prosecution of the patent an individual connected with such prosecution withheld relevant information, or made a misleading statement. The outcome of proceedings involving assertions of invalidity and unenforceability during patent litigation is unpredictable. With respect to the validity of patents, for example, we cannot be certain that there is no invalidating prior art of which we and the patent examiner were unaware during prosecution, but that an adverse third party may identify and submit in support of such assertions of invalidity. If a defendant were to prevail on a legal assertion of invalidity or unenforceability, we would lose at least part, and perhaps all, of the patent protection on our product candidates. Our patents and other intellectual property rights also will not protect our technology if competitors design around our protected technology without infringing our patents or other intellectual property rights.

Even if resolved in our favor, litigation or other legal proceedings relating to intellectual property claims may cause us to incur significant expenses and could distract our technical and management personnel from their normal responsibilities. In addition, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by

disclosure during this type of litigation. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments, and if securities analysts or investors view these announcements in a negative light, the price of our common stock could be adversely affected. Such litigation or proceedings could substantially increase our operating losses and reduce our resources available for development activities. We may not have sufficient financial or other resources to adequately conduct such litigation or proceedings. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their substantially greater financial resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could have an adverse effect on our ability to compete in the marketplace.

We may not identify relevant third-party patents or may incorrectly interpret the relevance, scope or expiration of a third-party patent which might adversely affect our ability to develop, manufacture and market our product candidates.

We cannot guarantee that any of our or our licensors' patent searches or analyses, including but not limited to the identification of relevant patents, analysis of the scope of relevant patent claims or determination of the expiration of relevant patents, are complete or thorough, nor can we be certain that we have identified each and every third-party patent and pending application in the United States, Europe and elsewhere that is relevant to or necessary for the commercialization of our product candidates in any jurisdiction. For example, in the United States, applications filed before November 29, 2000 and certain applications filed after that date that will not be filed outside the United States remain confidential until patents issue. Patent applications in the United States, EU and elsewhere are published approximately 18 months after the earliest filing for which priority is claimed, with such earliest filing date being commonly referred to as the priority date. Therefore, patent applications covering our product candidates could be filed by others without our knowledge. Additionally, pending patent applications that have been published can, subject to certain limitations, be later amended in a manner that could cover our product candidates or the use of our product candidates. After issuance, the scope of patent claims remains subject to construction as determined by an interpretation of the law, the written disclosure in a patent and the patent's prosecution history. Our interpretation of the relevance or the scope of a patent or a pending application may be incorrect, which may negatively impact our ability to market our product candidates. We may incorrectly determine that our product candidates are not covered by a third-party patent or may incorrectly predict whether a third party's pending application will issue with claims of relevant scope. Our determination of the expiration date of any patent in the United States, the EU or elsewhere that we consider relevant may be incorrect, which may negatively impact our ability to develop and market our product candidates. Our failure to identify and correctly interpret relevant patents may negatively impact our ability to develop and market our product candidates.

If we fail to correctly identify or interpret relevant patents, we may be subject to infringement claims. We cannot guarantee that we will be able to successfully settle or otherwise resolve such infringement claims. If we fail in any such dispute, in addition to being forced to pay monetary damages, we may be temporarily or permanently prohibited from commercializing our product candidates. We might, if possible, also be forced to redesign our product candidates in a manner that no longer infringes third-party intellectual property rights. Any of these events, even if we were ultimately to prevail, could require us to divert substantial financial and management resources that we would otherwise be able to devote to our business.

Changes in patent laws or patent jurisprudence could diminish the value of patents in general, thereby impairing our ability to protect our product candidates.

As is the case with other biotechnology companies, our success is heavily dependent on intellectual property, particularly patents. Obtaining and enforcing patents in the biotechnology and genetic medicine industries involve both technological complexity and legal complexity. Therefore, obtaining and enforcing biotechnology and genetic medicine patents is costly, time-consuming and inherently uncertain. In addition, the America Invents Act, or the AIA, which was passed in September 2011, resulted in significant changes to the U.S. patent system.

An important change introduced by the AIA is that, as of March 16, 2013, the United States transitioned from a "first-to-invent" to a "first-to-file" system for deciding which party should be granted a patent when two or more patent applications are filed by different parties claiming the same invention. Under a "first-to-file" system, assuming the other requirements for patentability are met, the first inventor to file a patent application generally will be entitled to a patent on the invention regardless of whether another inventor had made the invention earlier. A third party that files a patent application in the USPTO after that date but before us could therefore be awarded a patent covering an invention of ours even if we made the invention before it was made by the third party. This will require us to be cognizant going forward of the time from invention to filing of a patent application and diligent in filing patent applications, but circumstances could prevent us from promptly filing patent applications on our inventions.

Among some of the other changes introduced by the AIA are changes that limit where a patentee may file a patent infringement suit and providing opportunities for third parties to challenge any issued patent in the USPTO. This applies to all of our U.S. patents, even those issued before March 16, 2013. Because of a lower evidentiary standard in USPTO proceedings compared to the evidentiary standard in U.S. federal courts necessary to invalidate a patent claim, a third party could potentially provide evidence in a USPTO proceeding sufficient for the USPTO to hold a claim invalid even though the same evidence would be insufficient to invalidate the claim if first presented in a district court action.

Accordingly, a third party may attempt to use the USPTO procedures to invalidate our patent claims that would not have been invalidated if first challenged by the third party as a defendant in a district court action. It is not clear what, if any, impact the AIA will have on the operation of our business. However, the AIA and its implementation could increase the uncertainties and costs surrounding the prosecution of our or our licensors' patent applications and the enforcement or defense of our or our licensors' issued patents.

We may become involved in opposition, interference, derivation, inter partes review or other proceedings challenging our or our licensors' patent rights, and the outcome of any proceedings are highly uncertain. An adverse determination in any such proceeding could reduce the scope of, or invalidate, our owned or in-licensed patent rights, allow third parties to commercialize our technology or products and compete directly with us, without payment to us, or result in our inability to manufacture or commercialize products without infringing third-party patent rights.

Additionally, the U.S. Supreme Court has ruled on several patent cases in recent years either narrowing the scope of patent protection available in certain circumstances or weakening the rights of patent owners in certain situations, and there are other open questions under patent law that courts have yet to decisively address. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on decisions by Congress, the federal courts and the USPTO, the laws and regulations governing patents could change in unpredictable ways and could weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future. In addition, the European patent system is relatively stringent in the type of amendments that are allowed during prosecution, but, the complexity and uncertainty of European patent laws has also increased in recent years. Complying with these laws and regulations could limit our ability to obtain new patents in the future that may be important for our business.

Obtaining and maintaining our patent protection depends on compliance with various procedural, document submission, fee payment and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated for non-compliance with these requirements.

The USPTO and European and other patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. In addition, periodic maintenance and annuity fees on any issued patent are due to be paid to the USPTO and European and other patent agencies over the lifetime of a patent. While an inadvertent failure to make payment of such fees or

to comply with such provisions can in many cases be cured by additional payment of a late fee or by other means in accordance with the applicable rules, there are situations in which non-compliance with such provisions will result in the abandonment or lapse of the patent or patent application, and the partial or complete loss of patent rights in the relevant jurisdiction. Non-compliance events that could result in abandonment or lapse of a patent or patent application include failure to respond to official actions within prescribed time limits, non-payment of fees and failure to properly legalize and submit formal documents within prescribed time limits. If we or our licensors fail to maintain the patents and patent applications covering our product candidates or if we or our licensors otherwise allow our patents or patent applications to be abandoned or lapse, it can create opportunities for competitors to enter the market, which would hurt our competitive position and could impair our ability to successfully commercialize our product candidates in any indication for which they are approved.

We enjoy only limited geographical protection with respect to certain patents and we may not be able to protect our intellectual property rights throughout the world.

Filing, prosecuting and defending patents covering our product candidates in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States can be less extensive than those in the United States. In-licensing patents covering our product candidates in all countries throughout the world may similarly be prohibitively expensive, if such opportunities are available at all. And in-licensing or filing, prosecuting and defending patents even in only those jurisdictions in which we develop or commercialize our product candidates may be prohibitively expensive or impractical. Competitors may use our and our licensors' technologies in jurisdictions where we have not obtained patent protection or licensed patents to develop their own products and, further, may export otherwise infringing products to territories where we and our licensors have patent protection, but enforcement is not as strong as that in the United States or the EU. These products may compete with our product candidates, and our or our licensors' patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

In addition, we may decide to abandon national and regional patent applications while they are still pending. The grant proceeding of each national or regional patent is an independent proceeding which may lead to situations in which applications may be rejected by the relevant patent office, while substantively similar applications are granted by others. For example, relative to other countries, China has a heightened requirement for patentability and specifically requires a detailed description of medical uses of a claimed drug. Furthermore, generic drug manufacturers or other competitors may challenge the scope, validity or enforceability of our or our licensors' patents, requiring us or our licensors to engage in complex, lengthy and costly litigation or other proceedings. Generic drug manufacturers may develop, seek approval for and launch generic versions of our products. It is also quite common that depending on the country, the scope of patent protection may vary for the same product candidate or technology.

The laws of some jurisdictions do not protect intellectual property rights to the same extent as the laws or regulations in the United States and the EU, and many companies have encountered significant difficulties in protecting and defending proprietary rights in such jurisdictions. Moreover, the legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents, trade secrets or other forms of intellectual property, which could make it difficult for us to prevent competitors in some jurisdictions from marketing competing products in violation of our proprietary rights generally. Proceedings to enforce our patent rights in foreign jurisdictions, whether or not successful, are likely to result in substantial costs and divert our efforts and attention from other aspects of our business, and additionally could put at risk our or our licensors' patents of being invalidated or interpreted narrowly, could increase the risk of our or our licensors' patent applications not issuing, or could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate, while damages or other remedies may be awarded to the adverse party, which may be commercially significant. If we prevail, damages or other remedies awarded to us, if any, may not be commercially meaningful. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or

license. Furthermore, while we intend to protect our intellectual property rights in our expected significant markets, we cannot ensure that we will be able to initiate or maintain similar efforts in all jurisdictions in which we may wish to market our product candidates. Accordingly, our efforts to protect our intellectual property rights in such countries may be inadequate, which may have an adverse effect on our ability to successfully commercialize our product candidates in all of our expected significant foreign markets. If we or our licensors encounter difficulties in protecting, or are otherwise precluded from effectively protecting, the intellectual property rights important for our business in such jurisdictions, the value of these rights may be diminished and we may face additional competition in those jurisdictions.

In some jurisdictions, compulsory licensing laws compel patent owners to grant licenses to third parties. In addition, some countries limit the enforceability of patents against government agencies or government contractors. In these countries, the patent owner may have limited remedies, which could materially diminish the value of such patent. If we or any of our licensors are forced to grant a license to third parties under patents relevant to our business, or if we or our licensors are prevented from enforcing patent rights against third parties, our competitive position may be substantially impaired in such jurisdictions.

If we do not obtain patent term extension in the United States under the Hatch-Waxman Act and in foreign countries under similar legislation, thereby potentially extending the term of marketing exclusivity for our product candidates, our business may be materially harmed.

The term of any individual patent depends on applicable law in the country where the patent is granted. In the United States, provided all maintenance fees are timely paid, a patent generally has a term of 20 years from its application filing date or earliest claimed non-provisional filing date. Extensions may be available under certain circumstances, but the life of a patent and, correspondingly, the protection it affords is limited. Even if we or our licensors obtain patents covering our product candidates, when the terms of all patents covering a product expire, our business may become subject to competition from competitive medications, including generic medications. Given the amount of time required for the development, testing and regulatory review and approval of new product candidates, patents protecting such candidates may expire before or shortly after such candidates are commercialized. As a result, our owned and licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing products similar or identical to ours.

In the United States, a patent that covers an FDA- approved drug or biologic may be eligible for a term extension designed to restore the period of the patent term that is lost during the premarket regulatory review process conducted by the FDA. Depending upon the timing, duration and conditions of FDA marketing approval of our product candidates, one or more of our U.S. patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, or the Hatch-Waxman Act , which permits a patent term extension of up to five years for a patent covering an approved product as compensation for effective patent term lost during product development and the FDA regulatory review process. In the EU, our product candidates may be eligible for term extensions based on similar legislation. In either jurisdiction, however, we may not receive an extension if we fail to apply within applicable deadlines, fail to apply prior to expiration of relevant patents or otherwise fail to satisfy applicable requirements. Even if we are granted such extension, the duration of such extension may be less than our request. If we are unable to obtain a patent term extension, or if the term of any such extension is less than our request, the period during which we can enforce our patent rights for that product will be in effect shortened and our competitors may obtain approval to market competing products sooner. The resulting reduction of years of revenue from applicable products could be substantial.

Our proprietary rights may not adequately protect our technologies and product candidates, and do not necessarily address all potential threats to our competitive advantage.

The degree of future protection afforded by our intellectual property rights is uncertain because intellectual property rights have limitations, and may not adequately protect our business, or permit us to maintain our competitive advantage. The following examples are illustrative:

- others may be able to make products that are the same as or similar to our product candidates but that are not covered by the claims of the patents that we own or have exclusively licensed;
- others, including inventors or developers of our owned or in-licensed patented technologies who may become involved with competitors, may independently develop similar technologies that function as alternatives or replacements for any of our technologies without infringing our intellectual property rights;
- we or our licensors or our other collaboration partners might not have been the first to conceive and reduce to practice the inventions covered by the patents or patent applications that we own, license or will own or license;
- we or our licensors or our other collaboration partners might not have been the first to file patent applications covering certain of the patents or patent applications that we or they own or have obtained a license, or will own or will have obtained a license;
- we or our licensors may fail to meet obligations to the U.S. government with respect to in-licensed patents and patent applications funded by U.S. government grants, leading to the loss of patent rights;
- it is possible that our pending patent applications will not result in issued patents;
- it is possible that there are prior public disclosures that could invalidate our or our licensors' patents;
- issued patents that we own or exclusively license may not provide us with any competitive advantage, or may be held invalid or unenforceable, as a result of legal challenges by our competitors;
- our competitors might conduct research and development activities in countries where we do not have patent rights, or in countries where research and development safe harbor laws exist, and then use the information learned from such activities to develop competitive products for sale in our major commercial markets;
- ownership, validity or enforceability of our or our licensors' patents or patent applications may be challenged by third parties; and
- the patents of third parties or pending or future applications of third parties, if issued, may have an adverse effect on our business.

We depend on proprietary technology licensed from others. If we lose our existing licenses or are unable to acquire or license additional proprietary rights from third parties, we may not be able to continue developing our products.

We currently in-license certain intellectual property from City of Hope Medical Center, or COH, and the California Institute of Technology, or Caltech, and we have entered into a collaboration and license agreement with Novartis Institutes for Biomedical Research, Inc., or Novartis. In the future we may in-license intellectual

property from other licensors. We rely on certain of these licensors to file and prosecute patent applications and maintain patents and otherwise protect the intellectual property we license from them. We have limited control over these activities or any other intellectual property that may be related to our in-licensed intellectual property. For example, we cannot be certain that such activities by these licensors have been or will be conducted in compliance with applicable laws and regulations or will result in valid and enforceable patents and other intellectual property rights. We have limited control over the manner in which our licensors initiate an infringement proceeding against a third-party infringer of the intellectual property rights, or defend certain of the intellectual property that is licensed to us. It is possible that the licensors' infringement proceeding or defense activities may be less vigorous than had we conducted them ourselves. The licensing and acquisition of third-party intellectual property rights is a competitive practice, and companies that may be more established, or have greater resources than we do, may also be pursuing strategies to license or acquire third-party intellectual property rights that we may consider necessary or attractive in order to commercialize our product candidates. More established companies may have a competitive advantage over us due to their larger size and cash resources or greater clinical development and commercialization capabilities. There can be no assurance that we will be able to successfully complete such negotiations and ultimately acquire the rights to the intellectual property surrounding the additional product candidates that we may seek to acquire.

If we fail to comply with our obligations under our patent licenses with third parties, we could lose license rights that are important to our business.

We are a party to license agreements with COH and Caltech, pursuant to which we in-license patents and technology for our product candidates. These existing licenses impose various diligence, milestone payment, royalty, insurance and other obligations on us. If we fail to comply with these obligations or otherwise materially breach a license agreement, our licensors may have the right to terminate the license, in which event we would not be able to develop or market the products covered by such licensed intellectual property. In addition, any claims asserted against us by our licensors may be costly and time-consuming, divert the attention of key personnel from business operations or otherwise have a material adverse effect on our business.

Our reliance on third parties may require us to share our trade secrets, which increases the possibility that our trade secrets will be misappropriated or disclosed, and confidentiality agreements with employees and third parties may not adequately prevent disclosure of trade secrets and protect other proprietary information.

We consider proprietary trade secrets, confidential know-how and unpatented know-how to be important to our business. We may rely on trade secrets and confidential know-how to protect our technology, especially where patent protection is believed by us to be of limited value. However, trade secrets and confidential know-how are difficult to protect, and we have limited control over the protection of trade secrets and confidential know-how used by our licensors, collaborators and suppliers. Because we expect to rely on third parties to manufacture HMI-102 and any future product candidates, and we expect to collaborate with third parties on the development of HMI-102 and any future product candidates, we may, at times, share trade secrets with them. We also conduct joint research and development programs that may require us to share trade secrets under the terms of our research and development partnerships or similar agreements. Under such circumstances, trade secrets and confidential know-how can be difficult to maintain as confidential.

To protect this type of information against disclosure or appropriation by competitors, our policy is to require our employees, consultants, contractors and advisors to enter into confidentiality agreements and, if applicable, material transfer agreements, consulting agreements or other similar agreements with us prior to beginning research or disclosing proprietary information. These agreements typically limit the rights of the third parties to use or disclose our confidential information, including our trade secrets. However, current or former employees, consultants, contractors and advisers may unintentionally or willfully disclose our confidential information to competitors, and confidentiality agreements may not provide an adequate remedy in the event of unauthorized disclosure of confidential information. The need to share trade secrets and other confidential information increases the risk that such trade secrets become known by our competitors, are inadvertently

incorporated into the technology of others, or are disclosed or used in violation of these agreements. Given that our competitive position is based, in part, on our know-how and trade secrets, a competitor's discovery of our trade secrets or other unauthorized use or disclosure would impair our competitive position and may have an adverse effect on our business and results of operations. Enforcing a claim that a third party obtained illegally and is using trade secrets and/or confidential know-how is expensive, time consuming and unpredictable, and the enforceability of confidentiality agreements may vary from jurisdiction to jurisdiction.

In addition, these agreements typically restrict the ability of our advisors, employees, third-party contractors and consultants to publish data potentially relating to our trade secrets, although our agreements may contain certain limited publication rights. Despite our efforts to protect our trade secrets, our competitors may discover our trade secrets, either through breach of our agreements with third parties, independent development or publication of information by any of our third-party collaborators. A competitor's discovery of our trade secrets would impair our competitive position and have an adverse impact on our business.

If our trademarks and trade names are not adequately protected, then we may not be able to build name recognition in our markets of interest and our business may be adversely affected.

If our trademarks and trade names are not adequately protected, then we may not be able to build name recognition in our markets of interest and our business may be adversely affected. We currently own three pending trademark applications in the United States, as well as 11 registered trademarks and 19 pending trademark applications in other countries around the world. We may not be able to protect our rights to these trademarks and trade names, which we need to build name recognition among potential partners or customers in our markets of interest. At times, competitors may adopt trade names or trademarks similar to ours, thereby impeding our ability to build brand identity and possibly leading to market confusion. In addition, there could be potential trade name or trademark infringement claims brought by owners of other registered trademarks or trademarks that incorporate variations of our unregistered trademarks or trade names. Over the long term, if we are unable to successfully register our trademarks and trade names and establish name recognition based on our trademarks and trade names, then we may not be able to compete effectively and our business may be adversely affected. Our efforts to enforce or protect our proprietary rights related to trademarks, trade secrets, domain names, copyrights or other intellectual property may be ineffective and could result in substantial costs and diversion of resources and could adversely impact our financial condition or results of operations.

We may need to license additional intellectual property from third parties, and such licenses may not be available or may not be available on commercially reasonable terms.

The growth of our business may depend in part on our ability to acquire or in-license additional proprietary rights. For example, our programs may involve product candidates that may require the use of additional proprietary rights held by third parties. Our product candidates may also require specific formulations to work effectively and efficiently. These formulations may be covered by intellectual property rights held by others. We may develop products containing our compositions and pre-existing pharmaceutical compositions. These pharmaceutical products may be covered by intellectual property rights held by others. We may be required by the FDA or comparable foreign regulatory authorities to provide a companion diagnostic test or tests with our product candidates. These diagnostic test or tests may be covered by intellectual property rights held by others. We may be unable to acquire or in-license any relevant third-party intellectual property rights that we identify as necessary or important to our business operations. We may fail to obtain any of these licenses at a reasonable cost or on reasonable terms, if at all, which would harm our business. We may need to cease use of the compositions or methods covered by such third-party intellectual property rights, and may need to seek to develop alternative approaches that do not infringe on such intellectual property rights which may entail additional costs and development delays, even if we were able to develop such alternatives, which may not be feasible. Even if we are able to obtain a license under such intellectual property rights, any such license may be non-exclusive, which may allow our competitors access to the same technologies licensed to us.

We may be subject to claims that our employees, consultants or independent contractors have wrongfully used or disclosed confidential information of their former employers or other third parties.

We employ individuals who were previously employed at other biotechnology or pharmaceutical companies. Although we seek to protect our ownership of intellectual property rights by ensuring that our agreements with our employees, collaborators and other third parties with whom we do business include provisions requiring such parties to assign rights in inventions to us, we may be subject to claims that we or our employees, consultants or independent contractors have inadvertently or otherwise used or disclosed confidential information of our employees' former employers or other third parties. We may also be subject to claims that former employers or other third parties have an ownership interest in our patents. Litigation may be necessary to defend against these claims. There is no guarantee of success in defending these claims, and if we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, such as exclusive ownership of, or right to use, valuable intellectual property. Even if we are successful, litigation could result in substantial cost and reputational loss and be a distraction to our management and other employees.

Risks Related to Employee Matters and Managing Growth

Our future success depends on our ability to retain our key personnel and to attract, retain and motivate qualified personnel.

Our industry has experienced a high rate of turnover of management personnel in recent years. We are highly dependent on the development, regulatory, commercialization and business development expertise of Arthur Tzianabos, Ph.D., our President and Chief Executive Officer and Albert Seymour, Ph.D. our Chief Scientific Officer, as well as the other principal members of our management, scientific and clinical teams. Although we have formal employment agreements with our executive officers, these agreements do not prevent them from terminating their employment with us at any time.

If we lose one or more of our executive officers or key employees, our ability to implement our business strategy successfully could be seriously harmed. Furthermore, replacing executive officers and key employees may be difficult and may take an extended period of time because of the limited number of individuals in our industry with the breadth of skills and experience required to develop, gain regulatory approval of and commercialize product candidates successfully. Competition to hire from this limited pool is intense, and we may be unable to hire, train, retain or motivate these additional key personnel on acceptable terms given the competition among numerous pharmaceutical and biotechnology companies for similar personnel. We also experience competition for the hiring of scientific and clinical personnel from universities and research institutions. In addition, we rely on consultants and advisors, including scientific and clinical advisors, to assist us in formulating our research and development and commercialization strategy. Our consultants and advisors may be engaged by entities other than us and may have commitments under consulting or advisory contracts with other entities that may limit their availability to us. If we are unable to continue to attract and retain high quality personnel, our ability to develop and commercialize product candidates will be limited.

We expect to grow our organization, and as a result, we may encounter difficulties in managing our growth, which could disrupt our operations.

We expect to experience significant growth in the number of our employees and the scope of our operations, particularly in the areas of product candidate development, regulatory affairs and sales, marketing and distribution. Our management may need to divert a disproportionate amount of its attention away from our day-to-day activities to devote time to managing these growth activities. To manage these growth activities, we must continue to implement and improve our managerial, operational and financial systems, expand our facilities and continue to recruit and train additional qualified personnel. Due to our limited financial resources and the limited experience of our management team in managing a company with such anticipated growth, we may not

be able to effectively manage the expansion of our operations or recruit and train additional qualified personnel. Our inability to effectively manage the expansion of our operations may result in weaknesses in our infrastructure, give rise to operational mistakes, loss of business opportunities, loss of employees and reduced productivity among remaining employees. Our expected growth could require significant capital expenditures and may divert financial resources from other projects, such as the development of additional product candidates. If our management is unable to effectively manage our expected growth, our expenses may increase more than expected, our potential ability to generate revenue could be reduced and we may not be able to implement our business strategy.

We may engage in acquisitions that could disrupt our business, cause dilution to our stockholders or reduce our financial resources.

In the future, we may enter into transactions to acquire other businesses, products or technologies. If we do identify suitable candidates, we may not be able to make such acquisitions on favorable terms, or at all. Any acquisitions we make may not strengthen our competitive position, and these transactions may be viewed negatively by customers or investors. We may decide to incur debt in connection with an acquisition or issue our common stock or other equity securities to the stockholders of the acquired company, which would reduce the percentage ownership of our existing stockholders. We could incur losses resulting from undiscovered liabilities of the acquired business that are not covered by the indemnification we may obtain from the seller. In addition, we may not be able to successfully integrate the acquired personnel, technologies and operations into our existing business in an effective, timely and nondisruptive manner. Acquisitions may also divert management attention from day-to-day responsibilities, increase our expenses and reduce our cash available for operations and other uses. We cannot predict the number, timing or size of future acquisitions or the effect that any such transactions might have on our operating results.

We or the third parties upon whom we depend may be adversely affected by natural disasters and our business continuity and disaster recovery plans may not adequately protect us from a serious disaster.

Natural disasters could severely disrupt our operations and have a material adverse effect on our business, results of operations, financial condition and prospects. If a natural disaster, power outage or other event occurred that prevented us from using all or a significant portion of our headquarters, that damaged critical infrastructure, such as our manufacturing facilities, or that otherwise disrupted operations, it may be difficult or, in certain cases, impossible for us to continue our business for a substantial period of time. The disaster recovery and business continuity plans we have in place may prove inadequate in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans, which could have a material adverse effect on our business. For example, following Hurricane Maria, shortages in production and delays in a number of medical supplies produced in Puerto Rico resulted, and any similar interruption due to a natural disaster affecting us or any of our third-party manufacturers could materially delay our operations.

Risks Related to Our Common Stock and this Offering

An active trading market for our common stock may not develop.

Prior to this offering, there has been no public market for our common stock. The initial public offering price for our common stock will be determined through negotiations with the underwriters. Although we have applied to have our common stock approved for listing on The Nasdaq Global Select Market, an active trading market for our shares may never develop or be sustained following this offering. If an active market for our common stock does not develop, it may be difficult for you to sell shares you purchase in this offering without depressing the market price for the shares, or at all.

The market price of our common stock may be volatile and fluctuate substantially, which could result in substantial losses for purchasers of our common stock in this offering.

Our stock price is likely to be volatile. The stock market in general and the market for smaller biopharmaceutical companies in particular have experienced extreme volatility that has often been unrelated to the operating performance of particular companies. As a result of this volatility, you may not be able to sell your common stock at or above the initial public offering price. The market price for our common stock may be influenced by many factors, including:

- the success of competitive products or technologies;
- actual or expected changes in our growth rate relative to our competitors;
- results of clinical trials of our product candidates or those of our competitors;
- developments related to our existing or any future collaborations;
- regulatory or legal developments in the United States and other countries;
- development of new product candidates that may address our markets and make our product candidates less attractive;
- changes in physician, hospital or healthcare provider practices that may make our product candidates less useful;
- announcements by us, our partners or our competitors of significant acquisitions, strategic partnerships, joint ventures, collaborations or capital commitments;
- developments or disputes concerning patent applications, issued patents or other proprietary rights;
- the recruitment or departure of key personnel;
- the level of expenses related to any of our product candidates or clinical development programs;
- failure to meet or exceed financial estimates and projections of the investment community or that we provide to the public;
- the results of our efforts to discover, develop, acquire or in-license additional product candidates or products;
- actual or expected changes in estimates as to financial results, development timelines or recommendations by securities analysts;
- variations in our financial results or those of companies that are perceived to be similar to us;
- changes in the structure of healthcare payment systems;
- market conditions in the pharmaceutical and biotechnology sectors;
- general economic, industry and market conditions; and
- the other factors described in this “Risk Factors” section and elsewhere in this prospectus.

After this offering, our executive officers, directors and principal stockholders, if they choose to act together, will continue to have the ability to control or significantly influence all matters submitted to stockholders for approval.

Upon the closing of this offering, based on the number of shares of common stock outstanding as of , 2018, our executive officers, directors and stockholders who owned more than 5% of our outstanding common stock before this offering and their respective affiliates will, in the aggregate, hold shares representing approximately % of our outstanding voting stock. As a result, if these stockholders choose to act together, they would be able to control or significantly influence all matters submitted to our stockholders for approval, as well as our management and affairs. For example, these persons, if they choose to act together, would control or significantly influence the election of directors, the composition of our management and approval of any merger, consolidation or sale of all or substantially all of our assets.

If you purchase shares of common stock in this offering, you will suffer immediate dilution of your investment.

The initial public offering price of our common stock will be substantially higher than the net tangible book value per share of our common stock. Therefore, if you purchase shares of our common stock in this offering, you will pay a price per share that substantially exceeds our net tangible book value per share after this offering. To the extent shares subsequently are issued under outstanding options or warrants, you will incur further dilution. Based on an assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, you will experience immediate dilution of $ per share as of , 2018, representing the difference between our pro forma as adjusted net tangible book value per share, after giving effect to this offering, and the assumed initial public offering price. In addition, purchasers of common stock in this offering will have contributed approximately % of the aggregate price paid by all purchasers of our stock but will own only approximately % of our common stock outstanding after this offering.

We have broad discretion in the use of the net proceeds from this offering and may not use them effectively.

Our management will have broad discretion in the application of the net proceeds from this offering and could spend the proceeds in ways that do not improve our results of operations or enhance the value of our common stock. We expect that we will use the net proceeds of this offering to advance our lead and other product candidates, scale-up our manufacturing processes, build-out our internal manufacturing capacity, expand our intellectual property portfolio and pursue additional research and development activities as set forth under “Use of Proceeds.” However, our use of these proceeds may differ substantially from our current plans. The failure by our management to apply these funds effectively could result in financial losses that could have a material adverse effect on our business, cause the price of our common stock to decline and delay the development of our product candidates. Pending their use, we may invest the net proceeds from this offering in a manner that does not produce income or that loses value.

A significant portion of our total outstanding shares are eligible to be sold into the market in the near future, which could cause the market price of our common stock to drop significantly, even if our business is doing well.

Sales of a substantial number of shares of our common stock in the public market, or the perception in the market that the holders of a large number of shares intend to sell shares, could reduce the market price of our common stock. After this offering, we will have outstanding shares of common stock based on the number of shares outstanding as of , 2018. This includes the shares that we are selling in this offering, which may be resold in the public market immediately without restriction, unless purchased by our affiliates or existing stockholders. The remaining shares are currently restricted as a result of securities laws or lock-up agreements (which may be waived, with or without notice, by Merrill Lynch, Pierce, Fenner & Smith Incorporated and Cowen and Company, LLC) but will become eligible to be sold at various times beginning

180 days after this offering, unless held by one of our affiliates, in which case the resale of those securities will be subject to volume limitations under Rule 144 of the Securities Act of 1933, as amended, or Rule 144. Moreover, after this offering, holders of an aggregate of shares of our common stock will have rights, subject to specified conditions, to require us to file registration statements covering their shares or to include their shares in registration statements that we may file for ourselves or other stockholders, until such shares can otherwise be sold without restriction under Rule 144 or until the rights terminate pursuant to the terms of the investors' rights agreement between us and such holders. We also intend to register all shares of common stock that we may issue under our equity compensation plans. Once we register these shares, they can be freely sold in the public market upon issuance, subject to volume limitations applicable to affiliates and the lock-up agreements described in the "Underwriting" section of this prospectus.

We are an "emerging growth company," and the reduced disclosure requirements applicable to emerging growth companies may make our common stock less attractive to investors.

We are an "emerging growth company," as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act, and may remain an emerging growth company until the last day of the fiscal year following the fifth anniversary of the closing of this offering. However, if certain events occur prior to the end of such five-year period, including if we become a "large accelerated filer," our annual gross revenues exceed $1.07 billion or we issue more than $1.0 billion of non-convertible debt in any three-year period, we will cease to be an emerging growth company prior to the end of such five-year period. For so long as we remain an emerging growth company, we are permitted and intend to rely on exemptions from certain disclosure requirements that are applicable to other public companies that are not emerging growth companies. These exemptions include:

- being permitted to provide only two years of audited financial statements, in addition to any required unaudited interim financial statements, with correspondingly reduced "Management's Discussion and Analysis of Financial Condition and Results of Operations" disclosure in this prospectus;
- not being required to comply with the auditor attestation requirements in the assessment of our internal control over financial reporting;
- not being required to comply with any requirement that may be adopted by the Public Company Accounting Oversight Board regarding mandatory audit firm rotation or a supplement to the auditor's report providing additional information about the audit and the financial statements;
- reduced disclosure obligations regarding executive compensation; and
- exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and shareholder approval of any golden parachute payments not previously approved.

We have taken advantage of reduced reporting burdens in this prospectus. In particular, in this prospectus, we have provided only two years of audited financial statements and have not included all of the executive compensation related information that would be required if we were not an emerging growth company. We cannot predict whether investors will find our common stock less attractive if we rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be reduced or more volatile. In addition, the JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. This allows an emerging growth company to delay the adoption of these accounting standards until they would otherwise apply to private companies. We have elected to take advantage of this extended transition period.

We will incur increased costs as a result of operating as a public company, and our management will be required to devote substantial time to new compliance initiatives and corporate governance practices.

As a public company, and particularly after we are no longer an emerging growth company, we will incur significant legal, accounting and other expenses that we did not incur as a private company. The Sarbanes-Oxley Act of 2002, the Dodd-Frank Wall Street Reform and Consumer Protection Act, the listing requirements of The Nasdaq Global Select Market and other applicable securities rules and regulations impose various requirements on public companies, including establishment and maintenance of effective disclosure and financial controls and corporate governance practices. Our management and other personnel will need to devote a substantial amount of time to these compliance initiatives. Moreover, these rules and regulations will increase our legal and financial compliance costs and will make some activities more time-consuming and costly. For example, we expect that these rules and regulations may make it more difficult and more expensive for us to obtain director and officer liability insurance, which in turn could make it more difficult for us to attract and retain qualified members of our board of directors.

We are evaluating these rules and regulations, and cannot predict or estimate the amount of additional costs we may incur or the timing of such costs. These rules and regulations are often subject to varying interpretations, in many cases due to their lack of specificity, and, as a result, their application in practice may evolve over time as new guidance is provided by regulatory and governing bodies. This could result in continuing uncertainty regarding compliance matters and higher costs necessitated by ongoing revisions to disclosure and governance practices.

Pursuant to Section 404 of the Sarbanes-Oxley Act of 2002, or Section 404, we will be required to furnish a report by our management on our internal control over financial reporting. However, while we remain an emerging growth company, we will not be required to include an attestation report on internal control over financial reporting issued by our independent registered public accounting firm. To achieve compliance with Section 404 within the prescribed period, we will be engaged in a process to document and evaluate our internal control over financial reporting, which is both costly and challenging. In this regard, we will need to continue to dedicate internal resources, potentially engage outside consultants, adopt a detailed work plan to assess and document the adequacy of internal control over financial reporting, continue steps to improve control processes as appropriate, validate through testing whether such controls are functioning as documented, and implement a continuous reporting and improvement process for internal control over financial reporting. Despite our efforts, there is a risk that we will not be able to conclude, within the prescribed timeframe or at all, that our internal control over financial reporting is effective as required by Section 404. If we identify one or more material weaknesses, it could result in an adverse reaction in the financial markets due to a loss of confidence in the reliability of our financial statements.

If securities or industry analysts do not publish research or reports about our business, or if they issue an adverse or misleading opinion regarding our stock, our stock price and trading volume could decline.

The trading market for our common stock will be influenced by the research and reports that industry or securities analysts publish about us or our business. We do not currently have, and may never obtain, research coverage by securities and industry analysts. If no or few securities or industry analysts commence coverage of us, the trading price for our stock would be negatively impacted. In the event we obtain securities or industry analyst coverage, if any of the analysts who cover us issue an adverse or misleading opinion regarding us, our business model, our intellectual property or our stock performance, or if our target animal studies and operating results fail to meet the expectations of analysts, our stock price would likely decline. If one or more of these analysts ceases coverage of us or fails to publish reports on us regularly, we could lose visibility in the financial markets, which in turn could cause our stock price or trading volume to decline.

Provisions in our restated certificate of incorporation and restated bylaws and under Delaware law could make an acquisition of our company, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current management.

Provisions in our restated certificate of incorporation and our restated bylaws, which will become effective upon the closing of this offering may discourage, delay or prevent a merger, acquisition or other change in control of our company that stockholders may consider favorable, including transactions in which you might otherwise receive a premium for your shares. These provisions could also limit the price that investors might be willing to pay in the future for shares of our common stock, thereby depressing the market price of our common stock. In addition, because our board of directors is responsible for appointing the members of our management team, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors. Among other things, these provisions include those establishing:

- a classified board of directors with three-year staggered terms, which may delay the ability of stockholders to change the membership of a majority of our board of directors;
- no cumulative voting in the election of directors, which limits the ability of minority stockholders to elect director candidates;
- the exclusive right of our board of directors to elect a director to fill a vacancy created by the expansion of the board of directors or the resignation, death or removal of a director, which prevents stockholders from filling vacancies on our board of directors;
- the ability of our board of directors to authorize the issuance of shares of preferred stock and to determine the terms of those shares, including preferences and voting rights, without stockholder approval, which could be used to significantly dilute the ownership of a hostile acquirer;
- the ability of our board of directors to alter our bylaws without obtaining stockholder approval;
- the required approval of the holders of at least two-thirds of the shares entitled to vote at an election of directors to adopt, amend or repeal our bylaws or repeal the provisions of our restated certificate of incorporation regarding the election and removal of directors;
- a prohibition on stockholder action by written consent, which forces stockholder action to be taken at an annual or special meeting of our stockholders;
- the requirement that a special meeting of stockholders may be called only by the chairman of the board of directors, the chief executive officer, the president or the board of directors, which may delay the ability of our stockholders to force consideration of a proposal or to take action, including the removal of directors; and
- advance notice procedures that stockholders must comply with in order to nominate candidates to our board of directors or to propose matters to be acted upon at a stockholders' meeting, which may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of us.

Moreover, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the General Corporation Law of the State of Delaware, which prohibits a person who owns in excess of 15% of our outstanding voting stock from merging or combining with us for a period of three years after the date of the transaction in which the person acquired in excess of 15% of our outstanding voting stock, unless the merger or combination is approved in a prescribed manner. Furthermore, our restated certificate of incorporation, which

will become effective upon the closing of this offering, specifies that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for most legal actions involving claims brought against us by stockholders. Any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock shall be deemed to have notice of and to have consented to the provisions of our restated certificate of incorporation described above.

We believe this provision benefits us by providing increased consistency in the application of Delaware law by chancellors particularly experienced in resolving corporate disputes, efficient administration of cases on a more expedited schedule relative to other forums and protection against the burdens of multi-forum litigation. However, the provision may have the effect of discouraging lawsuits against our directors, officers, employees and agents as it may limit any stockholder's ability to bring a claim in a judicial forum that such stockholder finds favorable for disputes with us or our directors, officers, employees or agents. The enforceability of similar choice of forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that, in connection with any applicable action brought against us, a court could find the choice of forum provisions contained in our restated certificate of incorporation to be inapplicable or unenforceable in such action. If a court were to find the choice of forum provision contained in our restated certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions, which could adversely affect our business, financial condition or results of operations.

Because we do not anticipate paying any cash dividends on our common shares in the foreseeable future, capital appreciation, if any, would be your sole source of gain.

We have never declared or paid any cash dividends on our common shares. We currently anticipate that we will retain future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends for the foreseeable future. As a result, capital appreciation, if any, of our common shares would be your sole source of gain on an investment in our common shares for the foreseeable future. See the "Dividend Policy" section of this prospectus for additional information.

We could be subject to securities class action litigation.

In the past, securities class action litigation has often been brought against a company following a decline in the market price of its securities. This risk is especially relevant for us because biopharmaceutical companies have experienced significant stock price volatility in recent years. If we face such litigation, it could result in substantial costs and a diversion of management's attention and resources, which could harm our business.

Recent U.S. tax legislation may materially adversely affect our financial condition, results of operations and cash flows.

Recently-enacted U.S. tax legislation has significantly changed the U.S. federal income taxation of U.S. corporations, including by reducing the U.S. corporate income tax rate, limiting interest deductions, and revising the rules governing net operating losses. Many of these changes are effective immediately, without any transition periods or grandfathering for existing transactions. The legislation is unclear in many respects and could be subject to potential amendments and technical corrections, as well as interpretations and implementing regulations by the Treasury and Internal Revenue Service, any of which could lessen or increase certain adverse impacts of the legislation. In addition, it is unclear how these U.S. federal income tax changes will affect state and local taxation, which often uses federal taxable income as a starting point for computing state and local tax liabilities.

The reduction of the corporate tax rate under the legislation may cause a reduction in the economic benefit of our net operating loss carryforwards and other deferred tax assets available to us. Furthermore, under

the legislation, although the treatment of tax losses generated before December 31, 2017 has generally not changed, tax losses generated in calendar year 2018 and beyond will only be able to offset 80% of taxable income. This change may require us to pay federal income taxes in future years despite generating a loss for federal income tax purposes in prior years.

While some of the changes made by the tax legislation may adversely affect the Company in one or more reporting periods and prospectively, other changes may be beneficial on a going forward basis. We continue to work with our tax advisors to determine the full impact that the recent tax legislation as a whole will have on us. We urge our investors to consult with their legal and tax advisors with respect to such legislation.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus contains forward-looking statements that can involve substantial risks and uncertainties. All statements other than statements of historical facts contained in this prospectus, including statements regarding our future results of operations and financial position, business strategy, prospective products, product approvals, research and development costs, future revenue, timing and likelihood of success, plans and objectives of management for future operations, future results of anticipated products and prospects, plans and objectives of management are forward-looking statements. These statements involve known and unknown risks, uncertainties and other important factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements.

In some cases, you can identify forward-looking statements by terms such as “may,” “will,” “should,” “expect,” “plan,” “anticipate,” “could,” “intend,” “target,” “project,” “contemplate,” “believe,” “estimate,” “predict,” “potential,” “would” or “continue” or the negative of these terms or other similar expressions. The forward-looking statements in this prospectus are only predictions. We have based these forward-looking statements largely on our current expectations and projections about future events and financial trends that we believe may affect our business, financial condition and results of operations. These forward-looking statements speak only as of the date of this prospectus and are subject to a number of risks, uncertainties and assumptions described under the sections in this prospectus entitled “Risk Factors” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and elsewhere in this prospectus. Because forward-looking statements are inherently subject to risks and uncertainties, some of which cannot be predicted or quantified and some of which are beyond our control, you should not rely on these forward-looking statements as predictions of future events. The events and circumstances reflected in our forward-looking statements may not be achieved or occur and actual results could differ materially from those projected in the forward-looking statements. Moreover, we operate in an evolving environment. New risk factors and uncertainties may emerge from time to time, and it is not possible for management to predict all risk factors and uncertainties. Except as required by applicable law, we do not plan to publicly update or revise any forward-looking statements contained herein, whether as a result of any new information, future events, changed circumstances or otherwise.

INDUSTRY AND OTHER DATA

We obtained the industry, market and competitive position data in this prospectus from our own internal estimates and research as well as from industry and general publications and research, surveys and studies conducted by third parties. Industry publications, studies and surveys generally state that they have been obtained from sources believed to be reliable, although they do not guarantee the accuracy or completeness of such information. While we believe that each of these studies and publications is reliable, we have not independently verified market and industry data from third-party sources. While we believe our internal company research as to such matters is reliable and the market definitions are appropriate, neither such research nor these definitions have been verified by any independent source.

USE OF PROCEEDS

We estimate that the net proceeds to us from our issuance and sale of shares of our common stock in this offering will be approximately $ million, assuming an initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. If the underwriters' option to purchase additional shares from us is exercised in full, we estimate that our net proceeds will be approximately $ million. Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share would increase (decrease) the net proceeds to us from this offering by approximately $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. Each increase (decrease) of 1.0 million in the number of shares we are offering would increase (decrease) the net proceeds to us from this offering, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, by $ million, assuming the assumed initial public offering price stays the same.

We anticipate that we will use the net proceeds of this offering for the following purposes:

- approximately $ million to advance our lead gene therapy product candidate, HMI-102, through preclinical studies and through topline results in a Phase 1/2 clinical trial;
- approximately $ million to nominate our lead gene editing product candidate and advance this program through preclinical studies;
- approximately $ million to scale-up manufacturing processes and build-out internal cGMP manufacturing capacity sufficient for clinical supply of product;
- approximately $ million to expand our intellectual property portfolio to further protect our proprietary AAVHSCs and other aspects of our technology platform; and
- the remainder, if any, to fund new and ongoing research and development activities and for working capital and other general corporate purposes.

This expected use of the net proceeds from this offering represents our intentions based upon our current plans and business conditions, which could change in the future as our plans and business conditions evolve. We may also use a portion of the net proceeds to in-license, acquire or invest in additional businesses, technologies, products or assets, although currently we have no specific agreements, commitments or understandings in this regard. As of the date of this prospectus, we cannot predict with certainty all of the particular uses for the net proceeds to be received upon the closing of this offering or the amounts that we will actually spend on the uses set forth above. Predicting the cost necessary to develop product candidates can be difficult and we anticipate that we will need additional funds to complete the development of any product candidates we identify. The amounts and timing of our actual expenditures and the extent of clinical development may vary significantly depending on numerous factors, including the progress of our development efforts, the status of and results from pre-clinical studies and any ongoing clinical trials or clinical trials we may commence in the future, as well as any collaborations that we may enter into with third parties for our product candidates and any unforeseen cash needs. As a result, our management will retain broad discretion over the allocation of the net proceeds from this offering.

Based on our planned use of the net proceeds of this offering and our current cash and cash equivalents, we estimate that such funds will be sufficient to enable us to fund our operating expenses and capital expenditure requirements through . We have based this estimate on assumptions that may prove to be incorrect, and we could use our available capital resources sooner than we currently expect. We may satisfy our future cash

needs through the sale of equity securities, debt financings, working capital lines of credit, corporate collaborations or license agreements, grant funding, interest income earned on invested cash balances or a combination of one or more of these sources.

Pending our use of the net proceeds from this offering, we intend to invest the net proceeds in a variety of capital preservation investments, including short-term, investment-grade, interest-bearing instruments and U.S. government securities.

DIVIDEND POLICY

We have never declared or paid any cash dividends on our capital stock. We intend to retain future earnings, if any, to finance the operation and expansion of our business and do not anticipate paying any cash dividends in the foreseeable future. Any future determination related to our dividend policy will be made at the discretion of our board of directors after considering our financial condition, results of operations, capital requirements, business prospects and other factors the board of directors deems relevant, and subject to the restrictions contained in any future financing instruments.

CAPITALIZATION

The following table sets forth our cash and cash equivalents and capitalization as of December 31, 2017, as follows:

- on an actual basis;
- on a pro forma basis to reflect:
  - the automatic conversion of all outstanding shares of our preferred stock into 127,199,705 shares of common stock upon the closing of this offering; and
  - the filing and effectiveness of our restated certificate of incorporation which will occur upon the closing of this offering.
- on a pro forma as adjusted basis to give further effect to our issuance and sale of shares of common stock in this offering at an assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

Our capitalization following the closing of this offering will be adjusted based on the actual initial public offering price and other terms of this offering determined at pricing. You should read this information in conjunction with our consolidated financial statements and the related notes appearing at the end of this prospectus and the "Management's Discussion and Analysis of Financial Condition and Results of Operations" section and other financial information contained in this prospectus.

	As of December 31, 2017 (in thousands, except share data)		
	Actual	Pro Forma	Pro Forma As Adjusted(1)
Cash, cash equivalents and short-term investments	$129,659	$129,659	$
Convertible preferred stock (Series A and B), par value $0.0001 per share; 127,234,915 shares authorized, 127,199,705 shares issued and outstanding, actual; no shares authorized, issued or outstanding, pro forma and pro forma as adjusted	137,762	—	
Stockholders' (deficit) equity:			
Preferred stock, $0.0001 par value; no shares authorized, issued or outstanding, actual; shares authorized and no shares issued or outstanding, pro forma and pro forma as adjusted	—	—	
Common stock, par value $0.0001 per share; 170,000,000 shares authorized, 15,273,840 shares issued and outstanding (1,395,236 shares subject to repurchase), actual; shares authorized, pro forma and pro forma as adjusted; shares issued and outstanding, pro forma; shares issued and outstanding, pro forma as adjusted	1	14	
Additional paid-in capital	799	138,548	
Accumulated deficit	(40,181)	(40,181)	
Total stockholders' (deficit) equity	(39,454)	98,308	
Total capitalization	$137,530	137,530	$

(1) Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) the pro forma as adjusted amount of each of cash and cash equivalents, working capital, additional paid-in capital,

total assets, total stockholders' equity (deficit) and total capitalization by $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. Similarly, each increase (decrease) of 1.0 million shares in the number of shares offered by us at the assumed initial public offering price per share, which is the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) the pro forma as adjusted amount of each of cash and cash equivalents, additional paid-in capital, total stockholders' equity (deficit) and total capitalization by approximately $ million.

The number of shares in the table above includes shares of unvested restricted stock and does not include:

- shares of common stock issuable upon exercise of stock options outstanding under our 2015 Plan as of December 31, 2017, at a weighted-average exercise price of $ per share; and
- additional shares of our common stock reserved for future issuance under our 2018 Plan, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under the 2018 Plan; and
- shares of our common stock reserved for future issuance under our 2018 ESPP, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under the 2018 ESPP.

DILUTION

If you invest in our common stock in this offering, your ownership interest will be immediately diluted to the extent of the difference between the initial public offering price per share of our common stock and the pro forma as adjusted net tangible book value per share of our common stock after this offering.

As of December 31, 2017, we had a historical net tangible book value of $98.3 million, or $6.44 per share of common stock. Our historical net tangible book value per share represents total tangible assets less total liabilities, divided by the number of shares of our common stock outstanding as of December 31, 2017.

Our pro forma net tangible book value as of December 31, 2017 was $ million, or $ per share. Pro forma net tangible book value represents the amount of our total tangible assets less total liabilities, after giving effect to the automatic conversion of all shares of our preferred stock outstanding as of December 31, 2017 into an aggregate of 127,199,705 shares of our common stock in connection with this offering. Pro forma net tangible book value per share represents our pro forma net tangible book value divided by the total number of shares outstanding as of December 31, 2017, after giving effect to the pro forma adjustment described above.

After giving further effect to receipt of the net proceeds from our issuance and the sale of shares of common stock in this offering at an assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, our pro forma as adjusted net tangible book value as of December 31, 2017 would have been approximately $ million, or approximately $ per share. This amount represents an immediate increase in pro forma net tangible book value of $ per share to our existing stockholders and an immediate dilution of approximately $ per share to new investors participating in this offering. We determine dilution by subtracting the pro forma as adjusted net tangible book value per share after this offering from the amount of cash that a new investor paid for a share of common stock. The following table illustrates this dilution:

Assumed initial public offering price per share		$
Historical net tangible book value per share as of December 31, 2017	$6.44	
Increase (decrease) per share attributable to the conversion of our preferred stock		
Pro forma net tangible book value (deficit) per share as of December 31, 2017		
Increase per share attributable to this offering		
Pro forma as adjusted net tangible book value per share after this offering		$
Dilution per share to new investors in this offering		$

Each $1.00 increase (decrease) in the assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, would increase (decrease) the pro forma as adjusted net tangible book value per share after this offering by $ million, and dilution in pro forma net tangible book value per share to new investors by $, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. Each increase (decrease) of 1.0 million shares in the number of shares offered by us would increase (decrease) our pro forma as adjusted net tangible book value per share after this offering by $ per share and decrease (increase) the dilution to new investors by $ per share, assuming that the assumed initial public offering price remains the same, and after deducting the estimated underwriting discounts and commissions and the estimated offering expenses payable by us.

If the underwriters exercise their option to purchase additional shares of our common stock in full, the pro forma as adjusted net tangible book value after this offering would be $ per share, the increase in pro

forma net tangible book value per share would be $ and the dilution per share to new investors would be $ per share, in each case assuming an initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, and after deducting the estimated underwriting discounts and commissions and the estimated offering expenses payable by us.

The following table summarizes the pro forma as adjusted basis described above, as of December 31, 2017, the differences between the number of shares purchased from us, the total consideration paid to us in cash and the average price per share that existing stockholders and new investors paid. The calculation below is based on an assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, before deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

	Shares Purchased		Total Consideration		Average Price Per Share
	Number	Percent	Amount	Percent	
Existing stockholders		%	$	%	$
New investors					
Total		100.0%		100.0%	$

A $1.00 increase or decrease in the assumed initial public offering price of $ per share, which is the midpoint of the price range set forth on the cover page of this prospectus, would increase or decrease the total consideration paid by new investors by $ million and, in the case of an increase, would increase the percentage of total consideration paid by new investors by percentage points and, in the case of a decrease, would decrease the percentage of total consideration paid by new investors by percentage points, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same. An increase or decrease of 1.0 million shares in the number of shares offered by us, as set forth on the cover page of this prospectus, would increase or decrease the total consideration paid by new investors by $ million and, in the case of an increase, would increase the percentage of total consideration paid by new investors by % and, in the case of a decrease, would decrease the percentage of total consideration paid by new investors by percentage points, assuming no change in the assumed initial public offering price.

The foregoing tables and calculations are based on the number of shares of our common stock outstanding as of December 31, 2017 (which included 1,395,236 shares of unvested restricted stock subject to repurchase), after giving effect to the automatic conversion of all outstanding shares of our preferred stock into common stock in connection with this offering, and exclude:

- shares of common stock issuable upon exercise of stock options outstanding under our 2015 Plan as of December 31, 2017, at a weighted-average exercise price of $ per share; and
- additional shares of our common stock reserved for future issuance under our 2018 Plan, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under the 2018 Plan; and
- shares of our common stock reserved for future issuance under our 2018 ESPP, which will become effective in connection with this offering, as well as any automatic increases in the number of shares of our common stock reserved for future issuance under the 2018 ESPP.

To the extent any of these outstanding options is exercised, there will be further dilution to new investors. If all of such outstanding options had been exercised as of December 31, 2017, the pro forma as adjusted net tangible book value per share after this offering would be $, and total dilution per share to new investors would be $.

If the underwriters exercise their option to purchase additional shares of our common stock in full:

- the percentage of shares of common stock held by existing stockholders will decrease to approximately % of the total number of shares of our common stock outstanding after this offering; and
- the number of shares held by new investors will increase to , or approximately % of the total number of shares of our common stock outstanding after this offering.

SELECTED CONSOLIDATED FINANCIAL DATA

You should read the following selected consolidated financial data together with our consolidated financial statements and the related notes appearing at the end of this prospectus and the "Management's Discussion and Analysis of Financial Condition and Results of Operations" section of this prospectus. We have derived the consolidated statement of operations data for the years ended December 31, 2017 and 2016 and the consolidated balance sheet data as of December 31, 2017 and 2016 from our audited consolidated financial statements appearing at the end of this prospectus. Our historical results are not necessarily indicative of the results that should be expected in any future period.

(in thousands, except per share data)	Year Ended December 31, 2017	2016
Consolidated Statements of Operations Data:		
Operating expenses:		
Research and development	21,378	5,695
General and administrative	8,279	4,305
Total operating expenses	29,657	10,000
Loss from operations	(29,657)	(10,000)
Other income (expense):		
Change in fair market value of convertible preferred stock tranche liability	(876)	1,929
Interest income	542	24
Total other income (expense)	(334)	1,953
Net loss and net loss attributable to common stockholders-basic and diluted	$ (29,991)	$ (8,047)
Net loss per share attributable to common stockholders- basic and diluted	$ (2.30)	$ (0.80)
Weighted average common shares outstanding-basic and diluted(1)	13,048,943	10,002,586
Pro forma net loss per share attributable to common stockholders-basic and diluted (unaudited)(1)	$ (0.30)	
Pro forma weighted average common shares of common stock outstanding-basic and diluted (unaudited) (1)	97,904,322	

(1) See Note 14 to our consolidated financial statements included elsewhere in this prospectus for an explanation of the method used to calculate the historical and pro forma basic and diluted net loss per common share and the weighted average number of shares used in the computation of the per share amounts.

(in thousands)	As of December 31, 2017	As of December 31, 2016
Consolidated Balance Sheet Data:		
Cash, cash equivalents and short-term investments	$ 129,659	$ 11,392
Total assets	137,530	14,219
Total liabilities	39,222	6,719
Total stockholders' (deficit) equity	(39,454)	(9,892)
Total liabilities, convertible preferred stock and stockholders' deficit	$ 137,530	$ 14,219

MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

You should read the following discussion and analysis of financial condition and operating results together with the section captioned "Selected Consolidated Financial Data" and our financial statements and the related notes appearing at the end of this prospectus. This discussion contains forward-looking statements that involve risks and uncertainties. As a result of many factors, such as those set forth in the section of the prospectus captioned "Risk Factors" and elsewhere in this prospectus, our actual results may differ materially from those anticipated in these forward-looking statements. For convenience of presentation some of the numbers have been rounded in the text below.

Overview

We are a genetic medicines company dedicated to transforming the lives of patients suffering from rare genetic diseases with significant unmet medical needs by curing the underlying cause of the disease. Our proprietary platform is designed to utilize our human hematopoietic stem cell derived adeno-associated virus vectors, or AAVHSCs, to precisely and efficiently deliver genetic medicines *in vivo* either through a gene therapy or nuclease-free gene editing modality across a broad range of genetic disorders. The unique properties of our proprietary suite of 15 novel AAVHSCs enable us to focus on a method of gene editing called gene correction, either through the replacement of an entire diseased gene in the genome with a whole functional copy or the precise repair of individual mutated nucleotides, by harnessing the naturally occurring deoxyribonucleic acid, or DNA, repair process of homologous recombination, or HR. We believe our HR-driven gene editing approach will allow us to efficiently perform gene correction at therapeutic levels without unwanted on- and off-target modifications, and to directly measure and confirm those modifications in an unbiased manner to ensure only the intended changes are made. By utilizing the body's natural mechanism of correcting gene defects, we also avoid the need for exogenous nucleases, or bacteria-derived enzymes used in other gene editing approaches to cut DNA, that are known to significantly increase the risk of unwanted modifications. Our diverse set of AAVHSCs allows us to precisely target, via a single intravenous injection, a wide range of disease-relevant tissues, including the liver, CNS, bone marrow, lung, muscle and eye, across both modalities—gene editing and gene therapy. We believe these advantages will allow us to safely provide transformative cures using either modality.

We have generated compelling preclinical data for our first and lead product candidate, HMI-102, a gene therapy for the treatment of phenylketonuria, or PKU, and are advancing HMI-102 into a Phase 1/2 clinical trial. We expect to initiate the Phase 1/2 trial in PKU patients and to receive initial clinical data in 2019. We continue to advance our gene editing modality and have generated *in vivo* preclinical data demonstrating achievement of gene correction efficiencies that are significantly greater than both nuclease-based and other AAV-based approaches. We expect to nominate a lead gene editing product candidate for the treatment of PKU in 2018. We are a preclinical company and have not yet submitted an investigational new drug application for HMI-102 or any other product candidate. We will require additional capital in order to advance HMI-102 beyond our planned Phase 1/2 clinical trial.

Our management team has a successful track record of discovering, developing and commercializing therapeutics with a particular focus on rare diseases. Our genetic medicines platform is based on gene editing and gene therapy technologies resulting from the pioneering work conducted on AAVHSCs in the laboratory of one of our founders, Saswati Chatterjee, Ph.D., of COH. We have a robust intellectual property portfolio with issued composition of matter patents in the United States for our suite of 15 AAVHSCs and we believe the breadth and depth of our intellectual property is a strategic asset that has the potential to provide us with a significant competitive advantage. We continue to build on our intellectual property estate through our ongoing efforts to discover new AAVHSCs. We have internal process development and pilot manufacturing capabilities and are in the process of building out a cGMP manufacturing facility to support our clinical development programs. We recently entered into a collaboration with Novartis to develop new genetic medicines using our HR-based gene correction approach in ophthalmology, which leverages our platform technology into a new therapeutic area, and hemoglobinopathy. Since our inception in 2015, we have raised $137.0 million through preferred stock financings, including investments from 5AM Ventures, ARCH Venture Partners, Deerfield, Temasek, FMR, Novartis, Rock Springs Capital, VIVO, HBM Partners, Maverick and Vida, or affiliates thereof, in addition to others. We believe

that our compelling preclinical data, scientific expertise, product development strategy, manufacturing capabilities, and robust intellectual property position us as a leader in the development of genetic medicines.

We were incorporated and commenced operations in 2015. Since our incorporation, we have devoted substantially all of our resources to organizing and staffing our company, business planning, raising capital, developing our technology platform, advancing our lead product candidate, HMI-102, researching and identifying additional product candidates, developing manufacturing processes, building our intellectual property portfolio, and providing general and administrative support for these operations. To date, we have financed our operations primarily with proceeds from the sales of our preferred stock. Through December 31, 2017, we raised approximately $137 million in gross proceeds from the sale of Series A and Series B convertible preferred stock, and we received an up-front payment of $35 million from Novartis, our collaboration partner.

We are a development stage company and our lead product candidate and our research initiatives are all at a preclinical stage of development. To date, we have not generated any revenue from product sales and do not expect to generate any revenue from the sale of products in the foreseeable future. Since inception, we have incurred significant operating losses. Our net losses for the years ended December 31, 2017 and 2016 were $30.0 million and $8.0 million, respectively. As of December 31, 2017, we had an accumulated deficit of $40.2 million. We do not expect to generate revenue from sales of any products for years, if at all.

Our total operating expenses were $29.7 million and $10.0 million for the years ended December 31, 2017 and 2016, respectively. We expect our operating expenses to increase substantially in connection with our ongoing development activities related to our product candidates. We anticipate that our expenses will increase substantially due to costs associated with our preclinical activities for our lead gene therapy program for the treatment of PKU and the advancement of this product candidate into a Phase 1/2 clinical trial in the U.S., which we expect to initiate in 2019, development activities associated with our other gene editing and gene therapy product candidates, research activities in additional therapeutic areas to expand our pipeline, hiring additional personnel in manufacturing, research, clinical trials, quality and other functional areas, increased expenses incurred with contract manufacturing organizations, or CMOs, to supply us with product for our preclinical and clinical studies, as well as the further development of internal manufacturing capabilities and capacity and other associated costs including the management of our intellectual property portfolio. In addition, upon the closing of this offering, we expect to incur additional costs associated with operating as a public company.

As a result of these anticipated expenditures, we will need additional financing to support our continuing operations. We expect to finance our operations through a combination of public or private equity or debt financings or other sources, which may include collaborations with third parties. Adequate additional financing may not be available to us on acceptable terms, or at all. Our inability to raise capital as and when needed would have a negative impact on our financial condition and our ability to pursue our business strategy. We will need to generate significant revenue to achieve profitability, and we may never do so.

We believe that our existing cash resources, not including the proceeds from this offering, will enable us to fund our projected operating expenses and capital expenditures for at least the next 12 months. We expect that these cash resources, together with anticipated net proceeds from the offering, will enable us to fund our current and planned operating expenses and capital expenditures for at least the next two years. We have based these estimates on assumptions that may prove to be imprecise, and we may use our available capital resources sooner than we currently expect. See “Liquidity and Capital Resources.” Because of the numerous risks and uncertainties associated with the development of our product candidates and any future product candidates, our platform and technology and because the extent to which we may enter into collaborations with third parties for development of any of our product candidates is unknown, we are unable to estimate the amounts of increased capital outlays and operating expenses associated with completing the research and development of our product candidates. Our future capital requirements will depend on many factors, including:

- the costs, timing, and results of our ongoing research and development efforts on our lead gene therapy program for the treatment of PKU;

- the costs, timing, and results of our research and development efforts on future product candidates in our gene editing and gene therapy pipeline;
- the costs and timing of process development and manufacturing scale-up activities, supplies of our product candidates for preclinical studies and clinical trials through CMOs and internal manufacturing;
- the costs and timing of preparing, filing, and prosecuting patent applications, maintaining and enforcing our intellectual property rights and defending any intellectual property-related claims, including any claims by third parties that we are infringing upon their intellectual property rights;
- the effect of competitors and market developments; and
- our ability to establish and maintain strategic collaborations, licensing or other agreements and the financial terms of such agreements for our product candidates.

Adequate additional funds may not be available to us on acceptable terms, or at all. To the extent that we raise additional capital through the sale of equity or convertible debt securities, your ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect your rights as a shareholder. Any future debt financing or preferred equity or other financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends and may require the issuance of warrants, which could potentially dilute your ownership interests.

If we raise additional funds through collaborations, strategic alliances, or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings when needed, we may be required to delay, limit, reduce, or terminate our product development programs or any future commercialization efforts or grant rights to develop and market product candidates that we would otherwise prefer to develop and market ourselves.

Because of the numerous risks and uncertainties associated with drug development, we are unable to predict the timing or amount of increased expenses or when or if we will be able to achieve or maintain profitability. Even if we are able to generate revenue from product sales, we may not become profitable. If we fail to become profitable or are unable to sustain profitability on a continuing basis, then we may be unable to continue our operations at planned levels and be forced to reduce or terminate our operations.

Components of Our Results of Operations

Revenue

To date, we have not generated any revenue from product sales and do not expect to generate any revenue from the sale of products in the foreseeable future. We did not recognize any revenue from our collaboration with Novartis in 2017. We recorded the amounts received from Novartis as deferred revenue (see Note 16 to our Financial Statements for additional information regarding Novartis revenue recognition discussion).

Operating Expenses

Our operating expenses since inception have consisted solely of research and development costs and general and administrative costs.

Research and Development Expenses

Research and development expenses consist primarily of costs incurred for our research activities, including our discovery efforts, and the development of our product candidates, and include:

- salaries, benefits and other related costs, including stock-based compensation expense, for personnel engaged in research and development functions;
- expenses incurred under agreements with third parties, including CROs and other third parties that conduct research, preclinical activities and clinical trials on our behalf as well as CMOs that manufacture our product candidates for use in our preclinical and potential future clinical trials;
- costs of outside consultants, including their fees, stock-based compensation and related travel expenses;
- the costs of laboratory supplies and acquiring, developing and manufacturing preclinical study and clinical trial materials;
- facility-related expenses, which include direct depreciation costs and allocated expenses for rent and maintenance of facilities and other operating costs.

We expense research and development costs as incurred.

We typically use our employee and infrastructure resources across our development programs. We track outsourced development costs by product candidate or development program, but we do not allocate personnel costs, license payments made under our licensing arrangements or other internal costs to specific development programs or product candidates. These costs are included in other research and development expenses in the table below.

The following table summarizes our research and development expenses by product candidate or development program:

	Year Ended December 31,		
(in thousands)	2017	2016	Decrease (Increase)
HMI-102 external development costs	$ 3,964	$ 849	$ (3,115)
Employee-related costs	5,518	2,299	(3,219)
Other research and development costs	11,896	2,547	(9,349)
Total research and development expenses	$21,378	$5,695	$(15,683)

Research and development activities are central to our business model. We expect that our research and development expenses will continue to increase substantially for the foreseeable future as we initiate additional clinical trials of HMI-102, including our Phase 1/2 clinical trial, and continue to discover and develop additional product candidates.

We cannot determine with certainty the duration and costs of future clinical trials of HMI-102 or any other product candidate we may develop or if, when, or to what extent we will generate revenue from the commercialization and sale of any product candidate for which we obtain marketing approval. We may never succeed in obtaining marketing approval for any product candidate. The duration, costs and timing of clinical

trials and development of HMI-102 and any other our product candidate we may develop will depend on a variety of factors, including:

- the scope, rate of progress, expense and results of clinical trials of HMI-102, as well as of any future clinical trials of other product candidates and other research and development activities that we may conduct;
- uncertainties in clinical trial design and patient enrollment rates;
- the actual probability of success for our product candidates, including the safety and efficacy, early clinical data, competition, manufacturing capability and commercial viability;
- significant and changing government regulation and regulatory guidance;
- the timing and receipt of any marketing approvals; and
- the expense of filing, prosecuting, defending and enforcing any patent claims and other intellectual property rights.

A change in the outcome of any of these variables with respect to the development of a product candidate could mean a significant change in the costs and timing associated with the development of that product candidate. For example, if the FDA or another regulatory authority were to require us to conduct clinical trials beyond those that we anticipate will be required for the completion of clinical development of a product candidate, or if we experience significant delays in our clinical trials due to patient enrollment or other reasons, we would be required to expend significant additional financial resources and time on the completion of clinical development.

General and Administrative Expenses

General and administrative expenses consist primarily of salaries and other related costs, including stock-based compensation, for personnel in our executive, finance, business development and administrative functions. General and administrative expenses also include legal fees relating to intellectual property and corporate matters; professional fees for accounting, auditing, tax and consulting services; insurance costs; travel expenses; and facility-related expenses, which include direct depreciation costs and allocated expenses for rent and maintenance of facilities and other operating costs.

We expect that our general and administrative expenses will increase in the future as we increase our personnel headcount to support increased research and development activities relating to our HMI-102 product development candidate and any other product candidate we may develop. We also expect to incur increased expenses associated with being a public company, including costs of accounting, audit, legal, regulatory and tax-related services associated with maintaining compliance with Nasdaq and SEC requirements; director and officer insurance costs; and investor and public relations costs.

Interest Income

Interest income consists of interest income earned on our cash, cash equivalents and short-term investments. Our interest income has increased due to higher investment balances in 2017.

Income Taxes

Since our inception in 2015, we have not recorded any U.S. federal or state income tax benefits for the net losses we have incurred in any year or for our earned research and development tax credits, due to our uncertainty of realizing a benefit from those items. As of December 31, 2017, we had federal and state net

operating loss carryforwards of $33.4 million and $34.2 million, respectively, each of which begin to expire in 2036. As of December 31, 2017, we also had federal and state research and development tax credit carryforwards of $1.1 million and $0.8 million, respectively, each of which begin to expire in 2036.

Change in Fair Value of Convertible Preferred Stock Tranche Liability

We have determined that our obligation to issue, and our investors' obligation to purchase, additional shares of Series A preferred stock in the second of two tranches represent a freestanding financial instrument. The freestanding tranche liability was initially recorded at fair value, with gains and losses arising from changes in fair value recognized in other income in the statements of operations at each period end such instruments are outstanding. The liability was valued using an income approach, specifically the discounted cash flow method. On February 10, 2017, we issued 28,873,237 shares of our Series A preferred stock at $0.71 per share upon the achievement of certain development milestones, resulting in net proceeds of approximately $20.5 million. We adjusted the carrying value of the convertible preferred stock tranche liability to its estimated fair value at each reporting date and upon issuance of the second tranche of Series A preferred stock on February 10, 2017, recognizing the changes in fair value in other income (expense) in the consolidated statement of operations. During the years ended December 31, 2017 and 2016, we recognized total other income (expense) of $(876,000) and $1,929,000, respectively, related to changes in the fair value of the convertible preferred stock tranche liability.

Critical Accounting Policies and Use of Estimates

Our management's discussion and analysis of financial condition and results of operations is based on our financial statements, which have been prepared in accordance with generally accepted accounting principles in the United States. The preparation of our financial statements and related disclosures requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities, costs and expenses and the disclosure of contingent assets and liabilities in our financial statements. We base our estimates on historical experience, known trends and events and various other factors that we believe are reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. We evaluate our estimates and assumptions on an ongoing basis. Our actual results may differ from these estimates under different assumptions or conditions.

While our significant accounting policies are described in more detail in the notes to our financial statements appearing at the end of this prospectus, we believe that the following accounting policies are those most critical to the judgments and estimates used in the preparation of our financial statements.

Revenue Recognition—We recognize revenue when all of the following criteria are met: persuasive evidence of an arrangement exists; delivery has occurred or services have been rendered; our price to the buyer is fixed or determinable; and collectability is reasonably assured. We record as deferred revenue any amounts received or billed prior to satisfying the revenue recognition criteria. Deferred revenue not expected to be recognized within the next twelve months is reported as non-current deferred revenue.

In November 2017, we entered into a collaboration and license agreement for research, development, manufacturing and commercialization of products using our gene editing technology for the treatment of certain diseases (see Note 16 to our consolidated financial statements included elsewhere in this prospectus). Consideration we may receive under the collaboration and license agreement include upfront nonrefundable payments, payments for research and manufacturing activities, payments based upon the achievement of certain milestones and royalties on any resulting net product sales.

Multiple Element Arrangements

The terms of the Collaboration Agreement contain multiple deliverables, including licenses, research and development activities, participation on steering committees and manufacturing activities. We evaluate the

activities in our collaboration agreements to determine if the activities are consistent with a typical vendor-customer relationship, and if so, account for them in accordance with Accounting Standards Codification, or ASC, Topic 605-25, *Revenue Recognition—Multiple Element Arrangements*. If not, we evaluate other applicable guidance.

We evaluate multiple element arrangements to determine the deliverables included in the arrangement and whether the individual deliverables represent separate units of accounting, or whether they must be accounted for as a combined unit of accounting. When deliverables are separable, consideration received is allocated to the separate units of accounting based on the relative selling price method and the appropriate revenue recognition principles are applied to each unit. This evaluation requires us to make judgments about the individual deliverables and whether such deliverables (1) have value to the customer on a standalone basis and (2) if the arrangement includes a general right of return with respect to the delivered item, delivery or performance of the undelivered item is considered probable and substantially in our control. In assessing whether an item has standalone value, we consider factors such as the research, development, manufacturing and commercialization capabilities of the collaboration partner and the availability of the associated expertise in the general marketplace. In addition, we consider whether the collaboration partner can use any other deliverable for its intended purpose without the receipt of the remaining deliverables, whether the value of the deliverable is dependent on any undelivered item, and whether there are other vendors that can provide the undelivered items.

The consideration received under the arrangement that is fixed or determinable is then allocated among the separate units of accounting based on the relative selling prices of the separate units of accounting. For arrangements identified with multiple units of accounting, an allocation of the consideration is performed. We determine the estimated selling price for units of accounting within each arrangement using vendor-specific objective evidence, or VSOE, if available; third-party evidence, or TPE, of selling price if VSOE is not available; or best estimate of selling price, or BESP, if neither VSOE nor TPE is available. We typically use BESP to estimate the selling price as it generally does not have VSOE or TPE of selling price for its units of accounting. Determining the BESP for a unit of accounting requires significant judgment. In developing the BESP for a unit of accounting, we consider applicable market conditions and relevant entity-specific factors, including factors that were contemplated in negotiating the agreement with the customer and estimated costs.

We recognize arrangement consideration allocated to each unit of accounting when all of the revenue recognition criteria are satisfied for that particular unit of accounting. We recognize revenue from a combined unit of accounting over the contractual or estimated performance period for the undelivered items. If there is no discernible pattern of performance or objectively measurable performance measures do not exist for a unit of accounting, then we recognize revenue on a straight-line basis over the period we are expected to complete our performance obligations. Conversely, if the pattern of performance over which the service is provided to the customer can be determined and objectively measurable performance measures exist, then we recognize revenue under the arrangement using the proportional performance method. Amounts received prior to satisfying the associated revenue recognition criteria are recorded as deferred revenue on the consolidated balance sheets. Amounts not expected to be recognized within one year following the balance sheet date are classified as non-current deferred revenue.

Significant management judgment is required in determining the level of effort required under an arrangement and the period over which we expect to complete our performance obligations under an arrangement. Steering committee services that are not inconsequential or perfunctory and that are determined to be performance obligations are combined with other research services or performance obligations required under an arrangement, if any, in determining the level of effort required in an arrangement and the period over which we expect to complete our aggregate performance obligations.

Consideration for development and sales milestones are generally not considered fixed or determinable until the milestone is achieved. Consideration due to or received by us for the achievement of milestones are allocated to the units of accounting, if applicable, and recognized as revenue for the portion of the performance

obligation that is complete at the time the milestone is achieved. We will defer the remaining portion of the milestone payment and recognize it as revenue over the remaining term of the performance obligation. If no such performance obligation exists, milestone payments are recognized as revenue upon achievement, assuming all other revenue recognition criteria are met.

Royalties earned on product sales, if any, are recognized based on contractual terms of the agreement when reported sales are reliably measurable and collectibility is reasonably assured, provided that there are no performance obligations then remaining. To date, none of our product candidates have been approved and, therefore, we have not earned any royalty revenue from product sales.

In the event that the agreement were to be terminated and we had no further performance obligations at that time, we would recognize as revenue any portion of the upfront payment and other payments that had not previously been recorded as revenue and were classified as deferred revenue at the date of such termination.

Accrued Research and Development Expenses

As part of the process of preparing our financial statements, we are required to estimate our accrued research and development expenses. This process involves reviewing open contract and purchase orders, communicating with our personnel to identify services that have been performed on our behalf and estimating the level of service performed and the associated costs incurred for the services when we have not yet been invoiced or otherwise notified of the actual costs. The majority of our service providers invoice us in arrears for services performed, on a pre-determined schedule or when contractual milestones are met; however, some require advanced payments. We make estimates of our accrued expenses as of each balance sheet date in our financial statements based on facts and circumstances known to us at that time. Examples of estimated accrued research and development expenses include fees paid to:

- CROs and other third parties in connection with performing research activities on our behalf and conducting preclinical studies on our behalf and CMOs in connection with producing product for our preclinical studies;
- vendors in connection with preclinical development activities; and
- vendors related to product manufacturing and development and distribution of preclinical supplies.

We base our expenses related to preclinical studies on our estimates of the services received and efforts expended pursuant to quotes and contracts with CROs that conduct and manage preclinical studies and clinical trials and CMOs that manufacture product for our research and development activities on our behalf. The financial terms of these agreements are subject to negotiation, vary from contract to contract and may result in uneven payment flows. There may be instances in which payments made to our vendors will exceed the level of services provided and result in a prepayment of the expense. In accruing fees, we estimate the time period over which services will be performed and the level of effort to be expended in each period. If the actual timing of the performance of services or the level of effort varies from our estimate, we adjust the accrual or amount of prepaid expense accordingly. Although we do not expect our estimates to be materially different from amounts actually incurred, our understanding of the status and timing of services performed relative to the actual status and timing of services performed may vary and may result in us reporting amounts that are too high or too low in any particular period. To date, we have not made any material adjustments to our prior estimates of accrued research and development expenses.

Fair Value Measurements

Tranche Rights

The Series A preferred stock purchase agreement that we entered into provided the investors with the right, upon achievement of certain milestones, to participate in subsequent offerings of Series A preferred stock, which we refer to as convertible preferred stock tranche rights. The tranche rights meet the definition of a freestanding financial instrument, as the tranche rights are legally detachable and separately exercisable from the Series A preferred stock. Since the Series A preferred stock is redeemable upon certain change in control events that are outside of our control, the tranche rights are classified as an asset or liability and were initially recorded at fair value and then marked to market at each subsequent reporting period, through the settlement of the tranche rights.

We determine fair value utilizing the concept of "Fair Value" from ASC Topic 820, *Fair Value Measurement*, or ASC 820, that states that any fair value measurement requires that the reporting entity to determine the valuation technique(s) appropriate for the measurement, considering the availability of data with which to develop inputs that represent the assumptions that market participants would use in pricing the asset or liability and the level in the fair value hierarchy within which the inputs are categorized.

The estimated fair value of the tranche rights was determined using an income approach, specifically the discounted cash flow method, that considered the probability and timing of closing a tranche, the estimated future value of the Series A preferred stock to be issued at each closing, and the amount of the investment required at each closing. Future values were converted to present value using a discount rate appropriate for probability-adjusted cash flows. Upon the settlement of each tranche, the fair value of the tranche rights associated with that tranche was reclassified to Series A preferred stock at its then fair value and thereafter was no longer re-measured.

Stock-Based Compensation

We measure stock options and other stock-based awards granted to employees, directors, consultants or advisors of the company or its affiliates based on their fair value on the date of the grant and recognize compensation expense of those awards, net of estimated forfeitures, over the requisite service period, which is generally the vesting period of the respective award. We apply the straight-line method of expense recognition to all awards with only service-based vesting conditions and apply the graded-vesting method to all awards with performance-based vesting conditions or to awards with both service-based and performance-based vesting conditions.

For stock-based awards granted to non-employees, compensation expense is recognized over the period during which services are rendered by such non-employees until completed. At the end of each financial reporting period prior to the completion of the service, the fair value of these awards is re-measured using the then-current fair value of our common stock and updated assumption inputs in the Black-Scholes option-pricing model.

We estimate the fair value of each stock option grant on the date of grant using the Black-Scholes option-pricing model, which uses as inputs the fair value of our common stock and assumptions we make for the volatility of our common stock, the expected term of our stock options, the risk-free interest rate for a period that approximates the expected term of our stock options and our expected dividend yield.

Determination of Fair Value of Common Stock

As there has been no public market for our common stock to date, the estimated fair value of our common stock has been determined by our board of directors as of the date of each option grant, with input from

management, considering our most recently available third-party valuations of common stock and our board of directors' assessment of additional objective and subjective factors that it believed were relevant and which may have changed from the date of the most recent valuation through the date of the grant. Third-party valuations were performed in accordance with the guidance outlined in the American Institute of Certified Public Accountants' Accounting and Valuation Guide, *Valuation of Privately-Held-Company Equity Securities Issued as Compensation*. Our common stock valuations were prepared using a market approach, specifically the guideline transaction method. To derive the total equity value under the guideline transaction method, recent mergers and acquisitions within the biotechnology and pharmaceutical industries were compared for similar stage companies. An option pricing allocation method, or OPM, was selected to allocate the total equity value. The OPM treats common stock and preferred stock as call options on the total equity value of a company, with exercise prices based on the value thresholds at which the allocation among the various holders of a company's securities changes. Under this method, the common stock has value only if the funds available for distribution to stockholders exceeded the value of the preferred stock liquidation preference at the time of the liquidity event, such as a strategic sale or a merger. These third-party valuations resulted in a valuation of our common stock of $1.26 and $0.12 per share as of December 31, 2017 and 2016, respectively.

In addition to considering the results of these third-party valuations, our board of directors considered various objective and subjective factors to determine the fair value of our common stock as of each grant date, including:

- the prices at which we sold shares of preferred stock and the superior rights and preferences of the preferred stock relative to our common stock at the time of each grant;
- the progress of our research and development programs, including the status and results of preclinical studies for our product candidates;
- our stage of development and commercialization and our business strategy;
- external market conditions affecting the biopharmaceutical industry and trends within the biopharmaceutical industry;
- our financial position, including cash on hand, and our historical and forecasted performance and operating results;
- the lack of an active public market for our common stock and our preferred stock;
- the likelihood of achieving a liquidity event, such as an initial public offering, or IPO, or sale of our company in light of prevailing market conditions; and
- the analysis of IPOs and the market performance of similar companies in the biopharmaceutical industry.

The assumptions underlying these valuations represented management's best estimate, which involved inherent uncertainties and the application of management's judgment. As a result, if we had used different assumptions or estimates, the fair value of our common stock and our stock-based compensation expense could have been materially different.

Emerging Growth Company Status

The Jumpstart Our Business Startups Act of 2012, or the JOBS Act, permits an "emerging growth company," which we are, to take advantage of an extended transition period to comply with new or revised

accounting standards applicable to public companies until those standards would otherwise apply to private companies. We have elected to take advantage of this extended transition period.

Recent Accounting Pronouncements

In May 2014, the Financial Accounting Standards Board, or FASB, issued Accounting Standards Update, or ASU, No. 2014-09, *Revenue (Topic 606): Revenue from Contracts with Customers, or ASU 2014-09*, which will replace existing revenue recognition standards and significantly expand the disclosure requirements for revenue arrangements. The new standard and the subsequent amendments will be effective for us beginning on January 1, 2019. We are in the process of evaluating the impact of the adoption of ASU No. 2014-09 on our consolidated financial statements. We will continue to assess the potential impact that Topic 606 may have on our financial position and results of operations as it relates to our collaboration with Novartis (see Note 16 to our consolidated financial statements included elsewhere in this prospectus). We expect that certain accounting conclusions will require further judgment, including, but not limited to, the evaluation of variable consideration, and in particular, milestone payments due from Novartis as the inclusion of milestone payments in the transaction price could accelerate revenue recognized under ASC 606 compared to ASC 605.

In February 2016, the FASB issued ASU No. 2016-02, *Leases* (Topic 842), which eliminates the current tests for lease classification under U.S. GAAP and requires lessees to recognize the right-to-use assets and related lease liabilities in the balance sheet. ASU No. 2016-02 is effective for us beginning January 1, 2020 with early application permitted. The new standard provides for a modified retrospective application. We are in the process of evaluating the impact of the adoption of ASU No. 2016-02 on our consolidated financial statements.

In March 2016, the FASB issued ASU No. 2016-09, *Compensation—Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting*, which changes certain aspects of the accounting for share-based payments to employees. ASU No. 2016-09 is effective for us beginning January 1, 2018, with early application permitted. Certain changes will be applied prospectively and other changes will be applied using a modified retrospective approach with the recognition of the cumulative effect of the application of the new standard as of the beginning of the period of initial application. We are in the process of evaluating the impact of the adoption of ASU No. 2016-09 on our consolidated financial statements.

In December 2016, the FASB issued ASU No. 2016-18, *Statement of Cash Flows (Topic 230): Restricted Cash (a consensus of the FASB Emerging Issues Task Force)*, which requires that amounts described as restricted cash or cash equivalents must be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. ASU 2016-18 is effective for us beginning January 1, 2019 , with early application permitted. The new standard must be applied retrospectively to all periods presented. We are in the process of evaluating the impact that this standard will have on our consolidated financial statements.

Results of Operations

Comparison of Years Ended December 31, 2017 and 2016

The following table summarizes our results of operations for the years ended December 31, 2017 and 2016, respectively:

	Year Ended December 31,		
(in thousands)	2017	2016	Decrease (Increase)
Operating expenses:			
Research and development	$ 21,378	$ 5,695	$(15,683)
General and administrative	8,279	4,305	(3,974)
Total operating expenses	29,657	10,000	(19,657)
Loss from operations	(29,657)	(10,000)	(19,657)
Other income (expense):			
Change in fair value of convertible preferred stock tranche liability	(876)	1,929	(2,805)
Interest income	542	24	518
Total other income (expense)	(334)	1,953	(2,287)
Net loss	$(29,991)	$ (8,047)	$(21,944)

Research and Development Expenses

	Year Ended December 31,		
(in thousands)	2017	2016	Change
HMI-102 external development costs	$ 3,964	$ 849	$ (3,115)
Employee-related costs	5,518	2,299	(3,219)
Other research and development costs	11,896	2,547	(9,349)
Total research and development expenses	$21,378	$5,695	$(15,683)

Research and development expenses for the year ended December 31, 2017 were $21.4 million, compared to $5.7 million for the year ended December 31, 2016. The increase of $15.7 million was primarily due to an increase of $3.1 million in direct research expenses related to our HMI-102 program, a $4.5 million payment to COH for sublicensing fees which was expensed to research and development and the majority of the remaining increase was due to an increase in employee headcount to support technology platform and manufacturing capabilities.

General and Administrative Expenses

General and administrative expenses were $8.3 million for the year ended December 31, 2017, compared to $4.3 million for the year ended December 31, 2016. The increase of $4.0 million was primarily due to $1.9 million in increased employee headcount, $0.9 million in occupancy costs and professional fees of $0.6 million as a result of ongoing business activities.

Interest Income

Interest income was $0.5 million for the year ended December 31, 2017 compared to less than $0.1 million for the year ended December 31, 2016. The increase was the result of interest income generated on our higher average cash, cash equivalent and short-term investment balances for the year ended December 31, 2017 compared to the year ended December 31, 2016, due to the receipt of $20.5 million in proceeds from our Series A preferred stock financing in February 2017, receipt of $83.5 million in proceeds from our Series B preferred stock financing in July 2017 and Novartis' up-front payment of $35.0 million and additional proceeds of $10.0 million from the issuance of Series B preferred stock to Novartis in November 2017.

Change in Fair Value of Tranche Liability

For the year ended December 31, 2017, the changes in fair value of our preferred stock tranche liability resulted in a $0.9 million loss compared to a $1.9 million gain for the year ended December 31, 2016. The derivative loss in 2017 was due to the re-measurement and subsequent de-recognition of the tranche liability upon achievement of the development milestone in February 2017 and the issuance of shares of our Series A preferred stock. For the year ended December 31, 2016, the gain was due to the increase in the fair value of the underlying preferred shares on a period-over-period basis.

Liquidity and Capital Resources

Since our inception, we have incurred significant operating losses. We expect to incur significant expenses and operating losses for the foreseeable future as we advance the preclinical and clinical development of our product candidates. We expect that our research and development and general and administrative costs will increase in connection with conducting preclinical studies and clinical trials for our product candidates, contracting with CMOs and building out internal capacity to have product manufactured to support preclinical studies and clinical trials, expanding our intellectual property portfolio, and providing general and administrative support for our operations. As a result, we will need additional capital to fund our operations, which we may obtain from additional equity or debt financings, collaborations, licensing arrangements, or other sources.

We do not currently have any approved products and have never generated any revenue from product sales. To date, we have financed our operations primarily through the sale of preferred stock and through an up-front payment from a collaboration partner. Since we were incorporated, we have raised a total of $137.0 million in gross proceeds from the sale of shares of our Series A and Series B convertible preferred stock and a one-time up-front payment of $35.0 million from a collaboration partner.

Cash Flows

Our cash, cash equivalents and short-term investments totaled $129.7 million and $11.4 million as of December 31, 2017 and 2016, respectively. We had no indebtedness as of December 31, 2017 and 2016.

The following table summarizes our sources and uses of cash for the period presented:

(in thousands)	Year Ended December 31, 2017	2016
Net cash provided by (used in) operating activities	$ 6,479	$ (8,484)
Net cash used in investing activities	(81,526)	(2,265)
Net cash provided by financing activities	115,230	378
Increase (decrease) in cash and cash equivalents	$ 40,183	$(10,371)

Cash Flows for the year ended December 31, 2017

Operating Activities

Net cash provided by operating activities for the year ended December 31, 2017 was $6.5 million, consisting of a $35.0 million up-front payment received from a collaboration partner and recorded as deferred revenue, net of $1.7 million allocated to convertible preferred stock and changes in our operating assets and liabilities of $1.3 million. This was partially offset by our net losses of $30.0 million as we incurred expenses associated with research activities on our lead gene therapy program for PKU and research activities on other applications for our technology and incurred general and administrative expenses. In addition, we had non-cash charges totaling $1.8 million including the change in fair value of a convertible preferred stock tranche liability, depreciation and stock-based compensation expense offset by accretion on short-term investments. Net cash provided by changes in our operating assets and liabilities was due to increases of $33.4 million in deferred revenue, $1.7 million in accounts payable and $0.9 million in accrued expenses and other liabilities, partially offset by a decrease of $1.5 million in prepaid expenses and other current assets.

Investing Activities

Net cash used in investing activities for the year ended December 31, 2017 was $81.5 million, attributable to the purchases of short-term investments of $78.1 million, the purchases of property and equipment of $2.0 million, and the change in restricted cash of $1.5 million related to a new facility lease.

Financing Activities

Net cash provided by financing activities for the year ended December 31, 2017 was $115.2 million, consisting of the net proceeds from the second tranche of the Series A convertible preferred stock financing of $20.5 million and the net proceeds from the issuance of Series B convertible preferred stock of $94.8 million, net of issuance costs.

Cash Flows for the year ended December 31, 2016

Operating Activities

Net cash used in operating activities for the year ended December 31, 2016 was $8.5 million, consisting of our net loss of $8.0 million as we incurred expenses associated with research activities on our lead gene therapy program for PKU and research activities on other applications for our technology and incurred general and administrative expenses. In addition, we had a gain of $1.9 million on the change in fair value of a convertible preferred stock tranche liability, offset by non-cash charges of $0.4 million for depreciation and stock-based compensation expense. Net cash used in operating activities were also impacted by $0.9 million in changes in operating assets and liabilities including $0.5 million in accounts payable, $0.7 million in accrued expenses and other liabilities and $0.2 million in deferred rent, partially offset by a change of $0.5 million in prepaid expenses and other current assets.

Investing Activities

Net cash used in investing activities for the year ended December 31, 2016 was $2.3 million, attributable to purchases of property and equipment of $2.0 million and the change in restricted cash of $0.3 million.

Financing Activities

Net cash provided by financing activities for the year ended December 31, 2016 was $0.4 million in proceeds from the issuance of restricted common stock relating to the exercise of stock options by employees.

Funding Requirements

Our operating expenses have increased substantially in 2017 and are expected to increase substantially in the future in connection with our ongoing activities, particularly as we advance our preclinical activities including pre-IND enabling studies, scale-up of manufacturing processes and engagement with CMOs and initiation of human clinical trials. In addition, upon the closing of this offering, we expect to incur additional costs associated with operating as a public company.

Specifically, our expenses will increase as we:

- pursue the preclinical and clinical development of our lead product candidate in gene therapy, HMI-102, for the treatment of PKU;
- pursue the preclinical and clinical development of other product candidates based on our gene editing and gene therapy technology;

- further scale up our internal manufacturing processes and capabilities and contract with CMOs to support our preclinical studies and clinical trials of our product candidates;
- in-license or acquire the rights to other products, product candidates or technologies;
- maintain, expand and protect our intellectual property portfolio;
- hire additional personnel in research, manufacturing and regulatory and clinical development as well as management personnel; and
- expand our operational, financial and management systems and increase personnel, including personnel to support our operations as a public company.

We believe that the anticipated net proceeds from this offering, together with our existing cash on hand will enable us to fund our operating expenses and capital expenditure requirements for at least the next two years. We have based these estimates on assumptions that may prove to be imprecise, and we could utilize our available capital resources sooner than we expect.

Because of the numerous risks and uncertainties associated with research, development and commercialization of pharmaceutical drugs, it is difficult to estimate with certainty the amount of our working capital requirements. Our future funding requirements will depend on many factors, including:

- the progress, costs and results of our preclinical development and initial clinical trials for our lead gene therapy program for the treatment of PKU;
- the progress, costs and results of our additional research and preclinical development programs in gene editing and gene therapy;
- the costs and timing of internal process development and manufacturing scale-up activities and contract with CMOs associated with our PKU program and other programs we advance through preclinical and clinical development;
- our ability to establish and maintain strategic collaborations, licensing or other agreements and the financial terms of such agreements;
- the scope, progress, results and costs of any product candidates that we may derive from our platform technology or any other product candidates that we may develop;
- the extent to which we in-license or acquire rights to other products, product candidates or technologies; and
- the costs and timing of preparing, filing and prosecuting patent applications, maintaining and protecting our intellectual property rights and defending against any intellectual property-related claims.

Until such time, if ever, that we can generate product revenue sufficient to achieve profitability, we expect to finance our cash needs through a combination of equity offerings, debt financings, collaboration agreements, other third-party funding, strategic alliances, licensing arrangements and marketing and distribution arrangements.

To the extent that we raise additional capital through the sale of equity or convertible debt securities, your ownership interest will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect your rights as a common stockholder. Debt financing and preferred equity

financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through other third-party funding, collaboration agreements, strategic alliances, licensing arrangements or marketing and distribution arrangements, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds through equity or debt financings when needed, we may be required to delay, limit, reduce or terminate our product development or future commercialization efforts or grant rights to develop and market products or product candidates that we would otherwise prefer to develop and market ourselves.

Contractual Obligations

The following is a summary of our significant contractual obligations as of December 31, 2017:

		Payments Due by Period			
Contractual Obligation (in thousands)	Total	Less Than 1 Year	More Than 1 Year and Less Than 3	More Than 3 years and Less Than 5	More Than 5 years
			(in thousands)		
Operating lease obligation (1)	$28,604	$ 1,546	$ 7,255	$ 6,625	$ 13,178
License obligations (2)	$ 790	$ 45	$ 90	$ 90	$ 565
Sponsored research agreement (3)	$ 791	$ 672	$ 119	$ —	$ —

(1) Represents future minimum lease payments under our operating leases for office and lab space in Bedford, Massachusetts that expire in October 2021 and February 2027.

(2) Represents minimum annual license fees under our license agreements with Caltech and COH. These amounts do not include any potential contingent payments upon the achievement by us of specified clinical, regulatory and commercial events, as applicable, or patent prosecution or royalty payments we may be required to make under license agreements we have entered into with various universities or collaboration partners pursuant to which we have in-licensed certain intellectual property, including our license agreements with Caltech and COH. We have excluded these potential payments in the contractual obligations table because the timing and likelihood of these contingent payments are not currently known and would be difficult to predict or estimate. See “Business—Strategic Collaborations” for additional information about these license agreements, including with respect to potential payments thereunder.

(3) Represents future minimum payments under our sponsored research agreement with COH.

Off-Balance Sheet Arrangements

We have not entered into any off-balance sheet arrangements and do not have any holdings in variable interest entities.

Quantitative and Qualitative Disclosures about Market Risk

We are exposed to market risks in the ordinary course of our business. These risks primarily include interest rate sensitivities. Our interest-earning assets consist of cash, cash equivalents, and short-term investments of $129.7 million, or 94.3% of our total assets at December 31, 2017, and $11.4 million, or 80.1% of our total assets at December 31, 2016. Interest income earned on these assets was $543,000 in 2017 and $24,000 in 2016. Our interest income is sensitive to changes in the general level of interest rates, primarily U.S. interest rates. At December 31, 2017, our cash equivalents consisted of bank deposits and money market funds, and our short-term investments included interest-earning securities. Such interest-earning instruments carry a degree of interest rate risk; however, historical fluctuations in interest income have not been significant for us. We had no debt outstanding as of December 31, 2017 and 2016.

BUSINESS

Overview

We are a genetic medicines company dedicated to transforming the lives of patients suffering from rare genetic diseases with significant unmet medical needs by curing the underlying cause of the disease. Our proprietary platform is designed to utilize our human hematopoietic stem cell derived adeno-associated virus vectors, or AAVHSCs, to precisely and efficiently deliver genetic medicines *in vivo* either through a gene therapy or nuclease-free gene editing modality across a broad range of genetic disorders. The unique properties of our proprietary suite of 15 novel AAVHSCs enable us to focus on a method of gene editing called gene correction, either through the replacement of an entire diseased gene in the genome with a whole functional copy or the precise repair of individual mutated nucleotides, by harnessing the naturally occurring DNA repair process of homologous recombination, or HR. We believe our HR-driven gene editing approach will allow us to efficiently perform gene correction at therapeutic levels without unwanted on- and off-target modifications, and to directly measure and confirm those modifications in an unbiased manner to ensure only the intended changes are made. By utilizing the body's natural mechanism of correcting gene defects, we also avoid the need for exogenous nucleases, or bacteria-derived enzymes used in other gene editing approaches to cut DNA, that are known to significantly increase the risk of unwanted modifications. Our diverse set of AAVHSCs allows us to precisely target, via a single intravenous injection, a wide range of disease-relevant tissues, including the liver, central nervous system, or CNS, bone marrow, lung, muscle and eye, across both modalities—gene editing and gene therapy. We believe these advantages will allow us to safely provide transformative cures using either modality.

We have generated compelling preclinical data for our first and lead product candidate, HMI-102, a gene therapy for the treatment of phenylketonuria, or PKU, and are advancing HMI-102 into a Phase 1/2 clinical trial. We expect to initiate the Phase 1/2 trial in PKU patients and to receive initial clinical data in 2019. We continue to advance our gene editing modality and have generated *in vivo* preclinical data demonstrating achievement of gene correction efficiencies that are significantly greater than both nuclease-based and other adeno-associated virus, or AAV, based approaches. We expect to nominate a lead gene editing product candidate for the treatment of PKU in 2018. We are a preclinical company and have not yet submitted an investigational new drug application, or IND, for HMI-102 or any other product candidate. We will require additional capital in order to advance HMI-102 beyond our planned Phase 1/2 clinical trial.

Our management team has a successful track record of discovering, developing and commercializing therapeutics with a particular focus on rare diseases. Our genetic medicines platform is based on gene editing and gene therapy technologies resulting from the pioneering work conducted on AAVHSCs in the laboratory of one of our founders, Saswati Chatterjee, Ph.D., of the City of Hope Medical Center in California, or COH. We have a robust intellectual property portfolio with issued composition of matter patents in the United States for our suite of 15 AAVHSCs and we believe the breadth and depth of our intellectual property is a strategic asset that has the potential to provide us with a significant competitive advantage. We continue to build on our intellectual property estate through our ongoing efforts to discover new AAVHSCs. We have internal process development and pilot manufacturing capabilities and are in the process of building out a Current Good Manufacturing Practices, or cGMP, manufacturing facility to support our clinical development programs. We recently entered into a collaboration with Novartis Institutes for Biomedical Research, Inc., or Novartis, to develop new genetic medicines using our HR-based gene correction approach in ophthalmology, which leverages our platform technology into a new therapeutic area, and hemoglobinopathy. Since our inception in 2015, we have raised $137 million through preferred stock financings, including investments from 5AM Ventures, ARCH Venture Partners, Deerfield, Temasek, Fidelity Management & Research, or FMR, Novartis, Rock Springs Capital, VIVO HBM Partners, Maverick and Vida, or affiliates thereof, in addition to others. We believe that our compelling preclinical data, scientific expertise, product development strategy, manufacturing capabilities, and robust intellectual property position us as a leader in the development of genetic medicines.

Our Opportunity in Genetic Medicines

We are currently focused on monogenic diseases where the genetic abnormality is known to occur in a single diseased gene. The majority of monogenic diseases harbor thousands of individual mutations within the

diseased gene, each resulting in a loss of function. Replacing an entire diseased gene with a whole functional gene is the optimal therapeutic approach for addressing these monogenic disorders. This can be accomplished either through a method of gene therapy called gene transfer in slowly or non-dividing cells, or through a method of gene editing called gene correction in rapidly dividing cells.

The current focus of most nuclease-based gene editing methods is gene knockout, or knocking out a diseased gene to prevent the expression of an undesired protein. Since gene knockout does not result in a fully-corrected gene, this method can only potentially address the minority of monogenic diseases where a diseased protein is overexpressed. In addition to our knockout capabilities, our HR-driven gene correction method allows us to potentially address the significant majority of monogenic diseases by replacing an entire diseased gene with a whole functional gene or repairing a single mutation to fully correct the defect. Gene therapy, on the other hand, seeks to introduce a functional copy of a defective gene or gene sequence into a patient's own cells, but not incorporate such copy into the patient's genome. This method, called gene transfer, results in the expression of the therapeutic protein of interest without changing the genome.

DNA Repair Pathways

Human cells harbor two primary independent pathways to maintain the integrity of DNA: homologous recombination, or HR, and non-homologous end joining, or NHEJ, which are described below:

- ***HR*** is a process in which cells repair DNA through highly precise incorporation of correct DNA sequences that are homologous, or matching, to the site of damage. HR has evolved to repair DNA with high fidelity and avoids the introduction of unwanted mutations at the site of correction. In the late 1990's, researchers discovered that certain adeno-associated virus, or AAV, vectors deliver gene sequences into the genome specifically through the HR process. These AAV vectors delivered long single strands of homologous DNA to specific regions in the genome and induced the HR pathway, but their low efficiency of approximately 1% limited their use as a viable option for *in vivo* therapeutics.

- ***NHEJ*** is a less selective, error-prone process that rapidly joins the ends of broken DNA resulting in a high frequency of insertions or deletions at the break site. The discovery of nuclease-based gene editing technologies provided researchers with novel tools to specifically introduce DNA breaks into the genome. The most common repair pathway following a DNA break is NHEJ. Despite high potential for error, the majority of nuclease-based gene editing companies primarily utilize the NHEJ pathway.

While the introduction of nuclease-based gene editing technologies provides the capability to initiate DNA repair pathways in the cell and further increase the frequency of targeted gene modification, we believe its major limitation is the preferential utilization of the error prone NHEJ pathway instead of the HR pathway. Because of this preference, the greatest utility of nuclease-based gene editing technologies may lie in their ability to knockout genes rather than the replacement of an entire diseased gene in the genome with a whole functional copy. Furthermore, the use of nuclease-based gene editing technologies for insertion of a corrective sequence requires the separate delivery of both nuclease and homologous DNA template, and carries the risk of unwanted mutations from NHEJ including insertions and deletions or opposite orientation insertion of the template DNA.

We believe the unique characteristics of our genetic medicines platform will allow us to focus on the HR pathway, enabling precise nuclease-free gene correction and a broader set of disease targets with improved efficiency.

Our Approach

Our unique genetic medicines platform is designed to provide us the flexibility to choose the best suited method from either gene correction or gene transfer for each disease we pursue, based on such factors as the

targeted disease biology, the biodistribution of our AAVHSCs to key tissues, and the rate of cell division the tissues exhibit. Our product development strategy is to continue to develop in parallel both gene therapy and gene editing modalities, while initially leveraging the experience from our gene transfer modality to further advance our gene correction modality. Refer to Figure 1 below for a graphical depiction of our platform.

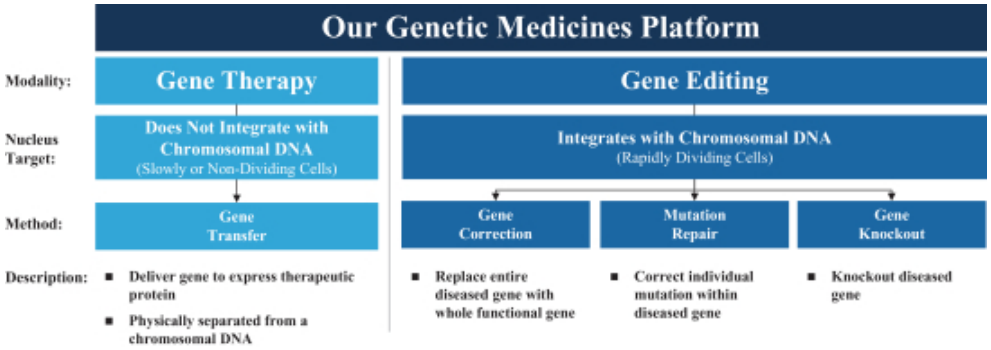


Figure 1. Our Genetic Medicines Platform.

While others are working on identifying and testing ways to mitigate the inherent risk in working with nucleases, our approach avoids the use of nucleases entirely. By targeting the HR pathway, our proprietary AAVHSCs mitigate the risks of nuclease-based technologies and have the potential to overcome other AAV vector limitations by combining the precision and high fidelity of HR with highly efficient *in vivo* gene correction, which we believe is capable of providing potential cures for a wide range of rare genetic diseases.

Our novel AAVHSCs are packaged with either a gene editing or traditional gene therapy construct. The gene editing construct includes lengthy guide sequences, or homology arms, which are designed to enable the specific alignment to the desired genomic location and then, through the natural process of HR, correction of the diseased gene in the genome by replacement with a whole functional copy. Our gene therapy construct includes a functional copy of the gene and a promotor sequence that is designed to enable the gene to be turned on in the cell and ultimately transcribed to express the therapeutic protein of interest without integrating into the genome. Refer to Figure 2 below for a graphical depiction of how our AAVHSCs enable each therapeutic modality.

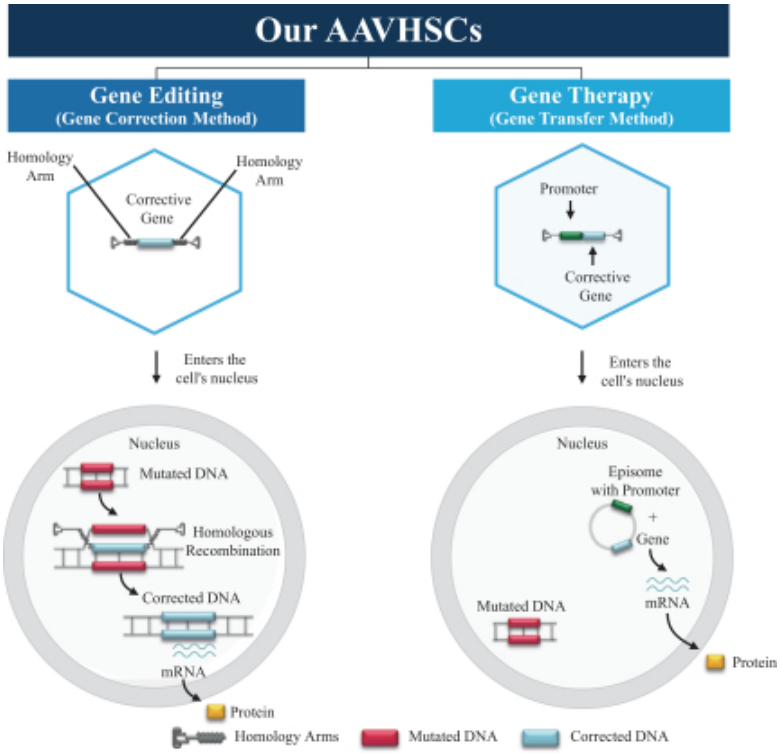


Figure 2. How Our AAVHSCs Enable Each Therapeutic Modality.

We believe our approach has several key advantages that include:

- ***Our proprietary platform AAVHSCs enable both gene therapy and gene editing modalities.*** Our platform provides us the flexibility to deliver genetic medicines through the best suited modality from either gene therapy or gene editing for each disease we pursue, based on such factors as the targeted disease biology, the biodistribution of our AAVHSCs to key tissues, and the rate of cell division the tissues exhibit.

- ***Ability to perform nuclease-free gene editing mediated by HR with high gene correction efficiency.*** Our suite of 15 novel AAVHSCs are designed to enable us to take advantage of the precise and high fidelity process of HR-directed gene insertion for nuclease-free gene editing while achieving gene correction efficiencies that are in therapeutic ranges and significantly higher than both nuclease-based and other AAV-based approaches. While nuclease-based gene editing technologies have achieved high gene knockout efficiencies in preclinical studies, they have shown limited published evidence of gene correction efficiencies to date.

- ***Ability to introduce an entire gene into the genome or the precise repair of individual mutated nucleotides in addition to gene knockout.*** Our HR-based gene editing approach provides the flexibility to introduce an entire copy of a functional gene into the genome in addition to repairing single mutations or knocking out entire genes, thus allowing us to potentially address the significant majority of monogenic diseases.

- ***High precision and lack of unwanted off-target or on-target DNA modifications.*** Our gene editing approach leverages HR, which makes DNA repairs with high fidelity, and enables us to precisely

perform gene correction without unwanted off- and on-target modifications. Furthermore, we are able to directly measure and confirm those modifications throughout the entire genome to ensure only the intended changes are made.

- ***Ability to target multiple tissues.*** In preclinical studies, intravenous administration of our suite of AAVHSCs have demonstrated ability to target a wide variety of tissues including the liver, CNS, bone marrow, eye, lung, and muscle, enabling us to potentially address a broad range of monogenic diseases.

- **In vivo *administration with a single component delivery system.*** Our platform is designed to perform gene editing at high efficiency without the use of a nuclease, enabling us to deliver genetic medicines *in vivo* using a single vector system that contains everything required to edit DNA. These characteristics simplify the manufacturing and delivery of our therapeutics relative to existing nuclease-based gene editing approaches.

- ***Ability to target a broad range of patients given low frequency of preexisting neutralizing antibodies.*** We believe our AAVHSCs can target a broad range of patient populations given the low prevalence of preexisting neutralizing antibodies relative to other AAV vectors.

Our Pipeline Strategy

We believe our genetic medicines platform can be applied broadly to treat and potentially cure a wide range of genetic diseases, and we have carefully designed and prioritized our pipeline strategy to maximize this opportunity. We are initially pursuing monogenic diseases where we know exactly what we are seeking to correct and exactly what gene to insert into patients' cells, thus mitigating the uncertainty of the disease biology. We are prioritizing monogenic diseases with significant unmet medical needs, validated regulatory pathways and significant commercial opportunities. We are currently focused on developing product candidates to treat monogenic diseases in the liver, CNS, bone marrow, lung and the eye, given that our AAVHSCs naturally show a high degree of tropism or ability to preferentially target cells in these organs and organ systems. These tissues are affected in many rare genetic diseases.

Our initial focus areas include developing product candidates for intracellular, inborn errors of metabolism and other genetic conditions that are especially well suited to correction by our gene editing or gene therapy methods. In slow- or non-dividing cells (*e.g.*, CNS and adult liver cells), gene therapy can potentially be curative, while rapidly dividing cells (*e.g.*, hematopoietic CD34+ cells and pediatric liver cells) require a gene editing approach to provide a permanent correction in the genome that can be replicated with each cell division. We are purposefully deploying our proprietary AAVHSCs in certain indications first with a gene therapy approach followed by a gene editing approach, in order to maximize the likelihood of translating our platform into widespread clinical and commercial success.

We are advancing into the clinic with our first and lead product candidate, HMI-102, for the treatment of PKU, a rare, inherited metabolic disorder that causes a buildup of the amino acid phenylalanine, or Phe, in the brain. Elevated Phe levels in children lead to impaired brain development, severe intellectual disability and behavior problems with a high frequency of seizures. To date, no treatment addresses the core genetic defect in PKU. The current standard of care consists of a highly restrictive diet, which is not always effective in normalizing the levels of serum Phe and its important metabolite, tyrosine. Low adherence to the diet leads to significant cognitive and behavioral problems, such as impairments in executive function, including planning, problem solving, information processing, and ability to focus. Kuvan, the only FDA approved therapy for PKU in conjunction with dietary supplementation, provides limited or no benefit to approximately 90% of patients with PKU. PKU has an easily measurable and translatable biomarker (blood Phe), facilitating both a rapid path to the clinic and characterization of therapeutic response. Our PKU program is initially focused on adults using the gene therapy approach. This strategy is designed to help us to further characterize the delivery, safety, and

manufacturing of our AAVHSCs, and to apply these learnings to our gene editing approach in the pediatric PKU population and to our broader platform. In initial preclinical studies, mice treated with HMI-102 showed a reduction in serum Phe to normal levels within one week and the reduction in serum Phe persisted for more than 16 weeks following a single intravenous administration. We anticipate entering into a Phase 1/2 clinical trial for HMI-102 in adult PKU patients in 2019. We have also received orphan drug designation for the use of AAVHSCs expressing human phenylalanine hydroxylase, or PAH, for the treatment of PKU from the U.S. Food and Drug Administration, or FDA.

Beyond PKU, we are building a deep pipeline across a wide range of diseases and tissue types to leverage the broad potential of our platform. We also intend to selectively partner to expand indications and accelerate development of programs where collaborators can contribute further disease-specific expertise to our platform.

Our Product Pipeline

The current status of our programs is summarized in the table below:

Our Programs	Target Organ	Method	Stage of Development						Worldwide Commercial Rights
			Discovery	Lead Optimization	IND-Enabling	Phase 1	Phase 2	Phase 3	
Gene Therapy									
Adult Phenylketonuria (PKU): HMI-102	Liver	Gene Transfer	Initiate Phase 1/2 Clinical Trial - 2019						HOMOLOGY
Metachromatic Leukodystrophy (MLD)	CNS	Gene Transfer							HOMOLOGY
Gene Editing									
Pediatric PKU	Liver	Gene Correction	Nominate Development Candidate - 2018						HOMOLOGY
Hemoglobinopathy #1	Human Stem Cells	Gene Correction							HOMOLOGY
Hemoglobinopathy #2	Human Stem Cells	Gene Correction							HOMOLOGY / NOVARTIS (1)
Select Ophthalmic Targets	Eye	Gene Correction							NOVARTIS
Lung Disease	Lung	Gene Correction							HOMOLOGY

(1) Homology retains U.S. rights and has licensed the Ex-U.S. rights to Novartis.

Our Strategy

Our goal is to transform the lives of patients suffering from severe genetic diseases by using gene editing and gene therapy to cure the underlying cause of the disease. The critical components of our strategy to achieve this goal include:

- ***Transform the treatment paradigm for rare genetically-defined diseases with the delivery of single-administration curative therapies.*** Utilizing our proprietary AAVHSCs, we intend to deliver genetic medicines *in vivo* via a single intravenous administration to address the underlying genetic problem in a given disease. For each of the programs in our pipeline, we have identified the mutations of a specific gene that we believe can potentially be addressed by replacing an aberrant gene with a healthy one via HR-driven gene correction or by introducing a functional copy of a defective gene via gene therapy. Our genetic medicines platform allows us to choose the best suited modality for each disease we pursue and we believe our nuclease-free editing approach will provide life-long clinical benefits for patients.

- ***Advance our pipeline programs through clinical proof of concept and commercialization.*** We intend to advance our lead product candidate, HMI-102, into a Phase 1/2 clinical trial in adult

PKU patients in 2019. We believe that our approach of initially utilizing our AAVHSCs for gene therapy in adult PKU patients while, in parallel, advancing gene editing for pediatric PKU patients will maximize the efficiency of our pipeline development while providing potential solutions for the unique needs of each particular PKU patient population. Given the well-defined nature of PKU, we intend to bring HMI-102, if approved, to patients through a small, targeted internal commercial organization.

- ***Continue to expand our pipeline within existing therapeutic areas and expand into other therapeutic areas.*** We are focused on applying the transformative potential of our genetic medicines platform to developing medicines for patients with monogenic diseases. Initially, we are targeting diseases occurring in the liver, hematopoietic system and the CNS. Given the ability of our AAVHSCs to deliver to a wide range of disease-relevant tissues, we believe there are many additional indications for which our technology may be applicable, including a number of inborn genetic deficiencies in metabolism, lysosomal storage diseases, hematological diseases, and CNS diseases. Our research and development collaboration with Novartis for select ophthalmic targets and a hemoglobinopathy disease illustrates the broad potential of our platform. In addition to our Novartis collaboration, we may also choose to selectively collaborate to expand the indications we can pursue and accelerate development of programs where collaborators can contribute further disease-specific expertise to our platform.

- ***Strengthen our platform by leveraging our discovery and development capabilities and selectively collaborating.*** We are committed to investing in our research and development activities to expand the capabilities of our platform, specifically our AAVHSCs as well as HR gene editing technology. We are optimizing our AAVHSC genetic medicines platform with focused efforts on AAVHSC characterization, gene therapy and editing construct design and screening, and genomic assays to characterize and quantitate our editing efficiencies. To augment our own efforts, we intend to continue to work with our scientific founders at COH who discovered our proprietary AAVHSCs as well as partner with other academic institutions to pursue new scientific and therapeutic insights and strengthen our position as a leader in gene correction.

- ***Control manufacturing through our in-house capabilities.*** We have developed internal process development and pilot manufacturing capabilities and are in the planning stages of building a cGMP manufacturing facility to support our clinical development programs. We believe the quality, reliability and scalability of our gene editing and gene therapy manufacturing approach will be a core competitive advantage crucial to our long-term success, and internal manufacturing capabilities will further safeguard our intellectual property.

- ***Continue to strengthen and expand our intellectual property portfolio.*** We have exclusive worldwide rights to our technologies including issued composition of matter patents in the United States for 15 of our novel AAVHSCs for both gene editing and gene therapy. We exclusively acquired rights to this foundational intellectual property for the AAVHSCs from COH for developing and commercializing therapeutics based on these vectors. We continue to strengthen our intellectual property estate through the continued discovery of new AAVHSCs further characterization around our existing AAVHSCs as well as the technology involved in delivering our product candidates to patients. To further advance our leadership in nuclease-free gene editing and gene therapy, we actively explore opportunities to partner with other leading scientific institutions in the field, as illustrated by our co-exclusive licensing agreement with the California Institute of Technology, or Caltech.

Genetically Defined Disease and Genetic Medicine

Each person’s genetic material, or genome, is encoded by DNA in sequences of genetic code called genes. Genes, in turn, through a process called gene expression, produce proteins that perform a vast array of

functions within all living organisms. The human genome consists of roughly three billion base pairs of nucleotides, which are the basic structural unit of nucleic acids like DNA, and small changes, or mutations, routinely occur in the base pairs of our DNA. A mutation in the gene or in sequences that control the expression of that gene can cause proteins to be produced aberrantly in the cell—for example, too little or too much protein can be produced in the cell—which can cause disease.

Significant investments in the human genome project, clinical data collection and analysis, and the development of affordable and efficient DNA sequencing and informatics tools have transformed the scientific community's understanding of genetically defined diseases and brought significant advancement to the field of genetic medicine. For example, many diseases previously thought to be genetically complex in nature have now been re-categorized as multiple distinct diseases that present with similar clinical dispositions, but are caused by different single-gene defects. Currently, there are approximately 3,600 diseases that are understood to be caused by single-gene mutations, which vary dramatically in their pathologies, their sites of manifestation, and the specific natures of their root causes.

According to the Online Mendelian Inheritance in Man database, a majority of genetically defined diseases are autosomal recessive in nature (meaning two copies of an abnormal gene must be present in order for the disease or trait to develop) resulting in a loss of function, whereas the remaining diseases are autosomal dominant (meaning you need only one copy of the mutated gene to be affected) with a gain of function. In loss of function based diseases, the mutation results in a protein that is not adequately produced; conversely, in the case of gain of function diseases the mutated gene product is inappropriately or excessively active. The majority of genetic diseases harbor thousands of individual mutations within a single gene, each resulting in a loss of function, thus treatment requires replacing or supplementing the diseased gene with the whole correct gene. Two approaches are currently used to restore function—gene therapy and gene editing.

Current Treatment Modalities and their Limitations

Traditional genetic medicines have focused on the addition of new genes to human cells, or gene therapy. Recent advances in the field, however, have led to the development of gene editing technologies that enable the introduction of DNA breaks to potentially achieve a therapeutic effect. However, competing gene editing approaches have been limited due to high rates of unwanted on- and off-target modifications and low gene correction efficiency due to the cell trying to rapidly repair the introduced DNA break. Other therapeutic approaches to genetic disease do not address the underlying genetic cause of the disease and offer solutions that typically only treat symptoms and require chronic administration, and as a result most genetic diseases tend to have significant unmet need.

Gene Therapy Overview

Gene therapy, through the process of gene transfer, seeks to introduce a functional copy of a defective gene or gene sequence into a patient's own cells alongside the existing genome, without integration, as an episome, which is a non-essential portion of genetic material that can exist autonomously within a cell. The episome drives functional gene expression using engineered promoters that can be designed to limit expression to specific cell types or be expressed in all cell types. Gene therapy is a viable option for delivery of potential cures in diseases where the target cell type does not divide frequently (*e.g.*, neurons in the CNS and adult liver cells). However, since gene therapy works through an episome that does not integrate into the genome, each time a cell divides, the number of episomes per cell decreases by 50%. After a few rounds of cell division, the episomes will be lost, limiting therapeutic relevance in rapidly dividing cells (*e.g.*, blood, lung and pediatric liver cells).

Gene therapy has been studied for over 50 years, and the first therapeutic use of gene transfer in humans occurred in 1990. Since then, more than 2,300 gene therapy trials have been planned or completed, covering a broad range of disease targets. Recently, gene therapies have progressed beyond academic trials to regulatory approvals, resulting in a growing acceptance and de-risking of the modality. In 2012, UniQure's Glybera became

the first gene therapy to be approved by the European Medicines Agency, or EMA, and was followed by the EMA approval of GlaxoSmithKline's Strimvelis in 2016. Spark Therapeutics' Luxturna is the first directly administered gene therapy approved in the U.S. that targets a disease caused by mutations in a specific gene.

Gene Editing Overview

Gene editing is a powerful new approach that has been developed in the last few years to change the course of genetic disease by physically correcting aberrant genes in a variety of tissues in the body. Gene editing is the process of replacing, deleting, or repairing defective DNA in its native location. The current focus of gene editing is knocking out a diseased gene or correcting an individual mutation within a gene that is frequent within the disease population, neither of which can address the larger population of recessive genetic diseases that would require the insertion of a full corrective gene.

Unlike the gene therapy approach, in gene editing the repaired genetic region is replicated through normal cell division and allows the protein to be expressed using its natural regulators. There are two approaches to gene editing, the traditional nuclease-based approach and our nuclease-free HR-driven gene correction approach.

Gene editing technologies to date primarily leverage two independent pathways to modify DNA: HR and NHEJ. HR is a process in which cells repair DNA through highly precise incorporation of correct DNA sequences complementary to the site of damage. HR has evolved to repair DNA with high fidelity and avoids the introduction of unwanted mutations at the site of correction. NHEJ is a less selective, error-prone process that rapidly joins the ends of broken DNA resulting in a high frequency of insertions or deletions at the break site.

Nuclease-Based Gene Editing

Nuclease-based gene editing utilizes nucleases, which are enzymes that were initially identified in bacteria and evolved to act like "molecular scissors." Nuclease-based gene editing is fundamentally a two-step process. First, a nuclease, which is capable of cutting one or both strands in the double-stranded DNA, is directed to the desired site and makes a specific cut. After the desired cut or cuts are made, the cell's DNA repair machinery responds to complete the edit through one of two possible repair mechanisms—the more common NHEJ or the less common HR—that can be leveraged for therapeutic effect.

NHEJ occurs in the absence of a DNA template for the cell to copy as it repairs a DNA cut. This is the primary or default pathway that the cell uses to repair double-stranded breaks. The NHEJ mechanism can be used to introduce small insertions or deletions, or indels, resulting in the knocking out of the function of the gene. NHEJ creates indels due to its mode of repair and can also result in the introduction of off-target, unwanted mutations including chromosomal aberrations.

Nuclease-based HR occurs with the co-delivery of the nuclease and a DNA template that is similar to the DNA that has been cut. Consequently, the cell can use this template to construct reparative DNA, resulting in the replacement of defective genetic sequences with correct ones. The HR mechanism is the preferred repair pathway when using a nuclease-based approach to insert a corrective sequence due to its high fidelity. However, a majority of the repair to the genome after being cut with a nuclease continues to go through the NHEJ mechanism and the more frequent NHEJ repair in the presence of a DNA template has the potential to result in unwanted mutations at the cut site including:

- insertion of the template DNA in the wrong orientation;
- unwanted mutations added at the site of integration;
- integration of template DNA fragments; and
- insertion of inverted terminal repeat sequences if AAV is used as the delivery vehicle.

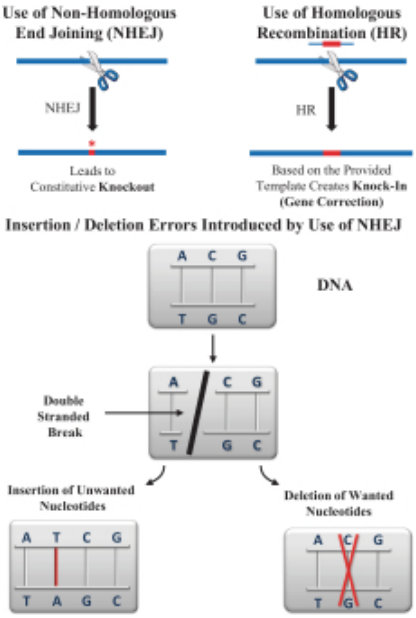


Figure 3. Non-Homologous End Joining and Homologous Recombination.

Much of the early recognition for gene editing's potential has come in response to these nuclease-based approaches, which include: Transcription activator-like effector nucleases, or TALENs; Clustered, Regularly Interspaced Short Palindromic Repeats (CRISPR) Associated protein-9, or CRISPR/Cas9; Zinc Finger Nucleases, or ZFN; and Transcription Activator-Like meganuclease, or megaTAL. While these approaches have already made and will likely continue to make an impact on biology research, we believe they face significant shortcomings.

Limitations of Nuclease-Based Gene Editing

- ***Unwanted on- and off-target DNA modifications.*** The use of exogenous nucleases results in DNA breakage which is predominantly repaired via NHEJ, an error-prone process involving the insertion or deletion of DNA residues as well as the possibility that DNA will be cut in the wrong place, resulting in unwanted mutations driven through NHEJ instead of a therapeutic correction at the precise location. This process coupled with the ability of these nucleases to break the DNA at off-target sites comprises one of the major safety concerns about these gene editing methods.
- ***Inability to efficiently and precisely introduce entire gene to the genome.*** Current gene editing approaches are unable to achieve high efficiencies of targeted gene correction *in vivo*.
- ***Complexity of vector delivery and manufacturing to achieve gene insertion.*** In order to deliver an entire functional gene, existing nuclease-based gene editing approaches require co-delivery of multiple constructs of editing machinery into the same cell. The need to use multiple vectors increases the complexity and cost of manufacturing.

Our Nuclease-Free Gene Editing Opportunity

Gene editing through the precise HR pathway can also be conducted without the use of nucleases. Although such approaches were pioneered in the 1990's before the advent of the nuclease-based gene editing

platforms, their use and progression to clinical trials since has been held back by issues including gene correction efficiencies that are typically well below those needed to achieve potential therapeutic effect. Nevertheless, early work in the field of nuclease-free gene editing elucidated some of the key characteristics of various platforms that are now providing higher editing frequencies. However, the published efficiency of this technology for gene correction is approximately 1%, significantly below levels that are typical for generating a therapeutic effect. This underscores a clear need for novel nuclease-free gene editing technologies capable of achieving higher gene correction efficiencies.

Our Genetic Medicines Platform

The unique characteristics of our platform enable nuclease-free gene editing, specifically gene correction, and broad, systemic tissue distribution. Our proprietary genetic medicines platform is built on our novel AAVHSCs, which allow us to choose the best suited modality from either gene correction or gene therapy for each disease we pursue, based on such factors as the targeted disease biology, the biodistribution of our AAVHSCs to key tissues, and the rate of cell division the target tissues exhibit. Our AAVHSCs are designed to directly integrate corrective DNA through HR with therapeutically relevant efficiencies. Our HR-based gene editing approach utilizes a single component AAV system that contains everything required to selectively edit DNA with no need for exogenous nucleases or editing machinery. This single-component approach simplifies the manufacturing and delivery of our therapeutics. Our AAVHSCs are naturally occurring and have been modified to be non-replicating to minimize potential safety issues. We believe our platform's combined attributes will allow us to develop more efficient and safer therapeutics for a wide range of genetic diseases.

Homologous Recombination—A Powerful Basis for Gene Editing

Unlike other gene editing approaches, our technology is based on the natural DNA repair process of HR, and is designed to enable precise and efficient correction or replacement of gene mutations without an exogenous nuclease. HR is a process that is used by cells to repair DNA through the incorporation of a template of homologous DNA. This pathway is not prone to the nucleotide insertions and/or deletions that occur frequently in the NHEJ process.

By pursuing one-time correction of underlying genomic defects using a nuclease-free, naturally occurring DNA repair process that addresses the underlying genetic problem in a given disease, we believe our approach has the potential to simplify production and delivery of therapeutics, minimize the risk of unwanted mutations and provide life-long clinical benefits for patients. Our gene editing approach has the potential to be curative in both dividing and non-dividing cells as it provides a permanent correction in the genome that is then replicated with each cell division so that new generations of cells will carry the corrected gene.

Our genetic medicines platform induces the endogenous HR cellular process using our AAVHSCs to insert replacement or corrective genes into cells that contain mutated or deleterious genes. We engineer our AAVHSCs to contain long, single-stranded DNA corrective sequences highly specific to the target region in the genome. These single-stranded DNA molecules are then delivered to cells in our AAVHSC vectors, which we believe results in precise and efficient gene correction via the HR pathway. The design of our long and specific sequences, up to the 4.7 kilobase packaging limit of our AAVHSCs, is intended to significantly reduce the risk of off-target integration. The engagement of the HR pathway to drive gene correction results in a highly precise and efficient on-target integration, with no detectable introduction of unwanted mutations at the corrective site. These guide sequences can be engineered to be as long as necessary to deliver highly efficient HR-based on-target correction while significantly minimizing off-target effects. We typically use homology arms as long as 1,600 base pairs of DNA to target corrective gene sequences into precise regions of the genome, in contrast to the guide sequences used in CRISPR/Cas 9-based gene editing, which are typically less than 100 base pairs in length. We also benefit from the ability of our platform to utilize HR to precisely insert gene sequences into the DNA of cells, similar to how mammalian cells repair their own DNA. This is a key distinction from approaches that rely on exogenous nucleases that were initially identified in organisms, such as bacteria, and evolved just to cut DNA. In order to bring about the excision and subsequent replacement that some forms of gene editing require, those other approaches must combine multiple additional techniques and deliver into the cell the requisite cellular

machinery, increasing the complexity of the task, introducing the possibility of integrating the wrong DNA due to non-HR-based repair mechanisms, and reducing the likelihood of success.

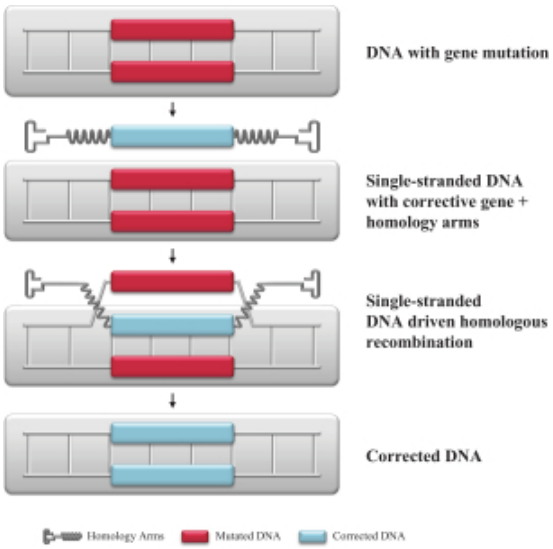


Figure 4. Schematic of Homologous Recombination.

Our Proprietary AAVHSCs

Our genetic medicines platform is based on a suite of 15 proprietary AAVHSCs which we can deploy with either gene editing or gene therapy constructs. Both applications rely on a unique ability of our AAVHSCs to efficiently target multiple tissues in the body. Our AAVHSCs were isolated from human stem cells and we believe they can direct nuclease-free gene correction with higher efficiency and precision relative to that indicated in published data for other AAV-based gene editing approaches. Our genetic medicines platform is based on gene editing and gene therapy technologies resulting from the pioneering work conducted on AAVHSCs in the laboratory of one of our founders, Saswati Chatterjee, Ph.D., of COH. Our AAVHSCs display the following advantages:

Single AAVHSC Platform for Both Gene Therapy and Gene Editing Modalities

Our platform provides us the flexibility to deliver genetic medicines through the best suited modality from either gene therapy or gene editing for each disease we pursue, based on such factors as the targeted disease biology, the biodistribution of our AAVHSCs to key tissues, and the rate of cell division the tissues exhibit.

Ability to Perform Nuclease-free Gene Editing Mediated by HR with Higher Efficiency

A 2016 study conducted by COH assessed the ability of AAVHSCs to carry out gene editing *in vivo* using a luciferase gene that lacked a promoter sequence. A vector with homology arms was designed to introduce D-luciferin, or luciferase, into the Rosa26 locus in the mouse genome. Rosa26 is a locus in the mouse genome that is known to have a strong promoter capable of driving constitutive expression of genes in all cell types. AAVHSC15 constructs with (N=3) and without (N=2) homology arms and an AAV8 construct with homology arms (N=3), were injected into mice intravenously at a dose of 1e13 vector genomes per kilogram, or vg/kg. High levels of luciferase expression were detected throughout the mouse up to 63 days after injection of the AAVHSC15 construct with homology arms. Luciferase expression was not seen if the homology arms were not present and was barely detectable when AAV8 was used instead of AAVHSC15. We presented these data at the 2017 American Society of Gene and Cell Therapy annual meeting.

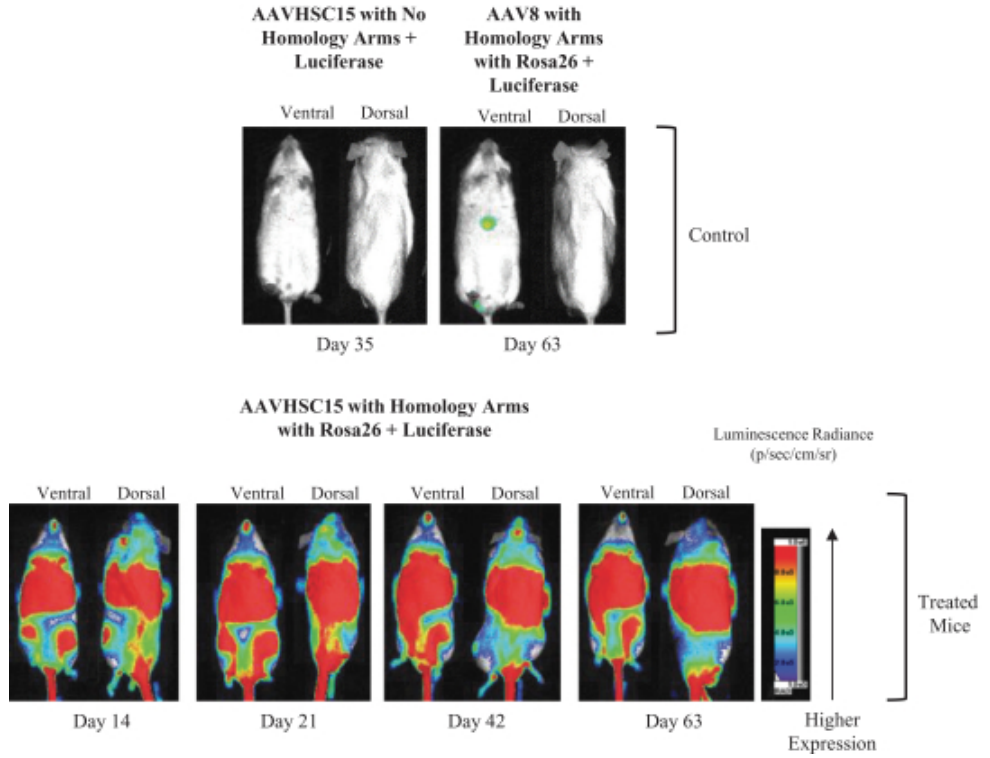


Figure 5. *In vivo* Gene Editing. Mice treated with our AAVHSC15 construct with homology arms specific to Rosa26 showed high expression of luciferase up to 63 days. Control mice injected without homology arms or with AAV8 constructs had none or limited luciferase expression.

Factor 8, or F8, is a locus in the mouse genome that is known to have a strong promoter but is expressed only in the liver. In a study we conducted in 2017 at our headquarters, AAVHSC15 and AAVHSC17 constructs, at a dose of 5e12vg/kg (N=3), containing homology arms specific to the murine F8 locus were injected into mice intravenously. Live luciferase imaging was conducted pre-dosing and weekly thereafter through week nine, with the exception of week four. Murine biodistribution data with AAVHSC15 and AAVHSC17 both show tropism to multiple tissues beyond the liver. However, in this study only liver-specific expression of luciferase was observed as early as 24 hours and sustained through 60 days post-injection, suggesting significant editing in the murine F8 locus. To assess the evidence of F8 gene correction, genomic DNA from the livers were extracted at 60 days post-injection and integration was assessed molecularly confirming editing of the promoterless luciferase into 6% to 12% of the F8 alleles, which we believe to be therapeutically relevant, as depicted in Figure 6 below.

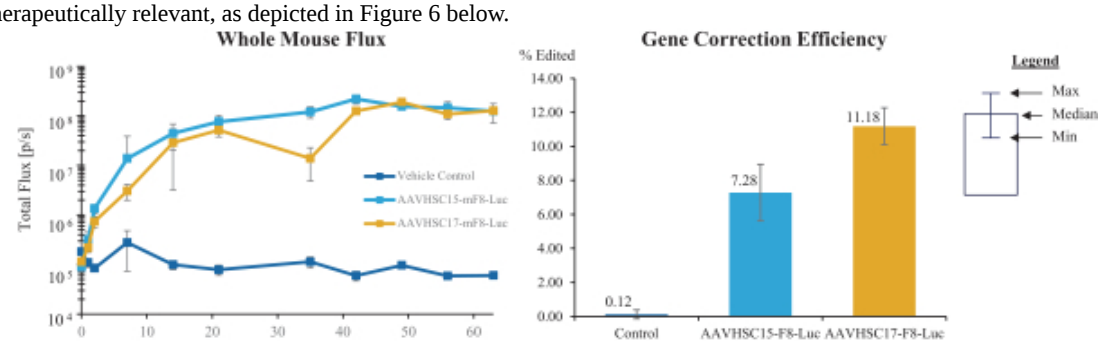


Figure 6. *In vivo* Gene Editing. In the active groups, liver specific expression of luciferase were observed up to 60 days and gene correction efficiencies were observed in a range of 6% to 12%.

In a subsequent study we conducted in 2017 using our internal manufacturing process, an AAVHSC15 construct, at a dose of 1.5e14vg/kg, containing homology arms specific to the murine F8 locus was injected into mice (N=3) intravenously. Genomic DNA from the livers were extracted at seven days post-injection in this study and editing efficiency was determined molecularly. As depicted in Figure 7 below, F8 gene correction editing efficiencies averaging 19.5% were observed when dosed at 1.5e14vg/kg.

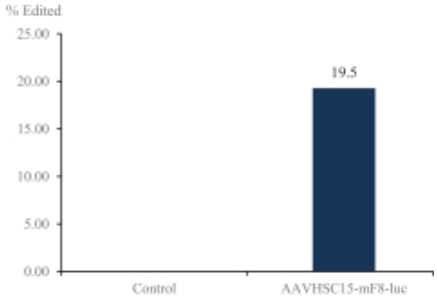


Figure 7. *In vivo* Gene Editing. In the dosed group, liver specific expression of luciferase was observed up to seven days post-injection and gene correction efficiencies were observed averaging 19.5%.

Ability to Introduce Entire Gene into the Genome Mediated via HR

In order to generate evidence regarding this gene editing capability, we carried out cellular assays with the widely used reporter protein green fluorescent protein, or GFP, which glows visibly green when it is expressed in a cell. In this study, which was conducted in 2016 at Charles River Labs in the Netherlands in collaboration with Charles River Labs and COH, a series of AAV vectors using sequences from widely used strains such as AAV2, AAV6, and AAV8, as well as our AAVHSC strains was constructed such that a promoterless copy of the gene for GFP was surrounded by 1,600 base pairs of an endogenous human gene, PPP1R12C. Previous work demonstrated that these surrounding sequences or homology arms can direct the process of HR into the genomic DNA at the desired site. Genes require promoters to signal the cell machinery to copy the gene instructions into messenger RNA or mRNA, which is then turned into protein. The artificial GFP construct alone is unable to direct the synthesis of mRNA and therefore no GFP protein can be synthesized from the episomal vector. The PPP1R12C gene sequences are homologous to a specific region in the human genome and are meant to direct the incorporation of GFP into the genome of the human near a particular, known endogenous promoter. The synthesis of GFP protein, as detected by its fluorescence, can be used as a surrogate for the successful integration of the GFP gene downstream of this promoter.

These GFP constructs were introduced into a broad panel of human cell lines and primary cells and recombination frequencies were determined using bioluminescence from expression of GFP. All cells were treated with a multiplicity of infection of 150,000. AAVHSCs resulted in much higher GFP positive cells and thus HR events than other AAV strains. This high level of HR has been observed with multiple genomic targets and independently confirmed in multiple laboratories. We presented these data at the 2017 American Society of Gene and Cell Therapy annual meeting.

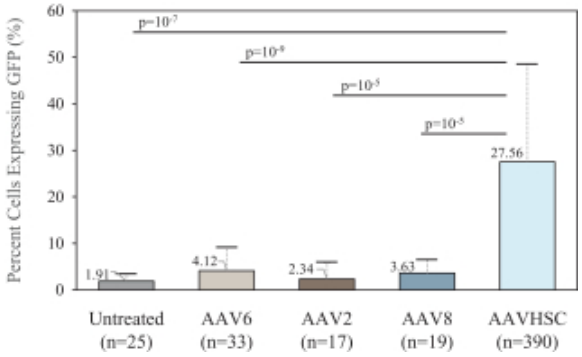


Figure 8. Targeted gene correction of AAVHSCs vs. other AAV strains was measured by assaying for the expression of GFP. Our AAVHSCs resulted in significantly higher GFP expression compared to other AAV strains, indicating higher levels of HR.

Direct confirmation of HR was observed using a DNA-based assay that can detect the insertion of the GFP gene at the desired location in the genome. The level of GFP expression was found to directly correlate to the recombination frequency. Furthermore, studies in cell lines with various mutations in DNA repair and recombination genes identified BRCA2 as a critical gene in AAVHSC-directed gene editing. Mutations in BRCA2, a gene that encodes a protein known to be essential for HR, completely eliminate gene editing but have no effect on transduction efficiencies, thereby providing evidence that the gene editing is accomplished through HR.

In initial preclinical experiments conducted at our headquarters in 2017, we introduced our initial gene editing construct containing human PAH intravenously targeting the endogenous PAH locus in the mouse through HR. Mice were dosed at 1e14 vg/kg and serum PHE was measured weekly through 21 weeks post-dosing, at which time livers were harvested to test for allele quantitation. Treated mice (N=3) had a greater than 50% reduction in serum Phe as compared to control mice (N=2) and these reduced levels persisted for at least five months. This represents a statistically significant reduction in Phe at every time point post treatment ($p<0.001$). We continue to optimize the gene editing and transfection rates through testing of various AAVHSC strains and alterations to the gene construct.

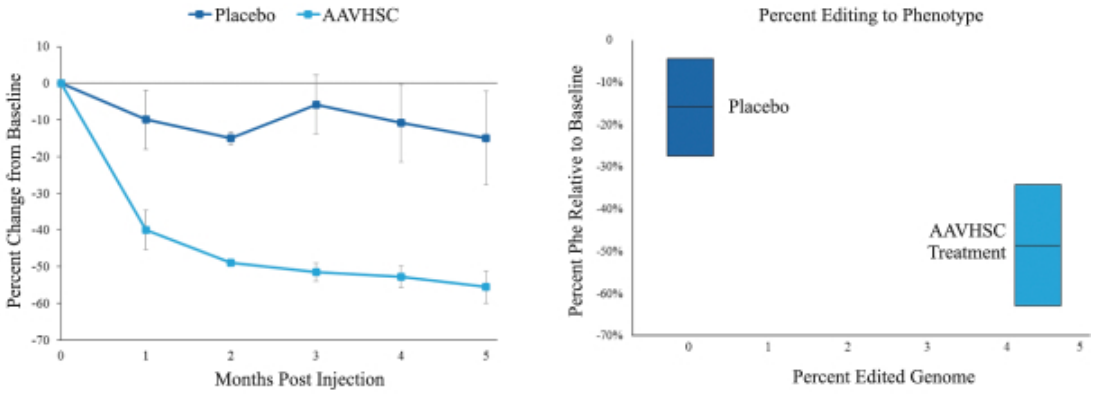


Figure 9. PAH gene editing meaningfully reduced serum Phe levels. A single injection of our AAVHSC15 construct delivering a functional copy of PAH through homology arms targeting the murine PAH resulted in rapid and sustained reduction in serum Phe levels in PAH deficient mice. The Phe level reduction was achieved within a week of administration and was observed out to 21 weeks, with an average gene correction efficiency of approximately 5%. Change in serum PHE from baseline is plotted as the average change from baseline each month.

We believe our approach, when compared to published third party data, can result in significantly higher and therapeutically meaningful *in vivo* gene correction efficiencies than those provided by existing methods, although we have not conducted any head-to-head studies comparing our AAVHSCs with existing products or treatment methods. In a 2015 study described in Nature and depicted in the second bar from the right in figure below for illustrative purposes, third-party researchers injected a gene editing construct, packaged in AAV8, targeting the murine albumin gene with a cDNA encoding human Factor 9, a gene responsible for encoding the production of a protein called coagulation factor IX, into a C57BL6 mouse at a dosage of 5e13vg/kg (N=7). Genomic DNA was harvested from the livers at 14 weeks post-dosing and a two-step nested qPCR assay was used to quantify the percentage of alleles with the integration of human Factor 9. The efficiency was determined to be approximately 0.5%. A qPCR assay was then used to measure the percentage of mRNA transcripts with the integration of human Factor 9. This assay was based on primers specific for the wild type albumin transcript and another set specific to the albumin transcript with the integration of human Factor 9. In this assay, the estimated proportion of transcripts from the edited allele was determined to be approximately 0.1%.

In an unrelated 2017 study described in EMBO Molecular Medicine and depicted in the far right bar in the figure below for illustrative purposes, third-party researchers injected a gene editing construct, packaged in AAV8, targeting the murine albumin gene with a cDNA encoding human UGT1A1, a gene belonging to a family of genes responsible for encoding the production of certain enzymes, into a mouse model at a dosage of 1e12 total vg (N=6). In this study, the estimated editing efficiency was determined through immunohistochemical assessment of hepatocytes staining positive for human UGT1A1. Using this method, the estimated efficiency was determined to range from 0.033% at one month post-dosing to 0.015% at one year post-dosing.

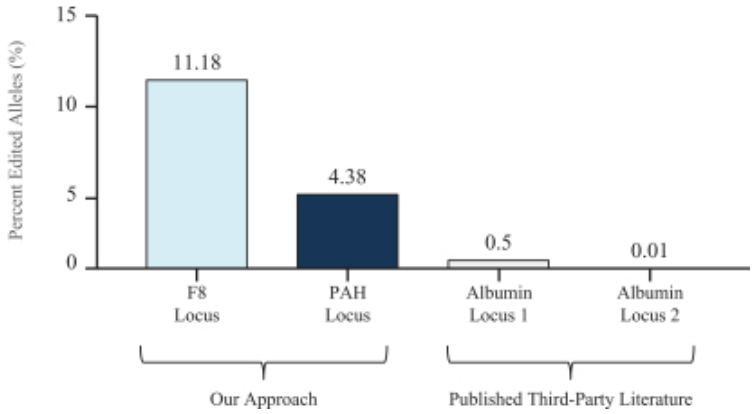


Figure 10. Significantly higher and therapeutically meaningful *in vivo* gene correction efficiencies observed in the livers of mice using our approach compared to published third party data.

We have successfully inserted full-length cDNA encoding luciferase and PAH into two separate genomic regions *in vivo* reaching levels of efficiency required for therapeutic efficacy. The ability to introduce entire genes specifically into the genome at these efficiencies provides an opportunity to target multiple monogenic diseases where the correction of a defective gene would result in therapeutic benefit. Given that a majority of monogenic diseases harbor mutations that render the gene inactive, we believe our gene correction modality can be expanded well beyond our initial focus on liver-based inborn errors of metabolism.

High Precision and Lack of Unwanted Off-target or On-target DNA Modifications

Using next-generation sequencing, we have developed methodologies to test for on-target mutations at the site of integration. Using these methods, we observed that HR using our AAVHSCs is very precise at the site of correction. We have amplified the corrected region in the genome and sequenced more than 2 million reads and were not able to detect any indels or traces of viral sequence at the detection limit of this sequencing.

We developed a method to enable whole genome unbiased next-generation sequencing for the detection and mapping of off-target integration sites. By leveraging the potential ability of our AAVHSCs to drive HR-based targeted integration we can utilize next-generation sequencing technologies to identify and quantify where the inserted sequence maps. Using this method, and based on over 2.2 million sequence reads, we estimate that 99.967% of insertions are at the targeted site.

Ability to Target Multiple Tissues

Through intravenous administration of our AAVHSCs into rodents and non-human primates, we have generated evidence of their ability to target a number of tissues including:

- crossing the blood-brain barrier to neurons throughout the brain, spinal cord, and dorsal root ganglion;
- retinal ganglion cells and neurons of the retinal outer nuclear layer; we have also demonstrated the ability to target retinal tissue via intravenous injection as well as multiple layers of target cells through sub-retinal injection;
- skeletal muscle myocytes in all skeletal muscle tissues examined, including gastrocnemius, soleus, diaphragm, esophagus, and biceps;
- cardiomyocytes throughout the heart; and
- extensive liver tropism.

In addition to our proprietary AAVHSCs, we have also co-exclusively licensed a set of modified AAV vectors and peptide sequences from Caltech that were designed to further increase the ability of our AAVHSCs to selectively cross the blood-brain barrier to target the central nervous system, including the brain and spinal cord. We are using these vectors to support our discovery efforts for central nervous system disorders, with an initial focus on monogenic indications.

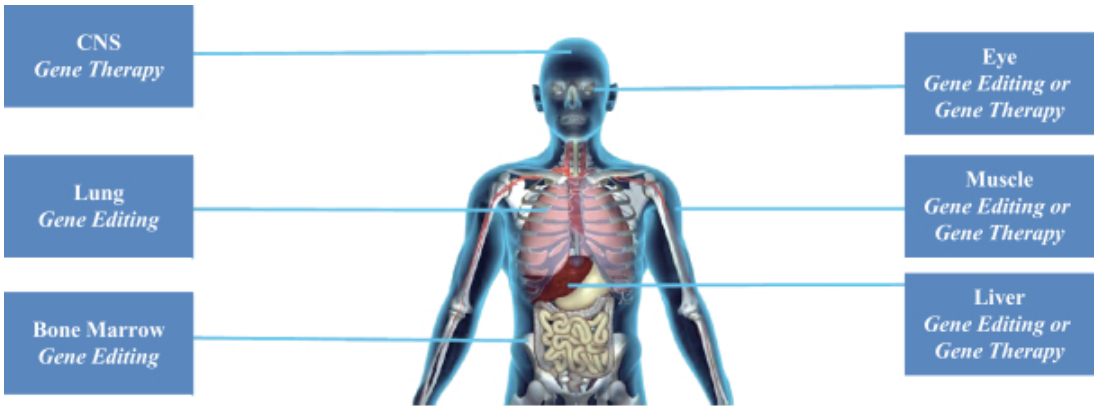


Figure 11. Our AAVHSCs show significant biodistribution to key tissues for treating genetic diseases.

In vivo *Administration With a Single Component Delivery System*

Our platform is designed to perform gene editing at higher efficiency without the use of a nuclease, enabling us to deliver genetic medicines *in vivo* using a single vector system. Existing nuclease-based gene editing technologies, when replacing a defective gene with a functional gene through gene editing, require the use of two or more different vector constructs in combination to perform their gene editing functions. One or more vector constructs house the nuclease, and the other vector construct houses the DNA template, and all vectors must reach and penetrate the specific target cell at the same time to edit the DNA. In contrast to these nuclease-based gene editing technologies, our AAVHSC technology is a single component system that contains everything required to selectively edit DNA across all gene editing methods with no need for additional exogenous nucleases, template DNA or editing machinery.

We believe our ability to perform gene editing at efficiencies that are significantly greater than both nuclease-based and other AAV-based approaches, coupled with our single component delivery system, enable us to administer genetic medicines *in vivo.* We believe the advantages of *in vivo* administration of therapeutics via a single component delivery system include the following:

- simpler and faster manufacturing relative to *ex vivo* resulting in reduced manufacturing costs;
- improved delivery of therapeutic as only a single vector is required to reach a cell instead of multiple vectors;
- ease of use for the patient, eliminating the need for bone marrow extraction, a common requirement for many *ex vivo* gene editing therapies; and
- improved safety profile, eliminating the risk of rejection or other unwanted immune response that can result from the administration of an *ex vivo* therapy.

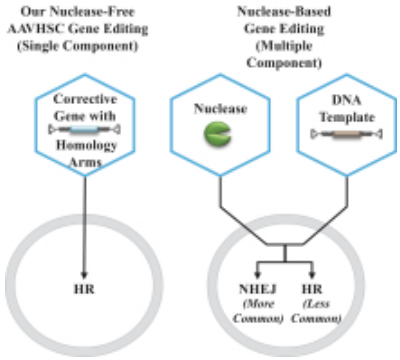


Figure 12. Our nuclease-free AAVHSC single component gene editing construct vs. nuclease-based multiple component gene editing construct for gene correction applications.

Ability to Target a Broad Range of Patients Given Low Frequency of Preexisting Neutralizing Antibodies

A potential concern for all AAV vectors is the presence of preexisting neutralizing antibodies that have the potential to reduce their effectiveness. We conducted a study across 100 human serum donors representing different ethnic segments of the U.S. population. Based on the initial results, we believe the findings suggest that approximately 80% of individuals lack antibodies that recognize AAVHSCs, which is comparable to AAV9, a commonly used vector for development of other gene therapies.

Our Product Candidates

We believe our genetic medicines platform can be applied broadly to treat and cure a wide range of genetic diseases, and have carefully designed and prioritized our pipeline strategy to maximize this opportunity. We are initially pursuing diseases where the genetic abnormality is known and is found in a single gene. These are also known as monogenic diseases. We therefore know exactly what we are correcting and exactly what gene to insert into the patient's cells, thus mitigating against the uncertainty of the disease biology. We are prioritizing monogenic diseases with significant unmet medical needs, validated regulatory pathways and significant commercial opportunities. We are currently focused on developing product candidates to treat monogenic diseases in the liver, bone marrow and the CNS, given that our AAVHSCs naturally show a high degree of tropism or ability to preferentially target cells in these organs and organ systems. These tissues are affected in many rare genetic diseases.

HMI-102 for Treatment of PKU

Our lead program, HMI-102, is an AAVHSC vector gene therapy candidate designed to treat the underlying genetic cause of PKU. We have received orphan drug designation from the FDA for the use of AAVHSCs expressing PAH for the treatment of PKU. We expect to initiate a Phase 1/2 clinical trial in PKU patients and to receive initial clinical data in 2019. HMI-102 is intended to treat adult patients with deficiencies in PAH regardless of the specific underlying PAH mutation.

PKU Disease Overview

PKU is an inborn error of metabolism that results from a mutation in the PAH gene. PAH is an enzyme that is normally expressed in the liver and is necessary to metabolize dietary phenylalanine, or Phe, to the amino acid and neurotransmitter tyrosine. PKU results from mutations in PAH that render its enzymatic activity deficient. If it is not metabolized by PAH, Phe builds up in the blood and the nervous system. Approximately 75% of all dietary Phe is typically metabolized by PAH so the absence of PAH leads directly to the pathological excess of Phe as well as a deficiency of tyrosine. Excessive blood Phe and low levels of tyrosine result in intellectual disability, which is possibly caused by a variety of mechanisms including effects on neuronal development, myelination, and neurotransmitter synthesis. Blood Phe is an easily measurable and translatable biomarker. It is also a surrogate clinical endpoint in clinical trials for PKU, facilitating both a rapid path to the clinic and characterization of therapeutic response.

Newborns in all 50 states are screened for PKU. It has been estimated that the incidence of PKU in the United States is one in 12,707 which translates to approximately 300 cases per year with an overall prevalence of 15,000. It has also been estimated that the prevalence of PKU in the European Union is 25,000. Worldwide, the estimated prevalence is 50,000.

The majority of patients are identified soon after birth and are primarily treated by dietary restriction of Phe. While Phe-restricted diets have dramatically reduced the intellectual deficiencies associated with this disease, they fail to address the cognitive and behavioral problems that continue throughout a patient's life. Lifetime adherence to a Phe-restricted diet is challenging and blood Phe is not achievable within the recommended range for the vast majority of patients. The inability to achieve recommended levels of Phe results in neurological as well as metabolic problems. Long-term studies in adults identify neurocognitive, psychosocial, quality of life, growth, nutrition, bone pathology and maternal PKU outcomes that are suboptimal despite early and continuous treatment. In a retrospective study of PKU patients, young children were adherent to Phe-restricted diet, whereas most adolescents (79%) did not achieve recommended Phe levels, and 88% of adults were no longer on a diet. Relaxing of dietary restrictions beyond preschool years, or failure to adhere to physician-assigned diets, which is the current guideline for most adolescents and adults, results in loss of metabolic control and wide fluctuations in Phe levels that are both directly associated with progressive neurological damage.

Current Treatments

There are currently no available treatments that address the core genetic biochemical defect in PKU, the deficiency of PAH.

Saproterin dihydrochloride, or Kuvan, is an FDA approved therapy to reduce elevations in serum Phe. Saproterin is a synthetic version of BH4, a cofactor that is required for PAH activity. The addition of saproterin helps deficient PAH to metabolize some Phe. However, clinical data suggests that saproterin is not fully effective in lowering high serum levels of Phe back to normal levels and must be used in conjunction with a low Phe diet. Kuvan reported worldwide sales of $348 million in 2016.

Pegvaliase is a pegylated plant-derived enzyme called phenylalanine ammonia lyase that has completed Phase 3 trials in PKU patients. This approach does not correct the underlying genetic disorder (PAH deficiency) and will not reconstitute the natural pathway that is needed to address the neurocognitive defects associated with PKU. Patients will still need to follow a Phe-restricted diet and supplement it with tyrosine. If approved, we believe pegvaliase will entail certain limitations. For example, pegvaliase must be administered via multiple daily injections and 8% of patients in the Phase 3 trials had an anaphylactic reaction. In 2016, BioMarin reported that patients in their Phase 3 trials did not experience cognitive benefit from pegvaliase.

Our Gene Therapy and Gene Editing Approaches to PKU

We are taking two approaches towards developing a potential therapy for PKU. The first is a proposed gene therapy in which a gene construct encoding human PAH is delivered to liver cells where it directs production of normal PAH via episomal expression driven off an exogenous promoter. The second proposed therapy involves true gene correction of the defect found in the chromosomes of affected patients. We believe that the gene therapy approach offers an expedited clinical development path towards delivery of a therapeutic to adult patients where the majority of target cells are non-dividing in the liver. We believe the gene correction approach would be more efficient in newborn and pediatric patients due to the higher rate of dividing cells as the child grows. The goal of both approaches is to enable production of functional PAH, thus restoring the normal biochemical pathway of Phe metabolism. This can reduce the abnormally high levels of Phe in the blood, while also increasing tyrosine levels, the product of PAH-driven Phe metabolism. Using gene editing to correct the defective PAH gene in young patients has the potential to provide long-term benefit as the corrected gene will persist as cells replicate. Correcting the gene while it remains under the control of its natural promoter early in disease progression has the potential to normalize not only Phe levels, but also tyrosine levels, the product of the PAH enzyme and a precursor to neurotransmitter synthesis. This may allow affected children to avoid many of the serious neurological consequences associated with PKU.

We believe that an effective gene therapy or gene correction for PKU has the potential to eliminate the need for Phe restricted diet and may lead to significant improvements in the morbidity and quality of life for patients. Published estimates suggest that restoration of PAH activity to 10% or more of normal levels would lead to significant improvements in serum Phe levels.

Our Gene Therapy Solution–HMI-102

We identified HMI-102 as our lead product candidate after screening multiple vector constructs. HMI-102 consists of an AAVHSC15 vector containing the coding sequence of human PAH under control of a promoter designed to continuously express PAH, specifically in the liver. We chose AAVHSC15 as the basis of this product candidate because of its observed propensity to target liver cells, the normal site for PAH protein expression.

The potential of an AAVHSC15-delivered PAH gene was assessed in a well-established mouse model of PKU called the ENU2 mouse. This model contains a mutation in the murine PAH gene that results in abolished activity and results in elevated serum Phe levels. Baseline levels of serum Phe in these mice are approximately 1,500 micromoles per liter compared to normal levels of 80 micromoles per liter, levels that are similar to those seen in patients and normal controls. Single intravenous injections of HMI-102 into these deficient mice resulted in reductions of serum to levels that are within the range for normal mice. The reduction in serum Phe levels persisted for greater than 16 weeks in treated mice on a normal protein diet. In addition to a reduction in serum Phe, the administration of our gene therapy candidate also resulted in elevations of serum tyrosine due to the restoration of the normal biochemical pathway.

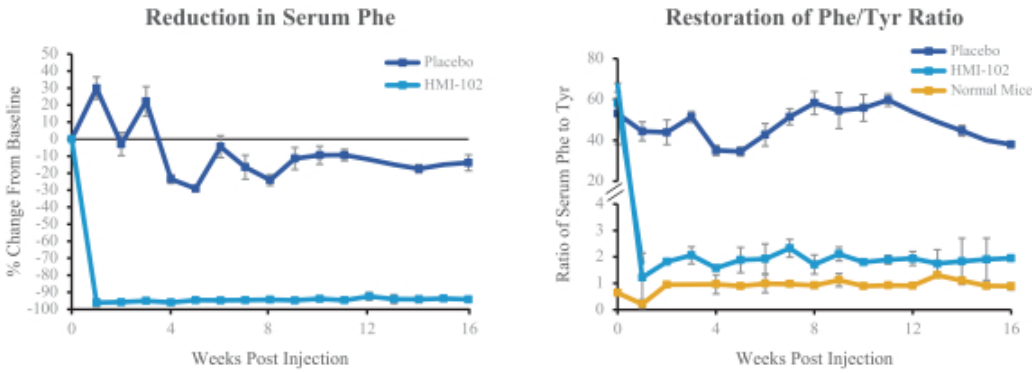


Figure 13. A single injection of HMI-102 resulted in rapid and sustained reductions in serum Phe and increased tyrosine levels in PAH deficient mice that are on a regular diet.

Our Gene Editing Approach for PKU

In order to address the pediatric PKU population, we are developing a gene editing therapy for PKU that is designed to replace the defective PAH gene with a normal copy. This therapy is designed to correct the defect in treated liver cells, such that they would be indistinguishable from those from an unaffected individual. These cells would direct the synthesis of PAH from its natural promoter, and therefore would be capable of normal regulation of its expression. The corrected copy of the PAH gene would be retained as these cells divide into daughter cells as the liver grows. Screening for PKU of all newborns in the United States allows the identification of affected individuals before serious neurological complications develop. We believe our AAVHSC vector HR approach possesses the efficacy and safety characteristics that would be appropriate to treat PKU in newly identified patients. As we further develop our expertise in treating PKU by correcting the defective PAH gene in the liver, we intend to develop treatments for other inborn errors of metabolism in the liver.

Our clinical product candidate for gene editing in PKU will be based on the optimized constructs used in the mouse experiments, but with the incorporation of human PAH gene sequences.

Additional Product Opportunities

CNS Diseases

Our CNS programs, which are initially focused on MLD, are designed to take advantage of our AAVHSCs' observed ability to cross the blood-brain barrier in non-human primates. We are also applying Caltech's technology that has shown significantly higher transduction in murine neuronal cells such as astrocytes, glial cells and neurons in the CNS, across multiple regions of the brain. We intend to apply this technology in a gene therapy setting in which genes for therapeutic proteins are delivered intravenously to

non-dividing cells in the brain. We initially expect to apply this technology to monogenic diseases in which defective genes in cells in the brain contribute to serious neurological complications. Specific disorders that we are evaluating at the preclinical stage include metachromatic leukodystrophy or MLD, a lysosomal storage disease caused by mutation of a gene called arylsulfatase A, or ASA. ASA is required for the breakdown of cellular components that in MLD accumulate in myelin, leading to progressive serious neurological deterioration. The prevalence of subtypes of MLD range between 1:40,000 and 1:150,000. Another CNS disease we are evaluating is Friedreich's ataxia or FA. In FA, mutations in a gene called frataxin, or FXN, lead to progressive deterioration of the spinal cord leading to difficulty walking and eventual complete incapacitation and shortened life-span. FA is the most common form of inherited ataxia with a prevalence of 1:40,000. Other diseases in this area include a subset of Parkinson's disease which is associated with Gaucher disease. Gaucher disease patients have a defect in the gene for glucocerebrosidase which is important for various processes in the body and in certain patients these mutations also lead to the development of Parkinson's disease. We believe our gene therapy technology has the potential to address directly the deficiency in glucocerebrosidase in the brain in a manner that is not possible with other Gaucher disease treatments that do not cross the blood-brain barrier.

Hemoglobinopathies

We are also pursuing treatment of diseases that affect blood cells such as sickle cell disease and beta thalassemia using our AAVHSC vector HR technology. We believe that our potential ability to correct the defective beta globin gene in blood precursor cells may lead to long-term functional cures for affected patients. Sickle cell disease affects over 100,000 individuals and beta thalassemia over 1,000 individuals in the United States. We are actively pursuing multiple programs in hemoglobinopathies including one undisclosed indication in collaboration with Novartis.

Ophthalmological Diseases

A number of serious, but rare diseases of the eye such as Leber's congenital amaurosis and Choroideremia, as well as more common diseases such as macular degeneration have been targeted using gene therapy approaches by academic groups as well as the pharmaceutical industry. Certain of our AAVHSCs have shown the unique ability to deliver genes to the eye when administered intravenously. Furthermore, in preclinical studies we conducted at our headquarters in 2017 in a minipig model, we evaluated the ability of our AAVHSCs, containing a vector that expresses a GFP transgene, to transduce retinal cells following localized delivery via subretinal injection to the eye at a dose of 1.3e12vg/kg (N=2). Expression of GFP was seen in all layers of the retina including the retinal pigment epithelium, photoreceptors and the outer nuclear layer out to day 28 and the AAVHSC subretinal treatment was well tolerated. We believe these studies suggest that our AAVHSCs have the potential to be useful as therapeutic vectors for treating retinal diseases in humans based on significant tropism to these target cells. We believe that these vectors have the potential to deliver long-lasting therapeutic benefit to patients that may eliminate the need for the regular and burdensome intravitreal injections that are required for many current treatments. We are collaborating with Novartis, experts in developing and marketing ophthalmic drugs, for select ophthalmology programs.

Lung Diseases

Biodistribution of our AAVHSCs in primate experiments showed that intravenous administration results in expression in a variety of lung cells. We believe this finding may provide a novel path to gene editing of serious genetic diseases such as cystic fibrosis, or CF. According to the Cystic Fibrosis Foundation Patient Registry there are more than 30,000 patients in the United States living with CF and more than 70,000 worldwide. Defects in the gene for an ion channel called cystic fibrosis transmembrane conductance regulator, or CFTR, result in a thick layer of mucus surrounding lung epithelial cells that obstructs airways and provides sites that can harbor life-threatening infections. This layer of mucus also limits the ability of therapeutics, including gene therapies, to be delivered by inhalation directly to the lungs. We intend to use our gene editing technology to develop therapies that can correct the underlying mutations in CF, focusing first on a specific mutation, delta 508, which is found in approximately 75% of patients. We believe that our technology can lead to significant correction of this mutation in the lung and in other tissues via intravenous administration.

Manufacturing

As a company committed to curing diseases, the ability to deliver our novel therapeutic vectors to patients is critical. Therefore, we are building strong internal scientific AAV process development and manufacturing capabilities and we are investing in a cGMP manufacturing facility to support our clinical development programs. We have established scalable manufacturing platforms for both gene editing and gene therapy. We view the development of internal manufacturing capacity and expertise as a key competitive advantage as it allows for better control over process development timelines, costs and intellectual property, and allows us to master our unique technology. Our process development and manufacturing teams are composed of industry veterans in the field of AAV and protein technologies, as well as experts in our novel AAVHSCs, with experience in both early development and commercialization of therapeutics.

Our process development and manufacturing strategy is to leverage technology platforms for both gene therapy and gene editing that are scalable and facilitate rapid development to the clinic. The gene therapy and gene editing platforms include development from vector design through to drug product manufacture. Expertise and learnings will be leveraged across both platform technologies.

Our gene therapy manufacturing strategy initially focuses on utilizing mammalian cells for our AAVHSC vector-based product candidates. Our current production process for the PKU program utilizes HEK293 cells in a serum free suspension bioreactor. The HEK293 is a well-characterized system and commonly used host cell for many clinical stage AAV vector products. Additionally, these cells are familiar to regulatory authorities and commercial raw materials and reagents are readily available. We have established a relationship with a contract manufacturing organization, or CMO, who specializes in the use of HEK293 gene therapy manufacturing. Our CMO partner will perform toxicology and cGMP manufacturing to supply our PKU program through Phase 1/2 clinical development.

Our gene editing manufacturing strategy is to internally control the process development and manufacturing to safeguard the proprietary nature of our technology, as well as to master all aspects of this technology. Furthermore, as part of our research and development collaboration with Novartis we have retained process development and manufacturing rights to the gene editing programs included within the collaboration.

We are in the planning stages of building a cGMP manufacturing facility that will have capability to process both gene therapy and gene editing batches in parallel. The initial scope will be for preclinical through Phase 1/2 manufacturing. Our manufacturing facility will leverage single use, disposable, closed system operations aligned to our technology platforms to ensure both flexibility and cost effectiveness. Our manufacturing facility is expected to be available for cGMP manufacturing of our product candidates in 2019.

Competition

The biotechnology and pharmaceutical industries, including in the gene therapy and gene editing fields, are characterized by rapidly advancing technologies, intense competition and a strong emphasis on intellectual property and proprietary products. While we believe that our technology, development experience and scientific knowledge provide us with competitive advantages, we face potential competition from many different sources, including major pharmaceutical, specialty pharmaceutical and biotechnology companies, academic institutions and governmental agencies, and public and private research institutions that conduct research, seek patent protection, and establish collaborative arrangements for research, development, manufacturing, and commercialization. Not only must we compete with other companies that are focused on gene therapy and/or gene editing technologies, any product candidates that we successfully develop and commercialize will compete with existing therapies and new therapies that may become available in the future.

We compete in the segments of the pharmaceutical, biotechnology and other related markets that utilize technologies encompassing genomic medicines to create therapies, including gene therapy and gene editing. There are additional companies that are working to develop therapies in areas related to our research programs.

Our platform and product focus is the development of genetic medicines using our proprietary AAVHSCs *in vivo* either through the gene therapy or nuclease-free gene editing modality. If our current programs are approved for the indications for which we are currently planning clinical trials, they may compete with other products currently under development, including gene editing and gene therapy products. There are a number of companies developing nuclease-based gene editing technologies using CRISPR/Cas9, TALENs, meganucleases, Mega-TALs and ZFNs, including bluebird bio, Caribou Biosciences, Cellectis, CRISPR Therapeutics, Editas Medicine, Intellia Therapeutics, Poseida Therapeutics, Precision BioSciences and Sangamo Therapeutics. Additional companies developing gene therapy products include Abeona Therapeutics, Adverum Biotechnologies, Applied Genetic Technologies, Audentes Therapeutics, AveXis, bluebird bio, Nightstar Therapeutics, REGENXBIO, Spark Therapeutics, Ultragenyx Pharmaceutical, uniQure and Voyager Therapeutics. In addition to competition from other gene editing therapies or gene therapies, any products we may develop may also face competition from other types of therapies, such as small molecule, antibody, or protein therapies

In addition, many of our current or potential competitors, either alone or with their collaboration partners, have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials and marketing approved products than we do. Mergers and acquisitions in the pharmaceutical, biotechnology and gene therapy industries may result in even more resources being concentrated among a smaller number of our competitors. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs. Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are safer, more effective, have fewer or less severe side effects, are more convenient or are less expensive than any products that we may develop. Our competitors also may obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for ours, which could result in our competitors establishing a strong market position before we are able to enter the market. The key competitive factors affecting the success of all of our programs are likely to be their efficacy, safety, convenience and availability of reimbursement.

Furthermore, we rely upon a combination of patents and trade secret protection, as well as license and confidentiality agreements to protect the intellectual property related to our proprietary technologies, product candidate development programs and product candidates. Our success depends in large part on our ability to secure and maintain patent protection in the United States and other countries with respect to HMI-102 and any future product candidates. Moreover, our industry is characterized by the existence of large numbers of patents and frequent allegations of patent infringement. If, therefore, we are unable to obtain and maintain patent protection for our technology and products or if the scope of the patent protection obtained or in-licensed is not sufficiently broad or if the validity of such patent is threatened, we may not be able to compete effectively in our markets, as it could create opportunities for competitors to enter the market or dissuade other companies from collaborating with us to develop products and technology, any of which would hurt our competitive position and could impair our ability to successfully commercialize our product candidates in any indication for which they are approved. For more information regarding these competitive risks, see “Risk Factors—Risks Related to Our Intellectual Property.”

Intellectual Property

Our success depends in large part upon our ability to secure and maintain proprietary protection for our technologies and products and to operate without infringing the proprietary rights of others. Our policy is to protect our proprietary position by, among other methods, filing or collaboration with our licensors to file U.S. and foreign patent applications related to our proprietary technology, inventions and improvements that are important to the development and implementation of our business. We also use other forms of protection, such as confidential information and trademark protection, particularly where we do not believe patent protection is appropriate or obtainable.

Our patent portfolio consists of a combination of issued patents and pending patent applications that are licensed from third parties. As of March 1, 2018, we have an exclusive license or co-exclusive license under ten United States issued patents and 17 patent applications, pending in the United States and internationally.

For any individual patent, the term depends on the applicable law in the country in which the patent is granted. In most countries where we have filed patent applications or in-licensed patents and patent applications, patents have a term of 20 years from the application filing date or earliest claimed non-provisional priority date. In the United States, the patent term is 20 years but may be shortened if a patent is terminally disclaimed over another patent that expires earlier. The term of a U.S. patent may also be lengthened by a patent term adjustment, in order to address administrative delays by the United States Patent and Trademark Office in granting a patent.

In the United States, the term of a patent that covers an FDA-approved drug or biologic may be eligible for patent term extension in order to restore the period of a patent term lost during the premarket FDA regulatory review process. The Drug Price Competition and Patent Term Restoration Act of 1984, or the Hatch-Waxman Act, permits a patent term extension of up to five years beyond the natural expiration of the patent. The patent term restoration period is generally equal to the regulatory review period for the approved product which period occurs after the date the patent issued, subject to certain exceptions. Only one patent may be extended for a regulatory review period for any product, and the application for the extension must be submitted prior to the expiration of the patent. In the future, we may decide to apply for restoration of patent term for one of our currently owned or licensed patents to extend its current expiration date, depending on the expected length of the clinical studies and other factors involved in the filing of the relevant BLA.

Licensed Intellectual Property

Certain of our issued patents and pending patent applications are exclusively licensed to us in all fields of use from COH. Certain of our issued patents and pending patent applications are co-exclusively licensed to us in all human therapeutic applications with and from Caltech.

The City of Hope Portfolio

In April 2016, we exclusively licensed two families of patents and patent applications directed to novel AAV capsids and their manufacture and methods of use, including their use in genome editing from COH.

These two families of patents and patent applications together include nine granted patents in the United States and 12 pending applications in the United States, Europe, Canada, Australia and other selected countries in Central America, South America, and Asia. The first family of issued patents and patent applications is material to HMI-102 and relates to our novel AAV capsids and vectors and their use in cellular transduction. The eight issued U.S. patents in this family are expected to expire in 2031, and may be extended by up to five years in certain countries via patent term extension depending on the regulatory pathway of the products covered by such patents. The second family includes one issued U.S. patent and patent applications directed to our AAV capsids, their methods of manufacture, and their use in genome editing. The issued patent in this family is expected to expire in 2035, and may be extended by up to five years in certain countries via patent term extension depending on the regulatory pathway of the products covered by such patents.

The Caltech Portfolio

In September 2016, we co-exclusively licensed, with another commercial third party, two families of patents and patent applications directed to novel AAV capsids and vectors that demonstrate enhanced blood-brain barrier penetration for the potential treatment of CNS diseases from Caltech.

These families of patents and patent applications include one granted patent in the United States and four pending applications in the United States and Europe and one international patent application under the Patent Cooperation Treaty. The issued U.S. patent relating to novel AAV capsids and vectors is expected to expire in 2034. Certain other patent applications directed to novel AAV capsids and vectors, if they were to issue, may have later expirations.

We also rely on trade secrets, technical know-how and continuing innovation to develop and maintain our competitive advantage. Our policy requires inventors who are identified on any company-owned patent applications to assign rights to us. We also rely on confidentiality agreements with our employees, consultants and other advisors to protect our proprietary information. Our policy is to require third parties that receive material confidential information to enter into confidentiality agreements with us.

Trademarks

Our trademarks Homology Medicines and HMI are pending or registered in the United States and certain international countries. We currently own three pending trademark applications in the United States, approximately 11 registered trademarks around the world, as well as 22 pending trademark applications. This includes our trademarks Homology Medicines, AMEnDR, and HMI, which are pending or registered in the United States and certain other countries.

Strategic Collaborations

Collaboration and License Agreement with the Novartis Institutes for BioMedical Research, Inc.

In November 2017, we entered into a collaboration and license agreement with Novartis, pursuant to which we agreed to collaborate on researching, developing, and commercializing novel genome editing products that modulate certain gene targets.

Under the terms of the agreement, we and Novartis agreed to collaborate to identify and synthesize gene editing vector candidates that modulate certain ophthalmic and hemoglobinopathy disease gene targets, against which Novartis agreed to develop licensed products. Our obligation to perform research for the targets will continue for five years from the effective date of the agreement.

We and Novartis agreed also to collaborate to explore the applicability of our technology with respect to other gene targets. Our obligation to perform such exploratory research concludes in November 2020.

We retain the right to commercialize products with *in vivo* applications related to the hemoglobinopathy disease in the United States. Novartis will be responsible for commercializing products with *in vivo* applications related to the hemoglobinopathy disease outside of the United States and globally for all other licensed products. We also retain the exclusive right to develop and commercialize products designed and optimized using our platform technology that modulates certain hemoglobinopathy disease gene targets.

Subject to certain limitations pursuant to the terms of the agreement, Novartis will be responsible for the internal and external costs incurred by us for the research activities as contemplated under the agreement. Novartis will also pay for the development of gene editing vector candidates and licensed products although we will reimburse Novartis for a certain percentage of the development costs for the *in vivo* applications related to the hemoglobinopathy disease.

Subject to the terms of the agreement, we will generally be responsible for manufacturing gene editing vector candidates for certain ophthalmic and hemoglobinopathy disease gene targets for research, and gene editing vector candidates and licensed products for development and commercialization, and Novartis will bear all such manufacturing costs that we incur.

Subject to the terms of the agreement, we granted Novartis the following licenses: (i) a worldwide, non-exclusive, sublicensable license under certain of our intellectual property rights to perform Novartis' responsibilities under the applicable research plan; (ii) a worldwide, sublicensable license under certain of our intellectual property rights to conduct preclinical development activities, which license is co-exclusive (with us) during the research term, and exclusive for the remainder of the term of the agreement; (iii) a worldwide, non-exclusive, perpetual, irrevocable license, without the right to grant sublicenses, to use certain reagents generated as a result of our exploratory research activities under the agreement solely for Novartis' internal

research purposes; (iv) an exclusive, royalty-bearing, sublicensable license under certain of our intellectual property rights to develop and commercialize certain gene editing vector candidates and licensed products directed to certain ophthalmic and hemoglobinopathy disease gene targets, except for the rights to commercialize products with *in vivo* applications related to the hemoglobinopathy disease in the United States; (v) as of the effective date, a co-exclusive (with us), royalty-bearing, sublicensable, worldwide license under certain of our intellectual property rights to manufacture certain gene editing vector candidates and/or licensed products directed to certain ophthalmic and hemoglobinopathy disease gene targets, which license will be exclusive as of a certain date on which Novartis is permitted to manufacture certain gene editing vector candidates and/or licensed products pursuant to the terms of the agreement; and (vi) a non-exclusive, royalty-free, fully paid, perpetual, irrevocable, worldwide license under certain of our intellectual property rights in connection with research, development, manufacturing, commercialization or other exploitation of products or services.

Subject to the terms of the agreement, Novartis granted to us the following licenses: (i) a worldwide, non-exclusive, sublicensable license under certain of Novartis' intellectual property rights to perform certain research activities during the research term; (ii) a worldwide, exclusive license, without the right to sublicense, under certain of Novartis' intellectual property rights to commercialize the *in vivo* products related to the hemoglobinopathy disease developed pursuant to the agreement in the United States; and (iii) a non-exclusive, royalty-bearing, perpetual, irrevocable, worldwide, sublicensable license under certain of Novartis' intellectual property rights that may arise under the agreement that relate to our manufacturing know-how for our manufacture of gene editing vector candidates and products created using our platform technology.

Under the terms of the agreement, we received an upfront payment of $35.0 million. Novartis also purchased shares of our Series B preferred stock for an aggregate purchase price of $15.0 million. We are also eligible to receive up to a total of $20.0 million upon completion of certain development candidate selection activities. In addition, we are eligible to receive up to a total of $960.0 million in milestone payments with respect to the licensed products. We are also eligible to earn tiered royalties on net sales of licensed products by Novartis, its affiliates or sublicensees ranging from mid single-digit to sub-teen double-digit percentages, which royalties are potentially subject to various reductions and offsets.

With respect to any products with *in vivo* applications related to the hemoglobinopathy program commercialized in the United States, we may book sales of such products and share net profits from such sales with Novartis (subject to certain circumstances in which Novartis obtains the right to book such sales, in which case Novartis will share such net profits with us) and we will reimburse Novartis for a percentage of the development costs incurred in connection with this program. The parties share such net profits equally.

The term of the agreement continues on a target-by-target basis until the expiration of all royalty payment obligations for the licensed products that modulate the applicable target on a country-by-country basis. Either party may terminate the agreement on a target-by-target basis for the other party's material breach with respect to such target, or in the event of the other party's bankruptcy. Novartis may terminate the agreement for convenience on a target-by-target basis. We may terminate the agreement if Novartis files, or joins a third party in filing or maintaining, a patent challenge against certain of the patent rights we license to Novartis under the terms of the agreement.

License Agreement with the California Institute of Technology

In September 2016, we entered into a license agreement with Caltech, pursuant to which Caltech granted us a co-exclusive (subject to certain reserved non-commercial rights), sublicensable, and worldwide license under certain AAV-related patents owned by Caltech for human therapeutic applications. Under this agreement, Caltech also granted us a non-exclusive, worldwide license under certain patents and other intellectual property controlled by Caltech to develop, manufacture, commercialize, and otherwise exploit products covered by such intellectual property rights for human therapeutic applications. We may grant sublicenses under the non-exclusive license to third parties to the extent necessary or useful for our, or our sublicensees', development, manufacturing, or sale of such products.

Under the Caltech agreement, we paid Caltech an initial licensing fee of $100,000. We are also required to pay Caltech up to a total of $7.2 million in milestone payments for the first licensed product; royalties, in the low single-digit percentages on net sales of licensed products, subject to a certain annual minimum royalty; and mid to high single-digit percentages of sublicensing revenues. Subject to certain exceptions, our royalty obligations under the agreement continue with respect to each licensed product until the earliest of (a) the date on which such licensed product is no longer covered by certain intellectual property rights, (b) a certain anniversary of the first commercial sale of such licensed product, or (c) a certain anniversary of the effective date of the agreement. As partial consideration for the licenses granted under the agreement, we issued 533,695 shares of our common stock to Caltech.

The agreement will expire upon the expiration of the last-to-expire patent that is licensed to us or as long as royalties are due under the agreement, whichever is later. We agreed to use commercially reasonable efforts to introduce commercially, and reasonably fulfill market demand for, licensed products as soon as practicable. Either party may terminate the agreement in the event of the other party's uncured material breach and in the event of the other party's bankruptcy or insolvency. We may terminate the agreement for convenience.

City of Hope License Agreement

In April 2016, we entered into a license agreement with COH, pursuant to which COH granted us an exclusive, sublicensable, worldwide license to certain AAV vector-related patents and know-how owned by COH to develop, manufacture, use and commercialize products and services covered by such patents and know-how in any and all fields. COH also granted us a non-exclusive, sublicensable, worldwide license to certain background patents owned by COH to develop, manufacture, use and commercialize licensed products and licensed services in any and all fields.

Under the agreement, we paid COH an initial licensing fee of $75,000, and made a subsequent payment of $4.5 million representing a percentage of sublicensing revenue. We are also required to pay COH an annual license maintenance fee; up to a total of $3.2 million in potential milestone fees; a royalty in the low single-digit percentages on net sales of licensed products or services, subject to certain reductions in certain circumstances, with a certain annual minimum royalty; and low double-digit percentages of sublicensing revenues. As partial consideration for the licenses granted under the agreement, we issued 814,905 shares of our common stock to COH.

The COH agreement will expire on a country-by-country and on a licensed patent-by-licensed patent basis upon the expiration of the last-to-expire valid claim of such patent in such country. We agreed to use commercially reasonable efforts to develop and commercialize licensed products and licensed services. If we fail to achieve certain diligence milestones, COH may terminate the agreement or convert the exclusive rights under the agreement from exclusive to non-exclusive. Either party may terminate the agreement in the event of the other party's material breach, subject to an opportunity to cure, and in the event of the other party's bankruptcy or insolvency. We may terminate the agreement for convenience.

Government Regulation and Product Approval

Governmental authorities in the U.S., at the federal, state and local level, and other countries extensively regulate, among other things, the research, development, testing, manufacture, labeling, packaging, promotion, storage, advertising, distribution, marketing, post-approval monitoring and reporting and export and import of products such as those we are developing. The processes for obtaining regulatory approvals in the United States and in foreign countries and jurisdictions, along with subsequent compliance with applicable statutes and regulations and other regulatory authorities, are extensive and require the expenditure of substantial time and financial resources. For the purposes of this Section, the term "gene therapy" includes both traditional gene therapy products as well as gene editing and our gene correction product candidates.

FDA Approval Process

We expect our future product candidates to be regulated as biologics. Biological products, including gene therapy products, are subject to extensive regulation by the FDA under the Federal Food, Drug, and Cosmetic Act,

or FD&C Act, and the Public Health Service Act, or PHS Act, and other federal, state, local and foreign statutes and regulations. Both the FD&C Act and the PHS Act and their corresponding regulations govern, among other things, the research, development, safety, testing, packaging, manufacture, storage, recordkeeping, approval, labeling, promotion and marketing, distribution, post-approval monitoring and reporting, sampling, and import and export of biological products. Before clinical testing of biological products in the United States may begin, we must submit an IND to the FDA, which reviews the clinical protocol, and the IND must become effective before clinical studies may begin. In some instances, we must also submit our protocols to the National Institutes of Health, or NIH, through its Recombinant DNA Advisory Committee, or RAC, for review before initiating clinical testing of gene therapy products.

Gene therapy products must be approved by the FDA before they may be legally marketed in the United States and by the appropriate foreign regulatory agencies before they may be legally marketed in foreign countries. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources and we may not be able to obtain the required regulatory approvals.

Within the FDA, the Center for Biologics Evaluation and Research, or CBER, regulates gene therapy products. The CBER works closely with the NIH and its RAC, which makes recommendations to the NIH on gene therapy issues and engages in a public discussion of scientific, safety, ethical and societal issues related to proposed and ongoing gene therapy protocols. The FDA has published guidance documents with respect to the development and submission of gene therapy protocols. The FDA also has published guidance documents related to, among other things, gene therapy products in general, their preclinical assessment, observing subjects involved in gene therapy clinical trials for delayed adverse events, potency testing, and chemistry, manufacturing and control information in gene therapy INDs.

To date, the FDA has approved three human gene therapy products for sale, including Kite Pharma's Yescarta, Novartis' Kymriah and Spark's Luxturna, and has provided general guidance regarding the development of gene therapy products. For example, the FDA has established the Office of Tissue and Advanced Therapies, or OTAT, within CBER, to consolidate the review of gene therapy and related products, and the Cellular, Tissue and Gene Therapies Advisory Committee, or CTGTAC, to advise CBER on its reviews. In addition, the FDA has issued a growing body of clinical guidelines, chemical, manufacturing and control, or CMC, guidelines and other guidelines, all of which are intended to facilitate industry's development of gene therapy products.

Ethical, social and legal concerns about gene-editing technology, gene therapy, genetic testing and genetic research could result in additional regulations restricting or prohibiting the processes we may use. Federal and state agencies, congressional committees and foreign governments have expressed interest in further regulating biotechnology. More restrictive regulations or claims that our products are unsafe or pose a hazard could prevent us from commercializing any product candidates. New government requirements may be established that could delay or prevent regulatory approval of our product candidates under development. It is impossible to predict whether legislative changes will be enacted, regulations, policies or guidance changed, or interpretations by agencies or courts changed, or what the impact of such changes, if any, may be.

U.S. Biological Products Development Process

The FDA determined that more than minimally manipulated products must be approved by the FDA through the Biologics License Application, or BLA, process before they may be legally marketed in the United States. The process required by the FDA before a biologic may be marketed in the United States generally involves the following:

- completion of extensive nonclinical, sometimes referred to as pre-clinical laboratory tests, and pre-clinical animal trials and applicable requirements for the humane use of laboratory animals and formulation studies in accordance with applicable regulations, including good laboratory practices, or GLPs;

- submission to the FDA of an IND application, which must become effective before human clinical trials may begin;
- approval by an independent Institutional Review Board, or IRB, or ethics committee at each clinical site before the trial is commenced;
- performance of adequate and well-controlled human clinical trials according to the FDA's regulations commonly referred to as good clinical practices, or GCPs, and any additional requirements for the protection of human research subjects and their health information, to establish the safety and efficacy of the proposed biological product for its intended use;
- submission to the FDA of a BLA for marketing approval that includes substantive evidence of safety, purity, potency and efficacy from results of nonclinical testing and clinical trials;
- satisfactory completion of an FDA inspection of the manufacturing facility or facilities where the biological product is produced to assess compliance with cGMP to assure that the facilities, methods and controls are adequate to preserve the biological product's identity, strength, quality and purity;
- potential FDA audit of the nonclinical and clinical study sites that generated the data in support of the BLA; and
- FDA review and approval, or licensure, of the BLA.

Before testing any biological product candidate, including a gene therapy product, in humans, the product candidate enters the preclinical testing stage. Preclinical tests, also referred to as nonclinical studies, include laboratory evaluations of product chemistry, toxicity and formulation, as well as animal studies to assess the potential safety and activity of the product candidate. The conduct of the preclinical tests must comply with federal regulations and requirements, including GLPs.

The clinical study sponsor must submit the results of the preclinical tests, together with manufacturing and controls, information about product chemistry, analytical data, any available clinical data or literature and a proposed clinical protocol, to the FDA as part of the IND. Some preclinical testing, such as reproductive toxicity tests and carcinogenicity in animals, may continue even after the IND is submitted. The IND automatically becomes effective 30 days after receipt by the FDA, after which human clinical trials may begin unless the FDA places the clinical study on a clinical hold within that 30-day time period. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical study can begin. With gene therapy protocols, if the FDA allows the IND to proceed, but a RAC decides that full public review of the protocol is warranted, the FDA will request at the completion of its IND review that sponsors delay initiation of the protocol until after completion of the RAC review process. The FDA may also impose clinical holds on a biological product candidate at any time before or during clinical trials due to safety concerns or non-compliance. If the FDA imposes a clinical hold, trials may not recommence without FDA authorization and then only under terms authorized by the FDA. Accordingly, we cannot be sure that submission of an IND will result in the FDA allowing clinical trials to begin, or that, once begun, issues will not arise that suspend or terminate such trials. In addition to the IND submission process, sponsors of certain clinical studies of cells containing recombinant or synthetic nucleic acid molecules, including human gene transfer studies, must comply with the NIH's Guidelines for Research Involving Recombinant or Synthetic Nucleic Acid Molecules, or NIH Guidelines. The NIH Guidelines set forth the principles and requirements for NIH and institutional oversight of research with recombinant or synthetic nucleic acid molecules, including the standards for investigators and institutions to follow to ensure the safe handling and containment of such molecules. In April 2016, modifications to the NIH Guidelines went into effect, pursuant to which only a subset of human gene transfer protocols are subject to review by the RAC. Specifically, under the modified NIH Guidelines, RAC review of the protocol will be required only in exceptional cases where an oversight body such as an Institutional Biosafety Committee, or IBC, which provides local review and oversight of research utilizing recombinant or synthetic nucleic acid molecules, or an IRB determines that the protocol would significantly benefit from RAC review, and the protocol (a) uses a

new vector, genetic material, or delivery methodology that represents a first-in-human experience and thus presents an unknown risk, and/or (b) relies on preclinical safety data that were obtained using a new preclinical model system of unknown and unconfirmed value, and/or (c) involves a proposed vector, gene construct, or method of delivery associated with possible toxicities that are not widely known and that may render it difficult for oversight bodies to evaluate the protocol rigorously. The RAC review proceedings are public, and reports are posted publicly to the website for the NIH's Office of Biotechnology Activities. Although compliance with the NIH Guidelines is mandatory for research conducted at or sponsored by institutions receiving NIH funding of recombinant or synthetic nucleic acid molecule research, many companies and other institutions not otherwise subject to the NIH Guidelines voluntarily follow them. Independent of RAC review, the NIH Guidelines also require all human gene transfer protocols subject to the NIH Guidelines to be registered with NIH, with limited exemptions. A study subject to the NIH Guidelines may not begin until the IBC approves the protocol, and the IBC cannot approve the protocol until confirmation from the NIH that such registration is complete. In the event that RAC review is warranted, the protocol registration process cannot be completed until RAC review has taken place.

Clinical trials involve the administration of the biological product candidate to healthy volunteers or patients under the supervision of qualified investigators, generally physicians not employed by or under the study sponsor's control. Clinical trials are conducted under protocols detailing, among other things, the objectives of the clinical study, dosing procedures, subject selection and exclusion criteria, the efficacy measurements to be evaluated and the parameters to be used to monitor subject safety, including stopping rules that assure a clinical study will be stopped if certain adverse events should occur. Each protocol and any amendments to the protocol must be submitted to the FDA as part of the IND. Clinical trials must be conducted and monitored in accordance with the FDA's regulations comprising the GCP requirements, including the requirement that all research subjects provide informed consent. Further, each clinical study must be reviewed and approved by an independent institutional review board, or IRB, at or servicing each institution at which the clinical study will be conducted. An IRB is charged with protecting the welfare and rights of study participants and considers such items as whether the risks to individuals participating in the clinical trials are minimized and are reasonable in relation to anticipated benefits. The IRB also approves the form and content of the informed consent that must be signed by each clinical study subject or his or her legal representative and must monitor the clinical study until completed. Clinical trials also must be reviewed by an IBC, a local institutional committee that reviews and oversees basic and clinical research conducted at that institution. The IBC assesses the safety of the research and identifies any potential risk to public health or the environment.

Human clinical trials are typically conducted in three sequential phases that may overlap or be combined:

- Phase I. The biological product candidate is initially introduced into healthy human subjects and tested for safety. In the case of some products for severe or life-threatening diseases, especially when the product may be too inherently toxic to ethically administer to healthy volunteers, the initial human testing is often conducted in patients.

- Phase II. The biological product candidate is evaluated in a limited patient population to identify possible adverse effects and safety risks, to preliminarily evaluate the efficacy of the product for specific targeted diseases and to determine dosage tolerance, optimal dosage and dosing schedule.

- Phase III. Clinical trials are undertaken to further evaluate dosage, clinical efficacy, potency, and safety in an expanded patient population at geographically dispersed clinical study sites. These clinical trials are intended to establish the overall risk/benefit ratio of the product and provide an adequate basis for product labeling.

In most cases, the FDA requires two adequate and well-controlled Phase 3 clinical trials to demonstrate the safety and efficacy of a biological product. In rare instances, a single Phase 3 trial, together with other

confirmatory evidence may be sufficient to support a BLA submission. Post-approval clinical trials, sometimes referred to as Phase IV clinical trials, may be conducted after initial marketing approval. These clinical trials are used to gain additional experience from the treatment of patients in the intended therapeutic indication, particularly for long-term safety follow-up. The FDA recommends that sponsors observe subjects for potential gene therapy-related delayed adverse events for a 15-year period, including a minimum of five years of annual examinations followed by ten years of annual queries, either in person or by questionnaire.

During all phases of clinical development, regulatory agencies require extensive monitoring and auditing of all clinical activities, clinical data, and clinical study investigators. Annual progress reports detailing the results of the clinical trials must be submitted to the FDA. Written IND safety reports must be promptly submitted to the FDA, the NIH and the investigators for serious and unexpected adverse events, any findings from other trials, tests in laboratory animals or *in vitro* testing that suggest a significant risk for human subjects, or any clinically important increase in the rate of a serious suspected adverse reaction over that listed in the protocol or investigator brochure. The sponsor must submit an IND safety report within 15 calendar days after the sponsor determines that the information qualifies for reporting. The sponsor also must notify the FDA of any unexpected fatal or life-threatening suspected adverse reaction within seven calendar days after the sponsor's initial receipt of the information. Phase I, Phase II and Phase III clinical trials may not be completed successfully within any specified period, if at all. The FDA or the sponsor or its data safety monitoring board may suspend or permanently discontinue a clinical study at any time on various grounds, including a finding that the research subjects or patients are being exposed to an unacceptable health risk or the clinical study is not being conducted in accordance with FDA regulations. Similarly, an IRB can suspend or terminate approval of a clinical study at its institution if the clinical study is not being conducted in accordance with the IRB's requirements or if the biological product candidate has been associated with unexpected serious harm to patients. The FDA and the IRB may also halt, terminate or impose other conditions if either believes the patients are subject to unacceptable risk.

There are also requirements governing the reporting of ongoing clinical trials and completed clinical trial results to public registries. Sponsors of clinical trials of FDA-regulated products, including biologics, are required to register and disclose certain clinical trial information, which is publicly available at www.clinicaltrials.gov. Information related to the product, patient population, phase of investigation, study sites and investigators, and other aspects of the clinical trial is then made public as part of the registration. Sponsors are also obligated to discuss the results of their clinical trials after completion. Disclosure of the results of these trials can be delayed until the new product or new indication being studied has been approved.

Human gene therapy products based on gene-editing technology are a new category of therapeutics. Because this is a relatively new and expanding area of novel therapeutic interventions, there can be no assurance as to the length of the study period, the number of patients the FDA will require to be enrolled in the trials in order to establish the safety, efficacy, purity and potency of human gene therapy products, or that the data generated in these trials will be acceptable to the FDA to support marketing approval. The NIH and the FDA have a publicly accessible database, the Genetic Modification Clinical Research Information System, which includes information on gene transfer trials and serves as an electronic tool to facilitate the reporting and analysis of adverse events in these trials.

Concurrent with clinical trials, companies usually complete additional animal trials and must also develop additional information about the physical characteristics of the biological product candidate as well as finalize a process for manufacturing the product in commercial quantities in accordance with cGMP requirements. To help reduce the risk of the introduction of adventitious agents with use of biological products, the PHS Act emphasizes the importance of manufacturing control for products whose attributes cannot be precisely defined. The manufacturing process must be capable of consistently producing quality batches of the product candidate and, among other things, the sponsor must develop methods for testing the identity, strength, quality, potency and purity of the final biological product. Additionally, appropriate packaging must be selected and tested and stability studies must be conducted to demonstrate that the biological product candidate does not undergo unacceptable deterioration over its shelf life.

U.S. Review and Approval Processes

After the completion of clinical trials of a biological product candidate, FDA approval of a BLA must be obtained before commercial marketing and distribution of the biological product. The BLA must include results of product development, laboratory and animal trials, human trials, information on the manufacture, pharmacology, chemistry and controls of the product, proposed labeling and other relevant information. In addition, under the Pediatric Research Equity Act, or PREA, a BLA or supplement to a BLA must contain data to assess the safety and effectiveness of the biological product candidate for the claimed indications in all relevant pediatric subpopulations and to support dosing and administration for each pediatric subpopulation for which the product is safe and effective.

The Food and Drug Administration Safety and Innovation Act, or FDASIA, requires that a sponsor who is planning to submit a marketing application for a drug or biological product that includes a new active ingredient, new indication, new dosage form, new dosing regimen or new route of administration submit an initial Pediatric Study Plan, or PSP, within sixty days after an end-of-Phase 2 meeting or as may be agreed between the sponsor and FDA. The initial PSP must include, among other things, an outline of the pediatric study or studies that the sponsor plans to conduct, including to the extent practicable study objectives and design, age groups, relevant endpoints and statistical approach, or a justification for not including such detailed information, and any request for a deferral of pediatric assessments or a full or partial waiver of the requirement to provide data from pediatric studies along with supporting information, along with any other information specified in FDA regulations. The FDA and the sponsor must reach agreement on the PSP. A sponsor can submit amendments to an agreed-upon initial PSP at any time if changes to the pediatric plan need to be considered based on data collected from nonclinical studies, early phase clinical trials, and/or other clinical development programs. The FDA may grant deferrals for submission of data or full or partial waivers. Unless otherwise required by regulation, PREA does not apply to any biological product for an indication for which orphan designation has been granted. The testing and approval processes require substantial time and effort and there can be no assurance that the FDA will accept the BLA for filing and, even if filed, that any approval will be granted on a timely basis, if at all.

Under the Prescription Drug User Fee Act, or PDUFA, as amended, each BLA must be accompanied by a user fee. The FDA adjusts the PDUFA user fees on an annual basis. PDUFA also imposes an annual program fee for products. Fee waivers or reductions are available in certain circumstances, including a waiver of the application fee for the first human drug application filed by a small business. Additionally, no user fees are assessed on BLAs for products designated as orphan drugs, unless the product also includes a non-orphan indication.

Within 60 days following submission of the application, the FDA reviews a BLA submitted to determine if it is substantially complete before the agency accepts it for filing. The FDA may refuse to file any BLA that it deems incomplete or not properly reviewable at the time of submission and may request additional information. In this event, the BLA must be resubmitted with the additional information. The resubmitted application also is subject to review before the FDA accepts it for filing. Once the submission is accepted for filing, the FDA begins an in-depth substantive review of the BLA. Under PDUFA, the FDA has agreed to certain performance goals to complete the review of BLAs. The FDA may give a priority review designation to biological products that offer major advances in treatment, or provide a treatment where no adequate therapy exists. A priority review means that the goal for the FDA to review an application is six months, rather than the standard review of ten months under current PDUFA guidelines. Under the current PDUFA agreement, these six and ten month review periods are measured from the “filing” date rather than the receipt date for original BLAs, which typically adds approximately two months to the timeline for review and decision from the date of submission.

The FDA reviews the BLA to determine, among other things, whether the proposed product is safe and potent, or effective, for its intended use, and has an acceptable purity profile, and whether the product is being

manufactured in accordance with cGMP requirements to assure and preserve the product's identity, safety, strength, quality, potency and purity. The FDA may refer applications for novel biological products or biological products that present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and a recommendation as to whether the application should be approved and under what conditions. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions. During the biological product approval process, the FDA also will determine whether a Risk Evaluation and Mitigation Strategy, or REMS, is necessary to assure the safe use of the biological product candidate. If the FDA concludes a REMS is needed, the sponsor of the BLA must submit a proposed REMS; the FDA will not approve the BLA without a REMS, if required.

Before approving a BLA, the FDA will inspect the facilities at which the product is manufactured. The FDA will not approve the product unless it determines that the manufacturing processes and facilities are in compliance with cGMP requirements and adequate to assure consistent production of the product within required specifications. Additionally, before approving a BLA, the FDA will typically inspect one or more clinical sites to assure that the clinical trials were conducted in compliance with IND study requirements and GCP requirements. To assure cGMP and GCP compliance, an applicant must incur significant expenditure of time, money and effort in the areas of training, record keeping, production, and quality control.

Notwithstanding the submission of relevant data and information, the FDA may ultimately decide that the BLA does not satisfy its regulatory criteria for approval and deny approval. Data obtained from clinical trials are not always conclusive and the FDA may interpret data differently than we interpret the same data. If the agency decides not to approve the BLA in its present form, the FDA will issue a complete response letter that usually describes all of the specific deficiencies in the BLA identified by the FDA. The deficiencies identified may be minor, for example, requiring labeling changes, or major, for example, requiring additional clinical trials. Additionally, the complete response letter may include recommended actions that the applicant might take to place the application in a condition for approval. If a complete response letter is issued, the applicant may either resubmit the BLA, addressing all of the deficiencies identified in the letter, or withdraw the application. If, or when, those deficiencies have been addressed to the FDA's satisfaction in a resubmission of the BLA, the FDA will issue an approval letter. Under the current PDUFA guidelines, the FDA has committed to reviewing such resubmissions in two or six months of receipt depending on the type of information included.

If regulatory approval of a product is granted, such approval will be granted for particular indications and may entail limitations on the indicated uses for which such product may be marketed. For example, the FDA may approve the BLA with a Risk Evaluation and Mitigation Strategy, or REMS, to ensure the benefits of the product outweigh its potential risks. A REMS is a safety strategy to manage a known or potential serious risk associated with a medicine and to enable patients to have continued access to such medicines by managing their safe use, and could include medication guides, physician communication plans, or elements to assure safe use, such as restricted distribution methods, patient registries and other risk minimization tools. The FDA also may condition approval on, among other things, changes to proposed labeling or the development of adequate controls and specifications. The requirement for a REMS can materially affect the potential market and profitability of the product.

Once approved, the FDA may withdraw the product approval if compliance with pre- and post-marketing requirements is not maintained or if problems occur after the product reaches the marketplace. Changes to some of the conditions established in an approved BLA, including changes in indications, product labeling, manufacturing processes or facilities, require submission and FDA approval of a new BLA or BLA supplement before the change can be implemented. A BLA supplement for a new indication typically requires clinical data similar to that in the original application, and the FDA uses the same procedures and actions in reviewing BLA supplements as it does in reviewing BLAs. The FDA may require one or more Phase IV post-market studies or surveillance to further assess and monitor the product's safety and effectiveness after commercialization, and may limit further marketing of the product based on the results of these post-marketing studies.

Additionally, new government requirements, including those resulting from new legislation, may be established, or the FDA's policies may change, which could impact the timeline for regulatory approval or otherwise impact ongoing development programs. For example, in December 2016, the 21st Century Cures Act was signed into law. The Act is intended, among other things, to modernize the regulation of drugs and biologics and to spur innovation, and contains provisions specific to the development of cell therapies.

One of the performance goals agreed to by the FDA under the PDUFA is to review 90% of standard BLAs in 10 months from the filing date and 90% of priority BLAs in six months from the filing date, whereupon a review decision is to be made. The FDA does not always meet its PDUFA goal dates for standard and priority BLAs and its review goals are subject to change from time to time. The review process and the PDUFA goal date may be extended by three months if the FDA requests or the BLA sponsor otherwise provides additional information or clarification regarding information already provided in the submission within the last three months before the PDUFA goal date.

Orphan Drug Designation

The FDA may grant Orphan Drug Designation to drugs or biologics intended to treat a rare disease or condition that affects fewer than 200,000 individuals in the United States, or if it affects more than 200,000 individuals in the United States, there is no reasonable expectation that the cost of developing and marketing the drug or biologic for this type of disease or condition will be recovered from its sales in the United States. Orphan product designation must be requested before submitting a BLA. After the FDA grants orphan product designation, the identity of the therapeutic agent and its potential orphan use are disclosed publicly by the FDA. Orphan product designation does not convey any advantage in or shorten the duration of the regulatory review and approval process

In the United States, Orphan Drug Designation entitles a party to financial incentives such as opportunities for grant funding towards clinical trial costs, tax advantages and BLA user-fee waivers. In addition, if a product receives the first FDA approval for the indication for which it has orphan designation, the product is entitled to orphan drug exclusivity, which means the FDA may not approve any other application, including a full BLA, to market the same drug or biologic for the same indication for a period of seven years, except in limited circumstances, such as a showing of clinical superiority over the product with orphan exclusivity or where the manufacturer with orphan exclusivity is unable to assure sufficient quantities of the approved orphan-designated product. Competitors, however, may receive approval of different products for the indication for which the orphan product has exclusivity or obtain approval for the same product but for a different indication for which the orphan product has exclusivity. Orphan product exclusivity also could block the approval of one of our products for seven years if a competitor obtains approval of the same biological product as defined by the FDA or if our product candidate is determined to be contained within the competitor's product for the same indication or disease. If a drug or biological product designated as an orphan product receives marketing approval for an indication broader than what is designated, it may not be entitled to orphan product exclusivity. In addition, exclusive marketing rights in the United States may be lost if the FDA later determines that the request for designation was materially defective or if the manufacturer is unable to assure sufficient quantities of the product to meet the needs of patients with the rare disease or condition. We have received orphan drug designation for the use of AAVHSC expressing human PAH for the treatment of PKU. There can be no assurance that we will receive orphan drug designation for additional indications or for any additional product candidates.

Expedited Development and Review Programs

The FDA has a Fast Track program that is intended to expedite or facilitate the process for reviewing new biological products that meet certain criteria. Specifically, new biological products are eligible for Fast Track designation if they are intended to treat a serious or life-threatening disease or condition and demonstrate the potential to address unmet medical needs for the disease or condition. Fast Track designation applies to the combination of the product and the specific indication for which it is being studied. The sponsor of a new

biologic may request that the FDA designate the biologic as a Fast Track product at any time during the clinical development of the product. The FDA must determine if the biologic product candidate qualifies for Fast Track designation within 60 days of receipt of the sponsor's request. Unique to a Fast Track product, the FDA may consider for review sections of the marketing application on a rolling basis before the complete application is submitted, if the sponsor provides a schedule for the submission of the sections of the application, the FDA agrees to accept sections of the application and determines that the schedule is acceptable, and the sponsor pays any required user fees upon submission of the first section of the application.

Any product submitted to the FDA for marketing, including under a Fast Track program, may be eligible for other types of FDA programs intended to expedite development and review, such as priority review and accelerated approval. Any product is eligible for priority review if it has the potential to provide safe and effective therapy where no satisfactory alternative therapy exists or a significant improvement in the treatment, diagnosis or prevention of a disease compared to marketed products. The FDA will attempt to direct additional resources to the evaluation of an application for a new biological product designated for priority review in an effort to facilitate the review. Additionally, a product may be eligible for accelerated approval. Biological products studied for their safety and effectiveness in treating serious or life-threatening illnesses and that provide meaningful therapeutic benefit over existing treatments may be eligible for accelerated approval, which means that they may be approved on the basis of adequate and well-controlled clinical studies establishing that the product has an effect on a surrogate endpoint that is reasonably likely to predict a clinical benefit, or on the basis of an effect on a clinical endpoint other than survival or irreversible morbidity or mortality or other clinical benefit, taking into account the severity, rarity, or prevalence of the condition and the availability or lack of alternative treatments. As a condition of approval, the FDA may require that a sponsor of a biological product subject to accelerated approval perform adequate and well-controlled post-marketing Phase IV clinical studies. Failure to conduct required post-approval trials, or to confirm a clinical benefit during post-marketing trials, will allow the FDA to withdraw the approved biologic product from the market on an expedited basis. In addition, the FDA currently requires as a condition for accelerated approval pre-approval of promotional materials, which could adversely impact the timing of the commercial launch of the product. Fast Track designation, priority review and accelerated approval do not change the standards for approval but may expedite the development or approval process.

In addition, under the provisions of FDASIA, enacted in 2012, the FDA established a Breakthrough Therapy Designation which is intended to expedite the development and review of products that treat serious or life-threatening diseases or conditions. A breakthrough therapy is defined as a drug that is intended, alone or in combination with one or more other drugs, to treat a serious or life-threatening disease or condition, and preliminary clinical evidence indicates that the drug may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. The designation includes all of the features of Fast Track designation, as well as more intensive FDA interaction and guidance. The Breakthrough Therapy Designation is a distinct status from both accelerated approval and priority review, but these can also be granted to the same product candidate if the relevant criteria are met. The FDA must take certain actions, such as holding timely meetings and providing advice, intended to expedite the development and review of an application for approval of a breakthrough therapy. All requests for breakthrough therapy designation will be reviewed within 60 days of receipt, and FDA will either grant or deny the request.

Fast Track designation, priority review, accelerated approval and breakthrough therapy designation do not change the standards for approval but may expedite the development or approval process. Even if we receive one or both of these designations for our product candidates, the FDA may later decide that our product candidates no longer meets the conditions for qualification. In addition, receiving these designations may not provide us with a material commercial advantage.

Post-Approval Requirements

Maintaining substantial compliance with applicable federal, state, and local statutes and regulations requires the expenditure of substantial time and financial resources. Rigorous and extensive FDA regulation of biological products continues after approval, particularly with respect to cGMP requirements. We will rely, and expect to continue to rely, on third parties for the production of clinical and commercial quantities of any products that we may commercialize. Manufacturers of our products are required to comply with applicable requirements in the cGMP regulations, including quality control and quality assurance and maintenance of records and documentation. Other post-approval requirements applicable to biological products, include reporting of cGMP deviations that may affect the identity, potency, purity and overall safety of a distributed product, record-keeping requirements, reporting of adverse effects, reporting updated safety and efficacy information, and complying with electronic record and signature requirements.

After a BLA is approved, the product also may be subject to official lot release. As part of the manufacturing process, the manufacturer is required to perform certain tests on each lot of the product before it is released for distribution. If the product is subject to official release by the FDA, the manufacturer submits samples of each lot of product to the FDA together with a release protocol showing a summary of the history of manufacture of the lot and the results of all of the manufacturer's tests performed on the lot. The FDA also may perform certain confirmatory tests on lots of some products, such as viral vaccines, before releasing the lots for distribution by the manufacturer. In addition, the FDA conducts laboratory research related to the regulatory standards on the safety, purity, potency, and effectiveness of biological products.

To help reduce the increased risk of the introduction of adventitious agents, the PHS Act emphasizes the importance of manufacturing controls for products whose attributes cannot be precisely defined. The PHS Act also provides authority to the FDA to immediately suspend biologics licenses in situations where there exists a danger to public health, to prepare or procure products in the event of shortages and critical public health needs, and to authorize the creation and enforcement of regulations to prevent the introduction or spread of communicable diseases within the United States.

The FDA may require one or more Phase IV post-market studies or surveillance to further assess and monitor the product's safety and effectiveness after commercialization, and may limit further marketing of the product based on the results of these post-marketing studies. We also must comply with the FDA's advertising and promotion requirements, such as those related to direct-to-consumer advertising, the prohibition on promoting products for uses or in patient populations that are not described in the product's approved labeling (known as "off-label use"), industry-sponsored scientific and educational activities, and promotional activities involving the internet. Biologics may be marketed only for the approved indications and in accordance with the provisions of the approved labeling.

Discovery of previously unknown problems or the failure to comply with the applicable regulatory requirements may result in restrictions on the marketing of a product or withdrawal of the product from the market as well as possible civil or criminal sanctions. Failure to comply with the applicable U.S. requirements at any time during the product development process, approval process or after approval, may subject an applicant or manufacturer to administrative or judicial civil or criminal sanctions and adverse publicity. FDA sanctions could include refusal to approve pending applications, withdrawal of an approval, clinical hold, warning or untitled letters, product recalls, product seizures, total or partial suspension of production or distribution, injunctions, fines, refusals of government contracts, mandated corrective advertising or communications with doctors, debarment, restitution, disgorgement of profits, or civil or criminal penalties. Any agency or judicial enforcement action could have a material adverse effect on us.

Biological product manufacturers and other entities involved in the manufacture and distribution of approved biological products are required to register their establishments with the FDA and certain state agencies, and are subject to periodic unannounced inspections by the FDA and certain state agencies for

compliance with cGMP requirements and other laws. Accordingly, manufacturers must continue to expend time, money, and effort in the area of production and quality control to maintain cGMP compliance. Discovery of problems with a product after approval may result in restrictions on a product, manufacturer, or holder of an approved BLA, including withdrawal of the product from the market. In addition, changes to the manufacturing process or facility generally require prior FDA approval before being implemented and other types of changes to the approved product, such as adding new indications and additional labeling claims, are also subject to further FDA review and approval.

U.S. Patent Term Restoration and Marketing Exclusivity

Depending upon the timing, duration and specifics of the FDA approval of the use of our product candidates, some of our U.S. patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, commonly referred to as the Hatch-Waxman Amendments. The Hatch-Waxman Amendments permit a patent restoration term of up to five years as compensation for patent term lost during product development and the FDA regulatory review process. However, patent term restoration cannot extend the remaining term of a patent beyond a total of 14 years from the product's approval date. The patent term restoration period is generally equal to the regulatory review period for the approved product which period occurs after the date the patent issued, subject to certain exceptions. Only one patent may be extended for a regulatory review period for any product, and the application for the extension must be submitted prior to the expiration of the patent. The U.S. Patent and Trademark Office, in consultation with the FDA, reviews and approves the application for any patent term extension or restoration. In the future, we may intend to apply for restoration of patent term for one of our currently owned or licensed patents to extend its current expiration date, depending on the expected length of the clinical studies and other factors involved in the filing of the relevant BLA.

For patents that might expire during the BLA review phase, the patent owner may request an interim patent term extension. If eligible, an interim patent term extension may be granted for a period of not more than one year. The patent owner may apply for not more than four subsequent interim extensions. Any interim extension granted will not be longer than the maximum period of extension allowed post-approval.

Biosimilars and Exclusivity

The Patient Protection and Affordable Care Act, or Affordable Care Act, signed into law on March 23, 2010, includes a subtitle called the Biologics Price Competition and Innovation Act of 2009, or BPCIA, which created an abbreviated approval pathway for biological products that are biosimilar to or interchangeable with an FDA-licensed reference biological product. To date, fewer than 10 biosimilars have been licensed under the BPCIA, and numerous biosimilars have been approved in Europe. The FDA has issued several guidance documents outlining an approach to review and approval of biosimilars.

Biosimilarity, which requires that there be no clinically meaningful differences between the biological product and the reference product in terms of safety, purity, and potency, can be shown through analytical studies, animal studies, and a clinical study or studies. Interchangeability requires that a product is biosimilar to the reference product and the product must demonstrate that it can be expected to produce the same clinical results as the reference product in any given patient and, for products that are administered multiple times to an individual, the biologic and the reference biologic may be alternated or switched after one has been previously administered without increasing safety risks or risks of diminished efficacy relative to exclusive use of the reference biologic. However, complexities associated with the larger, and often more complex, structures of biological products, as well as the processes by which such products are manufactured, pose significant hurdles to implementation of the abbreviated approval pathway that are still being worked out by the FDA.

Under the BPCIA, an application for a biosimilar product may not be submitted to the FDA until four years following the date that the reference product was first licensed by the FDA. In addition, the approval of a

biosimilar product may not be made effective by the FDA until 12 years from the date on which the reference product was first licensed. During this 12-year period of exclusivity, another company may still market a competing version of the reference product if the FDA approves a full BLA for the competing product containing the sponsor's own preclinical data and data from adequate and well-controlled clinical trials to demonstrate the safety, purity and potency of their product. The BPCIA also created certain exclusivity periods for biosimilars approved as interchangeable products. At this juncture, it is unclear whether products deemed "interchangeable" by the FDA will, in fact, be readily substituted by pharmacies, which are governed by state pharmacy law.

A biological product can also obtain pediatric market exclusivity in the United States. Pediatric exclusivity, if granted, adds six months to existing exclusivity periods and patent terms. This six-month exclusivity, which runs from the end of other exclusivity protection or patent term, may be granted based on the voluntary completion of a pediatric study in accordance with an FDA-issued "Written Request" for such a study.

The BPCIA is complex and continues to be interpreted and implemented by the FDA. In addition, recent government proposals have sought to reduce the 12-year reference product exclusivity period. Other aspects of the BPCIA, some of which may impact the BPCIA exclusivity provisions, have also been the subject of recent litigation. As a result, the ultimate impact, implementation, and meaning of the BPCIA remains subject to significant uncertainty.

Other Healthcare Laws and Compliance Requirements

Pharmaceutical companies are subject to additional healthcare regulation and enforcement by the federal government and by authorities in the states and foreign jurisdictions in which they conduct their business. Such laws include, without limitation, state and federal anti-kickback, fraud and abuse, false claims, privacy and security and physician sunshine laws and regulations. If their operations are found to be in violation of any of such laws or any other governmental regulations that apply, they may be subject to penalties, including, without limitation, civil and criminal penalties, damages, fines, the curtailment or restructuring of operations, exclusion from participation in federal and state healthcare programs and individual imprisonment.

Coverage and Reimbursement

Sales of any product depend, in part, on the extent to which such product will be covered by third-party payors, such as federal, state, and foreign government healthcare programs, commercial insurance and managed healthcare organizations, and the level of reimbursement for such product by third-party payors. Decisions regarding the extent of coverage and amount of reimbursement to be provided are made on a plan-by-plan basis. These third-party payors are increasingly reducing reimbursements for medical products, drugs and services. In addition, the U.S. government, state legislatures and foreign governments have continued implementing cost-containment programs, including price controls, restrictions on coverage and reimbursement and requirements for substitution of generic products. Adoption of price controls and cost-containment measures, and adoption of more restrictive policies in jurisdictions with existing controls and measures, could further limit sales of any product. Decreases in third-party reimbursement for any product or a decision by a third-party payor not to cover a product could reduce physician usage and patient demand for the product and also have a material adverse effect on sales.

Healthcare Reform

In March 2010, President Obama signed the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, collectively known as the Affordable Care Act, which substantially changed the way healthcare is financed by both governmental and private insurers, and significantly affected the pharmaceutical industry. The Affordable Care Act contains a number of provisions, including those

governing enrollment in federal healthcare programs, reimbursement adjustments and fraud and abuse changes. Additionally, the Affordable Care Act:

- increases the minimum level of Medicaid rebates payable by manufacturers of brand name drugs from 15.1% to 23.1%;
- requires collection of rebates for drugs paid by Medicaid managed care organizations;
- requires manufacturers to participate in a coverage gap discount program, under which they must agree to offer 50 percent point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturer's outpatient drugs to be covered under Medicare Part D, beginning January 2011; and
- imposes a non-deductible annual fee on pharmaceutical manufacturers or importers who sell "branded prescription drugs" to specified federal government programs.

Since its enactment, there have been judicial and Congressional challenges to certain aspects of the Affordable Care Act, and we expect there will be additional challenges and amendments to the Affordable Care Act in the future. Other legislative changes have been proposed and adopted since the Affordable Care Act was enacted, including aggregate reductions of Medicare payments to providers of 2% per fiscal year and reduced payments to several types of Medicare providers. Moreover, there has recently been heightened governmental scrutiny over the manner in which manufacturers set prices for their marketed products, which has resulted in several Congressional inquiries and proposed bills designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drug products. Individual states in the United States have also become increasingly active in implementing regulations designed to control pharmaceutical product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing.

Additional Regulation

In addition to the foregoing, state and federal laws regarding environmental protection and hazardous substances, including the Occupational Safety and Health Act, the Resource Conservancy and Recovery Act and the Toxic Substances Control Act, affect our business. These and other laws govern our use, handling and disposal of various biological, chemical and radioactive substances used in, and wastes generated by, our operations. If our operations result in contamination of the environment or expose individuals to hazardous substances, we could be liable for damages and governmental fines. We believe that we are in material compliance with applicable environmental laws and that continued compliance therewith will not have a material adverse effect on our business. We cannot predict, however, how changes in these laws may affect our future operations.

Government Regulation Outside of the United States

In addition to regulations in the United States, we will be subject to a variety of regulations in other jurisdictions governing, among other things, clinical studies and any commercial sales and distribution of our products. Because biologically sourced raw materials are subject to unique contamination risks, their use may be restricted in some countries.

Whether or not we obtain FDA approval of a product, we must obtain the requisite approvals from regulatory authorities in foreign countries prior to the commencement of clinical studies or marketing of the product in those countries. Certain countries outside of the United States have a similar process that requires the

submission of a clinical study application, or CTA, much like the IND prior to the commencement of human clinical studies. In the European Union, for example, a CTA must be submitted to each country's national health authority and an independent ethics committee, much like the FDA and the IRB, respectively. Once the CTA is approved in accordance with a country's requirements, clinical study development may proceed.

The requirements and process governing the conduct of clinical studies, product licensing, pricing and reimbursement vary from country to country. In all cases, the clinical studies are conducted in accordance with GCP and the applicable regulatory requirements and the ethical principles that have their origin in the Declaration of Helsinki.

To obtain regulatory approval of an investigational biological product under European Union regulatory systems, we must submit a marketing authorization application. The application used to file the BLA in the United States is similar to that required in the European Union, with the exception of, among other things, country-specific document requirements. The European Union also provides opportunities for market exclusivity. For example, in the European Union, upon receiving marketing authorization, new chemical entities generally receive eight years of data exclusivity and an additional two years of market exclusivity. If granted, data exclusivity prevents regulatory authorities in the European Union from referencing the innovator's data to assess a generic application. During the additional two-year period of market exclusivity, a generic marketing authorization can be submitted, and the innovator's data may be referenced, but no generic product can be marketed until the expiration of the market exclusivity. However, there is no guarantee that a product will be considered by the European Union's regulatory authorities to be a new chemical entity, and products may not qualify for data exclusivity. Products receiving orphan designation in the European Union can receive ten years of market exclusivity, during which time no similar medicinal product for the same indication may be placed on the market. An orphan product can also obtain an additional two years of market exclusivity in the European Union for pediatric studies. No extension to any supplementary protection certificate can be granted on the basis of pediatric studies for orphan indications.

The criteria for designating an "orphan medicinal product" in the European Union are similar in principle to those in the United States. Under Article 3 of Regulation (EC) 141/2000, a medicinal product may be designated as orphan if (1) it is intended for the diagnosis, prevention or treatment of a life-threatening or chronically debilitating condition; (2) either (a) such condition affects no more than five in 10,000 persons in the European Union when the application is made, or (b) the product, without the benefits derived from orphan status, would not generate sufficient return in the European Union to justify investment; and (3) there exists no satisfactory method of diagnosis, prevention or treatment of such condition authorized for marketing in the European Union, or if such a method exists, the product will be of significant benefit to those affected by the condition, as defined in Regulation (EC) 847/2000. Orphan medicinal products are eligible for financial incentives such as reduction of fees or fee waivers and are, upon grant of a marketing authorization, entitled to ten years of market exclusivity for the approved therapeutic indication. The application for orphan drug designation must be submitted before the application for marketing authorization. The applicant will receive a fee reduction for the marketing authorization application if the orphan drug designation has been granted, but not if the designation is still pending at the time the marketing authorization is submitted. Orphan drug designation does not convey any advantage in, or shorten the duration of, the regulatory review and approval process.

The 10-year market exclusivity may be reduced to six years if, at the end of the fifth year, it is established that the product no longer meets the criteria for orphan designation, for example, if the product is sufficiently profitable not to justify maintenance of market exclusivity. Additionally, marketing authorization may be granted to a similar product for the same indication at any time if:

- the second applicant can establish that its product, although similar, is safer, more effective or otherwise clinically superior;

- the applicant consents to a second orphan medicinal product application; or
- the applicant cannot supply enough orphan medicinal product.

For other countries outside of the European Union, such as countries in Eastern Europe, Latin America or Asia, the requirements governing the conduct of clinical studies, product licensing, pricing and reimbursement vary from country to country. In all cases, again, the clinical studies are conducted in accordance with GCP and the applicable regulatory requirements and the ethical principles that have their origin in the Declaration of Helsinki.

If we fail to comply with applicable foreign regulatory requirements, we may be subject to, among other things, fines, suspension or withdrawal of regulatory approvals, product recalls, seizure of products, operating restrictions and criminal prosecution.

Employees

As of March 1, 2018, we had 67 full-time employees, including 26 employees with M.D. or Ph.D. degrees. Of these full-time employees, 41 employees are engaged in research and development activities. None of our employees is represented by a labor union or covered by a collective bargaining agreement. We consider our relationship with our employees to be good.

Facilities

We currently occupy approximately 23,000 square feet of office and laboratory space in Bedford, Massachusetts, under a lease that expires in 2021. We have also signed a lease for an additional 67,000 square feet of office, laboratory and manufacturing space that expires in 2027, and we expect to occupy a portion of that space beginning in the second half of 2018. We believe that our facilities are sufficient to meet our current needs and that suitable additional space will be available as and when needed.

Legal Proceedings

We are not subject to any material legal proceedings.

MANAGEMENT

Executive Officers and Directors

The following table sets forth the name, age and position of each of our executive officers and directors as of March 1, 2018.

Name	Age	Position
Executive Officers		
Arthur O. Tzianabos, Ph.D.	54	President and Chief Executive Officer and Director
Bradford Smith	62	Chief Financial Officer, Treasurer and Assistant Secretary
Siyamak (Sam) Rasty, Ph.D.	54	Chief Operating Officer
Albert Seymour, Ph.D.	50	Chief Scientific Officer
Directors		
Steven Gillis, Ph.D.	64	Director
Richard J. Gregory, Ph.D.	60	Director
Kush M. Parmar, M.D., Ph.D.	37	Director
Matthew R. Patterson	46	Director
Mahendra G. Shah, Ph.D.	73	Director
Cameron Wheeler, Ph.D.	39	Director

(1) Member of the audit committee.
(2) Member of the compensation committee.
(3) Member of the nominating and corporate governance committee.

Executive Officers and Key Employees

Arthur O. Tzianabos, Ph.D. has served as our President, Chief Executive Officer and member of our board of directors since April of 2016. Dr. Tzianabos joined Homology from OvaScience where he served as President and Chief Scientific Officer from September of 2013 to March of 2016. Prior to OvaScience, Dr. Tzianabos spent nine years at Shire Pharmaceuticals where he served in positions of increasing responsibility, including Senior Director, Discovery Research, Vice President, Program Management and Senior Vice President and Head, Research and Early Development. From 1992 to 2005, Dr. Tzianabos was a faculty member at Harvard Medical School and maintained laboratories at the Channing Laboratory, Brigham and Women's Hospital and the Department of Microbiology and Molecular Genetics at Harvard Medical School. Dr. Tzianabos previously served as a director of BIND Therapeutics, Inc. Dr. Tzianabos holds a B.S. in Biology from Boston College and a Ph.D. in Microbiology from the University of New Hampshire. We believe Dr. Tzianabos' extensive academic and clinical experience, as well as his knowledge of the industry, qualifies him to serve on our board of directors.

Bradford Smith has served as our Chief Financial Officer and Treasurer since April of 2017 and our Secretary since July of 2017. From March 2014 to April 2017, Mr. Smith was Chief Financial Officer of Ocular Therapeutix, Inc. Prior to joining Ocular Therapeutix, Mr. Smith served as the Chief Financial Officer of OmniGuide, Inc., a medical device company, from July 2008 to March 2014. Mr. Smith holds a B.S. in Biology from Tufts University and an M.B.A. from the Whittemore School of Business and Economics at the University of New Hampshire.

Siyamak (Sam) Rasty, Ph.D. has served as our Chief Operating Officer since March 2016. Prior to joining Homology, Dr. Rasty was Vice President and Head of New Products at Shire Pharmaceuticals from August 2011 to January 2016. Dr. Rasty received a B.S. and Ph.D. in Biochemistry from Louisiana State University and holds an M.B.A. from Villanova University which he received in 2002.

Albert Seymour, Ph.D. has served as our Chief Scientific Officer since April of 2016. Prior to joining Homology, Dr. Seymour was Senior Vice President, Head of Global Research and Nonclinical Development at

Shire Pharmaceuticals from 2011 to 2016. Dr. Seymour received his B.A. in Biology from the University of Delaware, an M.S. from Johns Hopkins University School of Medicine and his Ph.D. in Human Genetics from the University of Pittsburgh.

Directors

Steven Gillis, Ph.D. has served as a member of our board of directors since 2016. Since 2005, Dr. Gillis has been a managing director at ARCH Venture Partners, a venture capital firm. From 1994 to 2005, Dr. Gillis served as chief executive officer and chairman of the board of directors of Corixa Corporation, which he co-founded in October 1994. Previously, Dr. Gillis served as a director, head of research and development, chief scientific officer and acting chief executive officer of Immunex Corporation, which he co-founded, from 1981 until his departure in 1994. As a former director and chairman of Trubion Pharmaceuticals, Inc., Dr. Gillis led its acquisition by Emergent BioSolutions in the fall of 2010. Dr. Gillis currently serves as a director of Shire plc, Oncofactor Corp., Pulmatrix, Inc. and serves as director and chairman of Accelerator Corporation, VBI Vaccines Inc., VentiRX Pharmaceuticals, Inc., Theraclone Sciences, Inc. and Lycera Corp. Dr. Gillis previously served as a director at PhaseRx, Inc. from 2008 to 2018 and at bluebird bio, Inc. from 2011 to 2015. Dr. Gillis received his B.A. in biology and English from Williams College and his Ph.D. in biological science from Dartmouth College. We believe that Dr. Gillis's knowledge in immunology and experience in the venture capital industry, particularly with biotechnology and pharmaceutical companies, qualifies him to serve as a member of our board of directors.

Richard J. Gregory, Ph.D. has served as a member of our board of directors since 2015. Dr. Gregory is Executive Vice President and Chief Scientific Officer of ImmunoGen, Inc., where he has been since 2015. Prior to joining ImmunoGen, he spent 25 years at Genzyme Corporation, a biotechnology company, in roles of increasing responsibility, including Senior Vice President and Head of Research from 2003 until Genzyme's acquisition by Sanofi in 2011, and Head of Research and Development for Genzyme from 2011 through 2014. Dr. Gregory serves as a director of ProMIS Neurosciences, Inc. Dr. Gregory holds a Ph.D. from the University of Massachusetts, Amherst, and completed his post-doctoral work at the Worcester Foundation for Experimental Biology. We believe that Dr. Gregory's knowledge of immunology qualifies him to serve as a member of our board of directors.

Kush M. Parmar, M.D., Ph.D. has served as a member of our board of directors since 2015. Dr. Parmar is a Managing Partner at 5AM Ventures, an early stage venture capital firm focused on the life sciences, where he has been since 2010. Before joining 5AM, from 2002 to 2010, he was at Harvard Medical School, where he was an NIH-sponsored M.D./Ph.D. physician scientist fellow in the joint Harvard-MIT Health Sciences and Technology Program. Dr. Parmar currently serves as a director on the boards of Arvinas, Audentes, scPharmaceuticals Inc. and CycloPorters. He previously served as board observer for Envoy (acquired by Takeda) and Achaogen. He is a member of the scientific advisory board of the Grace Wilsey Foundation and is a fellow of the Society of Kauffman Fellows. Before joining 5AM, Dr. Parmar completed clinical clerkships at the Massachusetts General & Brigham and Women's Hospitals, attended courses at Harvard Business School and consulted for an oncology startup. He also founded a non-profit international development organization, the Cruz Blanca Initiative. He holds an A.B. in Molecular Biology and Medieval Studies from Princeton University, a Ph.D. in Experimental Pathology from Harvard University, and an M.D. from Harvard Medical School. We believe that Dr. Parmar's experience in the life sciences industry, his experience as a venture capitalist and senior executive, as well as his service on the boards of directors of numerous companies provide him with the qualifications to serve as a director of our company.

Matthew R. Patterson has served as a member of our board of directors since 2018. Mr. Patterson is the co-founder of Audentes Therapeutics and has served as the President and Chief Executive Officer and a member of the board of directors since November 2012. Previously, Mr. Patterson was the Entrepreneur-In-Residence at OrbiMed Advisors LLC, an investment firm, from November 2011 to December 2012. Prior to OrbiMed, Mr. Patterson served in roles at Amicus Therapeutics, Inc., BioMarin Pharmaceutical Inc. and Genzyme Corporation. Mr. Patterson is a member of the board of directors of Gilda's Club of New York City, which provides social and

emotional support for people living with cancer. Mr. Patterson holds a B.A. from Bowdoin College. We believe that Mr. Patterson's experience in the biotechnology and biopharmaceutical industries, as well as his service on the board of directors of a public company provide him with the qualifications to serve as a director of our company.

Mahendra G. Shah, Ph.D. has served as a member of our board of directors since 2017. Dr. Shah has been with Vivo Capital, LLC, a healthcare focused investment firm, since March 2010, and is currently serving as its managing director. Dr. Shah is the founder and executive chairman of Semnur Pharmaceuticals. Dr. Shah previously served as chairman of the board of Essentialis, and currently serves as a board member of Soleno Therapeutics, Verona Pharma and several other privately held companies in the biopharmaceutical and biotechnology industries. Dr. Shaw is also a member of the board of trustees of St. John's University. From September 2005 to December 2009, he was the founder, chairman and CEO of NextWave Pharmaceuticals, a pediatric focused specialty pharmaceutical company, which was acquired by Pfizer. From 1993 to May 2003, he was the chairman and CEO of First Horizon Pharmaceuticals, a publicly traded specialty pharmaceutical company before it was sold to Shionogi Pharmaceuticals. From 1991 to October 1999, he was vice president of E. J. Financial Enterprises, Inc., a healthcare fund management company. He previously served on the boards of Biotie Therapies, Unimed Pharmaceuticals (UMED), Introgen Therapeutics, Inpharmakon, Protomed, Structural Bioinformatics and Zarix. From 1987 to 1991 he was the senior director of new business development with Fujisawa USA (now part of Astellas Pharma US, Inc.). Prior to that time he worked in various scientific and management positions with Schering-Plough and Bristol Myers-Squibb. Dr. Shah received his Ph.D. in industrial pharmacy from St. John's University and his Bachelor's and Master's Degree in Pharmacy from L.M. College of Pharmacy in Gujarat, India. We believe Dr. Shah is able to make a valuable contribution to our board of directors due to his vast experience as a finance professional in the biomedical and pharmaceutical industries.

Cameron Wheeler, Ph.D. has served as a member of our board of directors since 2017. Dr. Wheeler serves as a Principal at Deerfield Management. Prior to joining Deerfield in 2014, Cameron was at Eleven Biotherapeutics, Inc., an oncology biotech company, for more than five years, where he was responsible for corporate development and commercial strategy. Prior to Eleven, Cameron was at Third Rock Ventures, a Boston-based venture capital firm focused on launching and building life science companies. While at Third Rock, Cameron gained business development and operating experience as a member of the founding team of Constellation Pharmaceuticals. Cameron holds a Ph.D. and S.M. in Biological Engineering and an S.B. in Mechanical Engineering from the Massachusetts Institute of Technology. We believe Dr. Wheeler's extensive business experience in the biotechnology and biopharmaceutical industries qualifies him to serve on our board of directors.

Board Composition and Election of Directors

Director Independence

Our board of directors currently consists of six members. Our board of directors has determined that, of our six directors, , , , and do not have a relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director and that each of these directors is "independent" as that term is defined under the rules of The Nasdaq Stock Market LLC, or Nasdaq. There are no family relationships among any of our directors or executive officers.

Classified Board of Directors

In accordance with our restated certificate of incorporation that will go into effect upon the closing of this offering, our board of directors will be divided into three classes with staggered, three-year terms. At each annual meeting of stockholders, the successors to directors whose terms then expire will be elected to serve from the time of election and qualification until the third annual meeting following election. Effective upon the closing of this offering, our directors will be divided among the three classes as follows:

- the Class I directors will be , , and , and their terms will expire at our first annual meeting of stockholders following this offering;

- the Class II directors will be , and , and their terms will expire at our second annual meeting of stockholders following this offering; and
- the Class III directors will be , and , and their terms will expire at the third annual meeting of stockholders following this offering.

Our restated certificate of incorporation that will go into effect upon the closing of this offering will provide that the authorized number of directors may be changed only by resolution of the board of directors. Any additional directorships resulting from an increase in the number of directors will be distributed among the three classes so that, as nearly as possible, each class will consist of one-third of the directors. The division of our board of directors into three classes with staggered three-year terms may delay or prevent a change of our management or a change in control of our company. Our directors may be removed only for cause by the affirmative vote of the holders of at least two-thirds of our outstanding voting stock entitled to vote in the election of directors.

Board Leadership Structure

Our board of directors is currently chaired by . Our corporate governance guidelines provide that, if the chairman of the board is a member of management or does not otherwise qualify as independent, the independent directors of the board may elect a lead director. currently serves as our lead director. The lead director's responsibilities include, but are not limited to: presiding over all meetings of the board of directors at which the chairman is not present, including any executive sessions of the independent directors; approving board meeting schedules and agendas; and acting as the liaison between the independent directors and the chief executive officer and chairman of the board. Our corporate governance guidelines further provide the flexibility for our board of directors to modify our leadership structure in the future as it deems appropriate.

Role of the Board in Risk Oversight

One of the key functions of our board of directors is informed oversight of our risk management process. Our board of directors does not have a standing risk management committee, but rather administers this oversight function directly through our board of directors as a whole, as well as through various standing committees of our board of directors that address risks inherent in their respective areas of oversight. In particular, our board of directors is responsible for monitoring and assessing strategic risk exposure and our audit committee has the responsibility to consider and discuss our major financial risk exposures and the steps our management has taken to monitor and control these exposures, including guidelines and policies to govern the process by which risk assessment and management is undertaken. Our audit committee also monitors compliance with legal and regulatory requirements. Our nominating and corporate governance committee monitors the effectiveness of our corporate governance practices, including whether they are successful in preventing illegal or improper liability-creating conduct. Our compensation committee assesses and monitors whether any of our compensation policies and programs has the potential to encourage excessive risk-taking. While each committee is responsible for evaluating certain risks and overseeing the management of such risks, our entire board of directors is regularly informed through committee reports about such risks.

Board Committees

Our board of directors has established three standing committees—audit, compensation and nominating and corporate governance—each of which operates under a charter that has been approved by our board of directors. Upon our listing on The Nasdaq Global Market, each committee's charter will be available under the Corporate Governance section of our website at *www.homologymedicines.com*. The reference to our website address does not constitute incorporation by reference of the information contained at or available through our website, and you should not consider it to be a part of this prospectus.

Audit Committee

The audit committee's responsibilities include:

- appointing, approving the compensation of, and assessing the independence of our registered public accounting firm;
- overseeing the work of our registered public accounting firm, including through the receipt and consideration of reports from such firm;
- reviewing and discussing with management and the registered public accounting firm our annual and quarterly financial statements and related disclosures;
- coordinating our board of directors' oversight of our internal control over financial reporting, disclosure controls and procedures and code of business conduct and ethics;
- discussing our risk management policies;
- meeting independently with our internal auditing staff, if any, registered public accounting firm and management;
- reviewing and approving or ratifying any related person transactions; and
- preparing the audit committee report required by Securities Exchange Commission, or SEC, rules.

The members of our audit committee are , and . serves as the chairperson of the committee. All members of our audit committee meet the requirements for financial literacy under the applicable listing rules of Nasdaq (the "Nasdaq rules"). Our board of directors has determined that and meet the independence requirements of Rule 10A-3 under the Exchange Act and the applicable Nasdaq rules. Our board of directors has determined that is an "audit committee financial expert" as defined by applicable SEC rules and has the requisite financial sophistication as defined under the applicable Nasdaq rules.

Compensation Committee

The compensation committee's responsibilities include:

- reviewing and approving, or recommending for approval by the board of directors, the compensation of our Chief Executive Officer and our other executive officers;
- overseeing and administering our cash and equity incentive plans;
- reviewing and making recommendations to our board of directors with respect to director compensation;
- reviewing and discussing annually with management our "Compensation Discussion and Analysis," to the extent required; and
- preparing the annual compensation committee report required by SEC rules, to the extent required.

The members of our compensation committee are , and . serves as the chairperson of the committee. Our board of directors has determined that each of , and is independent under the applicable Nasdaq rules, including the Nasdaq rules specific to membership on the compensation committee, and is a "non-employee director" as defined in Rule 16b-3 promulgated under the Exchange Act.

Nominating and Corporate Governance Committee

The nominating and corporate governance committee's responsibilities include:

- identifying individuals qualified to become board members;
- recommending to our board of directors the persons to be nominated for election as directors and to each board committee;
- developing and recommending to our board of directors corporate governance guidelines, and reviewing and recommending to our board of directors proposed changes to our corporate governance guidelines from time to time; and
- overseeing a periodic evaluation of our board of directors.

The members of our nominating and corporate governance committee are , and . serves as the chairperson of the committee. Our board of directors has determined that , and are independent under the applicable Nasdaq rules.

Compensation Committee Interlocks and Insider Participation

No member of our compensation committee is or has been our current or former officer or employee. None of our executive officers served as a director or a member of a compensation committee (or other committee serving an equivalent function) of any other entity, one of whose executive officers served as a director or member of our compensation committee during the fiscal year ended December 31, 2017.

Code of Ethics and Code of Conduct

We have adopted a written code of business conduct and ethics that applies to our directors, officers and employees, including our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions. Upon our listing on The Nasdaq Global Market, our code of business conduct and ethics will be available under the Corporate Governance section of our website at *www.homologymedicines.com*. In addition, we intend to post on our website all disclosures that are required by law or the Nasdaq rules concerning any amendments to, or waivers from, any provision of the code. The reference to our website address does not constitute incorporation by reference of the information contained at or available through our website, and you should not consider it to be a part of this prospectus.

EXECUTIVE AND DIRECTOR COMPENSATION

Executive Compensation

This section discusses the material components of our 2017 compensation program for our principal executive officer and next two most highly compensated executive officers who are named in the 2017 Summary Compensation Table below. These "named executive officers" and their positions are:

- Arthur O. Tzianabos, Ph.D., President and Chief Executive Officer;
- Bradford Smith, Chief Financial Officer; and
- Albert Seymour, Ph.D., Chief Scientific Officer.

This discussion may contain forward-looking statements that are based on our current plans, considerations, expectations and determinations regarding future compensation programs. Actual compensation programs that we adopt following the completion of this offering may differ materially from the currently planned programs summarized in this discussion.

2017 Summary Compensation Table

The following table sets forth information concerning the compensation of our named executive officers for the year ended December 31, 2017:

Name and Principal Position	Year	Salary ($)	Bonus ($)	Option Awards ($)(3)	Non-Equity Incentive Plan Compensation ($)	Total
Arthur O. Tzianabos, Ph.D. President and Chief Executive Officer	2017	422,300	—	1,815,295	168,920	$ 2,406,515
Bradford Smith, Chief Financial Officer	2017	262,500(1)	20,000(2)	278,387	122,500	$ 683,387
Albert Seymour, Ph.D., Chief Scientific Officer	2017	360,500	—	269,541	126,175	$ 756,216

(1) Mr. Smith joined the Company in April 2017. The amount reported represents the base salary that he earned for the portion of the year that he was employed. Mr. Smith's annual base salary for 2017 was $350,000.

(2) The amount reported represents a signing bonus paid to Mr. Smith in connection with his commencing employment in April, 2017.

(3) Amounts reflect the full grant date fair value of stock options granted during 2017 computed in accordance with ASC Topic 718, rather than the amounts paid to or realized by the named individual. We provide information regarding the assumptions used to calculate the value of the option awards in Note 13 to our consolidated financial statements included in this prospectus.

2017 Salaries

The named executive officers receive base salary to provide a fixed component of compensation reflecting the executive's skill set, experience, role and responsibilities. The following table shows the annual base salaries for 2017 and 2018 of our named executive officers:

Name	2017 Annual Base Salary ($)	2018 Annual Base Salary ($)
Arthur O. Tzianabos, Ph.D.	$ 422,300	$ 462,000
Bradford Smith	$ 350,000	$ 364,000
Albert Seymour, Ph.D	$ 360,500	$ 374,920

2017 Bonuses

We offer our named executive officers the opportunity to earn annual cash bonuses to compensate them for attaining short-term company and individual goals as approved by our board of directors. For 2017, bonuses were based on attaining corporate goals relating to product development, establishment of manufacturing processes and overall business development and individual goals related to each named executive officer's area of responsibility within the Company. The 2017 target bonus amounts, expressed as a percentage of annual base salary, of our named executive officers were 40% for Dr. Tzianabos, 35% for Mr. Smith, and 35% for Dr. Seymour.

In December, 2017 our board of directors met to review performance against the 2017 bonus goals and approved cash bonuses for the named executive officers in the amounts set forth in the Non-Equity Incentive Plan Compensation column of the 2017 "Summary Compensation Table" above.

Equity Compensation

We generally offer stock options to our employees, including our named executive officers, as the long-term incentive component of our compensation program. Stock options allow our employees to purchase shares of our common stock at a price equal to the fair market value of our common stock on the date of grant, as determined by the board of directors. Our stock options generally vest as to 25% of the underlying shares on either the first anniversary of the date of grant or a specified vesting commencement date and in equal monthly installments over the following 36 months, subject to the holder's continued employment with us. Historically, our stock options have been intended to qualify as "incentive stock options" to the extent permitted under Internal Revenue Code of 1986, as amended, or the Code, and allow "early exercise" of an unvested option in exchange for shares or restricted stock subject to the same vesting schedule as the underlying stock option.

We granted the following stock options to our named executive officers during 2017:

Named Executive Officer	2017 Stock Options Granted
Arthur O. Tzianabos, Ph.D.	2,708,624
Bradford Smith	334,186
Albert Seymour, Ph.D	402,186

These options were issued under our 2015 Stock Incentive Plan, which we refer to as the 2015 Plan, with exercise prices equal to the fair market value of our common stock on the date of grant, as determined by the board of directors, and subject to our standard vesting schedule described above.

In connection with this offering, we intend to adopt a 2018 Incentive Award Plan, referred to below as the 2018 Plan, to facilitate the grant of cash and equity incentives to directors, employees (including our named executive officers) and consultants of our company and to enable our company to obtain and retain services of these individuals, which we believe is essential to our long-term success. Following the effective date of the 2018

Plan, we will not make any further grants under our 2015 Plan. However, the 2015 Plan will continue to govern the terms and conditions of the outstanding awards granted under it. For additional information about the 2018 Plan, please see the section titled “Incentive Plans” below.

Retirement Plans

We maintain a 401(k) retirement savings plan in which our named executive officers are eligible to participate on the same terms as other full-time employees. Currently, we do not match contributions made by participants in the 401(k) plan.

Employee Benefits and Perquisites

Our named executive officers are eligible to participate in our employee benefit plans and programs, which include medical, dental, and vision benefits, health spending accounts, and short- and long-term disability, accidental death and dismemberment, and life insurance, to the same extent as our other full-time employees generally, subject to the terms and eligibility requirements of those plans.

Outstanding Equity Awards at 2017 Fiscal Year-End

The following table summarizes the number of shares of common stock underlying outstanding equity incentive plan awards for each named executive officer as of December 31, 2017.

			Option Awards(1)				Stock Awards(1)	
Name	Grant Date	Vesting Commencement Date	Number of Securities Underlying Unexercised Options (#) Exercisable (2)	Number of Securities Underlying Unexercised Options (#) Unexercisable (2)	Option Exercise Price ($)	Option Expiration Date	Number of Shares or Units of Stock That Have Not Vested (#)(3)	Market Value of Shares or Units of Stock That Have Not Vested ($)
Arthur O. Tzianabos, Ph.D.	4/22/2016	3/31/2016	1,064,096	1,368,125	$ 0.09	4/22/2026		
	12/7/2017	1/1/2018		2,708,624	$ 1.26	12/7/2027		
Bradford Smith	4/5/2017	4/3/2017		860,000	$ 0.12	4/5/2027		
	12/7/2017	1/1/2018		334,186	$ 1.26	12/7/2027		
Albert Seymour, Ph.D.	4/22/2016	3/28/2016					675,722	$851,410
	12/7/2017	1/1/2018		402,186	$ 1.26	12/7/2027		

(1) All awards vest as to 25% of the underlying shares on either the first anniversary of the specified vesting commencement date and in equal monthly installments over the following 36 months, subject to the named executive officer’s continued employment with the Company.

(2) All stock options held by our named executive officers permit early exercise in exchange for restricted stock and were, therefore, exercisable as of December 31, 2017. The number of shares for which each option is shown as being exercisable and unexercisable represent, respectively, the numbers shares for which each option was vested and unvested as of December 31, 2017.

(3) Represent shares of unvested restricted stock acquired by the named executive officer upon exercise of unvested stock option.

Executive Employment Agreements and Change in Control Agreements

In connection with this offering, we intend to enter into agreements with each named executive officer that will supersede their current compensation arrangements and become effective on the effectiveness of the

registration statement of which this prospectus is a part. The material terms of those arrangements are not currently known and will be described in this prospectus once finally determined.

Incentive Plans

The following summarizes the material terms of the 2018 Plan, which will be the long-term incentive compensation plan in which our directors and named executive officers are eligible to participate following the consummation of this offering, and the 2015 Plan, under which we have previously made periodic grants of equity and equity-based awards to our directors and named executive officers.

2018 Incentive Award Plan

Effective the day prior to the first public trading date of our common stock, we intend to adopt and ask our stockholders to approve the 2018 Plan, under which we may grant cash and equity-based incentive awards to eligible service providers in order to attract, retain and motivate the persons who make important contributions to our company. The material terms of the 2018 Plan are summarized below.

Eligibility and Administration

Our employees, consultants and directors, and employees and consultants of our subsidiaries, will be eligible to receive awards under the 2018 Plan. The 2018 Plan will be administered by our board of directors, which may delegate its duties and responsibilities to one or more committees of our directors and/or officers (referred to collectively as the plan administrator below), subject to the limitations imposed under the 2018 Plan, Section 16 of the Exchange Act, stock exchange rules and other applicable laws. The plan administrator will have the authority to take all actions and make all determinations under the 2018 Plan, to interpret the 2018 Plan and award agreements and to adopt, amend and repeal rules for the administration of the 2018 Plan as it deems advisable. The plan administrator will also have the authority to determine which eligible service providers receive awards, grant awards and set the terms and conditions of all awards under the 2018 Plan, including any vesting and vesting acceleration provisions, subject to the conditions and limitations in the 2018 Plan.

Shares Available for Awards

An aggregate of shares of our common stock will initially be available for issuance under the 2018 Plan. The number of shares initially available for issuance will be increased by an annual increase on January 1 of each calendar year beginning in 2018 and ending in and including 2018, equal to the least of (A) , (B) % of the shares of common stock outstanding on the final day of the immediately preceding calendar year and (C) a smaller number of shares determined by our board of directors. No more than shares of common stock may be issued under the 2018 Plan upon the exercise of incentive stock options. Shares issued under the 2018 Plan may be authorized but unissued shares, shares purchased on the open market or treasury shares.

If an award under the 2018 Plan or the 2015 Plan expires, lapses or is terminated, exchanged for cash, surrendered, repurchased, canceled without having been fully exercised or forfeited, any unused shares subject to the award will, as applicable, become or again be available for new grants under the 2018 Plan. Awards granted under the 2018 Plan in substitution for any options or other stock or stock-based awards granted by an entity before the entity's merger or consolidation with us or our acquisition of the entity's property or stock will not reduce the shares available for grant under the 2018 Plan, but will count against the maximum number of shares that may be issued upon the exercise of incentive stock options, or ISOs.

In addition, the maximum aggregate grant date fair value as determined in accordance with FASB ASC Topic 718 (or any successor thereto), of awards granted to any non-employee director for services as a director pursuant to the 2018 Plan during any fiscal year may not exceed $ (or, in the fiscal year of any director's initial service, $). The plan administrator may, however, make exceptions to such limit on director compensation in extraordinary circumstances, subject to the limitations in the 2018 Plan.

Awards

The 2018 Plan provides for the grant of stock options, including ISOs, and nonqualified stock options, or NSOs, stock appreciation rights, or SARs, restricted stock, dividend equivalents, restricted stock units, or RSUs, and other stock or cash based awards. Certain awards under the 2018 Plan may constitute or provide for payment of "nonqualified deferred compensation" under Section 409A of the Code. All awards under the 2018 Plan will be set forth in award agreements, which will detail the terms and conditions of awards, including any applicable vesting and payment terms and post-termination exercise limitations. A brief description of each award type follows.

- *Stock Options and SARs*. Stock options provide for the purchase of shares of our common stock in the future at an exercise price set on the grant date. ISOs, by contrast to NSOs, may provide tax deferral beyond exercise and favorable capital gains tax treatment to their holders if certain holding period and other requirements of the Code are satisfied. SARs entitle their holder, upon exercise, to receive from us an amount equal to the appreciation of the shares subject to the award between the grant date and the exercise date. The plan administrator will determine the number of shares covered by each option and SAR, the exercise price of each option and SAR and the conditions and limitations applicable to the exercise of each option and SAR. The exercise price of a stock option or SAR will not be less than 100% of the fair market value of the underlying share on the grant date (or 110% in the case of ISOs granted to certain significant stockholders), except with respect to certain substitute awards granted in connection with a corporate transaction. The term of a stock option or SAR may not be longer than ten years (or five years in the case of ISOs granted to certain significant stockholders). The maximum aggregate number of shares of common stock with respect to one or more options or SARs that may be granted to any one person during any fiscal year of the company will be .

- *Restricted Stock and RSUs.* Restricted stock is an award of nontransferable shares of our common stock that remain forfeitable unless and until specified conditions are met and which may be subject to a purchase price. RSUs are contractual promises to deliver shares of our common stock in the future, which may also remain forfeitable unless and until specified conditions are met and may be accompanied by the right to receive the equivalent value of dividends paid on shares of our common stock prior to the delivery of the underlying shares. The plan administrator may provide that the delivery of the shares underlying RSUs will be deferred on a mandatory basis or at the election of the participant. The terms and conditions applicable to restricted stock and RSUs will be determined by the plan administrator, subject to the conditions and limitations contained in the 2018 Plan.

- *Other Stock or Cash Based Awards.* Other stock or cash based awards are awards of cash, fully vested shares of our common stock and other awards valued wholly or partially by referring to, or otherwise based on, shares of our common stock or other property. Other stock or cash based awards may be granted to participants and may also be available as a payment form in the settlement of other awards, as standalone payments and as payment in lieu of compensation to which a participant is otherwise entitled. The plan administrator will determine the terms and conditions of other stock or cash based awards, which may include any purchase price, performance goal, transfer restrictions and vesting conditions.

Performance Criteria

The plan administrator may select performance criteria for an award to establish performance goals for a performance period. Performance criteria under the 2018 Plan may include, but are not limited to, the following: net earnings or losses (either before or after one or more of interest, taxes, depreciation, amortization, and non-cash equity-based compensation expense); gross or net sales or revenue or sales or revenue growth; net

income (either before or after taxes) or adjusted net income; profits (including but not limited to gross profits, net profits, profit growth, net operation profit or economic profit), profit return ratios or operating margin; budget or operating earnings (either before or after taxes or before or after allocation of corporate overhead and bonus); cash flow (including operating cash flow and free cash flow or cash flow return on capital); return on assets; return on capital or invested capital; cost of capital; return on stockholders' equity; total stockholder return; return on sales; costs, reductions in costs and cost control measures; expenses; working capital; earnings or loss per share; adjusted earnings or loss per share; price per share or dividends per share (or appreciation in or maintenance of such price or dividends); regulatory achievements or compliance; implementation, completion or attainment of objectives relating to research, development, regulatory, commercial, or strategic milestones or developments; market share; economic value or economic value added models; division, group or corporate financial goals; customer satisfaction/growth; customer service; employee satisfaction; recruitment and maintenance of personnel; human resources management; supervision of litigation and other legal matters; strategic partnerships and transactions; financial ratios (including those measuring liquidity, activity, profitability or leverage); debt levels or reductions; sales-related goals; financing and other capital raising transactions; cash on hand; acquisition activity; investment sourcing activity; and marketing initiatives, any of which may be measured in absolute terms or as compared to any incremental increase or decrease. Such performance goals also may be based solely by reference to the company's performance or the performance of a subsidiary, division, business segment or business unit of the company or a subsidiary, or based upon performance relative to performance of other companies or upon comparisons of any of the indicators of performance relative to performance of other companies. When determining performance goals, the plan administrator may provide for exclusion of the impact of an event or occurrence which the plan administrator determines should appropriately be excluded, including, without limitation, non-recurring charges or events, acquisitions or divestitures, changes in the corporate or capital structure, events unrelated to the business or outside of the control of management, foreign exchange considerations, and legal, regulatory, tax or accounting changes.

Certain Transactions

In connection with certain corporate transactions and events affecting our common stock, including a change in control, or change in any applicable laws or accounting principles, the plan administrator has broad discretion to take action under the 2018 Plan to prevent the dilution or enlargement of intended benefits, facilitate the transaction or event or give effect to the change in applicable laws or accounting principles. This includes canceling awards for cash or property, accelerating the vesting of awards, providing for the assumption or substitution of awards by a successor entity, adjusting the number and type of shares subject to outstanding awards and/or with respect to which awards may be granted under the 2018 Plan and replacing or terminating awards under the 2018 Plan. In addition, in the event of certain non-reciprocal transactions with our stockholders, the plan administrator will make equitable adjustments to the 2018 Plan and outstanding awards as it deems appropriate to reflect the transaction.

Plan Amendment and Termination

Our board of directors may amend or terminate the 2018 Plan at any time; however, no amendment, other than an amendment that increases the number of shares available under the 2018 Plan, may materially and adversely affect an award outstanding under the 2018 Plan without the consent of the affected participant and stockholder approval will be obtained for any amendment to the extent necessary to comply with applicable laws. Further, the plan administrator cannot, without the approval of our stockholders, amend any outstanding stock option or SAR to reduce its price per share. The 2018 Plan will remain in effect until the tenth anniversary of its effective date, unless earlier terminated by our board of directors. No awards may be granted under the 2018 Plan after its termination.

Foreign Participants, Claw-Back Provisions, Transferability and Participant Payments

The plan administrator may modify awards granted to participants who are foreign nationals or employed outside the United States or establish subplans or procedures to address differences in laws, rules, regulations or customs of such foreign jurisdictions. All awards will be subject to any company claw-back policy as set forth in such claw-back policy or the applicable award agreement. Except as the plan administrator may determine or provide in an award agreement, awards under the 2018 Plan are generally non-transferrable, except by will or the laws of descent and distribution, or, subject to the plan administrator's consent, pursuant to a domestic relations order, and are generally exercisable only by the participant. With regard to tax withholding obligations arising in connection with awards under the 2018 Plan, and exercise price obligations arising in connection with the exercise of stock options under the 2018 Plan, the plan administrator may, in its discretion, accept cash, wire transfer or check, shares of our common stock that meet specified conditions, a promissory note, a "market sell order," such other consideration as the plan administrator deems suitable or any combination of the foregoing.

2015 Stock Incentive Plan

Our board of directors and stockholders have approved the 2015 Plan, under which we may grant stock options and restricted stock awards to employees, directors and consultants or advisors of our company or its affiliates. A total of 16,975,000 shares of our common stock have been authorized for issuance under the 2015 Plan.

Following the effectiveness of the 2018 Plan, we will not make any further grants under the 2015 Plan. However, the 2015 Plan will continue to govern the terms and conditions of the outstanding awards granted under it. Shares of our common stock subject to awards granted under the 2015 Plan that are forfeited, lapse unexercised or are settled in cash and which following the effective date of the 2018 Plan are not issued under the 2015 Plan will be available for issuance under the 2018 Plan.

Administration. Our board of directors administers the 2015 Plan and has the authority to issue awards under the 2015 Plan, to interpret the 2015 Plan and awards outstanding thereunder, to prescribe, amend and rescind rules and regulations relating to the 2015 Plan, to determine the terms and provisions of award agreements under the 2015 Plan, to correct any defect, omission or inconsistency in the 2015 Plan or in any award agreement, and to make all other determinations in the judgment of the board of directors that are necessary and desirable for the administration of the 2015 Plan. The board of directors may delegate its authority under the 2015 Plan to a committee. Following the effectiveness of this offering, we anticipate that the board of directors will delegate its general administrative authority under the 2015 Plan to its Compensation Committee.

Types of Awards. The 2015 Plan provides for the grant of NSOs and ISOs and restricted stock awards to employees, directors and consultants or advisors of the company or its affiliates, except that stock options intended to qualify as ISOs under the Code may only be granted to employees. As of the date of this prospectus, awards of stock options and restricted stock are outstanding under the 2015 Plan.

Certain Transactions. If certain changes are made in, or events occur with respect to, our common stock, the 2015 Plan and outstanding awards will be appropriately adjusted in the class, number and, as applicable, exercise price of securities as determined by the board of directors. In the event of certain corporate transactions of our company, including a consolidation, merger, sale of all or substantially all of our assets or a liquidation, our board or the board of directors of any corporation assuming the obligations under the 2015 Plan, may, in its discretion, take any one or more of the following actions, as to some or all options outstanding under the 2015 Plan (and need not take the same action as to each such option): (i) provide for the assumption or substitution of the option; (ii) upon written notice to the optionee, provide for the termination of all unexercised options unless exercised within a specified period; (iii) upon written notice, provide that all unvested shares of restricted stock will be repurchased at cost, (iv) in the event of a merger in which stockholders receive cash payment for shares surrendered, make or provide for a cash payment to optionees based on the difference between (A) the merger consideration times the number of shares subject to outstanding options and (B) the

aggregate exercise price of the outstanding options, in exchange for termination of such options; or (v) provide that all outstanding options will become exercisable in part or in full immediately prior to such event.

Amendment and Termination. The board of directors may terminate, modify or amend the 2015 Plan from time to time, provided that any amendment or modification may not adversely affect the rights of a holder of an outstanding award without such holder's consent. The board of directors may amend or modify the 2015 Plan and any outstanding ISOs to the extent necessary to qualify any or all such options for favorable federal income tax treatment; however, if shareholder approval is not obtained within 12 months after any amendment increasing the number of shares authorized or changing the class of persons eligible to receive options under the 2015 Plan, no options granted pursuant to such amendments will be deemed to be incentive stock options, and no incentive stock option will be issued pursuant to such amendments thereafter.

Director Compensation

Historically, our directors other than Dr. Gregory have not received compensation for their service on our board of directors. For 2017, we paid Dr. Gregory a $25,000 retainer for his services on our board of directors. We intend to approve and implement a compensation program for our directors that will become effective on the effectiveness of the registration statement of which this prospectus is a part. The terms of our director compensation program are not yet known and will be described in this prospectus once finalized.

2017 Director Compensation Table

Name	Fees Earned or Paid in Cash ($)	Total ($)
Steven Gillis, Ph.D.	—	—
Richard J. Gregory, Ph.D.	25,000	25,000
Kush M. Parmar, M.D., Ph.D.	—	—
Mahendra G. Shah, Ph.D.	—	—
Cameron Wheeler, Ph.D.	—	—

The table below shows the aggregate numbers of option awards (exercisable and unexercisable) held as of December 31, 2017 by each director who was serving as of December 31, 2017. None of our directors held unvested stock awards as of December 31, 2017.

Name	Options Outstanding
Steven Gillis, Ph.D.	—
Richard J. Gregory, Ph.D	56,875
Kush M. Parmar, M.D., Ph.D.	—
Mahendra G. Shah, Ph.D.	—
Cameron Wheeler, Ph.D	—
	—

CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS

The following includes a summary of transactions since January 1, 2014 to which we have been a party in which the amount involved exceeded or will exceed $120,000, and in which any of our directors, executive officers or, to our knowledge, beneficial owners of more than 5% of our capital stock or any member of the immediate family of any of the foregoing persons had or will have a direct or indirect material interest, other than equity and other compensation, termination, change in control and other arrangements, which are described under "Executive and Director Compensation." We also describe below certain other transactions with our directors, executive officers and stockholders.

Preferred Stock Financings and Convertible Notes Financing

Convertible Notes. From April 2015 to November 2015, we issued six convertible promissory notes in the aggregate principal amount of $2.5 million.

Series A Preferred Stock Financing. On December 22, 2015, we issued and sold to investors in a private placement 33,395,907 shares of our Series A preferred stock at a price per share of $0.71, for aggregate consideration of approximately $23.1 million, $20.5 million in cash proceeds plus the conversion of our promissory notes in the aggregate amount of approximately $2.6 million, which notes were converted at a discount to the Series A preferred stock price per share. On February 10, 2017, we issued and sold an additional 28,873,237 shares of our Series A preferred stock for aggregate consideration of approximately $20.5 million.

Series B Preferred Stock Financing. On July 28, 2017 and November 8, 2017, we issued and sold to investors in private placements an aggregate of 64,930,561 shares of our Series B preferred stock at a purchase price of $1.44 per share, for aggregate consideration of approximately $93.5 million.

The following table sets forth the aggregate number of shares of our capital stock acquired by beneficial owners of more than 5% of our capital stock in the financing transactions described above. Each share of our Series A preferred stock identified in the following table will convert into one share of common stock immediately prior to the closing of this offering. Each share of our Series B preferred stock identified in the following table will convert into one share of common stock immediately prior to the closing of this offering.

Participants	Series A Preferred Stock	Series B Preferred Stock
5% or Greater Stockholders(1)		
Entities affiliated with 5AM	22,128,302	6,250,000
Entities affiliated with ARCH	24,647,886	7,291,667
Entities affiliated with Deerfield	7,042,252	13,888,889
TLS Beta Pte. Ltd.	8,450,704	5,208,333
Novartis Institutes for BioMedical Research, Inc.	—	10,416,668

(1) Additional details regarding these stockholders and their equity holdings are provided in this prospectus under the caption "Principal Stockholders."

Some of our directors are associated with our principal stockholders as indicated in the table below:

Director	Principal Stockholder
Kush M. Parmar, M.D., Ph.D.	5AM Ventures
Steven Gillis, Ph.D.	ARCH Venture Partners
Cameron Wheeler, Ph.D.	Entities affiliated with Deerfield

Investors' Rights Agreement

We entered into an investors' rights agreement in December 2015, which was amended and restated in July 2017 with the holders of our preferred stock, including entities with which certain of our directors are

related. The agreement provides for certain rights relating to the registration of such holders' common stock, including shares issuable upon conversion of preferred stock, and a right of first refusal to purchase future securities sold by us. See "Description of Capital Stock—Registration Rights" for additional information.

Voting Agreement

We entered into an amended and restated voting agreement in December 2015, which was further amended and restated in July 2017, by and among us and certain of our stockholders, pursuant to which the following directors were elected to serve as members on our board of directors and, as of the date of this prospectus, continue to so serve: Steven Gillis, Ph.D., Richard J. Gregory, Ph.D., Kush M. Parmar, M.D., Ph.D., Matthew R. Patterson, Mahendra G. Shah, Ph.D., Arthur O. Tzianabos, Ph.D. and Cameron Wheeler, Ph.D. Dr. Tzianabos was initially selected to serve on our board of directors in his capacity as our chief executive officer. Drs. Parmar, Gillis, Wheeler, and Shah were initially selected to serve on our board of directors as representatives of holders of our preferred stock, as designated by entities affiliated with 5AM Ventures IV, L.P., ARCH Venture Fund VIII, L.P., entities affiliated with Deerfield, and Vivo Panda Fund, L.P., respectively. Dr. Gregory and Mr. Patterson were initially selected to serve on our board of directors as independent directors who are mutually acceptable to a majority of the other directors.

The voting agreement will terminate upon the closing of this offering, and members previously elected to our board of directors pursuant to this agreement will continue to serve as directors until they resign, are removed or their successors are duly elected by the holders of our common stock. The composition of our board of directors after this offering is described in more detail under "Management—Board Composition and Election of Directors."

Novartis Collaboration and License Agreement

In November 2017, we entered into a collaboration and license agreement with Novartis Institutes for BioMedical Research, Inc., or Novartis. For more information regarding the agreement with Novartis, see "Business—Strategic Collaborations."

Employment Agreements

We intend to enter into employment agreements with our named executive officers. For more information regarding the agreements with our named executive officers, see "Executive and Director Compensation—Executive Compensation Arrangements."

Indemnification Agreements

We intend to enter into indemnification agreements with each of our directors and executive officers. These agreements, among other things, require us or will require us to indemnify each director (and in certain cases their related venture capital funds) and executive officer to the fullest extent permitted by Delaware law, including indemnification of expenses such as attorneys' fees, judgments, fines and settlement amounts incurred by the director or executive officer in any action or proceeding, including any action or proceeding by or in right of us, arising out of the person's services as a director or executive officer. For further information, see "Executive and Director Compensation—Limitations of Liability and Indemnification."

Stock Option Grants to Executive Officers and Directors

We have granted stock options to our executive officers and one of our directors as more fully described in the section entitled "Executive and Director Compensation."

Policies and Procedures for Related Person Transactions

Our board of directors has adopted a written related person transaction policy, to be effective upon the closing of this offering, setting forth the policies and procedures for the review and approval or ratification of related person transactions. This policy will cover, with certain exceptions set forth in Item 404 of Regulation S-K under the Securities Act, any transaction, arrangement or relationship, or any series of similar transactions, arrangements or relationships, in which we were or are to be a participant, where the amount involved exceeds $120,000 in any fiscal year and a related person had, has or will have a direct or indirect material interest, including without limitation, purchases of goods or services by or from the related person or entities in which the related person has a material interest, indebtedness, guarantees of indebtedness and employment by us of a related person. In reviewing and approving any such transactions, our audit committee is tasked to consider all relevant facts and circumstances, including, but not limited to, whether the transaction is on terms comparable to those that could be obtained in an arm's length transaction and the extent of the related person's interest in the transaction. All of the transactions described in this section occurred prior to the adoption of this policy.

PRINCIPAL STOCKHOLDERS

The following table sets forth information with respect to the beneficial ownership of our common stock, as of January 31, 2018 by:

- each person or group of affiliated persons known by us to beneficially own more than 5% of our common stock;
- each of our named executive officers;
- each of our directors; and
- all of our executive officers and directors as a group.

The number of shares beneficially owned by each stockholder is determined under rules issued by the Securities and Exchange Commission. Under these rules, beneficial ownership includes any shares as to which the individual or entity has sole or shared voting power or investment power. Applicable percentage ownership is based on 142,519,899 shares of common stock outstanding as of January 31, 2018, assuming the conversion of all outstanding shares of preferred stock into common stock. In computing the number of shares beneficially owned by an individual or entity and the percentage ownership of that person, shares of common stock subject to options, warrants or other rights held by such person that are currently exercisable or will become exercisable within 60 days of January 31, 2018 are considered outstanding, although these shares are not considered outstanding for purposes of computing the percentage ownership of any other person. Unless noted otherwise, the address of all listed stockholders is 45 Wiggins Avenue, Bedford, MA 01730. Each of the stockholders listed has sole voting and investment power with respect to the shares beneficially owned by the stockholder unless noted otherwise, subject to community property laws where applicable.

	Shares Beneficially Owned Prior to Offering		Shares Beneficially Owned After Offering	
Name of Beneficial Owner	Number	Percentage	Number	Percentage
5% or Greater Stockholders				
Entities affiliated with 5AM Ventures(1)	35,378,302	24.8%		%
Entities affiliated with ARCH Venture Fund(2)	31,939,553	22.4		
Entities affiliated with Deerfield(3)	20,931,141	14.7		
Novartis Institutes for BioMedical Research, Inc.(4)	10,416,668	7.3		
TLS Beta Pte. Ltd.(5)	13,659,037	9.6		
Named Executive Officers and Directors				
Arthur O. Tzianabos, Ph.D.(6)	2,385,396	1.7		
Bradford Smith(7)	20,886	*		
Albert Seymour, Ph.D.(8)	1,226,419	*		
Steven Gillis, Ph.D.(2)	31,939,553	22.4		
Richard J. Gregory, Ph.D.(9)	40,286	*		
Kush M. Parmar, M.D., Ph.D.(1)	35,378,302	24.8		
Matthew R. Patterson	—	—		
Mahendra G. Shah, Ph.D.(10)	3,472,223	2.4		
Cameron Wheeler, Ph.D.(3)	20,931,141	14.7		
All executive officers and directors as a group (10 persons)	96,650,524	67.1		

* Less than 1%.

(1) Consists of 33,963,171 shares of common stock held by 5AM Ventures IV, L.P. (“Ventures IV”) and 1,415,131 shares of common stock held by 5AM Co-Investors IV, L.P. (“Co-Investors IV”). 5AM Partners IV, LLC (“Partners IV”) is the sole general partner of Ventures IV and Co-Investors IV.

Dr. John Diekman, Andrew J. Schwab and Dr. Scott M. Rocklage, are the managing members of Partners IV, and have shared voting and investment power over the shares beneficially owned by Ventures IV and Co-Investors IV. Kush M. Parmar, M.D., Ph.D., one of our directors, is an affiliate of Ventures IV. Each of Partners IV, Dr. Diekman, Mr. Schwab and Dr. Rocklage disclaim beneficial ownership of such shares except to the extent of its or their recurring interest therein. The address of all entities affiliated with 5AM Ventures is 501 2nd Street, Suite 350, San Francisco, CA 94107.

(2) Consists of 25,640,649 shares of common stock held by ARCH Venture Fund VIII, L.P. ("ARCH Fund VIII") and 6,298,904 shares of common stock held by ARCH Venture Fund VIII Overage, L.P. ("ARCH Fund Overage"). The sole general partner of ARCH Fund VIII is ARCH Venture Partners VIII, L.P. ("ARCH Partners VIII"), which may be deemed to beneficially own the shares held by ARCH Fund VIII. The sole general partner of ARCH Partners VIII and ARCH Fund Overage is ARCH Venture Partners VIII, LLC ("ARCH VIII LLC"), which may be deemed to beneficially own the shares held by ARCH Fund VIII and ARCH Fund Overage. ARCH Partners VIII and ARCH VIII LLC disclaim beneficial ownership of such shares, except to the extent of any pecuniary interest therein. The managing directors of ARCH VIII LLC are Keith L. Crandell, Clinton Bybee and Robert Nelsen, and they may be deemed to beneficially own the shares held by ARCH Fund VIII and ARCH Fund Overage. Messrs. Crandell, Bybee and Nelsen disclaim beneficial ownership of such shares, except to the extent of any pecuniary interest therein. Steven Gillis, M.D., Ph.D., one of our directors, is a managing director at ARCH Venture Partners. Director Steven Gillis owns an interest in ARCH Partners VIII but does not have voting or investment control over the shares held by ARCH Fund VIII, and disclaims beneficial ownership of such shares, except to the extent of any pecuniary interest therein. The address of ARCH Fund VIII and ARCH Fund Overage is 8755 West Higgins Road, Suite 1025, Chicago, Illinois 60631.

(3) Consists of 10,465,571 shares of common stock held by Deerfield Healthcare Innovations Fund, L.P. and 10,465,570 shares held by Deerfield Private Design Fund III, L.P. Deerfield Mgmt III, L.P. is the general partner of Deerfield Private Design Fund III, L.P., and Deerfield Mgmt HIF, L.P. is the general partner of Deerfield Healthcare Innovations Fund, L.P. Deerfield Management Company, L.P. is the investment manager of each of Deerfield Private Design Fund III, L.P. and Deerfield Healthcare Innovations Fund, L.P. Mr. James E. Flynn is the sole member of the general partner of each of Deerfield Mgmt III, L.P., Deerfield Mgmt HIF, L.P., and Deerfield Management Company, L.P. Deerfield Mgmt III, L.P., Deerfield Management Company, L.P., and Mr. James E. Flynn may be deemed to beneficially own the securities held by Deerfield Private Design Fund III, L.P. Deerfield Mgmt HIF, L.P., Deerfield Management Company, L.P. and Mr. James E. Flynn may be deemed to beneficially own the securities held by Deerfield Healthcare Innovations Fund, L.P. Dr. Wheeler, one of our directors, is the principal at Deerfield Management. The address of Deerfield Healthcare Innovations Fund, L.P., and Deerfield Private Design Fund III, L.P. is 780 Third Avenue, 37th Floor, New York, New York.

(4) Consists of 10,416,668 shares of common stock held by Novartis Institutes for BioMedical Research, Inc., or Novartis. Novartis is an indirect wholly-owned subsidiary of, and controlled by, Novartis AG. The address for Novartis is 250 Massachusetts Avenue, Cambridge, MA 02139.

(5) TLS Beta Pte. Ltd. is a direct wholly-owned subsidiary of Temasek Life Sciences Private Limited. Temasek Life Sciences Private Limited, is a direct wholly-owned subsidiary of Fullerton Management Pte Ltd, or FMPL, which in turn is a direct wholly-owned subsidiary of Temasek Holdings (Private) Limited. FMPL and Temasek Holdings (Private) Limited may be deemed to beneficially own the shares held by Temasek Life Sciences Private Limited. The principal business address of Temasek Holdings (Private) Limited, FMPL and Temasek Life Sciences Private Limited is 60B Orchard Road #06-18 Tower 2, The Atrium@Orchard, Singapore 238891.

(6) Includes options to purchase 1,385,396 shares of common stock that are or will be immediately exercisable within 60 days of January 31, 2018.

(7) Consists of options to purchase 20,886 shares of common stock that are or will be immediately exerciseable within 60 days of January 31, 2018.

(8) Includes options to purchase 25,136 shares of common stock that are or will be immediately exerciseable within 60 days of January 31, 2018.

(9) Consists of options to purchase 40,286 shares of common stock that are or will be immediately exercisable within 60 days of January 31, 2018.

(10) Consists of 3,472,223 shares of common stock held by Vivo Panda Fund, L.P. (“Vivo LP”). Vivo Panda, LLC (“Vivo LLC”) is the sole general partner of Vivo LP. Mahendra G. Shah, Ph.D., one of our directors, is a managing member of Vivo LLC and has shared voting and investment power over the shares beneficially owned by Vivo LP. Each of Vivo LLC and Dr. Shah disclaims beneficial ownership of such shares except to the extent of any pecuniary interest therein. The address of all entities affiliated with Vivo LP is 505 Hamilton Street, Suite 207, Palo Alto, CA 94301.

DESCRIPTION OF CAPITAL STOCK

General

The following description summarizes some of the terms of our amended and restated certificate of incorporation and amended and restated bylaws that will become effective upon the closing of this offering, the investors' rights agreement and of the General Corporation Law of the State of Delaware. Because it is only a summary, it does not contain all the information that may be important to you. For a complete description, you should refer to our amended and restated certificate of incorporation, amended and restated bylaws and investors' rights agreement, copies of which have been or will be filed as exhibits to the registration statement of which this prospectus is a part, as well as the relevant provisions of the General Corporation Law of the State of Delaware. The description of our common stock and preferred stock reflects changes to our capital structure that will occur upon the closing of this offering.

Following the closing of this offering, our authorized capital stock will consist of shares of common stock, par value $0.0001 per share, and shares of preferred stock, par value $0.0001 per share.

As of December 31, 2017, there were 15,273,840 shares of our common stock outstanding (including 1,395,236 shares of unvested restricted stock) and 127,199,705 shares of our common stock issuable upon the automatic conversion of all outstanding shares of our preferred stock in connection with this offering, held of record by 80 stockholders.

Common Stock

Holders of our common stock are entitled to one vote for each share held on all matters submitted to a vote of stockholders and do not have cumulative voting rights. An election of directors by our stockholders shall be determined by a plurality of the votes cast by the stockholders entitled to vote on the election. Subject to the supermajority votes for some matters, other matters shall be decided by the affirmative vote of our stockholders having a majority in voting power of the votes cast by the stockholders present or represented and voting on such matter. Our amended and restated certificate of incorporation and amended and restated bylaws also provide that our directors may be removed only for cause and only by the affirmative vote of the holders of at least two-thirds in voting power of the outstanding shares of capital stock entitled to vote thereon. In addition, the affirmative vote of the holders of at least two-thirds in voting power of the outstanding shares of capital stock entitled to vote thereon is required to amend or repeal, or to adopt any provision inconsistent with, several of the provisions of our amended and restated certificate of incorporation. See below under "—Anti-Takeover Effects of Delaware Law and Our Certificate of Incorporation and Bylaws—Amendment of Charter Provisions." Holders of common stock are entitled to receive proportionately any dividends as may be declared by our board of directors, subject to any preferential dividend rights of any series of preferred stock that we may designate and issue in the future.

In the event of our liquidation or dissolution, the holders of common stock are entitled to receive proportionately our net assets available for distribution to stockholders after the payment of all debts and other liabilities and subject to the prior rights of any outstanding preferred stock. Holders of common stock have no preemptive, subscription, redemption or conversion rights. Our outstanding shares of common stock are, and the shares offered by us in this offering will be, when issued and paid for, validly issued, fully paid and nonassessable. The rights, preferences and privileges of holders of common stock are subject to and may be adversely affected by the rights of the holders of shares of any series of preferred stock that we may designate and issue in the future.

Preferred Stock

Under the terms of our amended and restated certificate of incorporation that will become effective upon the closing of this offering, our board of directors is authorized to direct us to issue shares of preferred stock in

one or more series without stockholder approval. Our board of directors has the discretion to determine the rights, preferences, privileges and restrictions, including voting rights, dividend rights, conversion rights, redemption privileges and liquidation preferences, of each series of preferred stock.

The purpose of authorizing our board of directors to issue preferred stock and determine its rights and preferences is to eliminate delays associated with a stockholder vote on specific issuances. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions, future financings and other corporate purposes, could have the effect of making it more difficult for a third party to acquire, or could discourage a third party from seeking to acquire, a majority of our outstanding voting stock. Upon the closing of this offering, there will be no shares of preferred stock outstanding, and we have no present plans to issue any shares of preferred stock.

Options

As of December 31, 2017, options to purchase 10,377,285 shares of our common stock were outstanding under our 2015 Plan, all of which were exercisable and of which 998,770 were vested as of that date.

Registration Rights

Holders of shares of our common stock are entitled to certain rights with respect to the registration of such shares for public resale under the Securities Act, pursuant to an amended and restated investors' rights agreement by and among us and certain of our stockholders, until the rights otherwise terminate pursuant to the terms of the investors' rights agreement. The registration of shares of common stock as a result of the following rights being exercised would enable holders to trade these shares without restriction under the Securities Act when the applicable registration statement is declared effective.

Form S-1 Registration Rights

If at any time beginning 180 days after the closing date of this offering the holders of registrable securities request in writing that we effect a registration with respect to all or part of such registrable securities then outstanding and having an anticipated aggregate offering price that would exceed $5,000,000, net of expenses, we may be required to register their shares. We are obligated to effect at most two registrations in response to these demand registration rights. If the holders requesting registration intend to distribute their shares by means of an underwriting, the managing underwriter of such offering will have the right to limit the numbers of shares to be underwritten for reasons related to the marketing of the shares.

Piggyback Registration Rights

If at any time after this offering we propose to register any shares of our common stock under the Securities Act, subject to certain exceptions, the holders of registrable securities will be entitled to notice of the registration and to include their shares of registrable securities in the registration. If our proposed registration involves an underwriting, the managing underwriter of such offering will have the right to limit the number of shares to be underwritten for reasons related to the marketing of the shares.

Form S-3 Registration Rights

If, at any time after we become entitled under the Securities Act to register our shares on a registration statement on Form S-3, the holders of the registrable securities request in writing that we effect a registration with respect to registrable securities at an aggregate price to the public in the offering of at least $5,000,000, we will be required to effect such registration; provided, however, that we will not be required to effect such a registration if, within any twelve month period, we have already effected two registrations on Form S-3 for the holders of registrable securities.

Expenses and Indemnification

Ordinarily, other than underwriting discounts and commissions, we will be required to pay all expenses incurred by us related to any registration effected pursuant to the exercise of these registration rights. These expenses may include all registration and filing fees, printing expenses, fees and disbursements of our counsel, reasonable fees and disbursements of a counsel for the selling security holders and blue sky fees and expenses. Additionally, we have agreed to indemnify selling stockholders for damages, and any legal or other expenses reasonably incurred, arising from or based upon any untrue statement of a material fact contained in any registration statement, an omission or alleged omission to state a material fact in any registration statement or necessary to make the statements therein not misleading, or any violation or alleged violation by the indemnifying party of securities laws, subject to certain exceptions.

Termination of Registration Rights

The registration rights terminate upon the earlier of three years after the effective date of the registration statement of which this prospectus is a part, the closing of a deemed liquidation event, as defined in the investors' rights agreement.

Anti-Takeover Effects of Delaware Law and Our Certificate of Incorporation and Bylaws

Some provisions of Delaware law, our restated certificate of incorporation and our restated bylaws could make the following transactions more difficult: an acquisition of us by means of a tender offer; an acquisition of us by means of a proxy contest or otherwise; or the removal of our incumbent officers and directors. It is possible that these provisions could make it more difficult to accomplish or could deter transactions that stockholders may otherwise consider to be in their best interest or in our best interests, including transactions which provide for payment of a premium over the market price for our shares.

These provisions, summarized below, are intended to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors. We believe that the benefits of the increased protection of our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure us outweigh the disadvantages of discouraging these proposals because negotiation of these proposals could result in an improvement of their terms.

Undesignated Preferred Stock

The ability of our board of directors, without action by the stockholders, to issue up to shares of undesignated preferred stock with voting or other rights or preferences as designated by our board of directors could impede the success of any attempt to change control of us. These and other provisions may have the effect of deferring hostile takeovers or delaying changes in control or management of our company.

Stockholder Meetings

Our restated bylaws provide that a special meeting of stockholders may be called only by our chairman of the board, chief executive officer or president (in the absence of a chief executive officer), or by a resolution adopted by a majority of our board of directors.

Requirements for Advance Notification of Stockholder Nominations and Proposals

Our restated bylaws establish advance notice procedures with respect to stockholder proposals to be brought before a stockholder meeting and the nomination of candidates for election as directors, other than nominations made by or at the direction of the board of directors or a committee of the board of directors.

Elimination of Stockholder Action by Written Consent

Our restated certificate of incorporation eliminates the right of stockholders to act by written consent without a meeting.

Staggered Board

Our board of directors is divided into three classes. The directors in each class will serve for a three-year term, one class being elected each year by our stockholders. For more information on the classified board, see "Management—Board Composition and Election of Directors." This system of electing and removing directors may tend to discourage a third party from making a tender offer or otherwise attempting to obtain control of us, because it generally makes it more difficult for stockholders to replace a majority of the directors.

Removal of Directors

Our restated certificate of incorporation provides that no member of our board of directors may be removed from office by our stockholders except for cause and, in addition to any other vote required by law, upon the approval of the holders of at least two-thirds in voting power of the outstanding shares of stock entitled to vote in the election of directors.

Stockholders Not Entitled to Cumulative Voting

Our restated certificate of incorporation does not permit stockholders to cumulate their votes in the election of directors. Accordingly, the holders of a majority of the outstanding shares of our common stock entitled to vote in any election of directors can elect all of the directors standing for election, if they choose, other than any directors that holders of our preferred stock may be entitled to elect.

Delaware Anti-Takeover Statute

We are subject to Section 203 of the General Corporation Law of the State of Delaware, which prohibits persons deemed to be "interested stockholders" from engaging in a "business combination" with a publicly held Delaware corporation for three years following the date these persons become interested stockholders unless the business combination is, or the transaction in which the person became an interested stockholder was, approved in a prescribed manner or another prescribed exception applies. Generally, an "interested stockholder" is a person who, together with affiliates and associates, owns, or within three years prior to the determination of interested stockholder status did own, 15% or more of a corporation's voting stock. Generally, a "business combination" includes a merger, asset or stock sale, or other transaction resulting in a financial benefit to the interested stockholder. The existence of this provision may have an anti-takeover effect with respect to transactions not approved in advance by the board of directors.

Choice of Forum

Our restated certificate of incorporation provides that, unless we consent in writing to the selection of an alternative form, the Court of Chancery of the State of Delaware will be the sole and exclusive forum for: (1) any derivative action or proceeding brought on our behalf; (2) any action asserting a claim of breach of a fiduciary duty or other wrongdoing by any of our directors, officers, employees or agents to us or our stockholders; (3) any action asserting a claim against us arising pursuant to any provision of the General Corporation Law of the State of Delaware or our certificate of incorporation or bylaws; (4) any action to interpret, apply, enforce or determine the validity of our certificate of incorporation or bylaws; or (5) any action asserting a claim governed by the internal affairs doctrine. Our restated certificate of incorporation also provides that any person or entity purchasing or otherwise acquiring any interest in shares of our capital stock will be deemed to have notice of and to have consented to this choice of forum provision. It is possible that a court of law could rule that the choice of forum provision contained in our restated certificate of incorporation is inapplicable or unenforceable if it is challenged in a proceeding or otherwise.

Amendment of Charter Provisions

The amendment of any of the above provisions, except for the provision making it possible for our board of directors to issue preferred stock and the provision prohibiting cumulative voting, would require approval by holders of at least two-thirds in voting power of the outstanding shares of stock entitled to vote thereon.

The provisions of Delaware law, our restated certificate of incorporation and our restated bylaws could have the effect of discouraging others from attempting hostile takeovers and, as a consequence, they may also inhibit temporary fluctuations in the market price of our common stock that often result from actual or rumored hostile takeover attempts. These provisions may also have the effect of preventing changes in the composition of our board and management. It is possible that these provisions could make it more difficult to accomplish transactions that stockholders may otherwise deem to be in their best interests.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock will be .

Stock Exchange Listing

We have applied to have our common stock listed on The Nasdaq Global Select Market under the symbol “FIXX.”

SHARES ELIGIBLE FOR FUTURE SALE

Immediately prior to this offering, there was no public market for our common stock. Future sales of substantial amounts of common stock in the public market, or the perception that such sales may occur, could adversely affect the market price of our common stock.

Upon the closing of this offering, we will have outstanding an aggregate of shares of common stock, assuming the issuance of shares of common stock offered by us in this offering, the automatic conversion of all outstanding shares of our preferred stock into shares of our common stock and no exercise of options after September 30, 2017. Of these shares, all shares sold in this offering will be freely tradable without restriction or further registration under the Securities Act, except for any shares purchased by our "affiliates," as that term is defined in Rule 144 under the Securities Act, whose sales would be subject to the Rule 144 resale restrictions described below, other than the holding period requirement.

The remaining shares of common stock will be "restricted securities," as that term is defined in Rule 144 under the Securities Act. These restricted securities are eligible for public sale only if they are registered under the Securities Act or if they qualify for an exemption from registration under Rules 144 or 701 under the Securities Act, which are summarized below. We expect that substantially all of these shares will be subject to the 180-day lock-up period under the lock-up agreements described below. Upon expiration of the lock-up period, we estimate that approximately shares will be available for sale in the public market, subject in some cases to applicable volume limitations under Rule 144.

In addition, of the shares of our common stock that were subject to stock options outstanding as of December 31, 2017, options to purchase shares of common stock were vested as of December 31, 2017 and, upon exercise, these shares will be eligible for sale subject to the lock–up agreements described below and Rules 144 and 701 under the Securities Act.

Lock-Up Agreements

We and each of our directors and executive officers and holders of substantially all of our outstanding capital stock have agreed that, without the prior written consent of Merrill Lynch, Pierce, Fenner & Smith Incorporated and Cowen and Company, LLC, we and they will not, subject to certain exceptions, during the period ending 180 days after the date of this prospectus, offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, lend, or otherwise transfer or dispose of, directly or indirectly, any shares of our common stock or any securities convertible into or exercisable or exchangeable for common stock; or enter into any swap or other arrangement that transfers to another, in whole or in part, any of the economic consequences of ownership of our common stock, whether any transaction described above is to be settled by delivery of our common stock or such other securities, in cash or otherwise.

Upon the expiration of the applicable lock-up periods, substantially all of the shares subject to such lock-up restrictions will become eligible for sale, subject to the limitations discussed above. These lock-up restrictions may be waived at any time by Merrill Lynch, Pierce, Fenner & Smith Incorporated and Cowen and Company, LLC. For a further description of these lock-up agreements, please see "Underwriting."

Rule 144

Affiliate Resales of Restricted Securities

In general, beginning 90 days after the effective date of the registration statement of which this prospectus is a part, a person who is an affiliate of ours, or who was an affiliate at any time during the 90 days before a sale, who has beneficially owned shares of our common stock for at least six months would be entitled

to sell in "broker's transactions" or certain "riskless principal transactions" or to market makers, a number of shares within any three-month period that does not exceed the greater of:

- 1% of the number of shares of our common stock then outstanding, which will equal approximately shares immediately after this offering; or
- the average weekly trading volume in our common stock on the Nasdaq Global Select Market during the four calendar weeks preceding the filing of a notice on Form 144 with respect to such sale.

Affiliate resales under Rule 144 are also subject to the availability of current public information about us. In addition, if the number of shares being sold under Rule 144 by an affiliate during any three-month period exceeds 5,000 shares or has an aggregate sale price in excess of $50,000, the seller must file a notice on Form 144 with the Securities and Exchange Commission and Nasdaq concurrently with either the placing of a sale order with the broker or the execution directly with a market maker.

Non-Affiliate Resales of Restricted Securities

In general, beginning 90 days after the effective date of the registration statement of which this prospectus is a part, a person who is not an affiliate of ours at the time of sale, and has not been an affiliate at any time during the three months preceding a sale, and who has beneficially owned shares of our common stock for at least six months but less than a year, is entitled to sell such shares subject only to the availability of current public information about us. If such person has held our shares for at least one year, such person can resell under Rule 144(b)(1) without regard to any Rule 144 restrictions, including the 90-day public company requirement and the current public information requirement.

Non-affiliate resales are not subject to the manner of sale, volume limitation or notice filing provisions of Rule 144.

Rule 701

In general, under Rule 701, any of an issuer's employees, directors, officers, consultants or advisors who purchases shares from the issuer in connection with a compensatory stock or option plan or other written agreement before the effective date of a registration statement under the Securities Act is entitled to sell such shares 90 days after such effective date in reliance on Rule 144. An affiliate of the issuer can resell shares in reliance on Rule 144 without having to comply with the holding period requirement, and non-affiliates of the issuer can resell shares in reliance on Rule 144 without having to comply with the current public information and holding period requirements.

The Securities and Exchange Commission has indicated that Rule 701 will apply to typical stock options granted by an issuer before it becomes subject to the reporting requirements of the Exchange Act, along with the shares acquired upon exercise of such options, including exercises after an issuer becomes subject to the reporting requirements of the Exchange Act.

Equity Plans

We intend to file one or more registration statements on Form S-8 under the Securities Act to register all shares of common stock subject to outstanding stock options and common stock issued or issuable under our stock plans. We expect to file the registration statement covering shares offered pursuant to our stock plans shortly after the date of this prospectus, permitting the resale of such shares by non-affiliates in the public market without restriction under the Securities Act and the sale by affiliates in the public market, subject to compliance with the resale provisions of Rule 144.

Registration Rights

Upon the closing of this offering, the holders of shares of common stock, which includes all of the shares of common stock issuable upon the automatic conversion of our preferred stock upon the closing of this offering, or their transferees will be entitled to various rights with respect to the registration of these shares under the Securities Act. Registration of these shares under the Securities Act would result in these shares becoming fully tradable without restriction under the Securities Act immediately upon the effectiveness of the registration, except for shares purchased by affiliates. See “Description of Capital Stock—Registration Rights” for additional information. Shares covered by a registration statement will be eligible for sale in the public market upon the expiration or release from the terms of the lock-up agreement.

MATERIAL U.S. FEDERAL INCOME TAX CONSEQUENCES TO NON-U.S. HOLDERS

The following discussion is a summary of the material U.S. federal income tax consequences to non-U.S. holders (as defined below) of the purchase, ownership and disposition of the shares of common stock issued pursuant to this offering, but does not purport to be a complete analysis of all potential tax effects. The effects of other U.S. federal tax laws, such as estate and gift tax laws, and any applicable state, local or foreign tax laws are not discussed. This discussion is based on the Internal Revenue Code of 1986, as amended, or the Code, Treasury Regulations promulgated thereunder, judicial decisions, and published rulings and administrative pronouncements of the U.S. Internal Revenue Service, or IRS, in effect as of the date of this offering. These authorities may change or be subject to differing interpretations. Any such change or differing interpretation may be applied retroactively in a manner that could adversely affect a non-U.S. holder of our common stock. We have not sought and will not seek any rulings from the IRS regarding the matters discussed below. There can be no assurance the IRS or a court will not take a contrary position regarding the tax consequences of the purchase, ownership and disposition of our common stock.

This discussion is limited to non-U.S. holders that hold our common stock as a "capital asset" within the meaning of Section 1221 of the Code (property held for investment). This discussion does not address all U.S. federal income tax consequences relevant to a non-U.S. holder's particular circumstances, including the impact of the alternative minimum tax or the unearned income Medicare contribution tax. In addition, it does not address consequences relevant to holders subject to particular rules, including, without limitation:

- U.S. expatriates and certain former citizens or long-term residents of the United States;
- persons holding our common stock as part of a hedge, straddle or other risk reduction strategy or as part of a conversion transaction or other integrated investment;
- banks, insurance companies, and other financial institutions;
- brokers, dealers or traders in securities or currencies;
- "controlled foreign corporations," "passive foreign investment companies," and corporations that accumulate earnings to avoid U.S. federal income tax;
- partnerships or other entities or arrangements treated as partnerships for U.S. federal income tax purposes (and investors therein);
- tax-exempt organizations or governmental organizations;
- persons deemed to sell our common stock under the constructive sale provisions of the Code;
- persons for whom our common stock constitutes "qualified small business stock" within the meaning of Section 1202 of the Code;
- persons who hold or receive our common stock pursuant to the exercise of any employee stock option or otherwise as compensation;
- persons subject to special tax accounting rules as a result of any item of gross income with respect to our common stock being taken into account in an applicable financial statement; and
- tax-qualified retirement plans.

If a partnership (or other entity treated as a partnership for U.S. federal income tax purposes) holds our common stock, the tax treatment of a partner in the partnership will depend on the status of the partner, the

activities of the partnership and certain determinations made at the partner level. Accordingly, partnerships holding our common stock and the partners in such partnerships should consult their tax advisors regarding the U.S. federal income tax consequences to them.

THIS DISCUSSION IS FOR INFORMATION PURPOSES ONLY AND IS NOT INTENDED AS LEGAL OR TAX ADVICE. INVESTORS SHOULD CONSULT THEIR TAX ADVISORS WITH RESPECT TO THE APPLICATION OF THE U.S. FEDERAL INCOME TAX LAWS TO THEIR PARTICULAR SITUATIONS AS WELL AS ANY TAX CONSEQUENCES OF THE PURCHASE, OWNERSHIP AND DISPOSITION OF OUR COMMON STOCK ARISING UNDER THE U.S. FEDERAL ESTATE OR GIFT TAX LAWS OR UNDER THE LAWS OF ANY STATE, LOCAL OR NON-U.S. TAXING JURISDICTION OR UNDER ANY APPLICABLE INCOME TAX TREATY.

Definition of a Non-U.S. Holder

For purposes of this discussion, a "non-U.S. holder" is any beneficial owner of our common stock that is not a "U.S. person," a partnership or an entity disregarded as separate from its owner, each for U.S. federal income tax purposes. A U.S. person is any person that, for U.S. federal income tax purposes, is:

- an individual who is a citizen or resident of the United States;
- a corporation (or other entity treated as a corporation for U.S. federal income tax purposes) created or organized under the laws of the United States, any state thereof, or the District of Columbia;
- an estate, the income of which is subject to U.S. federal income tax regardless of its source; or
- a trust that (1) is subject to the primary supervision of a U.S. court and the control of one or more U.S. persons (within the meaning of Section 7701(a)(30) of the Code), or (2) has made a valid election under applicable Treasury Regulations to continue to be treated as a U.S. person.

Distributions

As described in the section entitled "Dividend Policy," we do not anticipate declaring or paying dividends to holders of our common stock in the foreseeable future. However, if we do make distributions on our common stock, such distributions of cash or property on our common stock will constitute dividends for U.S. federal income tax purposes to the extent paid from our current or accumulated earnings and profits, as determined under U.S. federal income tax principles. Amounts not treated as dividends for U.S. federal income tax purposes will constitute a return of capital and first be applied against and reduce a non-U.S. holder's adjusted tax basis in its common stock, but not below zero. Any excess will be treated as capital gain and will be treated as described below in the section relating to the sale or disposition of our common stock. Because we may not know the extent to which a distribution is a dividend for U.S. federal income tax purposes at the time it is made, for purposes of the withholding rules discussed below we or the applicable withholding agent may treat the entire distribution as a dividend.

Subject to the discussion below on backup withholding and foreign accounts, dividends paid to a non-U.S. holder of our common stock that are not effectively connected with the non-U.S. holder's conduct of a trade or business within the United States will be subject to U.S. federal withholding tax at a rate of 30% of the gross amount of the dividends (or such lower rate specified by an applicable income tax treaty).

Non-U.S. holders will be entitled to a reduction in or an exemption from withholding on dividends as a result of either (a) an applicable income tax treaty or (b) the non-U.S. holder holding our common stock in connection with the conduct of a trade or business within the United States and dividends being effectively connected with that trade or business. To claim such a reduction in or exemption from withholding, the non-U.S.

holder must provide the applicable withholding agent with a properly executed (a) IRS Form W-8BEN or W-8BEN-E (or other applicable documentation) claiming an exemption from or reduction of the withholding tax under the benefit of an income tax treaty between the United States and the country in which the non-U.S. holder resides or is established, or (b) IRS Form W-8ECI stating that the dividends are not subject to withholding tax because they are effectively connected with the conduct by the non-U.S. holder of a trade or business within the United States, as may be applicable. These certifications must be provided to the applicable withholding agent prior to the payment of dividends and must be updated periodically. Non-U.S. holders that do not timely provide the applicable withholding agent with the required certification, but that qualify for a reduced rate under an applicable income tax treaty, may obtain a refund of any excess amounts withheld by timely filing an appropriate claim for refund with the IRS.

If dividends paid to a non-U.S. holder are effectively connected with the non-U.S. holder's conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, the non-U.S. holder maintains a permanent establishment in the United States to which such dividends are attributable), then, although exempt from U.S. federal withholding tax (provided the non-U.S. holder provides appropriate certification, as described above), the non-U.S. holder will be subject to U.S. federal income tax on such dividends on a net income basis at the regular graduated U.S. federal income tax rates. In addition, a non-U.S. holder that is a corporation may be subject to a branch profits tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on its effectively connected earnings and profits for the taxable year that are attributable to such dividends, as adjusted for certain items. Non-U.S. holders should consult their tax advisors regarding their entitlement to benefits under any applicable income tax treaty.

Sale or Other Disposition of Common Stock

Subject to the discussions below on backup withholding and foreign accounts, a non-U.S. holder will not be subject to U.S. federal income tax on any gain realized upon the sale or other disposition of our common stock unless:

- the gain is effectively connected with the non-U.S. holder's conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, the non-U.S. holder maintains a permanent establishment in the United States to which such gain is attributable);
- the non-U.S. holder is a nonresident alien individual present in the United States for 183 days or more during the taxable year of the disposition and certain other requirements are met; or
- our common stock constitutes U.S. real property interests, or USRPIs, by reason of our status as a U.S. real property holding corporation, or USRPHC, for U.S. federal income tax purposes.

Gain described in the first bullet point above will generally be subject to U.S. federal income tax on a net income basis at the regular graduated U.S. federal income tax rates. A non-U.S. holder that is a foreign corporation also may be subject to a branch profits tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on such effectively connected gain, as adjusted for certain items.

A non-U.S. holder described in the second bullet point above will be subject to U.S. federal income tax at a rate of 30% (or such lower rate specified by an applicable income tax treaty) on any gain derived from the disposition, which may be offset by certain U.S. source capital losses of the non-U.S. holder (even though the individual is not considered a resident of the United States) provided the non-U.S. holder has timely filed U.S. federal income tax returns with respect to such losses.

With respect to the third bullet point above, we believe we are not currently and do not anticipate becoming a USRPHC. Because the determination of whether we are a USRPHC depends on the fair market value of our USRPIs relative to the fair market value of our other business assets and our non-U.S. real property

interests, however, there can be no assurance we are not a USRPHC or will not become one in the future. Even if we are or were to become a USRPHC, gain arising from the sale or other taxable disposition by a non-U.S. holder of our common stock will not be subject to U.S. federal income tax if our common stock is "regularly traded," as defined by applicable Treasury Regulations, on an established securities market, and such non-U.S. holder owned, actually and constructively, 5% or less of our common stock throughout the shorter of the five-year period ending on the date of the sale or other taxable disposition or the non-U.S. holder's holding period. If we are a USRPHC and either our common stock is not regularly traded on an established securities market or a non-U.S. holder holds more than 5% of our outstanding common stock, directly or indirectly, during the applicable testing period, such non-U.S. holder's gain on the disposition of shares of our common stock generally will be taxed in the same manner as gain that is effectively connected with the conduct of a U.S. trade or business, except that the branch profits tax generally will not apply. If we are a USRPHC and our common stock is not regularly traded on an established securities market, a non-U.S. holder's proceeds received on the disposition of shares will also generally be subject to withholding at a rate of 15%. Prospective investors are encouraged to consult their tax advisors regarding the possible consequences to them if we are, or were to become, a USRPHC.

Non-U.S. holders should consult their tax advisors regarding potentially applicable income tax treaties that may provide for different rules.

Information Reporting and Backup Withholding

Subject to the discussion below on foreign accounts, a non-U.S. holder will not be subject to backup withholding with respect to distributions on our common stock we make to the non-U.S. holder, provided the applicable withholding agent does not have actual knowledge or reason to know such holder is a U.S. person and the holder certifies its non-U.S. status, such as by providing a valid IRS Form W-8BEN, W-8BEN-E or W-8ECI, or other applicable certification. However, information returns generally will be filed with the IRS in connection with any distributions (including deemed distributions) made on our common stock to the non-U.S. holder, regardless of whether any tax was actually withheld. Copies of these information returns may also be made available under the provisions of a specific treaty or agreement to the tax authorities of the country in which the non-U.S. holder resides or is established.

Information reporting and backup withholding may apply to the proceeds of a sale or other taxable disposition of our common stock within the United States, and information reporting may (although backup withholding generally will not) apply to the proceeds of a sale or other taxable disposition of our common stock outside the United States conducted through certain U.S.-related financial intermediaries, in each case, unless the beneficial owner certifies under penalty of perjury that it is a non-U.S. holder on IRS Form W-8BEN or W-8BEN-E, or other applicable form (and the payor does not have actual knowledge or reason to know that the beneficial owner is a U.S. person) or such owner otherwise establishes an exemption. Proceeds of a disposition of our common stock conducted through a non-U.S. office of a non-U.S. broker generally will not be subject to backup withholding or information reporting.

Backup withholding is not an additional tax. Any amounts withheld under the backup withholding rules may be allowed as a refund or a credit against a non-U.S. holder's U.S. federal income tax liability, provided the required information is timely furnished to the IRS.

Additional Withholding Tax on Payments Made to Foreign Accounts

Withholding taxes may be imposed under the Foreign Account Tax Compliance Act, or FATCA, on certain types of payments made to non-U.S. financial institutions and certain other non-U.S. entities. Specifically, a 30% withholding tax may be imposed on dividends (including deemed dividends) paid on our common stock, or gross proceeds from the sale or other disposition of our common stock paid to a "foreign financial institution" or a "non-financial foreign entity" (each as defined in the Code), unless (1) the foreign financial institution

undertakes certain diligence and reporting obligations, (2) the non-financial foreign entity either certifies it does not have any "substantial United States owners" (as defined in the Code) or furnishes identifying information regarding each substantial United States owner, or (3) the foreign financial institution or non-financial foreign entity otherwise qualifies for an exemption from these rules. If the payee is a foreign financial institution and is subject to the diligence and reporting requirements in (1) above, it must enter into an agreement with the U.S. Department of the Treasury requiring, among other things, that it undertake to identify accounts held by certain "specified United States persons" or "United States-owned foreign entities" (each as defined in the Code), annually report certain information about such accounts, and withhold 30% on certain payments to non-compliant foreign financial institutions and certain other account holders. Foreign financial institutions located in jurisdictions that have an intergovernmental agreement with the United States governing FATCA may be subject to different rules.

Under the applicable Treasury Regulations and administrative guidance, withholding under FATCA generally applies to payments of dividends (including deemed dividends) paid on our common stock, and will apply to payments of gross proceeds from the sale or other disposition of common stock on or after January 1, 2019. Because we may not know the extent to which a distribution is a dividend for U.S. federal income tax purposes at the time it is made, for purposes of these withholding rules we or the applicable withholding agent may treat the entire distribution as a dividend. Prospective investors should consult their tax advisors regarding the potential application of these withholding provisions.

UNDERWRITING

Merrill Lynch, Pierce, Fenner & Smith Incorporated, Cowen and Company, LLC and Evercore Group L.L.C. are acting as representatives of each of the underwriters named below. Subject to the terms and conditions set forth in an underwriting agreement among us and the underwriters, we have agreed to sell to the underwriters, and each of the underwriters has agreed, severally and not jointly, to purchase from us, the number of shares of common stock set forth opposite its name below.

Underwriter	Number of Shares
Merrill Lynch, Pierce, Fenner & Smith Incorporated	
Cowen and Company, LLC	
Evercore Group L.L.C.	
BTIG, LLC	
Total	

Subject to the terms and conditions set forth in the underwriting agreement, the underwriters have agreed, severally and not jointly, to purchase all of the shares sold under the underwriting agreement if any of these shares are purchased. If an underwriter defaults, the underwriting agreement provides that the purchase commitments of the nondefaulting underwriters may be increased or the underwriting agreement may be terminated.

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act, or to contribute to payments the underwriters may be required to make in respect of those liabilities.

The underwriters are offering the shares, subject to prior sale, when, as and if issued to and accepted by them, subject to approval of legal matters by their counsel, including the validity of the shares, and other conditions contained in the underwriting agreement, such as the receipt by the underwriters of officer's certificates and legal opinions. The underwriters reserve the right to withdraw, cancel or modify offers to the public and to reject orders in whole or in part.

Commissions and Discounts

The representatives have advised us that the underwriters propose initially to offer the shares to the public at the public offering price set forth on the cover page of this prospectus and to dealers at that price less a concession not in excess of $ per share. After the initial offering, the public offering price, concession or any other term of the offering may be changed.

The following table shows the public offering price, underwriting discount and proceeds before expenses to us. The information assumes either no exercise or full exercise by the underwriters of their option to purchase additional shares.

	Per Share	Without Option	With Option
Public offering price	$	$	$
Underwriting discount	$	$	$
Proceeds, before expenses, to us	$	$	$

The expenses of the offering, not including the underwriting discount, are estimated at $ and are payable by us. We have also agreed to reimburse the underwriters for their expenses relating to clearance of this offering with the Financial Industry Regulatory Authority in an amount up to $.

Option to Purchase Additional Shares

We have granted an option to the underwriters, exercisable for 30 days after the date of this prospectus, to purchase up to additional shares at the public offering price, less the underwriting discount. If the underwriters exercise this option, each will be obligated, subject to conditions contained in the underwriting agreement, to purchase a number of additional shares proportionate to that underwriter's initial amount reflected in the above table.

No Sales of Similar Securities

We, our executive officers and directors and our other existing security holders have agreed not to sell or transfer any common stock or securities convertible into, exchangeable for, exercisable for, or repayable with common stock, for 180 days after the date of this prospectus without first obtaining the written consent of Merrill Lynch, Pierce, Fenner & Smith Incorporated and Cowen and Company, LLC. Specifically, we and these other persons have agreed, with certain limited exceptions, not to directly or indirectly:

- offer, pledge, sell or contract to sell any common stock,
- sell any option or contract to purchase any common stock,
- purchase any option or contract to sell any common stock,
- grant any option, right or warrant for the sale of any common stock,
- lend or otherwise dispose of or transfer any common stock,
- request or demand that we file a registration statement or make a confidential submission related to the common stock, or
- enter into any swap or other agreement that transfers, in whole or in part, the economic consequence of ownership of any common stock whether any such swap or transaction is to be settled by delivery of shares or other securities, in cash or otherwise.

This lock-up provision applies to common stock and to securities convertible into or exchangeable or exercisable for or repayable with common stock. It also applies to common stock owned now or acquired later by the person executing the agreement or for which the person executing the agreement later acquires the power of disposition. Merrill Lynch, Pierce, Fenner & Smith Incorporated and Cowen and Company, LLC, in their sole discretion, may release the common stock and other securities subject to the lock-up agreements described above in whole or in part at any time with or without notice. In addition, in the event that any stockholder holding in excess of five percent of our outstanding shares, or a Major Holder, is granted an early release from the lock-up restrictions with respect to our securities in an aggregate amount in excess of one percent of our issued and outstanding shares (whether in one or multiple releases), then each other Major Holder automatically will be granted an equivalent early release from its obligations under the lock-up agreement on a pro-rata basis. Such release shall not be applicable in the event of an underwritten primary or secondary public offering or sale of our common stock during the period ending 180 days after the date of this prospectus.

Nasdaq Global Select Market Listing

We expect the shares to be approved for listing on the Nasdaq Global Select Market, subject to notice of issuance, under the symbol "FIXX."

Before this offering, there has been no public market for our common stock. The initial public offering price will be determined through negotiations between us and the representatives. In addition to prevailing market conditions, the factors to be considered in determining the initial public offering price are

- the valuation multiples of publicly traded companies that the representatives believe to be comparable to us,
- our financial information,
- the history of, and the prospects for, our company and the industry in which we compete,
- an assessment of our management, its past and present operations, and the prospects for, and timing of, our future revenues,
- the present state of our development, and
- the above factors in relation to market values and various valuation measures of other companies engaged in activities similar to ours.

An active trading market for the shares may not develop. It is also possible that after the offering the shares will not trade in the public market at or above the initial public offering price.

The underwriters do not expect to sell more than 5% of the shares in the aggregate to accounts over which they exercise discretionary authority.

Price Stabilization, Short Positions and Penalty Bids

Until the distribution of the shares is completed, SEC rules may limit underwriters and selling group members from bidding for and purchasing our common stock. However, the representatives may engage in transactions that stabilize the price of the common stock, such as bids or purchases to peg, fix or maintain that price.

In connection with the offering, the underwriters may purchase and sell our common stock in the open market. These transactions may include short sales, purchases on the open market to cover positions created by short sales and stabilizing transactions. Short sales involve the sale by the underwriters of a greater number of shares than they are required to purchase in the offering. “Covered” short sales are sales made in an amount not greater than the underwriters’ option to purchase additional shares described above. The underwriters may close out any covered short position by either exercising their option to purchase additional shares or purchasing shares in the open market. In determining the source of shares to close out the covered short position, the underwriters will consider, among other things, the price of shares available for purchase in the open market as compared to the price at which they may purchase shares through the option granted to them. “Naked” short sales are sales in excess of such option. The underwriters must close out any naked short position by purchasing shares in the open market. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of our common stock in the open market after pricing that could adversely affect investors who purchase in the offering. Stabilizing transactions consist of various bids for or purchases of shares of common stock made by the underwriters in the open market prior to the completion of the offering.

The underwriters may also impose a penalty bid. This occurs when a particular underwriter repays to the underwriters a portion of the underwriting discount received by it because the representatives have repurchased shares sold by or for the account of such underwriter in stabilizing or short covering transactions.

Similar to other purchase transactions, the underwriters’ purchases to cover the syndicate short sales may have the effect of raising or maintaining the market price of our common stock or preventing or retarding a

decline in the market price of our common stock. As a result, the price of our common stock may be higher than the price that might otherwise exist in the open market. The underwriters may conduct these transactions on the Nasdaq Global Select Market, in the over-the-counter market or otherwise.

Neither we nor any of the underwriters make any representation or prediction as to the direction or magnitude of any effect that the transactions described above may have on the price of our common stock. In addition, neither we nor any of the underwriters make any representation that the representatives will engage in these transactions or that these transactions, once commenced, will not be discontinued without notice.

Electronic Distribution

In connection with the offering, certain of the underwriters or securities dealers may distribute prospectuses by electronic means, such as e-mail.

Other Relationships

Some of the underwriters and their affiliates have engaged in, and may in the future engage in, investment banking and other commercial dealings in the ordinary course of business with us or our affiliates. They have received, or may in the future receive, customary fees and commissions for these transactions.

In addition, in the ordinary course of their business activities, the underwriters and their affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (including bank loans) for their own account and for the accounts of their customers. Such investments and securities activities may involve securities and/or instruments of ours or our affiliates. The underwriters and their affiliates may also make investment recommendations and/or publish or express independent research views in respect of such securities or financial instruments and may hold, or recommend to clients that they acquire, long and/or short positions in such securities and instruments.

Notice to Prospective Investors in the European Economic Area

In relation to each member state of the European Economic Area, no offer of ordinary shares which are the subject of the offering has been, or will be made to the public in that Member State, other than under the following exemptions under the Prospectus Directive:

(a) to any legal entity which is a qualified investor as defined in the Prospectus Directive;

(b) to fewer than 150 natural or legal persons (other than qualified investors as defined in the Prospectus Directive), subject to obtaining the prior consent of the Representatives for any such offer; or

(c) in any other circumstances falling within Article 3(2) of the Prospectus Directive,

provided that no such offer of ordinary shares referred to in (a) to (c) above shall result in a requirement for the Company or any Representative to publish a prospectus pursuant to Article 3 of the Prospectus Directive, or supplement a prospectus pursuant to Article 16 of the Prospectus Directive.

Each person located in a Member State to whom any offer of ordinary shares is made or who receives any communication in respect of an offer of ordinary shares, or who initially acquires any ordinary shares will be deemed to have represented, warranted, acknowledged and agreed to and with each Representative and the Company that (1) it is a “qualified investor” within the meaning of the law in that Member State implementing Article 2(1)(e) of the Prospectus Directive; and (2) in the case of any ordinary shares acquired by it as a financial intermediary as that term is used in Article 3(2) of the Prospectus Directive, the ordinary shares acquired by it in

the offer have not been acquired on behalf of, nor have they been acquired with a view to their offer or resale to, persons in any Member State other than qualified investors, as that term is defined in the Prospectus Directive, or in circumstances in which the prior consent of the Representatives has been given to the offer or resale; or where ordinary shares have been acquired by it on behalf of persons in any Member State other than qualified investors, the offer of those ordinary shares to it is not treated under the Prospectus Directive as having been made to such persons.

The Company, the Representatives and their respective affiliates will rely upon the truth and accuracy of the foregoing representations, acknowledgments and agreements.

This prospectus has been prepared on the basis that any offer of shares in any Member State will be made pursuant to an exemption under the Prospectus Directive from the requirement to publish a prospectus for offers of shares. Accordingly any person making or intending to make an offer in that Member State of shares which are the subject of the offering contemplated in this prospectus may only do so in circumstances in which no obligation arises for the Company or any of the Representatives to publish a prospectus pursuant to Article 3 of the Prospectus Directive in relation to such offer. Neither the Company nor the Representatives have authorized, nor do they authorize, the making of any offer of shares in circumstances in which an obligation arises for the Company or the Representatives to publish a prospectus for such offer.

For the purposes of this provision, the expression an "offer of ordinary shares to the public" in relation to any ordinary shares in any Member State means the communication in any form and by any means of sufficient information on the terms of the offer and the ordinary shares to be offered so as to enable an investor to decide to purchase or subscribe the ordinary shares, as the same may be varied in that Member State by any measure implementing the Prospectus Directive in that Member State, the expression "Prospectus Directive" means Directive 2003/71/EC (as amended) and includes any relevant implementing measure in each Member State.

The above selling restriction is in addition to any other selling restrictions set out below.

Notice to Prospective Investors in the United Kingdom

In addition, in the United Kingdom, this document is being distributed only to, and is directed only at, and any offer subsequently made may only be directed at persons who are "qualified investors" (as defined in the Prospectus Directive) (i) who have professional experience in matters relating to investments falling within Article 19 (5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005, as amended (the "Order") and/or (ii) who are high net worth companies (or all such persons together being referred to as "relevant persons"). This document must not be acted on or relied on in the United Kingdom by persons who are not relevant persons. In the United Kingdom, any investment or investment activity to which this document relates is only available to, and will be engaged in with, relevant persons.

Notice to Prospective Investors in Switzerland

The shares may not be publicly offered in Switzerland and will not be listed on the SIX Swiss Exchange ("SIX") or on any other stock exchange or regulated trading facility in Switzerland. This document has been prepared without regard to the disclosure standards for issuance prospectuses under art. 652a or art. 1156 of the Swiss Code of Obligations or the disclosure standards for listing prospectuses under art. 27 ff. of the SIX Listing Rules or the listing rules of any other stock exchange or regulated trading facility in Switzerland. Neither this document nor any other offering or marketing material relating to the shares or the offering may be publicly distributed or otherwise made publicly available in Switzerland.

Neither this document nor any other offering or marketing material relating to the offering, the Company, or the shares have been or will be filed with or approved by any Swiss regulatory authority. In

particular, this document will not be filed with, and the offer of shares will not be supervised by, the Swiss Financial Market Supervisory Authority FINMA (FINMA), and the offer of shares has not been and will not be authorized under the Swiss Federal Act on Collective Investment Schemes ("CISA"). The investor protection afforded to acquirers of interests in collective investment schemes under the CISA does not extend to acquirers of shares.

Notice to Prospective Investors in the Dubai International Financial Centre

This prospectus relates to an Exempt Offer in accordance with the Offered Securities Rules of the Dubai Financial Services Authority ("DFSA"). This prospectus is intended for distribution only to persons of a type specified in the Offered Securities Rules of the DFSA. It must not be delivered to, or relied on by, any other person. The DFSA has no responsibility for reviewing or verifying any documents in connection with Exempt Offers. The DFSA has not approved this prospectus nor taken steps to verify the information set forth herein and has no responsibility for the prospectus. The shares to which this prospectus relates may be illiquid and/or subject to restrictions on their resale. Prospective purchasers of the shares offered should conduct their own due diligence on the shares. If you do not understand the contents of this prospectus you should consult an authorized financial advisor.

Notice to Prospective Investors in Australia

No placement document, prospectus, product disclosure statement or other disclosure document has been lodged with the Australian Securities and Investments Commission ("ASIC"), in relation to the offering. This prospectus does not constitute a prospectus, product disclosure statement or other disclosure document under the Corporations Act 2001 (the "Corporations Act"), and does not purport to include the information required for a prospectus, product disclosure statement or other disclosure document under the Corporations Act.

Any offer in Australia of the shares may only be made to persons (the "Exempt Investors") who are "sophisticated investors" (within the meaning of section 708(8) of the Corporations Act), "professional investors" (within the meaning of section 708(11) of the Corporations Act) or otherwise pursuant to one or more exemptions contained in section 708 of the Corporations Act so that it is lawful to offer the shares without disclosure to investors under Chapter 6D of the Corporations Act.

The shares applied for by Exempt Investors in Australia must not be offered for sale in Australia in the period of 12 months after the date of allotment under the offering, except in circumstances where disclosure to investors under Chapter 6D of the Corporations Act would not be required pursuant to an exemption under section 708 of the Corporations Act or otherwise or where the offer is pursuant to a disclosure document which complies with Chapter 6D of the Corporations Act. Any person acquiring shares must observe such Australian on-sale restrictions.

This prospectus contains general information only and does not take account of the investment objectives, financial situation or particular needs of any particular person. It does not contain any securities recommendations or financial product advice. Before making an investment decision, investors need to consider whether the information in this prospectus is appropriate to their needs, objectives and circumstances, and, if necessary, seek expert advice on those matters.

Notice to Prospective Investors in Hong Kong

The shares have not been offered or sold and will not be offered or sold in Hong Kong, by means of any document, other than (a) to "professional investors" as defined in the Securities and Futures Ordinance (Cap. 571) of Hong Kong and any rules made under that Ordinance; or (b) in other circumstances which do not result in the document being a "prospectus" as defined in the Companies Ordinance (Cap. 32) of Hong Kong or which do not constitute an offer to the public within the meaning of that Ordinance. No advertisement, invitation or

document relating to the shares has been or may be issued or has been or may be in the possession of any person for the purposes of issue, whether in Hong Kong or elsewhere, which is directed at, or the contents of which are likely to be accessed or read by, the public of Hong Kong (except if permitted to do so under the securities laws of Hong Kong) other than with respect to shares which are or are intended to be disposed of only to persons outside Hong Kong or only to "professional investors" as defined in the Securities and Futures Ordinance and any rules made under that Ordinance.

Notice to Prospective Investors in Japan

The shares have not been and will not be registered under the Financial Instruments and Exchange Law of Japan (Law No. 25 of 1948, as amended) and, accordingly, will not be offered or sold, directly or indirectly, in Japan, or for the benefit of any Japanese Person or to others for re-offering or resale, directly or indirectly, in Japan or to any Japanese Person, except in compliance with all applicable laws, regulations and ministerial guidelines promulgated by relevant Japanese governmental or regulatory authorities in effect at the relevant time. For the purposes of this paragraph, "Japanese Person" shall mean any person resident in Japan, including any corporation or other entity organized under the laws of Japan.

Notice to Prospective Investors in Singapore

This prospectus has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of shares may not be circulated or distributed, nor may the shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Singapore other than (i) to an institutional investor under Section 274 of the Securities and Futures Act, Chapter 289 of Singapore (the "SFA"), (ii) to a relevant person pursuant to Section 275(1), or any person pursuant to Section 275(1A), and in accordance with the conditions specified in Section 275, of the SFA, or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA.

Where the shares are subscribed or purchased under Section 275 of the SFA by a relevant person which is:

(a) a corporation (which is not an accredited investor (as defined in Section 4A of the SFA)) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor; or

(b) a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary of the trust is an individual who is an accredited investor,

securities (as defined in Section 239(1) of the SFA) of that corporation or the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferred within six months after that corporation or that trust has acquired the shares pursuant to an offer made under Section 275 of the SFA except:

(a) to an institutional investor or to a relevant person defined in Section 275(2) of the SFA, or to any person arising from an offer referred to in Section 275(1A) or Section 276(4)(i)(B) of the SFA;

(b) where no consideration is or will be given for the transfer;

(c) where the transfer is by operation of law;

(d) as specified in Section 276(7) of the SFA; or

(e) as specified in Regulation 32 of the Securities and Futures (Offers of Investments) (Shares and Debentures) Regulations 2005 of Singapore.

Notice to Prospective Investors in Canada

The shares may be sold only to purchasers purchasing, or deemed to be purchasing, as principal that are accredited investors, as defined in National Instrument 45-106 *Prospectus Exemptions* or subsection 73.3(1) of the *Securities Act* (Ontario), and are permitted clients, as defined in National Instrument 31-103 *Registration Requirements, Exemptions and Ongoing Registrant Obligations*. Any resale of the shares must be made in accordance with an exemption from, or in a transaction not subject to, the prospectus requirements of applicable securities laws.

Securities legislation in certain provinces or territories of Canada may provide a purchaser with remedies for rescission or damages if this prospectus (including any amendment thereto) contains a misrepresentation, provided that the remedies for rescission or damages are exercised by the purchaser within the time limit prescribed by the securities legislation of the purchaser's province or territory. The purchaser should refer to any applicable provisions of the securities legislation of the purchaser's province or territory for particulars of these rights or consult with a legal advisor.

Pursuant to section 3A.3 (or, in the case of securities issued or guaranteed by the government of a non-Canadian jurisdiction, section 3A.4) of National Instrument 33-105 *Underwriting Conflicts* (**NI 33-105**), the underwriters are not required to comply with the disclosure requirements of NI 33-105 regarding underwriter conflicts of interest in connection with this offering.

LEGAL MATTERS

The validity of the shares of common stock offered hereby will be passed upon for us by Latham & Watkins LLP. Certain legal matters in connection with this offering will be passed upon for the underwriters by Shearman & Sterling LLP.

EXPERTS

The financial statements included in this Prospectus have been audited by Deloitte & Touche LLP, an independent registered public accounting firm, as stated in their report appearing herein. Such financial statements are included in reliance upon the report of such firm given upon their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We have filed with the Securities and Exchange Commission a registration statement on Form S-1 under the Securities Act with respect to the shares of common stock offered hereby. This prospectus, which constitutes a part of the registration statement, does not contain all of the information set forth in the registration statement or the exhibits and schedules filed therewith. For further information about us and the common stock offered hereby, we refer you to the registration statement and the exhibits and schedules filed thereto. Statements contained in this prospectus regarding the contents of any contract or any other document that is filed as an exhibit to the registration statement are not necessarily complete, and each such statement is qualified in all respects by reference to the full text of such contract or other document filed as an exhibit to the registration statement. Upon completion of this offering, we will be required to file periodic reports, proxy statements, and other information with the Securities and Exchange Commission pursuant to the Securities Exchange Act of 1934. You may read and copy this information at the Public Reference Room of the Securities and Exchange Commission, 100 F Street, N.E., Room 1580, Washington, District of Columbia. 20549. You may obtain information on the operation of the public reference rooms by calling the Securities and Exchange Commission at 1-800-SEC-0330. The Securities and Exchange Commission also maintains an Internet website that contains reports, proxy statements and other information about registrants, like us, that file electronically with the Securities and Exchange Commission. The address of that site is *www.sec.gov*.

HOMOLOGY MEDICINES, INC.

INDEX TO FINANCIAL STATEMENTS

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Stockholders of Homology Medicines, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Homology Medicines, Inc. and its subsidiary (the "Company") as of December 31, 2017 and 2016, and the related consolidated statements of operations, comprehensive loss, convertible preferred stock and stockholders' deficit, and cash flows for the years then ended and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2017 and 2016, and the results of its operations and its cash flows for the years then ended, in conformity with accounting principles generally accepted in the United States of America.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulation of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits, we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Deloitte & Touche LLP

Boston, Massachusetts

February 23, 2018

We have served as the Company's auditor since 2017.

HOMOLOGY MEDICINES, INC.

CONSOLIDATED BALANCE SHEETS
AS OF DECEMBER 31, 2017 AND 2016

	December 31, 2017	December 31, 2016	Pro Forma December 31, 2017 (unaudited)
ASSETS			
CURRENT ASSETS:			
Cash and cash equivalents	$ 51,574,932	$ 11,392,207	$ 51,574,932
Short-term investments	78,083,604	—	78,083,604
Prepaid expenses and other current assets	1,944,751	481,794	1,944,751
Deferred rent	—	113,260	—
Total current assets	131,603,287	11,987,261	131,603,287
Property and equipment, net	3,154,205	1,956,054	3,154,205
Deferred offering costs	1,000,262	—	1,000,262
Restricted cash	1,772,587	276,000	1,772,587
TOTAL ASSETS	$ 137,530,341	$ 14,219,315	$ 137,530,341
LIABILITIES, CONVERTIBLE PREFERRED STOCK AND STOCKHOLDERS' DEFICIT			
CURRENT LIABILITIES:			
Accounts payable	$ 2,538,057	$ 893,673	$ 2,538,057
Accrued expenses and other liabilities	2,860,025	1,237,726	2,860,025
Deferred rent	122,601	—	122,601
Deferred revenue	3,341,063	—	3,341,063
Convertible preferred stock tranche liability	—	4,247,000	—
Total current liabilities	8,861,746	6,378,399	8,861,746
NON-CURRENT LIABILITIES:			
Deferred rent, net of current portion	290,923	340,627	290,923
Deferred revenue, net of current portion	30,069,563	—	30,069,563
Total liabilities	39,222,232	6,719,026	39,222,232
COMMITMENTS AND CONTINGENCIES (NOTE 8)			
CONVERTIBLE PREFERRED STOCK:			
Series A convertible preferred stock, $0.0001 par value; 62,304,354 and 62,269,145 shares authorized as of December 31, 2017 and 2016, respectively; 62,269,144 and 33,395,907 shares issued and outstanding as of December 31, 2017 and 2016, respectively; aggregate liquidation preference of $44,211,092 and $23,711,094 as of December 31, 2017 and 2016, respectively, no shares issued or outstanding, pro forma (unaudited)	42,994,550	17,392,062	—
Series B convertible preferred stock, $0.0001 par value; 64,930,561 shares authorized, issued and outstanding as of December 31, 2017; aggregate liquidation preference of $93,500,008 as of December 31, 2017, no shares issued or outstanding, pro forma (unaudited)	94,767,610	—	—
Total convertible preferred stock	137,762,160	17,392,062	—
STOCKHOLDERS' (DEFICIT) EQUITY:			
Common stock, $0.0001 par value; 170,000,000 and 86,000,000 shares authorized as of December 31, 2017 and 2016, respectively; 15,273,840 and 15,490,059 shares issued as of December 31, 2017 and 2016, respectively; and 13,878,604 and 11,163,645 shares outstanding as of December 31, 2017 and 2016, respectively, 141,078,309 shares issued and outstanding, pro forma at December 31, 2017 (unaudited)	1,388	1,117	14,108
Additional paid-in capital	798,735	297,113	138,548,175
Accumulated other comprehensive loss	(73,308)	—	(73,308)
Accumulated deficit	(40,180,866)	(10,190,003)	(40,180,866)
Total stockholders' (deficit) equity	(39,454,051)	(9,891,773)	98,308,109
TOTAL LIABILITIES, CONVERTIBLE PREFERRED STOCK AND STOCKHOLDERS' DEFICIT	$ 137,530,341	$ 14,219,315	$ 137,530,341

See notes to consolidated financial statements.

HOMOLOGY MEDICINES, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS
FOR THE YEARS ENDED DECEMBER 31, 2017 AND 2016

	Year Ended December 31, 2017	2016
OPERATING EXPENSES:		
Research and development	$ 21,378,154	$ 5,694,997
General and administrative	8,279,344	4,305,021
Total operating expenses	29,657,498	10,000,018
LOSS FROM OPERATIONS	(29,657,498)	(10,000,018)
OTHER INCOME (EXPENSE):		
Changes in fair value of convertible preferred stock tranche liability	(876,000)	1,929,000
Interest income	542,635	24,201
Total other income (expense)	(333,365)	1,953,201
Net loss and net loss attributable to common stockholders-basic and diluted	$(29,990,863)	$ (8,046,817)
Net loss per share attributable to common stockholders-basic and diluted	$ (2.30)	$ (0.80)
Weighted average common shares outstanding-basic and diluted	13,048,943	10,002,586
Pro forma net loss per share attributable to common stockholders-basic and diluted (unaudited)	$ (0.30)	
Pro forma weighted average common shares outstanding-basic and diluted (unaudited)	97,904,322	

See notes to consolidated financial statements.

HOMOLOGY MEDICINES, INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
FOR THE YEARS ENDED DECEMBER 31, 2017 AND 2016

	Year Ended December 31, 2017	2016
Net loss	$ (29,990,863)	$ (8,046,817)
Other comprehensive loss:		
Unrealized losses on available for sale securities, net	(73,308)	—
Total other comprehensive loss	(73,308)	—
Comprehensive loss	$ (30,064,171)	$ (8,046,817)

See notes to consolidated financial statements.

HOMOLOGY MEDICINES, INC.

CONSOLIDATED STATEMENTS OF CONVERTIBLE PREFERRED STOCK AND STOCKHOLDERS' DEFICIT
FOR THE YEARS ENDED DECEMBER 31, 2017 AND 2016

	Convertible Preferred Stock $0.0001 Par Value Series A		Convertible Preferred Stock $0.0001 Par Value Series B		Common Stock $0.0001 Par Value		Additional Paid-in Capital	Accumulated Other Comprehensive Loss	Accumulated Deficit	Total Stockholders' Deficit
	Shares	Amount	Shares	Amount	Shares	Amount				
BALANCE, January 1, 2016	33,395,907	$ 17,392,062	—	$ —	8,890,625	$ 889	$ —	$ —	$ (2,143,186)	$ (2,142,297)
Issuance of common stock to licensor	—	—	—	—	1,348,600	135	121,239	—	—	121,374
Vesting of common stock from option exercise	—	—	—	—	236,920	24	13,591	—	—	13,615
Vesting of founders restricted common stock	—	—	—	—	687,500	69	63,525	—	—	63,594
Stock-based compensation	—	—	—	—	—	—	98,758	—	—	98,758
Net loss	—	—	—	—	—	—	—	—	(8,046,817)	(8,046,817)
BALANCE, December 31, 2016	33,395,907	$ 17,392,062	—	$ —	11,163,645	$ 1,117	$ 297,113	$ —	$ (10,190,003)	$ (9,891,773)
Issuance of Series A convertible preferred stock, net of issuance costs of $ 20,511	28,873,237	20,479,488	—	—	—	—	—	—	—	—
Reclassification of tranche liability upon issuance of convertible preferred stock	—	5,123,000	—	—	—	—	—	—	—	—
Issuance of Series B convertible preferred stock, net of issuance costs of $ 399,065	—	—	64,930,561	93,100,943	—	—	—	—	—	—
Allocation of collaboration proceeds to carrying value of Series B convertible preferred stock	—	—	—	1,666,667	—	—	—	—	—	—
Vesting of common stock from option exercise	—	—	—	—	2,543,084	254	224,421	—	—	224,675
Vesting of founders restricted common stock	—	—	—	—	171,875	17	20,608	—	—	20,625
Stock-based compensation	—	—	—	—	—	—	256,593	—	—	256,593
Comprehensive loss					—	—	—	(73,308)	—	(73,308)
Net loss	—	—	—	—	—	—	—	—	(29,990,863)	(29,990,863)
BALANCE, December 31, 2017	62,269,144	$ 42,994,550	64,930,561	$ 94,767,610	13,878,604	$ 1,388	$ 798,735	$ (73,308)	$ (40,180,866)	$ (39,454,051)

See notes to consolidated financial statements.

HOMOLOGY MEDICINES, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS
FOR THE YEARS ENDED DECEMBER 31, 2017 AND 2016

	December 31, 2017	2016
CASH FLOWS FROM OPERATING ACTIVITIES:		
Net loss	$ (29,990,863)	$ (8,046,817)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:		
Depreciation	684,214	239,797
Stock-based compensation	277,201	162,283
Accretion on short-term investments	(85,740)	
Change in fair value associated with convertible preferred stock tranche liability	876,000	(1,929,000)
Research and development expense funded through share issuance	—	121,374
Abandonment of leasehold improvements	—	39,829
Changes in operating assets and liabilities:		
Prepaid expense and other current assets	(1,462,957)	(477,602)
Accounts payable	1,719,926	517,971
Accrued expenses and other liabilities	864,200	660,743
Deferred revenue	33,410,626	—
Deferred rent	186,157	227,367
Net cash provided by (used in) operating activities	6,478,764	(8,484,055)
CASH FLOWS FROM INVESTING ACTIVITIES:		
Purchases of short-term investments	(78,071,172)	—
Purchases of property and equipment	(1,957,908)	(1,989,333)
Changes in restricted cash	(1,496,587)	(276,000)
Net cash used in investing activities	(81,525,667)	(2,265,333)
CASH FLOWS FROM FINANCING ACTIVITIES:		
Proceeds from issuance of restricted common stock	—	378,312
Repurchase of unvested common stock	(17,470)	
Proceeds from issuance of Series A convertible preferred stock, net of issuance costs	20,479,488	—
Proceeds from issuance of Series B convertible preferred stock, net of issuance costs	94,767,610	—
Net cash provided by financing activities	115,229,628	378,312
INCREASE (DECREASE) IN CASH AND CASH EQUIVALENTS	40,182,725	(10,371,076)
CASH AND CASH EQUIVALENTS, BEGINNING OF YEAR	11,392,207	21,763,283
CASH AND CASH EQUIVALENTS, END OF YEAR	$ 51,574,932	$ 11,392,207
SUPPLEMENTAL DISCLOSURES OF NONCASH INVESTING AND FINANCING ACTIVITIES:		
Reclassification of liability for common stock vested	$ 224,675	$ 13,615
Property and equipment additions included in accounts payable	$ 167,594	$ 243,137
Deferred offering costs included in accrued expenses	$ 1,000,262	$ —
Reclassification of tranche liability upon issuance of convertible preferred stock	$ 5,123,000	$ —

See notes to consolidated financial statements.

HOMOLOGY MEDICINES, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS
AS OF AND FOR THE YEAR ENDED DECEMBER 31, 2017 AND 2016

1. NATURE OF BUSINESS AND BASIS OF PRESENTATION

Nature of Business—Homology Medicines, Inc. (the "Company") is a pre-clinical stage biopharmaceutical company dedicated to translating proprietary gene editing and gene therapy technology into novel treatments for patients with rare genetic diseases. The Company was founded in March 2015 as a Delaware corporation. Its principal offices are in Bedford, Massachusetts.

Since its inception, the Company has devoted substantially all of its efforts to research and development activities, raising capital and recruiting skilled personnel for the pursuit of translating proprietary gene editing and gene therapy technology into novel treatments for patients with rare genetic diseases. The Company is subject to a number of risks similar to those of other companies conducting high-risk, early-stage research and development of product candidates. Principal among these risks are dependent on key individuals and intellectual property, competition from other products and companies, and the technical risks associated with the successful research, development and clinical manufacturing of its product candidates. The Company's success is dependent upon its ability to continue to raise additional capital in order to fund ongoing research and development, obtain regulatory approval of its products, successfully commercialize its products, generate revenue, meet its obligations, and, ultimately, attain profitable operations.

Basis of Presentation—The accompanying consolidated financial statements are prepared in conformity with accounting principles generally accepted in the United States of America ("U.S. GAAP") and have been prepared on a going concern basis, which contemplates the realization of assets and the satisfaction of liabilities in the normal course of business. To date, the Company has not generated any revenue from product sales and does not expect to generate any revenue from the sale of product in the foreseeable future. During the year ended December 31, 2017, the Company incurred a net loss of $30.0 million and has $40.2 million in accumulated deficit. The Company has financed its operations to date primarily through the issuance of convertible preferred stock (see Note 11) and with proceeds from its collaboration and license agreement with Novartis (see Note 16). The Company expects to incur additional operating losses and negative operating cash flows for the foreseeable future.

Management believes that existing cash, cash equivalents and short-term investments will allow the Company to continue its operations for at least a year from the issuance date of these consolidated financial statements. In the absence of a significant source of recurring revenue, the continued viability of the Company beyond that point is dependent on its ability to continue to raise additional capital to finance its operations. There can be no assurance that the Company will be able to obtain sufficient capital to cover its costs on acceptable terms, if at all.

2. SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Principles of Consolidation—In December 2015, the Company formed Homology Medicines Securities Corporation ("HMSC"), a wholly owned Massachusetts corporation, for the sole purpose of buying, selling, and holding securities on the Company's behalf. The Company's consolidated financial statements include the accounts of the Company and HMSC. All intercompany balances and transactions have been eliminated in the consolidated financial statements.

Use of Estimates—The preparation of financial statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the reported amounts of assets, liabilities, revenue, and expenses, and the disclosure of contingent assets and liabilities as of and during the reporting period. The Company bases its estimates and assumptions on historical experience when available and on various factors that

it believes to be reasonable under the circumstances. Significant estimates and assumptions reflected in these consolidated financial statements include, but are not limited to, useful lives assigned to property and equipment, as well as the fair values of common stock, convertible preferred stock and convertible preferred stock tranche liability. The Company assesses estimates on an ongoing basis; however, actual results could materially differ from those estimates.

Unaudited Pro Forma Information—The unaudited pro forma balance sheet as of December 31, 2017 assumes the automatic conversion of all outstanding preferred stock into shares of common stock and the reclassification of the Company's outstanding Series A convertible preferred stock ("Series A Preferred Stock"), and Series B convertible preferred stock ("Series B Preferred Stock") from temporary to permanent equity classification, in each case occurring upon the closing of the Company's proposed initial public offering ("IPO"), as if these transactions had occurred on December 31, 2017.

Comprehensive Income (Loss) —Comprehensive income (loss) is defined as the change in equity of a business enterprise during a period from transactions and other events and circumstances from non-owner sources. The Company's only element of other comprehensive income (loss) is unrealized gains and losses on available-for-sale investments.

Cash and Cash Equivalents—Cash and cash equivalents consist of standard checking accounts and money market accounts. The Company considers all highly liquid investments with original maturities of 90 days or less at the time of purchase to be cash equivalents, which primarily consist of money market funds.

Short-Term Investments—Short-term investments represent holdings of available-for-sale marketable securities in accordance with the Company's investment policy and cash management strategy. Short-term investments mature within one-year from the balance sheet date. Investments in marketable securities are recorded at fair value, with any unrealized gains and losses, reported within accumulated other comprehensive income as a separate component of stockholders' deficit until realized or until a determination is made that an other-than-temporary decline in market value has occurred. The amortized cost of debt securities is adjusted for amortization of premiums and accretion of discounts to maturity. Such amortization and accretion, together with interest on securities, are included in interest income on our consolidated statements of operations. The cost of marketable securities sold is determined based on the specific identification method and any realized gains or losses on the sale of investments are reflected as a component of other income (expense), net.

Restricted Cash—The Company had restricted cash of $1.8 million and $276,000 as of December 31, 2017 and 2016, respectively, which represents cash serving as collateral for letters of credit issued for security deposits for the Company's facility leases in Bedford, Massachusetts.

Concentrations of Credit Risk—Financial instruments that potentially subject us to significant concentration of credit risk consist primarily of cash, cash equivalents, short-term investments and restricted cash. Periodically, the Company may maintain deposits in financial institutions in excess of government insured limits. We believe that we are not exposed to significant credit risk as our deposits are held at financial institutions that management believes to be of high credit quality and the Company has not experienced any losses on these deposits. We regularly invest excess cash with major financial institutions in money market funds, U.S. government and corporate debt securities and commercial paper, all of which can be readily purchased and sold using established markets. As of December 31, 2017, the Company's cash and cash equivalents were held with two financial institutions. We believe that the market risk arising from our holdings of these financial instruments is mitigated based on the fact that many of these securities are either government backed or of high credit rating.

Deferred Offering Costs—The Company capitalizes incremental legal, professional accounting and other third-party fees that are directly associated with our planned IPO as other non-current assets until the IPO is consummated. After consummation of the IPO, these costs will be recorded in stockholders' deficit as a reduction of additional paid-in capital generated as a result of the offering. If the Company terminates its plan for an IPO, any costs deferred will be expensed immediately.

Guarantees and Indemnifications—As permitted under Delaware law, the Company indemnifies its officers, directors, consultants and employees for certain events or occurrences that happen by reason of the relationship with, or position held at, the Company. Through December 31, 2017, the Company had not experienced any losses related to these indemnification obligations, and no claims were outstanding. The Company does not expect significant claims related to these indemnification obligations and, consequently, concluded that the fair value of these obligations is negligible, and no related liabilities have been established.

Property and Equipment—Property and equipment are recorded at cost. Expenditures for repairs and maintenance are expensed as incurred. When assets are retired or disposed of, the assets and related accumulated depreciation are derecognized from the accounts, and any resulting gain or loss is included in the determination of net loss. Depreciation is provided using the straight-line method over the estimated useful lives of the related assets. Leasehold improvements are amortized over the shorter of the lease term or the estimated useful life of the asset.

Computer equipment and software	3 years
Laboratory equipment and office furniture	5 years
Leasehold improvements	Shorter of the lease term or estimated useful life

Impairment of Long-Lived Assets—The Company evaluates its long-lived assets, which consist primarily of property and equipment, for impairment whenever events or changes in circumstances indicate that the carrying amount of such assets may not be recoverable. Recoverability of assets to be held and used is measured by a comparison of the carrying amount of an asset to the future undiscounted net cash flows expected to be generated by the asset. If such assets are considered to be impaired, the impairment to be recognized is measured by the amount by which the carrying amount of the asset exceeds the fair value of the asset. To date, no impairments have been recognized for these assets.

Derivative Instruments—The Company has determined that its obligation to issue, and the Company's investors' obligation to purchase, additional shares of Series A convertible preferred stock in the second of two tranches represents a freestanding financial instrument. The freestanding tranche liability was initially recorded at fair value, with gains and losses arising from changes in fair value recognized in other income (expense) in the statements of operations at each period end while such instruments were outstanding. The liability was valued using an income approach, specifically the discounted cash flow method. On February 10, 2017, the Company issued 28,873,237 shares of Series A Preferred Stock at $0.71 per share upon the achievement of certain development milestones, resulting in net proceeds of $20.5 million. Accordingly, the convertible preferred stock tranche liability was re-measured at fair value on February 10, 2017 using an income approach and then derecognized with a corresponding amount recorded to Series A Preferred Stock.

Research and Development Costs—Research and development costs are charged to expense as incurred. Research and development expense consists of expenses incurred in performing research and development activities, including salaries and benefits, materials and supplies, preclinical expenses, stock-based compensation expense, depreciation of equipment, contract services, and other outside expenses. Costs for certain development activities are recognized based on an evaluation of the progress to completion of specific tasks using information provided to the Company by its vendors on their actual costs incurred. Payments for these activities are based on the terms of the individual arrangements, which may differ from the pattern of costs incurred, and are reflected in the consolidated financial statements as prepaid expense or accrued research and development expense.

Income Taxes—The Company recognizes deferred tax assets and liabilities for the expected future tax consequences of events that have been included in the Company's consolidated financial statements and tax returns. Deferred tax assets and liabilities are determined based upon the differences between the financial statement carrying amounts and the tax bases of existing assets and liabilities and for loss and credit

carryforwards, using enacted tax rates expected to be in effect in the year in which the differences are expected to reverse. Deferred tax assets are reduced by a valuation allowance if it is more likely than not that these assets may not be realized. The Company determines whether it is more likely than not that a tax position will be sustained upon examination. If it is not more likely than not that a position will be sustained, none of the benefit attributable to the position is recognized. The tax benefit to be recognized for any tax position that meets the more-likely-than-not recognition threshold is calculated as the largest amount that is more than 50% likely of being realized upon resolution of the contingency. The Company accounts for interest and penalties related to uncertain tax positions as part of its provision for income taxes.

Common Stock Valuation—Due to the absence of an active market for the Company's common stock, the Company utilized methodologies in accordance with the framework of the American Institute of Certified Public Accountants Technical Practice Aid, Valuation of Privately-Held Company Equity Securities Issued as Compensation, to estimate the fair value of its common stock. In determining the exercise prices for options granted, the Company has considered the estimated fair value of the common stock as of the measurement date. The estimated fair value of the common stock has been determined at each grant date based upon a variety of factors, including the illiquid nature of the common stock, arm's-length sales of the Company's capital stock (including convertible preferred stock), the effect of the rights and preferences of the preferred shareholders, and the prospects of a liquidity event. Among other factors are the Company's financial position and historical financial performance, the status of technological developments within the Company's research, the composition and ability of the current research and management team, an evaluation or benchmark of the Company's competition, and the current business climate in the marketplace. Significant changes to the key assumptions underlying the factors used could result in different fair values of common stock at each valuation date.

Convertible Preferred Stock—The Company has classified convertible preferred stock ("preferred stock") as temporary equity in the accompanying consolidated balance sheets due to certain change in control events that are outside of the Company's control, including sale or transfer of control of the Company, as holders of the preferred stock could cause redemption of the shares in these situations. The Company does not accrete the carrying values of the preferred stock to the redemption values since a liquidation event was not considered probable as of December 31, 2017 and 2016. Subsequent adjustments of the carrying values to the ultimate redemption values will be made only when it becomes probable that such a liquidation event will occur.

Segment Information—Operating segments are identified as components of an enterprise about which separate discrete financial information is made available for evaluation by the chief operating decision maker ("CODM") in making decisions regarding resource allocation and assessing performance. The CODM is the Company's Chief Executive Officer. The Company manages its operations as a single segment for the purposes of assessing performance and making operating decisions. The Company's singular focus is dedicated to translating proprietary gene editing and gene therapy technology into novel treatments for patients with rare genetic diseases. All of the Company's tangible assets are held in the United States.

Revenue Recognition— The Company recognizes revenue when all of the following criteria are met: persuasive evidence of an arrangement exists; delivery has occurred or services have been rendered; the Company's price to the buyer is fixed or determinable; and collectability is reasonably assured. The Company records as deferred revenue any amounts received or billed prior to satisfying the revenue recognition criteria. Deferred revenue not expected to be recognized within the next twelve months is reported as non-current deferred revenue.

In November 2017, the Company entered into a collaboration and license agreement for research, development, manufacturing and commercialization of products using the Company's gene editing technology for the treatment of certain diseases (see Note 16). Consideration the Company may receive under the collaboration and license agreement include upfront nonrefundable payments, payments for research and manufacturing activities, payments based upon the achievement of certain milestones and royalties on any resulting net product sales.

Multiple Element Arrangements

The terms of the Collaboration Agreement contain multiple deliverables, including licenses, research and development activities, participation on steering committees and manufacturing activities. The Company evaluates the activities in its collaboration agreements to determine if the activities are consistent with a typical vendor-customer relationship, and if so, accounts for them in accordance with Accounting Standards Codification ("ASC") Topic 605-25, *Revenue Recognition – Multiple Element Arrangements*. If not, the Company evaluates other applicable guidance.

The Company evaluates multiple element arrangements to determine the deliverables included in the arrangement and whether the individual deliverables represent separate units of accounting, or whether they must be accounted for as a combined unit of accounting. When deliverables are separable, consideration received is allocated to the separate units of accounting based on the relative selling price method and the appropriate revenue recognition principles are applied to each unit. This evaluation requires the Company to make judgments about the individual deliverables and whether such deliverables (1) have value to the customer on a standalone basis and (2) if the arrangement includes a general right of return with respect to the delivered item, delivery or performance of the undelivered item is considered probable and substantially in the Company's control. In assessing whether an item has standalone value, the Company considers factors such as the research, development, manufacturing and commercialization capabilities of the collaboration partner and the availability of the associated expertise in the general marketplace. In addition, the Company considers whether the collaboration partner can use any other deliverable for its intended purpose without the receipt of the remaining deliverables, whether the value of the deliverable is dependent on any undelivered item, and whether there are other vendors that can provide the undelivered items.

The consideration received under the arrangement that is fixed or determinable is then allocated among the separate units of accounting based on the relative selling prices of the separate units of accounting. For arrangements identified with multiple units of accounting, an allocation of the consideration is performed. The Company determines the estimated selling price for units of accounting within each arrangement using vendor-specific objective evidence ("VSOE"), if available; third-party evidence ("TPE") of selling price if VSOE is not available; or best estimate of selling price ("BESP"), if neither VSOE nor TPE is available. The Company typically uses BESP to estimate the selling price as it generally does not have VSOE or TPE of selling price for its units of accounting. Determining the BESP for a unit of accounting requires significant judgment. In developing the BESP for a unit of accounting, the Company considers applicable market conditions and relevant entity-specific factors, including factors that were contemplated in negotiating the agreement with the customer and estimated costs.

The Company recognizes arrangement consideration allocated to each unit of accounting when all of the revenue recognition criteria are satisfied for that particular unit of accounting. The Company recognizes revenue from a combined unit of accounting over the contractual or estimated performance period for the undelivered items. If there is no discernible pattern of performance or objectively measurable performance measures do not exist for a unit of accounting, then the Company recognizes revenue on a straight-line basis over the period the Company is expected to complete its performance obligations. Conversely, if the pattern of performance over which the service is provided to the customer can be determined and objectively measurable performance measures exist, then the Company recognizes revenue under the arrangement using the proportional performance method. Amounts received prior to satisfying the associated revenue recognition criteria are recorded as deferred revenue on the consolidated balance sheets. Amounts not expected to be recognized within one year following the balance sheet date are classified as non-current deferred revenue.

Significant management judgment is required in determining the level of effort required under an arrangement and the period over which the Company expects to complete its performance obligations under an arrangement. Steering committee services that are not inconsequential or perfunctory and that are determined to be performance obligations are combined with other research services or performance obligations required under

an arrangement, if any, in determining the level of effort required in an arrangement and the period over which the Company expects to complete its aggregate performance obligations.

Consideration for development and sales milestones are generally not considered fixed or determinable until the milestone is achieved. Consideration due to or received by the Company for the achievement of milestones are allocated to the units of accounting, if applicable, and recognized as revenue for the portion of the performance obligation that is complete at the time the milestone is achieved. The Company will defer the remaining portion of the milestone payment and recognize it as revenue over the remaining term of the performance obligation. If no such performance obligation exists, milestone payments are recognized as revenue upon achievement, assuming all other revenue recognition criteria are met.

Royalties earned on product sales, if any, are recognized based on contractual terms of the agreement when reported sales are reliably measurable and collectibility is reasonably assured, provided that there are no performance obligations then remaining. To date, none of the Company's product candidates have been approved and, therefore, the Company has not earned any royalty revenue from product sales.

In the event that the agreement was to be terminated and the Company had no further performance obligations at that time, the Company would recognize as revenue any portion of the upfront payment and other payments that had not previously been recorded as revenue and were classified as deferred revenue at the date of such termination.

Stock-based Compensation—The Company recognizes compensation expense for awards to employees based on the grant date fair value of stock-based awards on a straight-line basis over the period during which an award holder provides service in exchange for the award. The Company accounts for stock-based compensation for awards granted to nonemployees by re-measuring the fair value of the awards over the vesting period as the services are provided.

Fair Value Measurements—Certain assets and liabilities are reported on a recurring basis at fair value. Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. Valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. Financial assets and liabilities carried at fair value are to be classified and disclosed in one of the following three levels of the fair value hierarchy, of which the first two are considered observable and the last is considered unobservable:

- Level 1—Quoted prices in active markets for identical assets or liabilities.
- Level 2—Observable inputs (other than Level 1 quoted prices), such as quoted prices in active markets for similar assets or liabilities, quoted prices in markets that are not active for identical or similar assets or liabilities, or other inputs that are observable or can be corroborated by observable market data.
- Level 3—Unobservable inputs that are supported by little or no market activity and that are significant to determining the fair value of the assets or liabilities, including pricing models, discounted cash flow methodologies and similar techniques.

Net Loss per Share and Unaudited Pro Forma Loss per Share—Basic net loss per share is computed by dividing net loss by the weighted-average number of common shares outstanding during the period. Diluted net loss per share is computed using the weighted average number of common shares outstanding during the period and, if dilutive, the weighted average number of potential shares of common stock. Net loss per share attributable to common stockholders is calculated using the two-class method, which is an earnings allocation formula that determines net loss per share for the holders of the Company's common shares and participating securities. The Company's convertible preferred stock contains participation rights in any dividend paid by the

Company and is deemed to be a participating security. Net loss attributable to common stockholders and participating preferred shares are allocated to each share on an as-converted basis as if all of the earnings for the period had been distributed. The participating securities do not include a contractual obligation to share in losses of the Company and are not included in the calculation of net loss per share in the periods in which a net loss is recorded.

Diluted net loss per share is computed using the more dilutive of (a) the two-class method or (b) the if converted method. The Company allocates earnings first to preferred stockholders based on dividend rights and then to common and preferred stockholders based on ownership interests. The weighted average number of common shares included in the computation of diluted net loss gives effect to all potentially dilutive common equivalent shares, including outstanding stock options, convertible preferred stock, convertible preferred stock tranche liability and the potential issuance of stock upon the conversion of the Company's convertible notes.

Common stock equivalent shares are excluded from the computation of diluted net loss per share if their effect is antidilutive. In periods in which the Company reports a net loss attributable to common stockholders, diluted net loss per share attributable to common stockholders is generally the same as basic net loss per share attributable to common stockholders since dilutive common shares are not assumed to have been issued if their effect is anti-dilutive. When a gain is recorded pursuant to a change in fair value of the preferred stock tranche liability during the period, the Company assesses whether the impact of reversing the gain and including the additional securities is dilutive, and if so, will adjust dilutive net loss per share. The Company reported a net loss attributable to common stockholders for the year ended December 31, 2017 and 2016.

Unaudited pro forma net loss per share applicable to common stockholders is computed using the weighted-average number of common shares outstanding after giving effect to the conversion of all outstanding convertible preferred stock into shares of common stock as if such conversion had occurred on January 1, 2017, or the date of original issuance, if later.

Recent Accounting Pronouncements—The Jumpstart Our Business Startups Act of 2012 permits an emerging growth company to take advantage of an extended transition period to comply with new or revised accounting standards applicable to public companies until those standards would otherwise apply to private companies. As an emerging growth company, the Company has elected to take advantage of this extended transition period.

In May 2014, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2014-09, *Revenue (Topic 606): Revenue from Contracts with Customers ("ASU 2014-09")*, which will replace existing revenue recognition standards and significantly expand the disclosure requirements for revenue arrangements. The new standard and the subsequent amendments will be effective for the Company beginning on January 1, 2019. The Company is in the process of evaluating the impact of the adoption of ASU No. 2014-09 on its consolidated financial statements. The Company will continue to assess the potential impact that Topic 606 may have on its financial position and results of operations as it relates to the Collaboration and License agreement with Novartis (see Note 16). The Company expects that certain accounting conclusions will require further judgment, including, but not limited to, the evaluation of variable consideration, and in particular, milestone payments due from Novartis as the inclusion of milestone payments in the transaction price could accelerate revenue recognized under ASC 606 compared to ASC 605.

In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)*, which eliminates the current tests for lease classification under U.S. GAAP and requires lessees to recognize the right-to-use assets and related lease liabilities in the balance sheet. ASU No. 2016-02 is effective for the Company beginning January 1, 2020 with early application permitted. The new standard provides for a modified retrospective application. The Company is in the process of evaluating the impact of the adoption of ASU No. 2016-02 on its consolidated financial statements.

In March 2016, the FASB issued ASU No. 2016-09, *Compensation—Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting*, which changes certain aspects of the accounting for share-based payments to employees. ASU No. 2016-09 is effective for the Company beginning January 1, 2018, with early application permitted. Certain changes will be applied prospectively and other changes will be applied using a modified retrospective approach with the recognition of the cumulative effect of the application of the new standard as of the beginning of the period of initial application. The Company is in the process of evaluating the impact of the adoption of ASU No. 2016-09 on the Company's consolidated financial statements.

In December 2016, the FASB issued ASU No. 2016-18, *Statement of Cash Flows (Topic 230): Restricted Cash (a consensus of the FASB Emerging Issues Task Force)*, which requires that amounts described as restricted cash or cash equivalents must be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. ASU 2016-18 is effective for the Company beginning January 1, 2019 , with early application permitted. The new Standard must be applied retrospectively to all periods presented. The Company is in the process of evaluating the impact that this standard will have on its consolidated financial statements.

3. CASH AND CASH EQUIVALENTS

The Company held $51.6 million and $11.4 million in cash and cash equivalents as of December 31, 2017 and 2016, respectively. From time to time, the Company may have cash balances in financial institutions in excess of federal deposit insurance limits. The Company has never experienced any losses related to these balances. The Company considers only those investments that are highly liquid, readily convertible to cash, and that mature within three months from date of purchase to be cash equivalents.

The following table summarizes the Company's cash and cash equivalents as of December 31, 2017 and 2016:

	As of December 31,	
	2017	2016
Cash	$ 7,393,176	$ 5,336,103
Money market funds	44,181,756	$ 6,056,104
Total cash and cash equivalents	$ 51,574,932	$ 11,392,207

4. SHORT-TERM INVESTMENTS

The Company invests its excess cash in fixed income instruments denominated and payable in U.S. dollars including, U.S. treasury securities commercial paper, corporate debt securities and assets-backed securities in accordance with the Company's investment policy that primarily seeks to maintain adequate liquidity and preserve capital.

The following table summarizes the Company's short-term investments as of December 31, 2017:

	Amortized Cost	Unrealized Gains	Unrealized Losses	Fair Value
Asset-backed securities	$ 7,428,021	$ —	$ (6,318)	$ 7,421,703
Commercial paper	34,882,298	—	—	34,882,298
Corporate debt securities	26,905,815	—	(49,532)	26,856,283
U.S. treasury securities	8,940,778	—	(17,458)	8,923,320
Total	$78,156,912	$ —	$ (73,308)	$78,083,604

As of December 31, 2017, we do not consider those securities that are in an unrealized loss position to be other-than-temporarily impaired, as we have the ability to hold such investments until recovery of the fair

value. We utilize the specific identification method in computing realized gains and losses. We had no realized gains and losses on our available-for-sale securities for the year ended December 31, 2017.

The Company did not hold any short-term investments as of December 31, 2016.

5. PROPERTY AND EQUIPMENT

Property and equipment, net as of December 31, 2017 and 2016 consist of the following:

	2017	2016
Laboratory equipment	$ 3,713,912	$ 1,922,104
Computers and purchased software	252,436	198,625
Furniture and fixtures	51,379	25,038
Leasehold improvements	34,120	23,715
Property and equipment, at cost	4,051,847	2,169,482
Less accumulated depreciation and amortization	(897,642)	(213,428)
Property and equipment—net	$ 3,154,205	$ 1,956,054

Depreciation and amortization expense for the years ended December 31, 2017 and 2016 was $684,214 and $239,797, respectively. Maintenance and repairs are charged to expense as incurred and any additions or improvements are capitalized.

6. FAIR VALUE MEASUREMENTS

The Company's financial instruments consist of cash and cash equivalents, short-term investments, restricted cash, accounts payable and the convertible preferred stock tranche liability. The carrying amount of cash, cash equivalents, restricted cash and accounts payable are each considered a reasonable estimate of fair value due to the short-term maturity.

The following table presents the fair value of the Company's financial assets and liabilities determined using the inputs defined.

Description	December 31, 2017	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Other Observable Inputs (Level 3)
Assets				
Money market funds, included in cash equivalents	$ 44,181,756	$ 44,181,756	$ —	$ —
Short-term investments	78,083,604	—	78,083,604	—
Total financial assets	$122,265,360	$ 41,181,756	$ 78,083,604	$ —

Short-term securities are valued using models or other valuation methodologies that use Level 2 inputs. These models are primarily industry-standard models that consider various assumptions, including time value, yield curve, volatility factors, default rates, current market and contractual prices for the underlying financial instruments, as well as other relevant economic measures. Substantially all of these assumptions are observable in the marketplace, can be derived from observable data or are supported by observable levels at which transactions are executed in the marketplace.

Description	December 31, 2016	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Other Observable Inputs (Level 3)
Assets				
Money market funds, included in cash equivalents	$ 6,056,104	$ 6,056,104	$ —	$ —
Total financial assets	$ 6,056,104	$ 6,056,104	$ —	$ —
Liabilities				
Convertible preferred stock tranche liability	$ 4,247,000	$ —	$ —	$ 4,247,000
Total financial liabilities	$ 4,247,000	$ —	$ —	$ 4,247,000

The convertible preferred stock tranche liability is stated at fair value and is measured using a Level 3 input because the fair value measurement is based, in part, on significant inputs not observed in the market. The Company determined the fair value of the convertible preferred stock tranche liability as described in Note 11.

The reconciliations of changes in the fair value of financial instruments based on Level 3 inputs for the years ended December 31, 2017 and 2016 consisted of:

Fair value as of January 1, 2016	$ 6,176,000
Change in fair value of convertible preferred stock tranche liability	(1,929,000)
Fair value as of December 31, 2016	$ 4,247,000
Change in fair value of convertible preferred stock tranche liability	876,000
Reduction in tranche liability due to preferred stock issuance	(5,123,000)
Fair value as of December 31, 2017	$ —

There have been no transfers between fair value measure levels during the years ended December 31, 2017 and 2016, respectively.

7. ACCRUED EXPENSES

Accrued expenses at December 31, 2017 and 2016 consist of the following:

	2017	2016
Accrued professional fees	$ 1,119,959	$ 149,005
Accrued compensation and benefits	1,435,015	612,035
Accrued unvested common stock subject to repurchase	122,551	364,713
Accrued research and development expenses	182,500	111,973
Total accrued expenses	$ 2,860,025	$ 1,237,726

8. COMMITMENTS AND CONTINGENCIES

Operating Leases—In February 2016, the Company entered into an operating lease for office and laboratory space in Lexington, Massachusetts, which originally was scheduled to expire in January 2019. This lease was cancelled effective November 2016, without penalty.

In September 2016, the Company entered into a noncancelable operating lease beginning in November 2016 for office, laboratory and manufacturing space in Bedford, Massachusetts, that expires in October 2021, with an option for an additional three-year term. In addition to the leased space, the Company has certain rights to expand the lease to include certain adjacent property. As of December 31, 2017, no expansion rights had been exercised.

In December 2017, the Company entered into a noncancelable operating lease for approximately 67,000 square feet of research and development, manufacturing and general office space in Bedford, Massachusetts. The

lease expires in February 2027 with an option for an additional five-year term. Rent will be due under the lease in two phases with rent on the first 46,000 square feet starting in September 2018 and with rent on the remaining 21,000 square feet starting in March 2019. The initial annual base rent is $39.50 per square foot and will increase by three percent annually. The Company is obligated to pay, on a pro-rata basis, real estate taxes and operating costs related to the premises.

Future minimum lease payments as of December 31, 2017 are as follows:

Years Ending December 31	Amount
2018	$ 1,546,251
2019	3,505,225
2020	3,750,149
2021	3,696,598
2022	2,928,014
Thereafter	13,177,338
Total future minimum lease payments	$ 28,603,575

A letter of credit was established as a security deposit for the facility lease in the amount of $1.5 million. The letter of credit is secured by restricted cash of $1.5 million. The lease agreement allows for a tenant improvement allowance not to exceed $10.9 million to be applied to the total cost of tenant improvements to the leased premises. The tenant improvement allowance must be used on or before August 31, 2019 or it will be deemed forfeited with no further obligation by the landlord.

Rent expense for the years ended December 31, 2017 and 2016 was $947,822 and $367,310, respectively. The Company maintains letters of credit, secured by restricted cash, for security deposits totaling $1.8 million and $276,000 as of December 31, 2017 and 2016, respectively, in conjunction with its current leases.

Loan and Security Agreement—In September 2016, the Company entered into a Loan and Security Agreement (the “Agreement”) with a bank. Under the terms of the Agreement, the Company could draw down up to $2.5 million in the form of term loans through June 30, 2017. The Agreement, expired on June 30, 2017 with no borrowings drawn or outstanding balance.

9. LICENSE AGREEMENTS

City of Hope

In April 2016, the Company entered into a license agreement with City of Hope (“COH”), an academic research and medical center. In consideration for the right to develop, manufacture, and commercialize products based on certain of COH’s intellectual property, the Company paid a one-time, non-refundable license fee of $75,000 and issued 814,905 shares of common stock, with a fair value of $73,342. The total consideration of $148,342 is recorded in research and development expense in the consolidated statement of operations for the year ended December 31, 2016. The license term extends until the last to expire patent, unless terminated earlier by either party under certain provisions. The Company is required to pay an annual license fee of $25,000, reimburse COH for patent costs incurred, pay amounts up to $3.2 million upon the achievement of certain development and commercialization milestones for each product under the license, pay royalties on future sales in the low single- digits and royalties on sublicense revenue in the low double-digits, if any.

As a result of the execution of the Collaboration Agreement with Novartis (see Note 16), the Company paid $4.5 million to COH in December 2017, under the terms of the license agreement.

In May 2015, the Company entered into a sponsored research agreement with COH with a goal to identify potential treatments for diseases in humans. The agreed upon commitment for research and development services is for $1,064,628 which continues through 2019. Under this agreement, the Company has recorded $76,250 and $256,282 in research and development expense for the years ended December 31, 2017 and 2016, respectively, of which $140,000 and $98,891 is recorded as accrued research and development expenses as of December 31, 2017 and 2016, respectively.

The Company's future contractual obligation under the sponsored research agreement is $791,128 as of December 31, 2017.

California Institute of Technology

In September 2016, the Company entered into a co-exclusive license agreement with the California Institute of Technology ("Caltech"), an academic research institute. In consideration for the right to develop, manufacture, and commercialize products based on certain Caltech intellectual property, the Company paid a one-time, non-refundable license fee of $100,000 and issued 533,695 shares of common stock, with a fair value of $48,032 The total consideration of $148,032 has been recorded in research and development expense in the consolidated statement of operations for the year ended December 31, 2016. The license term extends until the expiration, revocation, invalidation or unenforceability of the licensed patent rights. The Company is required to pay an annual minimal royalty fee of $20,000, reimburse for patent costs incurred, pay an amount up to $7.2 million upon the achievement of certain milestones and pay royalties on future sales in the low single-digits and royalties on sublicense revenue in the mid to high single-digits, if any.

As a result of the execution of the Collaboration Agreement with Novartis (see Note 16), the Company paid $0.1 million to Caltech in December 2017, under the terms of the license agreement.

10. INCOME TAXES

A reconciliation of the income tax expense computed using the federal statutory income tax rate to the Company's effective income tax rate is as follows:

	Year Ended December 31,	
	2017	2016
Income tax computed at federal statutory rate	34.0%	34.0%
Tax credits	4.8%	1.7%
State taxes, net of federal tax benefit	5.0%	6.3%
Change in tranche liability	(1.0%)	7.9%
Non-deductible expenses	(1.8%)	(0.6%)
Impact of federal rate change	(15.2%)	0.0%
Change in valuation allowance	(25.8%)	(49.3%)
Effective income tax rate	0.0%	0.0%

The principal components of the Company's deferred tax assets and liabilities consist of the following at December 31, 2017 and 2016:

	As of December 31, 2017	2016
Deferred tax assets:		
Net operating losses	$ 9,179,589	$ 2,400,386
R&D credits	1,775,534	234,850
Capitalized R&D costs	1,362,333	2,188,801
Accrued expense and other	196,272	89,833
Equity compensation	26,837	12,078
Deferred rent	112,974	89,310
Total deferred tax assets	12,653,539	5,015,258
Deferred tax liabilities:		
Depreciation	(165,712)	(270,590)
Total deferred tax liabilities	(165,712)	(270,590)
Valuation allowance	(12,487,827)	(4,744,668)
Net deferred taxes	$ —	$ —

In December 2017, the Tax Cuts and Jobs Act, or the Tax Act ("TCJA"), was signed into law. Among other things, the Tax Act permanently lowers the corporate federal income tax rate to 21% from the statutory rate of 34%, effective for tax years including or commencing January 1, 2018. As a result of the reduction of the corporate federal income tax rate to 21%, U.S. GAAP requires companies to revalue their deferred tax assets and deferred tax liabilities as of the date of enactment, with the resulting tax effects accounted for in the reporting period of enactment. This revaluation resulted in an overall reduction of deferred taxes of $4,558,258 and a corresponding reduction in the valuation allowance. As a result, there was no net impact to the Company's statement of operations as a result of the reduction in tax rates.

The Company has no income tax expense due to the operating loss incurred for the years ended December 31, 2017 and 2016. The Company has provided a valuation allowance for the full amount of the net deferred tax assets as the realization of the net deferred tax assets is not determined to be more likely than not.

At December 31, 2017, the Company has $33,429,262 and $34,168,424 of federal and state net operating loss carryforwards, respectively, that expire at various dates through 2037. At December 31, 2016, the Company has $6,142,640 and $5,906,973 of federal and state net operating loss carryforwards, respectively, that expire at various dates through 2036. At December 31, 2017, the Company has $1,148,562 and $793,635 of federal and state research and development credit carryforwards, respectively, that expire at various dates through 2037. At December 31, 2016, the Company has $82,365 and $231,037 of federal and state research and development credit carryforwards, respectively, that expire at various dates through 2036. The valuation allowance increased in 2017 and 2016 by $7,743,159 and $4,129,679, respectively, due to the increase in the deferred tax assets by the same amounts, primarily due to net operating loss carryforwards and research and development tax credits not utilized.

Realization of the future tax benefits is dependent on many factors, including the Company's ability to generate taxable income within the net operating loss carryforward period. Under the provisions of the Internal Revenue Code, certain substantial changes in the Company's ownership, including a sale of the Company or significant changes in ownership due to sales of equity, may have limited, or may limit in the future, the amount of net operating loss carryforwards that could be used annually to offset future taxable income. The Company has not completed a study to assess whether a change of control has occurred or whether there have been multiple changes of control since the Company's formation due to the significant complexity and cost associated with

such study and because there could be additional changes in control in the future. As a result, the Company is not able to estimate the effect of the change in control, if any, on the Company's ability to utilize net operating loss and research and development credit carryforwards in the future.

The Company files tax returns in the United States and Massachusetts. All tax years since inception remain open to examination by the major taxing jurisdictions to which the Company is subject, as carryforward attributes generated in years past may still be adjusted upon examination by the Internal Revenue Service (IRS) or other authorities if they have or will be used in a future period. The Company is not currently under examination by the IRS or any other jurisdictions for any tax years.

As of December 31, 2017, the Company had no uncertain tax positions. The Company has elected to recognize interest and penalties related to income tax matters as a component of income tax expense, of which no interest or penalties were recorded for the years ended December 31, 2017 and 2016.

11. CONVERTIBLE PREFERRED STOCK

In December 2015, the Company authorized the sale and issuance of up to 62,269,145 shares of Series A preferred stock. The Series A preferred financing was structured to close in two tranches. The first tranche closed on December 22, 2015 with the issuance of 28,873,237 shares at $0.71 per share resulting in gross cash proceeds of $20.5 million. Issuance costs totaled $143,033. As part of the closing on December 22, 2015, the Company also issued 4,522,670 shares of Series A in connection with the conversion of notes payable to investors that were originally issued in 2015.

The investors in the first tranche were granted the right to purchase additional 28,873,237 shares of Series A preferred stock to be offered in the second tranche at $0.71 per share. The Company determined that the right of the investors to purchase Series A preferred stock in the second tranche meets the definition of a freestanding financial instrument and therefore was recognized as a liability at fair value until the tranche right was exercised.

Upon the first tranche closing, the Company recognized a liability of $6.2 million for the fair value of the convertible preferred stock tranche liability representing the future obligation. The convertible preferred stock tranche liability was re-measured with a fair value of $5.1 million and $4.2 million as of February 9, 2017 and December 31, 2016, respectively. The fair value of the convertible preferred stock tranche liability was determined using an option pricing model with the following assumptions:

	February 9, 2017	December 31, 2016
Probability of milestone closing	99.9%	85.0%
Expected years closing	0.0	0.08
Discount rate	1.0%	15.0%
Risk-free interest rate	0.84%	0.94%
Expected dividend yield	0.0%	0.0%

The Company adjusted the carrying value of the convertible preferred stock tranche liability to its estimated fair value at each reporting date and upon issuance of the second tranche of Series A preferred stock on February 10, 2017, recognizing the changes in fair value in other income (expense) in the consolidated statement of operations. During the years ended December 31, 2017 and 2016, the Company recognized total other income (expense) of $(876,000) and $1,929,000, respectively, related to changes in the fair value of the convertible preferred stock tranche liability.

On February 10, 2017, the Company issued 28,873,237 shares of Series A preferred stock at $0.71 per share for gross proceeds of $20.5 million. Issuance costs were $20,511. Accordingly, the convertible preferred stock tranche liability was re-measured at fair value and then derecognized with a corresponding amount of $5.1 million reclassified to Series A preferred stock.

On July 28, 2017, the Company authorized the sale of 64,930,561 shares of Series B convertible preferred stock and issued 57,986,116 shares of Series B convertible preferred stock at $1.44 per share, for gross proceeds of $83.5 million upon closing. Total issuance costs were $399,065. All holders of Series A convertible preferred stock participated in the Series B issuance along with new investors.

On November 6, 2017, the Company entered into a Collaboration and License Agreement with Novartis for the development and commercialization of products using the Company's gene editing technology for the treatment of certain ophthalmic targets and a hemoglobinopathy disease (see Note 16). Under the terms of the Collaboration Agreement, Novartis invested $10.0 million to purchase 6,944,445 shares of Series B convertible preferred stock. The difference between the cash proceeds received from Novartis for the purchase of Series B preferred stock and the $11.7 million estimated fair value of the Series B at the time of purchase was allocated from the collaboration proceeds to Series B preferred stock.

The following is a summary of the rights and privileges of the Series A and Series B convertible preferred stock holders as of December 31, 2017.

Conversion—Each share of Series A and Series B preferred stock may be converted into shares of common stock, subject to the applicable conversion rate, which was determined by dividing the original issue price ($0.71 and $1.44, respectively) by the conversion price ($0.71 and $1.44, respectively). The Series A and Series B preferred shares automatically convert into shares of common stock at the earlier of the closing of an initial public offering of the Company's common stock with gross proceeds to the Company of at least $50.0 million or at the election of the holders of at least 71.5% of the then-outstanding shares of Series A and Series B convertible preferred stock, voting together as a single class.

Liquidation Preference—Upon liquidation, dissolution, or winding-up of the Company, Series A and Series B preferred shareholders are entitled to receive a liquidation preference in priority to holders of common stock at the greater of the original Series A and Series B preferred stock original issue price plus any declared but unpaid dividends, or such amount per share as would have been payable had all shares of preferred stock been converted into common stock immediately prior to such liquidation, dissolution or winding up of the Company or deemed liquidation event. No dividends have been declared to date. If assets available for distribution are insufficient to satisfy the liquidation payment to holders in full, assets available for distribution will be allocated among holders based on their pro rata holdings. When holders are satisfied in full, any excess assets available for distribution will be allocated ratably among common stockholders based on their pro rata holdings.

Dividends—Holders are entitled to non-cumulative dividends at the rate of 8% of the original issue price per share when and if declared by the Board of Directors. No dividends have been declared through December 31, 2017.

Voting Rights—Preferred stock and common stock vote together as one class on an as converted basis. Common stock voting rights on certain matters are subject to the powers, preferences, and rights of the preferred stock. Holders are entitled to vote on all matters and shall have the number of votes equal to the number of shares of common stock into which the shares of preferred stock held by such holder are then convertible. At any time where there are at least 5,000,0000 shares of preferred stock outstanding, certain actions such as mergers, acquisition, liquidation, dissolution, wind up of business and deemed liquidation events, must be approved by at least 71.5% of the then outstanding shares of preferred stock.

12. STOCKHOLDERS' EQUITY

Common Stock—Voting, dividend and liquidation rights of the holders of the common stock are subject to and qualified by the rights, powers and preferences of the holders of the preferred stock.

Voting—Each holder of outstanding shares of common stock shall be entitled to one vote in respect of each share. The holders of outstanding shares of common stock, voting together as a single class, shall be entitled to elect one director. The number of authorized shares of common stock may be increased or decreased by the affirmative vote of a majority of the outstanding shares of common stock and preferred stock voting together as a single class.

Dividends—Subject to the payment in full of all preferential dividends to which the holders of the preferred stock are entitled, the holders of common stock shall be entitled to receive dividends out of funds legally available therefore at such times and in such amounts as the Board of Directors may determine in its sole discretion, with holders of preferred stock and common stock sharing pari passu in such dividends.

Liquidation Rights—In the event of any voluntary or involuntary liquidation, dissolution or winding-up of the Company, after the payment or provision for payment of all debts and liabilities of the Company and all preferential amounts to which the holders of preferred stock are entitled with respect to the distribution of assets in liquidation, the holders of common stock shall be entitled to share ratably in the remaining assets of the Company available for distribution.

Reserved Shares—As of December 31, 2017, the Company has reserved the following shares of common stock for potential conversion of the outstanding convertible preferred stock and exercise of stock options:

	December 31, 2017
Convertible preferred stock	127,199,705
2015 stock option plan	12,799,760
Total	139,999,465

Restricted Common Stock—During 2015, the Company issued 2,750,000 shares of founders' restricted common stock to the scientific founders of the Company for an aggregate consideration of $275. The purchase price of the founders' restricted common stock was the estimated fair value at the issuance date. The shares were subject to vesting over a period of two years, and vesting could have been accelerated upon a change in control, as defined. If the holders ceased to have a business relationship with the Company during the vesting period, the Company could have repurchased any unvested founders' restricted common stock held by these individuals at their original purchase price. The Company recognized a liability in accrued expenses of $17 for the unvested portion of the founders' restricted common stock as of December 31, 2016. During March 2017, the founders' restricted common stock fully vested. A summary of the Company's unvested founders' restricted common stock and changes during the year ended December 31, 2017 as follows:

	Shares	Grant Date Fair Value
Unvested—January 1, 2017	171,875	$ 0.0001
Issued	—	—
Vested	(171,875)	0.0001
Unvested—December 31, 2017	—	$ —

The total fair value of the founders' restricted common stock that vested during the year ended December 31, 2017 was $21.

13. STOCK OPTION PLAN

In December 2015, the Board of Directors adopted the 2015 Stock Incentive Plan (the "2015 Plan"), which provided for the grant of qualified incentive and nonqualified stock options or restricted stock awards to the Company's employees, officers, directors, advisors, and outside consultants. In February 2017 and July 2017, the Board of Directors amended the 2015 Plan to increase the number of shares available for issue under the 2015 Plan to 12,875,000 and 16,975,000, respectively.

Stock options generally vest over a four-year period and expire ten years from the date of grant. Certain options provide for accelerated vesting if there is a change in control, as defined in the 2015 Plan. At December 31, 2017, there were 2,422,475 shares available for future grant under the 2015 Plan.

Total stock-based compensation expense recorded as research and development and general and administrative expenses, respectively, for employees, directors and non-employees during the years ended December 31, 2017 and 2016 is as follows:

	2017	2016
Research and development	$115,094	$39,794
General and administrative	141,499	58,964
	$256,593	$98,758

As of December 31, 2017, there was $3.8 million of unrecognized compensation expense related to unvested employee and non-employee share-based compensation arrangements granted under the 2015 Plan. The unrecognized compensation expense is estimated to be recognized over a period of 3.7 years at December 31, 2017.

The fair value of each option award is estimated on the date of grant using the Black-Scholes option- pricing model, with the assumptions noted in the table below. Expected volatility for the Company's common stock was determined based on an average of the historical volatility of a peer group of publicly traded companies that are similar to the Company. The expected term of options granted to employees was calculated using the simplified method, which represents the average of the contractual term of the option and the weighted-average vesting period of the option. The Company uses the simplified method because it does not have sufficient historical option exercise data to provide a reasonable basis upon which to estimate expected term. The contractual life of the option was used for the expected life of nonemployees. The assumed dividend yield is based upon the Company's expectation of not paying dividends in the foreseeable future. The risk-free rate for periods within the expected life of the option is based upon the U.S. Treasury yield curve in effect at the time of grant.

In determining the exercise prices for options granted, the Company's Board of Directors has considered the fair value of the common stock as of the measurement date. The fair value of the common stock has been determined by the Board of Directors at each award grant date based upon a variety of factors, including the results obtained from an independent third-party valuation, the Company's financial position and historical financial performance, the status of technological developments within the Company's proposed products, an evaluation or benchmark of the Company's competition, the current business climate in the marketplace, the illiquid nature of the common stock, arm's length sales of the Company's capital stock, including convertible preferred stock, the effect of the rights and preferences of the preferred shareholders, and the prospects of a liquidity event, among others.

The assumptions used in Black-Scholes option pricing model for the years ended December 31, 2017 and 2016 were as follows:

	2017	2016
Expected volatility	52.73% - 59.40%	53.05% - 63.63%
Weighted-average risk-free interest rate	2.04% - 2.37%	1.49% - 2.07%
Expected dividend yield	-%	-%
Expected term (in years)	5.9 - 8.6	6.25 - 9.4
Underlying common stock fair value	$0.12 - $1.26	$0.12

A summary of option activity under the 2015 Plan during the year ended December 31, 2017 is as follows:

	Number of Options	Weighted-Average Exercise Price per Share	Weighted Average Remaining Contractual Term (in Years)	Aggregate Intrinsic Value
Outstanding as of January 1, 2017	3,523,721	$ 0.09	9.3	$ 121,807
Granted	6,853,564	$ 0.99		
Exercised	—	$ —		
Cancelled/Forfeited	—	$ —		
Outstanding as of December 31, 2017	10,377,285	$ 0.68	9.3	$5,977,162
Exercisable at December 31, 2017	998,770	$ 0.08	8.2	$1,182,904
Vested and expected to vest at December 31, 2017	10,377,285	$ 0.68	9.3	$5,977,162

The total intrinsic value of options exercised during the year ended December 31, 2016 was $16,920. There were no option exercises in 2017. The weighted-average grant date fair value of options granted during the years ended December 31, 2017 and 2016 was $0.53 and $0.05, respectively.

Stock options granted pursuant to the 2015 Plan permit option holders to elect to exercise unvested options in exchange for unvested common stock. Options granted under the Plan that are exercised prior to vesting will continue to vest according to the respective option agreement, and such unvested shares are subject to repurchase by the Company at the optionee's original exercise price in the event the optionee's service with the Company voluntarily or involuntarily terminates.

A summary of the Company's unvested common stock from early exercises that is subject to repurchase by the Company is as follows:

	Shares
Unvested shares—January 1, 2017	4,154,539
Vested	(2,543,084)
Repurchased	(216,219)
Unvested shares—December 31, 2017	1,395,236

As of December 31, 2017 and 2016, 1,395,236 and 4,154,539 shares, respectively, remained subject to a repurchase right by the Company, with a related liability included in accrued expenses and other liabilities in the consolidated balance sheet of $122,551 and $364,696, respectively.

14. NET LOSS PER SHARE AND UNAUDITED PRO FORMA NET LOSS PER SHARE

Net Loss Per Share-Basic and diluted net loss per share attributable to common stockholders was calculated as follows:

	Year Ended December 31, 2017	Year Ended December 31, 2016
Numerator:		
Net loss attributable to common stockholders	$(29,990,863)	$ (8,046,817)
Denominator:		
Weighted average common shares outstanding—basic and diluted	13,048,943	10,002,586
Net loss per share attributable to common stockholders—basic and diluted	$ (2.30)	$ (0.80)

The Company's potential dilutive securities, which include convertible preferred stock tranche rights, restricted stock, unvested common stock from the early-exercise of stock options and outstanding common stock options, have been excluded from the computation of diluted net loss per share as the effect would be to reduce the net loss per share. Therefore, the weighted average number of common shares outstanding used to calculate both basic and diluted net loss per share attributable to common stockholders is the same. The Company excluded the following potential common shares, presented based on amounts outstanding at December 31, 2017 and 2016, from the computation of diluted net loss per share attributable to common stockholders because including them would have had an anti-dilutive effect:

	As of December 31, 2017	2016
Convertible preferred shares (as converted to common stock)	127,199,705	33,395,907
Unvested restricted common stock	—	171,875
Unvested common stock from early exercise of options	1,395,236	4,154,539
Stock options to purchase common stock	10,377,285	3,523,721
	138,972,226	41,246,042

Unaudited Pro Forma Net Loss Per Share

The unaudited pro forma basic and diluted net loss per share attributable to common stockholders for the year ended December 31, 2017 has been prepared to give effect to adjustments arising upon the completion of a qualified initial public offering. The unaudited pro forma net loss attributable to common stockholders used in the calculation of unaudited pro forma basic and diluted net loss per share attributable to common stockholders does not include the effects of the preferred stock tranche liability because the calculation gives effect to the automatic conversion of all shares of convertible preferred stock outstanding as of December 31, 2017 into shares of common stock as if the proposed initial public offering had occurred on the later of January 1, 2017 or the issuance date of the convertible preferred stock.

The unaudited pro forma basic and diluted weighted average common shares outstanding used in the calculation of unaudited pro forma basic and diluted net loss per share attributable to common stockholders for the year ended December 31, 2017 has been prepared to give effect, upon a qualified initial public offering, to the automatic conversion of all outstanding shares of convertible preferred stock into common stock as if the proposed initial public offering had occurred on the later of January 1, 2017 or the issuance date of the convertible preferred stock. Pro forma basic and diluted net loss per share attributable to common stockholders was calculated as follows:

	Year Ended December 31, 2017 (unaudited)
Numerator:	
Net loss attributable to common stockholders	$ (29,990,863)
Change in fair value of convertible preferred stock tranche liability	876,000
Pro forma net loss attributable to common stockholders	$ (29,114,863)
Denominator:	
Weighted average common shares outstanding—basic and diluted	13,048,943
Pro forma adjustment to reflect automatic conversion of convertible preferred stock to common stock upon the completion of the proposed initial public offering	84,855,379
Pro forma weighted average common shares outstanding—basic and diluted	97,904,322
Pro forma net loss per share attributable to common stockholders—basic and diluted	$ (0.30)

15. DEFINED CONTRIBUTION PLAN

The Company has a 401(k) defined contribution plan (the "401(k) Plan") for all of its employees. Eligible employees may make pretax contributions to the 401(k) Plan up to statutory limits. There was no discretionary match made under the 401(k) Plan as of December 31, 2017 and 2016.

16. COLLABORATION AND LICENSE AGREEMENT

In November 2017, the Company entered into a collaboration and license agreement (the "Collaboration Agreement") with Novartis Institutes of BioMedical Research, Inc. ("Novartis") for the research, development, manufacturing and commercialization of products using the Company's gene-editing technology for the treatment of certain ophthalmic targets and a hemoglobinopathy disease. Under the terms of the Collaboration Agreement, the Company granted Novartis a research license, a development and commercialization license, and a manufacturing license, under certain of its intellectual property rights to research, develop, manufacture and commercialize the ophthalmic targets, the *ex vivo* applications of the hemoglobinopathy disease program and the *in vivo* applications of the hemoglobinopathy disease target outside of the U.S. The Company retained U.S. commercialization rights to the in vivo applications of the hemoglobinopathy program. Upon entering into the Collaboration Agreement, the Company received an upfront, nonrefundable payment of $35.0 million and issued additional shares of its Series B preferred stock to Novartis for consideration of $10.0 million.

The Collaboration Agreement consists of a research term, where the Company and Novartis will collaborate to perform research and conduct preclinical development to identify candidates that modulate the ophthalmic targets and hemoglobinopathy disease targets. Novartis may select up to four targets, with limited substitution rights. The Company will be responsible for the manufacturing of proprietary research grade human hematopoietic stem cell derived adeno-associated virus vectors ("AAVHSCs") during the research term. Research activities performed by the Company will be reimbursed at a full-time equivalent rate ("FTE") and manufacturing activities will be reimbursed at cost, as specified and defined in the Collaboration Agreement. Novartis is required to pay the Company a target fee of $5.0 million for each target that meets certain success

criteria during the research term (the “target fee trigger date”), up to a maximum of four targets. The research term will continue for five years from the effective date of the Collaboration Agreement. Pursuant to the Collaboration Agreement, the Company will also participate on a joint steering committee and a joint manufacturing subcommittee, with equal representation from both the Company and Novartis.

Novartis has the exclusive right to develop and commercialize up to four candidates or products arising from the research activities, with the exception of the right to commercialize in the U.S. any *in vivo* hemoglobinipathy product, for which the Company maintains the exclusive right. Novartis will fund all development and commercialization costs, with the exception of the *in vivo* applications of the hemoglobinopathy candidate, for which the Company will fund less than half of the global development costs and fund all U.S. commercialization costs. The Company will also share U.S. commercialization profits with Novartis from the *in vivo* applications of hemoglobinopathy products. The Company will be responsible for manufacturing candidates and products for Novartis during the development and commercialization terms. The Company’s manufacturing activities will be reimbursed at cost during the development term and at cost plus a margin during the commercialization term, as defined in the Collaboration Agreement. If the Company is not able to manufacture candidates or products that meet the quality or quantity requirements of Novartis, then Novartis shall have the right to designate a third party contract manufacturer or manufacture such candidates or products itself.

In accordance with the Collaboration Agreement, the Company is also eligible to receive up to a total of $960.0 million in development, regulatory and commercial milestone payments with respect to the licensed products. The Company is also eligible to earn tiered royalties on net sales of licensed products by Novartis, its affiliates or sublicensees, ranging from mid single-digit, to sub-teen double-digit percentages, which royalties are potentially subject to various reductions and offsets.

Unless earlier terminated, the Collaboration Agreement will continue on a target-by-target basis until the expiration of all applicable royalty terms with respect to all products that modulate such target on a country-by-country-basis. There are no performance, cancellation, termination or refund provisions in the arrangement that contain material financial consequences to the Company.

Revenue Recognition

The Company evaluated the terms of the Collaboration Agreement and determined the development and commercialization activities related to the *in vivo* application of the hemoglobinopathy program represent active involvement and the sharing of risks and rewards between the Company and Novartis. The Company will segregate these activities and the related cost sharing, and record payments made to Novartis for such activities as expense. The Company evaluated the remaining terms of the Collaboration Agreement pursuant to ASC Topic 605, *Revenue Recognition*.

The Company has identified the following deliverables in the Collaboration Agreement in accordance with the provisions of ASC Topic 605-25, *Revenue Recognition—Multiple Element Arrangements*: (1) the research license, (2) the development and commercialization license, (3) the manufacturing license, (4) research activities performed by the Company, (5) service on the joint committees, (6) manufacturing during the research and development terms, and (7) manufacturing during the commercialization term. Except for manufacturing during the commercialization term, none of the other deliverables have standalone value to the customer. Since separability criteria have not been met for these deliverables, the deliverables are being accounted for as a single combined unit of accounting at the outset of the Collaboration Agreement (the “combined unit of accounting”). The manufacturing services during the commercialization term are being accounted for a separate unit of accounting.

Upon entering into the Collaboration Agreement, the Company received a nonrefundable upfront payment of $35.0 million and a $10.0 million investment in its Series B preferred stock by Novartis. The

Company recorded the Series B preferred stock at its estimated fair value of $11.7 million, and allocated the remaining $33.3 million to the Collaboration Agreement. The Company believes the consideration it will receive for the manufacturing services during the commercialization term, when and if it provides such services, is representative of the best estimate of selling price of the services. Therefore, the entire $33.3 million of upfront nonrefundable consideration was allocated to the combined unit of accounting.

At the inception of the Collaboration Agreement, the Company could not reasonably estimate the level of effort required to fulfill its obligations for the combined unit of accounting. Therefore revenue will be recognized on a straight-line basis over the estimated period of performance for the combined unit of accounting, which the Company estimates to be approximately ten years from the inception of the Collaboration Agreement. The Company will commence revenue recognition upon delivery of the final deliverable included in the combined unit of accounting. As of December 31, 2017, all deliverables included in the combined unit of accounting have commenced except for the manufacturing services, which are expected to commence early in 2018. Accordingly no amounts of revenue have been recognized as of December 31, 2017. All payments due or received from Novartis as of December 31, 2017, including amounts due for research activities performed, have been recorded as deferred revenue as of December 31, 2017.

17. SUBSEQUENT EVENTS

The Company has evaluated subsequent events for financial statement purposes occurring through February 23, 2018, the date that these financial statements were issued, and determined that no additional subsequent events had occurred that would require recognition in these consolidated financial statements and that all subsequent events that require disclosure have been disclosed.

* * * * * *

Through and including , 2018 (the 25th day after the date of this prospectus), all dealers effecting transactions in the Common Stock, whether or not participating in this offering, may be required to deliver a prospectus. This delivery requirement is in addition to a dealer's obligation to deliver a prospectus when acting as an underwriter and with respect to an unsold allotment or subscription.

Shares

Common Stock

PROSPECTUS

BofA Merrill Lynch

Cowen

Evercore ISI

BTIG

, 2018

Part II

INFORMATION NOT REQUIRED IN PROSPECTUS

Item 13. Other Expenses of Issuance and Distribution.

The following table indicates the expenses to be incurred in connection with the offering described in this registration statement, other than underwriting discounts and commissions, all of which will be paid by us. All amounts are estimated except the Securities and Exchange Commission registration fee, the Financial Industry Regulatory Authority, Inc., or FINRA, filing fee and the Nasdaq listing fee.

	Amount
Securities and Exchange Commission registration fee	$ 12,450
FINRA filing fee	15,500
Nasdaq initial listing fee	*
Accountants' fees and expenses	*
Legal fees and expenses	*
Blue Sky fees and expenses	*
Transfer Agent's fees and expenses	*
Printing and engraving expenses	*
Miscellaneous	*
Total expenses	$ *

* To be filed by amendment.

Item 14. Indemnification of Directors and Officers.

Section 102 of the General Corporation Law of the State of Delaware permits a corporation to eliminate the personal liability of directors of a corporation to the corporation or its stockholders for monetary damages for a breach of fiduciary duty as a director, except where the director breached his duty of loyalty, failed to act in good faith, engaged in intentional misconduct or knowingly violated a law, authorized the payment of a dividend or approved a stock repurchase in violation of Delaware corporate law or obtained an improper personal benefit. Our restated certificate of incorporation provides that no director of the Registrant shall be personally liable to it or its stockholders for monetary damages for any breach of fiduciary duty as a director, notwithstanding any provision of law imposing such liability, except to the extent that the General Corporation Law of the State of Delaware prohibits the elimination or limitation of liability of directors for breaches of fiduciary duty.

Section 145 of the General Corporation Law of the State of Delaware provides that a corporation has the power to indemnify a director, officer, employee, or agent of the corporation, or a person serving at the request of the corporation for another corporation, partnership, joint venture, trust or other enterprise in related capacities against expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred by the person in connection with an action, suit or proceeding to which he was or is a party or is threatened to be made a party to any threatened, ending or completed action, suit or proceeding by reason of such position, if such person acted in good faith and in a manner he reasonably believed to be in or not opposed to the best interests of the corporation, and, in any criminal action or proceeding, had no reasonable cause to believe his conduct was unlawful, except that, in the case of actions brought by or in the right of the corporation, no indemnification shall be made with respect to any claim, issue or matter as to which such person shall have been adjudged to be liable to the corporation unless and only to the extent that the Court of Chancery or other adjudicating court determines that, despite the adjudication of liability but in view of all of the circumstances of the case, such person is fairly and reasonably entitled to indemnity for such expenses which the Court of Chancery or such other court shall deem proper.

Our restated certificate of incorporation provides that we will indemnify each person who was or is a party or threatened to be made a party to any threatened, pending or completed action, suit or proceeding (other than an action by or in the right of us) by reason of the fact that he or she is or was, or has agreed to become, a director or officer, or is or was serving, or has agreed to serve, at our request as a director, officer, partner, employee or trustee of, or in a similar capacity with, another corporation, partnership, joint venture, trust or other enterprise (all such persons being referred to as an "Indemnitee"), or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding and any appeal therefrom, if such Indemnitee acted in good faith and in a manner he or she reasonably believed to be in, or not opposed to, our best interests, and, with respect to any criminal action or proceeding, he or she had no reasonable cause to believe his or her conduct was unlawful. Our restated certificate of incorporation provides that we will indemnify any Indemnitee who was or is a party to an action or suit by or in the right of us to procure a judgment in our favor by reason of the fact that the Indemnitee is or was, or has agreed to become, a director or officer, or is or was serving, or has agreed to serve, at our request as a director, officer, partner, employee or trustee of, or in a similar capacity with, another corporation, partnership, joint venture, trust or other enterprise, or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees) and, to the extent permitted by law, amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding, and any appeal therefrom, if the Indemnitee acted in good faith and in a manner he or she reasonably believed to be in, or not opposed to, our best interests, except that no indemnification shall be made with respect to any claim, issue or matter as to which such person shall have been adjudged to be liable to us, unless a court determines that, despite such adjudication but in view of all of the circumstances, he or she is entitled to indemnification of such expenses. Notwithstanding the foregoing, to the extent that any Indemnitee has been successful, on the merits or otherwise, he or she will be indemnified by us against all expenses (including attorneys' fees) actually and reasonably incurred in connection therewith. Expenses must be advanced to an Indemnitee under certain circumstances.

We have entered into indemnification agreements with each of our directors and officers. These indemnification agreements may require us, among other things, to indemnify our directors and officers for some expenses, including attorneys' fees, judgments, fines and settlement amounts incurred by a director or officer in any action or proceeding arising out of his or her service as one of our directors or officers, or any of our subsidiaries or any other company or enterprise to which the person provides services at our request.

We maintain a general liability insurance policy that covers certain liabilities of directors and officers of our corporation arising out of claims based on acts or omissions in their capacities as directors or officers.

In any underwriting agreement we enter into in connection with the sale of common stock being registered hereby, the underwriters will agree to indemnify, under certain conditions, us, our directors, our officers and persons who control us within the meaning of the Securities Act of 1933, as amended, or the Securities Act, against certain liabilities.

Item 15. Recent Sales of Unregistered Securities.

Set forth below is information regarding shares of capital stock issued by us within the past three years. Also included is the consideration received by us for such shares and information relating to the section of the Securities Act, or rule of the Securities and Exchange Commission, under which exemption from registration was claimed.

(a) Issuance of Capital Stock.

From December 22, 2015 through November 8, 2017, the registrant issued an aggregate of 62,269,144 shares of Series A Preferred Stock for aggregate consideration of $44.2 million to accredited investors and 64,930,561 shares of Series B Preferred Stock for aggregate consideration of $93.5 million pursuant to Section 4(a)(2) of the Securities Act and Rule 506 as a transaction not involving a public offering.

(b) Equity Grants.

From May 5, 2015 through December 7, 2017, the registrant granted stock options to purchase an aggregate of 14,807,869 shares of its common stock with exercise prices ranging between $0.005 and $1.26 per share, 4,391,459 shares of restricted common stock to employees, non-employees, and directors from the early exercise of stock options in connection with services provided to the registrant by such parties.

(c) Warrants.

On October 6, 2016, the registrant issued a warrant to purchase up to an aggregate of 35,210 shares of Series A preferred stock to Silicon Valley Bank pursuant to Section 4(a)(2) of the Securities Act as a transaction not involving a public offering. The warrant never became exercisable for any shares and, in November 2017, the warrant was terminated.

(d) Issuance of Notes.

From April 2015 to November 2015, the registrant issued six unsecured convertible loan notes for aggregate consideration of $2,500,000.

Item 16. Exhibits and Financial Statement Schedules.

(a) Exhibits.

Exhibit Number	Description of Exhibit
1.1*	Underwriting Agreement
3.1	Certificate of Incorporation of the Registrant, as amended (currently in effect)
3.2	Bylaws of the Registrant (currently in effect)
3.3*	Form of Restated Certificate of Incorporation of the Registrant (to be effective upon the closing of this offering)
3.4*	Form of Restated Bylaws of the Registrant (to be effective upon the closing of this offering)
4.1	Amended and Restated Investors' Rights Agreement dated July 28, 2017, among the Registrant and the investors named therein
4.2*	Specimen Stock Certificate evidencing the shares of common stock
5.1*	Opinion of Latham & Watkins LLP
10.1#	2015 Stock Incentive Plan, as amended, and form of option agreements thereunder
10.2#*	2018 Incentive Award Plan and form of option agreements thereunder
10.3#*	Non-Employee Director Compensation Program
10.4#*	Form of Indemnification Agreement for Directors and Officers
10.5	Lease Agreement, dated August 31, 2016, between the Registrant and ARE-MA Region No. 24, LLC
10.6	Lease Agreement, dated December 21, 2017, between the Registrant and Bedford Patriots Park, LLC
10.7	Offer Letter to Siyamak (Sam) Rasty, dated December 7, 2015
10.8	Offer Letter to Albert Seymour, dated February 14, 2016
10.9	Offer Letter to Arthur O. Tzianabos, dated March 31, 2016

Exhibit Number	Description of Exhibit
10.10*	Employment Agreement, by and between the Registrant and Siyamak (Sam) Rasty (to be effective upon the closing of this offering)
10.11*	Employment Agreement, by and between the Registrant and Albert Seymour (to be effective upon the closing of this offering)
10.12*	Employment Agreement, by and between the Registrant and Bradford Smith (to be effective upon the closing of this offering)
10.13*	Employment Agreement, by and between the Registrant and Arthur Tzianabos, Ph.D. (to be effective upon the closing of this offering)
10.14†	Collaboration and License Agreement, dated November 6, 2017, between the Registrant and Novartis Institutes for BioMedical Research, Inc.
10.15†	Exclusive License Agreement, dated April 28, 2016, between the Registrant and City of Hope
10.16.1†	License Agreement, dated September 14, 2016, between the Registrant and California Institute of Technology
10.16.2†	First Amendment to License Agreement, dated May 16, 2017, between the Registrant and California Institute of Technology
10.16.3†	Letter Agreement, dated November 14, 2017, between the Registrant and California Institute of Technology
21.1	Subsidiaries of the Registrant
23.1	Consent of Deloitte & Touche LLP
23.2*	Consent of Latham & Watkins LLP (included in Exhibit 5.1)
24.1	Power of Attorney (included on signature page)

* To be filed by amendment.
\# Indicates management contract or compensatory plan.
† Portions of this exhibit (indicated by asterisks) have been omitted pursuant to a request for confidential treatment pursuant to Rule 406 under the Securities Act of 1933, as amended.

(b) Financial Statement Schedules. Schedules not listed above have been omitted because the information required to be set forth therein is not applicable or is shown in the consolidated financial statements or notes thereto.

Item 17. Undertakings.

The undersigned registrant hereby undertakes to provide to the underwriter, at the closing specified in the underwriting agreement, certificates in such denominations and registered in such names as required by the underwriter to permit prompt delivery to each purchaser.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being

registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

The undersigned hereby undertakes that:

(1) For purposes of determining any liability under the Securities Act, the information omitted from the form of prospectus filed as part of this registration statement in reliance upon Rule 430A and contained in a form of prospectus filed by the registrant pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act shall be deemed to be part of this registration statement as of the time it was declared effective.

(2) For the purpose of determining any liability under the Securities Act, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

SIGNATURES

Pursuant to the requirements of the Securities Act, the registrant has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Bedford, Commonwealth of Massachusetts, on this 2nd day of March, 2018.

HOMOLOGY MEDICINES, INC.

By: /s/ Arthur O. Tzianabos, Ph.D.
Arthur O. Tzianabos, Ph.D.
President and Chief Executive Officer

SIGNATURES AND POWER OF ATTORNEY

We, the undersigned officers and directors of Homology Medicines, Inc., hereby severally constitute and appoint Arthur O. Tzianabos, Ph.D. and Bradford Smith, and each of them singly (with full power to each of them to act alone), our true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution in each of them for him and in his name, place and stead, and in any and all capacities, to sign any and all amendments (including post-effective amendments) to this registration statement (or any other registration statement for the same offering that is to be effective upon filing pursuant to Rule 462(b) under the Securities Act of 1933), and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite or necessary to be done in and about the premises, as full to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or any of them, or their or his substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this registration statement has been signed by the following persons in the capacities held on the dates indicated.

Signature	Title	Date
/s/ Arthur O. Tzianabos, Ph.D. Arthur O. Tzianabos, Ph.D.	President, Chief Executive Officer and Director (principal executive officer)	March 2, 2018
/s/ Bradford Smith Bradford Smith	Chief Financial Officer, Treasurer and Assistant Secretary (principal financial officer and principal accounting officer)	March 2, 2018
/s/ Steven Gillis, Ph.D. Steven Gillis, Ph.D.	Director	March 2, 2018
/s/ Richard J. Gregory, Ph.D. Richard J. Gregory, Ph.D.	Director	March 2, 2018
/s/ Kush M. Parmar, M.D., Ph.D. Kush M. Parmar, M.D., Ph.D.	Director	March 2, 2018
/s/ Matthew R. Patterson Matthew R. Patterson	Director	March 2, 2018
/s/ Mahendra G. Shah, Ph.D. Mahendra G. Shah, Ph.D.	Director	March 2, 2018
/s/ Cameron Wheeler, Ph.D. Cameron Wheeler, Ph.D.	Director	March 2, 2018

AMENDED AND RESTATED CERTIFICATE OF INCORPORATION OF HOMOLOGY MEDICINES, INC.

(Pursuant to Sections 242 and 245 of the
General Corporation Law of the State of Delaware)

Homology Medicines, Inc., a corporation organized and existing under and by virtue of the provisions of the General Corporation Law of the State of Delaware,

DOES HEREBY CERTIFY:

1. That the name of this corporation is Homology Medicines, Inc., and that this corporation was originally incorporated pursuant to the General Corporation Law of the State of Delaware on March 12, 2015.

2. That the Board of Directors of the corporation duly adopted resolutions proposing to further amend and restate the Amended and Restated Certificate of Incorporation of this corporation, declaring said amendment and restatement to be advisable and in the best interests of this corporation and its stockholders, and authorizing the appropriate officers of this corporation to solicit the consent of the stockholders therefor, which resolution setting forth the proposed amendment and restatement is as follows:

RESOLVED, that the Amended and Restated Certificate of Incorporation of this corporation be amended and restated in its entirety to read as follows:

FIRST: The name of this corporation is Homology Medicines, Inc. (the "**Corporation**").

SECOND: The address of the registered office of the Corporation in the State of Delaware is 1209 Orange Street, in the City of Wilmington, County of New Castle, Delaware 19801. The name of its registered agent at such address is The Corporation Trust Company.

THIRD: The nature of the business or purposes to be conducted or promoted is to engage in any lawful act or activity for which corporations may be organized under the General Corporation Law of the State of Delaware (the "**DGCL**").

FOURTH: The total number of shares of all classes of stock which the Corporation shall have authority to issue is 297,234,915, consisting of (i) 170,000,000 shares of Common Stock, $0.0001 par value per share ("**Common Stock**"), and (ii) 127,234,915 shares of Preferred Stock, $0.0001 par value per share ("**Preferred Stock**"), of which 62,304,354 shares are hereby designated "Series A Preferred Stock," and 64,930,561 shares are hereby designated "Series B Preferred Stock".

The following is a statement of the designations and the powers, privileges and rights, and the qualifications, limitations or restrictions thereof in respect of each class of capital stock of the Corporation.

A. COMMON STOCK

1. General. The voting, dividend and liquidation rights of the holders of the Common Stock are subject to and qualified by the rights, powers and preferences of the holders of the Preferred Stock set forth herein.

2. Voting. The holders of the Common Stock are entitled to one vote for each share of Common Stock held at all meetings of stockholders (and written actions in lieu of meetings); provided, however, that, except as otherwise required by law, holders of Common Stock, as such, shall not be entitled to vote on any amendment to this Amended and Restated Certificate of Incorporation (the "**Restated Certificate**") that relates solely to the terms of one or more outstanding series of Preferred Stock if the holders of such affected series are entitled, either separately or together with the holders of one or more other such series, to vote thereon pursuant to the Restated Certificate or pursuant to the DGCL. There shall be no cumulative voting. The number of authorized shares of Common Stock may be increased or decreased (but not below the number of shares thereof then outstanding) by (in addition to any vote of the holders of one or more series of Preferred Stock that may be required by the terms of the Restated Certificate) the affirmative vote of the holders of shares of capital stock of the Corporation representing a majority of the votes represented by all outstanding shares of capital stock of the Corporation entitled to vote, irrespective of the provisions of Section 242(b)(2) of the DGCL.

B. PREFERRED STOCK

The Series A Preferred Stock and the Series B Preferred Stock shall have the following rights, preferences, powers, privileges and restrictions, qualifications and limitations. Unless otherwise indicated, references to "sections" or "subsections" in this Part B of this Article Fourth refer to sections and subsections of Part B of this Article Fourth.

1. Dividends.

The holders of Preferred Stock shall be entitled to receive non-cumulative cash dividends, on a pari passu basis, out of any assets legally available therefor, prior and in preference to any declaration or payment of any dividend on shares of Common Stock (payable other than in Common Stock or other securities and rights convertible into or entitling the holder thereof to receive, directly or indirectly, additional shares of Common Stock of the Corporation) at the rate of (i) with respect to shares of Series A Preferred Stock, eight percent (8%) of the Series A Original Issue Price (as defined below) per share of Series A Preferred Stock per annum (the "**Series A Dividend**"), and (ii) with respect to shares of Series B Preferred Stock, eight percent (8%) of the Series B Original Issue Price (as defined below) per share of Series B Preferred Stock per annum (the "**Series B Dividend**" and, together with the Series A Dividend, the "**Preferred Dividend**"), payable only when, as and if declared by the Board of Directors of the Corporation. The Corporation shall not declare, pay or set aside any dividends on shares of any other class or series of capital stock of the Corporation (other than dividends on shares of Common Stock payable in shares of Common Stock) unless (in addition to the obtaining of any consents required elsewhere in the Restated Certificate) the holders of the Preferred Stock then outstanding shall first receive, or simultaneously receive, in addition to the Preferred Dividend, a dividend on each outstanding share of Preferred Stock in an amount at least equal to (i) in the case of a dividend on Common Stock or any class or series that is convertible into Common

Stock, that dividend per share of the applicable class or series of Preferred Stock as would equal the product of (A) the dividend payable on each share of such class or series determined, if applicable, as if all shares of such class or series had been converted into Common Stock and (B) the number of shares of Common Stock issuable upon conversion of a share of such class or series of Preferred Stock, in each case calculated on the record date for determination of holders entitled to receive such dividend or (ii) in the case of a dividend on any class or series that is not convertible into Common Stock, at a rate per share of the applicable class or series of Preferred Stock determined by (A) dividing the amount of the dividend payable on each share of such class or series of capital stock by the original issuance price of such class or series of capital stock (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to such class or series) and (B) multiplying such fraction by an amount equal to the applicable Original Issue Price (as defined below); provided that, if the Corporation declares, pays or sets aside, on the same date, a dividend on shares of more than one class or series of capital stock of the Corporation, the dividend payable to the holders of Preferred Stock pursuant to this Section 1 shall be calculated based upon the dividend on the class or series of capital stock that would result in the highest Preferred Stock dividend. The "**Series A Original Issue Price**" shall mean $0.71 per share, subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Series A Preferred Stock. The "**Series B Original Issue Price**" shall mean $1.44 per share, subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Series B Preferred Stock. "**Original Issue Price**" shall mean the Series A Original Issue Price or Series B Original Issue Price, as applicable.

2. Liquidation, Dissolution or Winding Up; Certain Mergers, Consolidations and Asset Sales.

2.1 Preferential Payments to Holders of Preferred Stock. In the event of any voluntary or involuntary liquidation, dissolution or winding up of the Corporation or Deemed Liquidation Event, the holders of shares of Preferred Stock then outstanding shall be entitled to be paid out of the assets of the Corporation available for distribution to its stockholders, on a pari passu basis, before any payment shall be made to the holders of Common Stock by reason of their ownership thereof, an amount per share equal to (i) in the case of the Series A Preferred Stock, the greater of (A) the Series A Original Issue Price, plus any dividends declared but unpaid thereon or (B) such amount per share as would have been payable had all shares of Series A Preferred Stock been converted into Common Stock pursuant to Section 4 immediately prior to such liquidation, dissolution or winding up of the Corporation or Deemed Liquidation Event (the amount payable pursuant to this clause (i) is hereinafter referred to as the "**Series A Liquidation Amount**"), and (ii) in the case of the Series B Preferred Stock, the greater of (A) the Series B Original Issue Price, plus any dividends declared but unpaid thereon or (B) such amount per share as would have been payable had all shares of Series B Preferred Stock been converted into Common Stock pursuant to Section 4 immediately prior to such liquidation, dissolution or winding up of the Corporation or Deemed Liquidation Event (the amount payable pursuant to this clause (ii) is hereinafter referred to as the "**Series B Liquidation Amount**"). If upon any such liquidation, dissolution or winding up of the Corporation or Deemed Liquidation Event, the assets of the Corporation available for distribution to its stockholders shall be insufficient to pay the holders of shares of Preferred Stock the full amount to which they shall be entitled under this Subsection 2.1, the holders of shares of Preferred Stock

shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full.

2.2 Payments to Holders of Common Stock. In the event of any voluntary or involuntary liquidation, dissolution or winding up of the Corporation or Deemed Liquidation Event, after the payment of all preferential amounts required to be paid to the holders of shares of Preferred Stock, the remaining assets of the Corporation available for distribution to its stockholders shall be distributed among the holders of shares of Common Stock, pro rata based on the number of shares held by each such holder.

2.3 Deemed Liquidation Events.

2.3.1 Definition. Each of the following events shall be considered a "**Deemed Liquidation Event**" unless the holders of at least seventy-one and one-half percent (71.5%) in voting power of the outstanding shares of Preferred Stock, voting together as a single class (the "**Requisite Holders**"), elect otherwise by written notice sent to the Corporation at least ten days prior to the effective date of any such event:

(a) a merger or consolidation in which

(i) the Corporation is a constituent party or

(ii) a subsidiary of the Corporation is a constituent party and the Corporation issues shares of its capital stock pursuant to such merger or consolidation,

except any such merger or consolidation involving the Corporation or a subsidiary in which the shares of capital stock of the Corporation outstanding immediately prior to such merger or consolidation continue to represent, or are converted into or exchanged for shares of capital stock that represent, immediately following such merger or consolidation, a majority, by voting power, of the capital stock of (1) the surviving or resulting corporation or (2) if the surviving or resulting corporation is a wholly owned subsidiary of another corporation immediately following such merger or consolidation, the parent corporation of such surviving or resulting corporation; or

(b) the sale, lease, transfer, exclusive license or other disposition, in a single transaction or series of related transactions, by the Corporation or any subsidiary of the Corporation of all or substantially all the assets of the Corporation and its subsidiaries taken as a whole, or the sale or disposition (whether by merger or otherwise) of one or more subsidiaries of the Corporation if substantially all of the assets of the Corporation and its subsidiaries taken as a whole are held by such subsidiary or subsidiaries, except where such sale, lease, transfer, exclusive license or other disposition is to a wholly owned subsidiary of the Corporation.

2.3.2 Effecting a Deemed Liquidation Event.

(a) The Corporation shall not have the power to effect a Deemed Liquidation Event referred to in Subsection 2.3.1(a)(i) unless the agreement or plan of merger or consolidation for such transaction (the "**Merger Agreement**") provides that the consideration payable to the stockholders of the Corporation shall be allocated among the holders of capital stock of the Corporation in accordance with Subsections 2.1 and 2.2.

(b) In the event of a Deemed Liquidation Event referred to in Subsections 2.3.1(a)(ii) or 2.3.1(b), if the Corporation does not effect a dissolution of the Corporation under the DGCL within 90 days after such Deemed Liquidation Event, then (i) the Corporation shall send a written notice (the "**Redemption Notice**") to each holder of Preferred Stock no later than the 90th day after the Deemed Liquidation Event advising such holders of their right (and the requirements to be met to secure such right) pursuant to the terms of the following clause (ii) to require the redemption of such shares of Preferred Stock, and (ii) if the Requisite Holders so request in a written instrument delivered to the Corporation not later than 120 days after such Deemed Liquidation Event, the Corporation shall use the consideration received by the Corporation in respect of such Deemed Liquidation Event (net of any retained liabilities associated with the assets sold or technology licensed, as determined in good faith by the Board of Directors of the Corporation), together with any other assets of the Corporation available for distribution to its stockholders, all to the extent permitted by Delaware law governing distributions to stockholders (the "**Available Proceeds**"), on the 150th day after such Deemed Liquidation Event (the "**Redemption Date**"), to redeem each outstanding share of Series A Preferred Stock at a price per share equal to the Series A Liquidation Amount and each outstanding share of Series B Preferred Stock at a price per share equal to the Series B Liquidation Amount (the "**Redemption Price**"). The Redemption Notice shall state (i) the Redemption Date, Series A Liquidation Amount and Series B Liquidation Amount, (ii) the date upon which the holder's right to convert the shares Preferred Stock held by such holder terminates (as determined in accordance with Subsection 4.1), and (iii) for holders of shares in certificated form, that the holder is to surrender to the Corporation, in the manner and at the place designated, his, her or its certificate or certificates representing the shares of Preferred Stock in the event such shares are certificated. Notwithstanding the foregoing, in the event of a redemption pursuant to this Subsection 2.3.2(b), if the Available Proceeds are not sufficient to redeem all outstanding shares of Preferred Stock, the Corporation shall redeem a pro rata portion of each holder's shares of Preferred Stock to the fullest extent of such Available Proceeds, based on the respective amounts that would otherwise be payable in respect of the shares to be redeemed had the Available Proceeds been sufficient to redeem all such shares, and shall redeem the remaining shares as soon as it may lawfully do so under Delaware law governing distributions to stockholders. In the event of a redemption pursuant to this Subsection 2.3.2(b), on or before the Redemption Date, each holder of shares of Preferred Stock, unless such holder has exercised his, her or its right to convert such shares as provided in Section 4, shall, if such shares are certificated, surrender the certificate or certificates representing such shares (or, if such registered holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate) to the Corporation, in the manner and at the place designated in the Redemption Notice, and thereupon the Redemption Price for such shares shall be payable to the order of the individual or entity whose name appears on such certificate or certificates as the owner thereof. In the event less than all of the shares of Preferred Stock represented by a certificate are redeemed, a new certificate representing the unredeemed shares of Preferred Stock shall promptly be issued to such holder. If on the Redemption Date the Redemption Price payable on the shares of Preferred Stock being redeemed is paid or tendered

for payment or deposited with an independent payment agent so as to be available therefor in a timely manner, then notwithstanding that any of the certificates for any of the shares of Preferred Stock shall not have been surrendered, dividends with respect to such shares of Preferred Stock shall cease to accrue after such Redemption Date and all rights, preferences and privileges with respect to such shares shall forthwith after the Redemption Date terminate, except only the right of the holders to receive the Redemption Price payable on such shares of Preferred Stock without interest upon surrender of such certificate or certificates. Prior to the distribution or redemption provided for in this Subsection 2.3.2(b), the Corporation shall not expend or dissipate the consideration received for such Deemed Liquidation Event, except to discharge expenses incurred in connection with such Deemed Liquidation Event or in the ordinary course of business.

2.3.3 Amount Deemed Paid or Distributed. The amount deemed paid or distributed to the holders of capital stock of the Corporation upon any such merger, consolidation, sale, transfer, exclusive license, other disposition or redemption shall be the cash or the value of the property, rights or securities paid or distributed to such holders by the Corporation or the acquiring person, firm or other entity. The value of such property, rights or securities shall be determined in good faith by the Board of Directors of the Corporation.

2.3.4 Allocation of Escrow and Contingent Consideration**.** In the event of a Deemed Liquidation Event pursuant to Subsection 2.3.1(a)(i), if any portion of the consideration payable to the stockholders of the Corporation is payable only upon satisfaction of contingencies (the "**Additional Consideration**"), the Merger Agreement shall provide that (a) the portion of such consideration that is not Additional Consideration (such portion, the "**Initial Consideration**") shall be allocated among the holders of capital stock of the Corporation in accordance with Subsections 2.1 and 2.2 as if the Initial Consideration were the only consideration payable in connection with such Deemed Liquidation Event and (b) any Additional Consideration which becomes payable to the stockholders of the Corporation upon satisfaction of such contingencies shall be allocated among the holders of capital stock of the Corporation in accordance with Subsections 2.1 and 2.2 after taking into account the previous payment of the Initial Consideration as part of the same transaction. For purposes of this Subsection 2.3.4, consideration placed into escrow or retained as holdback to be available for satisfaction of indemnification or similar obligations in connection with such Deemed Liquidation Event shall be deemed to be Additional Consideration.

3. Voting.

3.1 General. On any matter presented to the stockholders of the Corporation for their action or consideration at any meeting of stockholders of the Corporation (or by written consent of stockholders in lieu of meeting), each holder of outstanding shares of Preferred Stock shall be entitled to cast the number of votes equal to the number of whole shares of Common Stock into which the shares of Preferred Stock held by such holder are convertible as of the record date for determining stockholders entitled to vote on such matter. Except as provided by law or by the other provisions of the Restated Certificate, holders of Preferred Stock shall vote together with the holders of Common Stock as a single class.

3.2 Election of Directors. The holders of record of the shares of Preferred Stock, exclusively and voting together as a single class, shall be entitled to elect four (4) directors of the Corporation (the "**Preferred Directors**"). The holders of record of the shares

of Common Stock, exclusively and as a separate class, shall be entitled to elect one (1) director of the Corporation. Any director elected as provided in the preceding sentences may be removed without cause by, and only by, the affirmative vote of the holders of the shares of the class or series of capital stock entitled to elect such director or directors, given either at a special meeting of such stockholders duly called for that purpose or pursuant to a written consent of stockholders. If the holders of shares of Preferred Stock or Common Stock, as the case may be, fail to elect a sufficient number of directors to fill all directorships for which they are entitled to elect directors, exclusively and voting together as a single class or exclusively and as a separate class, as the case may be, pursuant to the first two sentences of this Subsection 3.2, then any directorship not so filled shall remain vacant until such time as the holders of the Preferred Stock or Common Stock, as the case may be, elect a person to fill such directorship by vote or written consent in lieu of a meeting; and no such directorship may be filled by stockholders of the Corporation other than by the stockholders of the Corporation that are entitled to elect a person to fill such directorship, exclusively and voting together as a single class or exclusively and as a separate class, as the case may be.. The holders of record of the shares of Common Stock and of any other class or series of voting stock (including the Preferred Stock), exclusively and voting together as a single class, shall be entitled to elect the balance of the total number of directors of the Corporation. At any meeting held for the purpose of electing a director, the presence in person or by proxy of the holders of a majority of the outstanding shares of the class or series entitled to elect such director shall constitute a quorum for the purpose of electing such director. Except as otherwise provided in this Subsection 3.2, a vacancy in any directorship filled by the holders of any class or series shall be filled only by vote or written consent in lieu of a meeting of the holders of such class or series or by any remaining director or directors elected by the holders of such class or series pursuant to this Subsection 3.2.

3.3 Preferred Stock Protective Provisions. At any time when at least 5,000,000 shares of Preferred Stock (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Preferred Stock) are outstanding, the Corporation shall not, either directly or indirectly by amendment, merger, consolidation or otherwise, do any of the following without (in addition to any other vote required by law or the Restated Certificate) the written consent or affirmative vote of the Requisite Holders, given in writing or by vote at a meeting, consenting or voting (as the case may be) separately as a class, and any such act or transaction entered into without such consent or vote shall be null and void *ab initio*, and of no force or effect:

3.3.1 liquidate, dissolve or wind-up the business and affairs of the Corporation, effect any merger or consolidation or any other Deemed Liquidation Event, or consent to any of the foregoing;

3.3.2 (i) amend, alter or repeal any provision of the Restated Certificate or Bylaws of the Corporation, (ii) increase or decrease the authorized number of shares of Common Stock or Preferred Stock of the Corporation or (iii) otherwise take any action to alter any of the rights, preferences or privileges of the Preferred Stock;

3.3.3 create, or authorize the creation of, any additional class or series of capital stock unless the same ranks junior to the Series A Preferred Stock and Series B Preferred Stock with respect to the distribution of assets on the liquidation, dissolution or winding up of the Corporation, the payment of dividends and rights of redemption, or increase the authorized number of shares of Preferred Stock;

3.3.4 (i) reclassify, alter or amend any existing security of the Corporation that is pari passu with the Series A Preferred Stock and Series B Preferred Stock in respect of the distribution of assets on the liquidation, dissolution or winding up of the Corporation, the payment of dividends or rights of redemption, if such reclassification, alteration or amendment would render such other security senior to the Series A Preferred Stock or Series B Preferred Stock in respect of any such right, preference or privilege, or (ii) reclassify, alter or amend any existing security of the Corporation that is junior to the Series A Preferred Stock or the Series B Preferred Stock in respect of the distribution of assets on the liquidation, dissolution or winding up of the Corporation, the payment of dividends or rights of redemption, if such reclassification, alteration or amendment would render such other security senior to or pari passu with the Series A Preferred Stock or the Series B Preferred Stock in respect of any such right, preference or privilege;

3.3.5 purchase or redeem (or permit any subsidiary to purchase or redeem) or pay or declare any dividend or make any distribution on, any shares of capital stock of the Corporation other than (i) redemptions of or dividends or distributions on the Preferred Stock as expressly authorized herein, (ii) dividends or other distributions payable on the Common Stock solely in the form of additional shares of Common Stock, (iii) repurchases of stock from former employees, officers, directors, consultants or other persons who performed services for the Corporation or any subsidiary in connection with the cessation of such employment or service at the lower of the original purchase price or the then-current fair market value thereof, and (iv) repurchases of stock upon exercise of the Corporation's contractual rights of first refusal with respect to proposed transfers of stock;

3.3.6 create, or authorize the creation of, or issue, or authorize the issuance of any debt security, or permit any subsidiary to take any such action with respect to any debt security, if the aggregate indebtedness of the Corporation and its subsidiaries for borrowed money following such action would exceed $1,000,000;

3.3.7 enter into any agreement or arrangement pursuant to which the Corporation is obligated to make or guarantee payments or has financial obligations in excess of $1,000,000 that were not included in a budget approved by the Board of Directors of the Corporation, including at least two Preferred Directors;

3.3.8 issue any equity securities of the Corporation in connection with the acquisition of all of the equity capital of any third party or all or substantially all of the assets of a third party;

3.3.9 create, or hold capital stock in, any subsidiary that is not wholly owned (either directly or through one or more other subsidiaries) by the Corporation, or sell, transfer or otherwise dispose of any capital stock of any direct or indirect subsidiary of the Corporation, or permit any direct or indirect subsidiary to sell, lease, transfer, exclusively license or otherwise dispose (in a single transaction or series of related transactions) of all or substantially all of the assets of such subsidiary;

3.3.10 unless otherwise approved by the Board of Directors of the Corporation, grant any stock option or stock equivalent containing acceleration of vesting provisions upon the change of control of the Corporation, sale of all or substantially all assets of the Corporation, termination of employment with or service to the Corporation or similar event;

3.3.11 increase or decrease the authorized number of directors constituting the Board of Directors; or

3.3.12 enter into any agreement to do any of the foregoing.

3.4 Series B Preferred Stock Protective Provision. At any time when at least 5,000,000 shares of Series B Preferred Stock (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to any class or series of Preferred Stock) are outstanding, the Corporation shall not, either directly or indirectly by amendment, merger, consolidation or otherwise, without (in addition to any other vote required by law or the Certificate of Incorporation) the written consent or affirmative vote of the holders of at least sixty percent (60%) of the outstanding shares of Series B Preferred Stock, given in writing or by vote at a meeting, consenting or voting (as the case may be) separately as a class and any such act or transaction entered into without such consent or vote shall be null and void *ab initio*, and of no force or effect:

3.4.1 amend, alter or repeal any provision of the Certificate of Incorporation in a manner that adversely affects the power, preferences or privileges of the Series B Preferred Stock;

3.4.2 increase or decrease the authorized number of shares of Series B Preferred Stock;

3.4.3 issue or obligate itself to issue shares of Series A Preferred Stock or Series B Preferred Stock; or

3.4.4 enter into an agreement to do any of the foregoing.

4. Optional Conversion.

The holders of the Preferred Stock shall have conversion rights as follows (the "**Conversion Rights**"):

4.1 Right to Convert.

4.1.1 Conversion Ratios.

(a) Each share of Series A Preferred Stock shall be convertible, at the option of the holder thereof, at any time and from time to time, and without the payment of additional consideration by the holder thereof, into such number of fully paid and nonassessable shares of Common Stock as is determined by dividing the Series A Original Issue Price by the Series A Conversion Price (as defined below) in effect at the time of conversion. The "**Series A Conversion Price**" shall initially be equal to $0.71. Such initial Series A Conversion Price, and the rate at which shares of Series A Preferred Stock may be converted into shares of Common Stock, shall be subject to adjustment as provided below.

(b) Each share of Series B Preferred Stock shall be convertible, at the option of the holder thereof, at any time and from time to time, and without the payment of additional consideration by the holder thereof, into such number of fully paid and

nonassessable shares of Common Stock as is determined by dividing the Series B Original Issue Price by the Series B Conversion Price (as defined below) in effect at the time of conversion. The "**Series B Conversion Price**" shall initially be equal to $1.44. Such initial Series B Conversion Price, and the rate at which shares of Series B Preferred Stock may be converted into shares of Common Stock, shall be subject to adjustment as provided below. "**Conversion Price**" shall mean the Series A Conversion Price or the Series B Conversion Price, as applicable.

4.1.2 Termination of Conversion Rights. In the event of a notice of redemption of any shares of Preferred Stock pursuant to Section 2, the Conversion Rights of the shares designated for redemption shall terminate at the close of business on the last full day preceding the date fixed for redemption, unless the redemption price is not fully paid on such redemption date, in which case the Conversion Rights for such shares shall continue until such price is paid in full. In the event of a liquidation, dissolution or winding up of the Corporation or a Deemed Liquidation Event, the Conversion Rights shall terminate at the close of business on the last full day preceding the date fixed for the payment of any such amounts distributable on such event to the holders of Preferred Stock.

4.2 Fractional Shares. No fractional shares of Common Stock shall be issued upon conversion of the Preferred Stock. In lieu of any fractional shares to which the holder would otherwise be entitled, the Corporation shall pay cash equal to such fraction multiplied by the fair market value of a share of Common Stock as determined in good faith by the Board of Directors of the Corporation. Whether or not fractional shares would be issuable upon such conversion shall be determined on the basis of the total number of shares of Preferred Stock the holder is at the time converting into Common Stock and the aggregate number of shares of Common Stock issuable upon such conversion.

4.3 Mechanics of Conversion.

4.3.1 Notice of Conversion. In order for a holder of Preferred Stock to voluntarily convert shares of Preferred Stock into shares of Common Stock, such holder shall (a) if such shares are certificated, surrender the certificate or certificates for such shares of Preferred Stock (or, if such registered holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate), at the office of the transfer agent for the Preferred Stock (or at the principal office of the Corporation if the Corporation serves as its own transfer agent), and (b) provide written notice that such holder elects to convert all or any number of such holder's shares of Preferred Stock and, if applicable, any event on which such conversion is contingent. Such notice shall state such holder's name or the names of the nominees in which such holder wishes the shares of Common Stock to be issued. If required by the Corporation, any certificates surrendered for conversion shall be endorsed or accompanied by a written instrument or instruments of transfer, in form satisfactory to the Corporation, duly executed by the registered holder or his, her or its attorney duly authorized in writing. The close of business on the date of receipt by the transfer agent (or by the Corporation if the Corporation serves as its own transfer agent) of such notice, and if applicable, certificates (or lost certificate affidavit and agreement) shall be the time of conversion (the "**Conversion Time**"), and the shares of Common Stock issuable upon conversion of the specified shares shall be deemed to be outstanding of record as of such date. The Corporation shall, as soon as practicable after the Conversion Time, (i) issue and deliver to such holder of Preferred Stock, or to his, her or its

nominees, in the event such shares are certificated, a certificate or certificates, and in the event uncertificated, book entry statement, for the number of full shares of Common Stock issuable upon such conversion in accordance with the provisions hereof and a certificate for the number (if any) of the shares of Preferred Stock represented by the surrendered certificate that were not converted into Common Stock, (ii) pay in cash such amount as provided in Subsection 4.2 in lieu of any fraction of a share of Common Stock otherwise issuable upon such conversion and (iii) pay all declared but unpaid dividends on the shares of Preferred Stock converted.

4.3.2 Reservation of Shares. The Corporation shall at all times when the Preferred Stock shall be outstanding, reserve and keep available out of its authorized but unissued capital stock, for the purpose of effecting the conversion of the Preferred Stock, such number of its duly authorized shares of Common Stock as shall from time to time be sufficient to effect the conversion of all outstanding Preferred Stock; and if at any time the number of authorized but unissued shares of Common Stock shall not be sufficient to effect the conversion of all then outstanding shares of the Preferred Stock, the Corporation shall take such corporate action as may be necessary to increase its authorized but unissued shares of Common Stock to such number of shares as shall be sufficient for such purposes, including, without limitation, engaging in best efforts to obtain the requisite stockholder approval of any necessary amendment to the Restated Certificate. Before taking any action which would cause an adjustment reducing the Series A Conversion Price below the then par value of the shares of Common Stock issuable upon conversion of the Series A Preferred Stock or the Series B Conversion Price below the then par value of the shares of Common Stock issuable upon conversion of the Series B Preferred Stock, the Corporation will take any corporate action which may, in the opinion of its counsel, be necessary in order that the Corporation may validly and legally issue fully paid and nonassessable shares of Common Stock at such adjusted Conversion Price.

4.3.3 Effect of Conversion. All shares of Preferred Stock which shall have been surrendered for conversion as herein provided shall no longer be deemed to be outstanding and all rights with respect to such shares shall immediately cease and terminate at the Conversion Time, except only the right of the holders thereof to receive shares of Common Stock in exchange therefor, to receive payment in lieu of any fraction of a share otherwise issuable upon such conversion as provided in Subsection 4.2 and to receive payment of any dividends declared but unpaid thereon. Any shares of Preferred Stock so converted shall be retired and cancelled and may not be reissued as shares of such series, and the Corporation may thereafter take such appropriate action (without the need for stockholder action) as may be necessary to reduce the authorized number of shares of Preferred Stock accordingly.

4.3.4 No Further Adjustment. Upon any such conversion, no adjustment to the (i) Series A Conversion Price shall be made for any declared but unpaid dividends on the Series A Preferred Stock surrendered for conversion or on the Common Stock delivered upon conversion thereof or (ii) Series B Conversion Price shall be made for any declared but unpaid dividends on the Series B Preferred Stock surrendered for conversion or on the Common Stock delivered upon conversion thereof.

4.3.5 Taxes. The Corporation shall pay any and all issue and other similar taxes that may be payable in respect of any issuance or delivery of shares of Common Stock upon conversion of shares of Preferred Stock pursuant to this Section 4. The Corporation shall not, however, be required to pay any tax which may be payable in respect of

any transfer involved in the issuance and delivery of shares of Common Stock in a name other than that in which the shares of Preferred Stock so converted were registered, and no such issuance or delivery shall be made unless and until the person or entity requesting such issuance has paid to the Corporation the amount of any such tax or has established, to the satisfaction of the Corporation, that such tax has been paid.

4.4 Adjustments to Conversion Price for Diluting Issues.

4.4.1 Special Definitions. For purposes of this Article Fourth, the following definitions shall apply:

(a) "**Option**" shall mean rights, options or warrants to subscribe for, purchase or otherwise acquire Common Stock or Convertible Securities.

(b) "**Series B Original Issue Date**" shall mean the date on which the first share of Series B Preferred Stock was issued.

(c) "**Convertible Securities**" shall mean any evidences of indebtedness, shares or other securities directly or indirectly convertible into or exchangeable for Common Stock, but excluding Options.

(d) "**Additional Shares of Common Stock**" shall mean all shares of Common Stock issued (or, pursuant to Subsection 4.4.3 below, deemed to be issued) by the Corporation after the Series B Original Issue Date, other than (1) the following shares of Common Stock and (2) shares of Common Stock deemed issued pursuant to the following Options and Convertible Securities (clauses (1) and (2), collectively, "**Exempted Securities**"):

(i) shares of Common Stock, Options or Convertible Securities issued as a dividend or distribution on Preferred Stock;

(ii) shares of Common Stock, Options or Convertible Securities issued by reason of a dividend, stock split, split-up or other distribution on shares of Common Stock that is covered by Subsection 4.5, 4.6, 4.7 or 4.8;

(iii) shares of Common Stock or Options issued to employees or directors of, or consultants or advisors to, the Corporation or any of its subsidiaries pursuant to a plan, agreement or arrangement that is in effect as of the filing of this Restated Certificate (the "**Effective Date**"), or is subsequently approved by the Board of Directors of the Corporation (including any amendments to any existing plans, agreements or arrangements after the Effective Date);

(iv) shares of Common Stock or Convertible Securities actually issued upon the exercise of Options or shares of Common Stock actually issued upon the conversion or exchange of Convertible Securities, in each case provided such issuance is pursuant to the terms of such Option or Convertible Security;

(v) shares of Common Stock, Options or Convertible Securities issued to banks, equipment lessors or other financial institutions, or to real property lessors, pursuant to a debt financing, equipment leasing or real property leasing transaction approved by the Board of Directors of the Corporation, including at least two Preferred Directors;

(vi) shares of Common Stock, Options or Convertible Securities issued to suppliers or third party service providers in connection with the provision of goods or services pursuant to transactions approved by the Board of Directors of the Corporation, including at least two Preferred Directors;

(vii) shares of Common Stock, Options or Convertible Securities issued pursuant to the acquisition of another corporation by the Corporation, by merger, purchase of substantially all of the assets or other reorganization or to a joint venture agreement, provided that such acquisition is approved by the Board of Directors of the Corporation, including at least two Preferred Directors;

(viii) shares of Common Stock issued in the Corporation's initial public offering of Common Stock under the Securities Act of 1933, as amended;

(ix) shares of Common Stock, Options or Convertible Securities issued in connection with sponsored research, collaboration, technology license, development, OEM, marketing or other similar agreements or strategic partnerships approved by the Board

of Directors of the Corporation, pursuant to transactions approved by the Board of Directors of the Corporation, including at least two Preferred Directors; or

(x) shares of Common Stock, Options or Convertible Securities issued in connection with any other transaction for which the Requisite Holders waive adjustment of the Series A Conversion Price and Series B Conversion Price pursuant to Subsection 4.4.2 below.

4.4.2 No Adjustment of Conversion Price. No adjustment in the Series A Conversion Price or Series B Conversion Price shall be made as the result of the issuance or deemed issuance of Additional Shares of Common Stock if the Corporation receives written notice from the Requisite Holders agreeing that no such adjustment shall be made as the result of the issuance or deemed issuance of such Additional Shares of Common Stock.

4.4.3 Deemed Issue of Additional Shares of Common Stock.

(a) If the Corporation at any time or from time to time after the Series B Original Issue Date shall issue any Options or Convertible Securities (excluding Options or Convertible Securities which are themselves Exempted Securities) or shall fix a record date for the determination of holders of any class of securities entitled to receive any such Options or Convertible Securities, then the maximum number of shares of Common Stock (as set forth in the instrument relating thereto, assuming the satisfaction of any conditions to exercisability, convertibility or exchangeability but without regard to any provision contained therein for a subsequent adjustment of such number) issuable upon the exercise of such Options or, in the case of Convertible Securities and Options therefor, the conversion or exchange of such Convertible Securities, shall be deemed to be Additional Shares of Common Stock issued as of the time of such issue or, in case such a record date shall have been fixed, as of the close of business on such record date.

(b) If the terms of any Option or Convertible Security, the issuance of which resulted in an adjustment to the Series A Conversion Price or Series B Conversion Price pursuant to the terms of Subsection 4.4.4, are revised as a result of an amendment to such terms or any other adjustment pursuant to the provisions of such Option or Convertible Security (but excluding automatic adjustments to such terms pursuant to anti-dilution or similar provisions of such Option or Convertible Security) to provide for either (1) any increase or decrease in the number of shares of Common Stock issuable upon the exercise, conversion and/or exchange of any such Option or Convertible Security or (2) any increase or decrease in the consideration payable to the Corporation upon such exercise, conversion and/or exchange, then, effective upon such increase or decrease becoming effective, the applicable Conversion Price computed upon the original issue of such Option or Convertible Security (or upon the occurrence of a record date with respect thereto) shall be readjusted to such Conversion Price as would have obtained had such revised terms been in effect upon the original date of issuance of such Option or Convertible Security. Notwithstanding the foregoing, no readjustment pursuant to this clause (b) shall have the effect of increasing (i) the Series A

Conversion Price to an amount which exceeds the lower of (x) the Series A Conversion Price in effect immediately prior to the original adjustment made as a result of the issuance of such Option or Convertible Security, or (y) the Series A Conversion Price that would have resulted from any issuances of Additional Shares of Common Stock (other than deemed issuances of Additional Shares of Common Stock as a result of the issuance of such Option or Convertible Security) between the original adjustment date and such readjustment date or (ii) the Series B Conversion Price to an amount which exceeds the lower of (x) the Series B Conversion Price in effect immediately prior to the original adjustment made as a result of the issuance of such Option or Convertible Security, or (y) the Series B Conversion Price that would have resulted from any issuances of Additional Shares of Common Stock (other than deemed issuances of Additional Shares of Common Stock as a result of the issuance of such Option or Convertible Security) between the original adjustment date and such readjustment date.

(c) If the terms of any Option or Convertible Security (excluding Options or Convertible Securities which are themselves Exempted Securities), the issuance of which did not result in an adjustment to the applicable Conversion Price pursuant to the terms of Subsection 4.4.4 (either because the consideration per share (determined pursuant to Subsection 4.4.5) of the Additional Shares of Common Stock subject thereto was equal to or greater than the applicable Conversion Price then in effect, or because such Option or Convertible Security was issued before the Series B Original Issue Date), are revised after the Series B Original Issue Date as a result of an amendment to such terms or any other adjustment pursuant to the provisions of such Option or Convertible Security (but excluding automatic adjustments to such terms pursuant to anti-dilution or similar provisions of such Option or Convertible Security) to provide for either (1) any increase in the number of shares of Common Stock issuable upon the exercise, conversion or exchange of any such Option or Convertible Security or (2) any decrease in the consideration payable to the Corporation upon such exercise, conversion or exchange, then such Option or Convertible Security, as so amended or adjusted, and the Additional Shares of Common Stock subject thereto (determined in the manner provided in Subsection 4.4.3(a)) shall be deemed to have been issued effective upon such increase or decrease becoming effective.

(d) Upon the expiration or termination of any unexercised Option or unconverted or unexchanged Convertible Security (or portion thereof) which resulted (either upon its original issuance or upon a revision of its terms) in an adjustment to the applicable Conversion Price pursuant to the terms of Subsection 4.4.4, the applicable Conversion Price shall be readjusted to such Conversion Price as would have obtained had such Option or Convertible Security (or portion thereof) never been issued.

(e) If the number of shares of Common Stock issuable upon the exercise, conversion and/or exchange of any Option or Convertible Security, or the consideration payable to the Corporation upon such exercise, conversion and/or exchange, is calculable at the time such Option or Convertible Security is issued or amended but is subject to adjustment based upon subsequent events, any adjustment to the applicable Conversion Price provided for in this Subsection 4.4.3 shall be effected at the time of such issuance or amendment based on such number of shares or amount of consideration without regard to any provisions for subsequent adjustments (and any subsequent adjustments shall be treated as provided in clauses (b) and (c) of this Subsection 4.4.3). If the number of shares of Common Stock issuable upon the exercise, conversion and/or exchange of any Option or Convertible Security, or the

consideration payable to the Corporation upon such exercise, conversion and/or exchange, cannot be calculated at all at the time such Option or Convertible Security is issued or amended, any adjustment to the applicable Conversion Price that would result under the terms of this Subsection 4.4.3 at the time of such issuance or amendment shall instead be effected at the time such number of shares and/or amount of consideration is first calculable (even if subject to subsequent adjustments), assuming for purposes of calculating such adjustment to the Conversion Price that such issuance or amendment took place at the time such calculation can first be made.

4.4.4 Adjustment of Series A Conversion Price Upon Issuance of Additional Shares of Common Stock. In the event the Corporation shall at any time after the Series B Original Issue Date issue Additional Shares of Common Stock (including Additional Shares of Common Stock deemed to be issued pursuant to Subsection 4.4.3), without consideration or for a consideration per share less than the Series A Conversion Price and/or Series B Conversion Price in effect immediately prior to such issue, then the Series A Conversion Price and/or Series B Conversion Price, as the case may be, shall be reduced, concurrently with such issue, to a price (calculated to the nearest one-hundredth of a cent) determined in accordance with the following formula:

$$CP_2 = CP_1 * (A + B) \div (A + C)$$

For purposes of the foregoing formula, the following definitions shall apply:

(a) "CP_2" shall mean (1) in the case of an adjustment to the Series A Conversion Price, the Series A Conversion Price in effect immediately after such issue of Additional Shares of Common Stock, (2) in the case of an adjustment to the Series B Conversion Price, the Series B Conversion Price in effect immediately after such issue of Additional Shares of Common Stock;

(b) "CP_1" shall mean (1) in the case of an adjustment to the Series A Conversion Price, the Series A Conversion Price in effect immediately prior to such issue of Additional Shares of Common Stock, (2) in the case of an adjustment to the Series B Conversion Price, the Series B Conversion Price in effect immediately prior to such issue of Additional Shares of Common Stock;

(c) "A" shall mean the number of shares of Common Stock outstanding immediately prior to such issue of Additional Shares of Common Stock (treating for this purpose as outstanding all shares of Common Stock issuable upon exercise of Options outstanding immediately prior to such issue or upon conversion or exchange of Convertible Securities (including the Preferred Stock) outstanding (assuming exercise of any outstanding Options therefor) immediately prior to such issue);

(d) "B" shall mean the number of shares of Common Stock that would have been issued if such Additional Shares of Common Stock had been issued at a price per share equal to CP_1 (determined by dividing the aggregate consideration received by the Corporation in respect of such issue by CP_1); and

(e) "C" shall mean the number of such Additional Shares of Common Stock issued in such transaction.

4.4.5 Determination of Consideration. For purposes of this Subsection 4.4, the consideration received by the Corporation for the issue of any Additional Shares of Common Stock shall be computed as follows:

(a) Cash and Property: Such consideration shall:

(i) insofar as it consists of cash, be computed at the aggregate amount of cash received by the Corporation, excluding amounts paid or payable for accrued interest;

(ii) insofar as it consists of property other than cash, be computed at the fair market value thereof at the time of such issue, as determined in good faith by the Board of Directors of the Corporation; and

(iii) in the event Additional Shares of Common Stock are issued together with other shares or securities or other assets of the Corporation for consideration which covers both, be the proportion of such consideration so received, computed as provided in clauses (i) and (ii) above, as determined in good faith by the Board of Directors of the Corporation.

(b) Options and Convertible Securities. The consideration per share received by the Corporation for Additional Shares of Common Stock deemed to have been issued pursuant to Subsection 4.4.3, relating to Options and Convertible Securities, shall be determined by dividing

(i) the total amount, if any, received or receivable by the Corporation as consideration for the issue of such Options or Convertible Securities, plus the minimum aggregate amount of additional consideration (as set forth in the instruments relating thereto, without regard to any provision contained therein for a subsequent adjustment of such consideration) payable to the Corporation upon the exercise of such Options or the conversion or exchange of such Convertible Securities, or in the case of Options for Convertible Securities, the exercise of such Options for Convertible Securities and the conversion or exchange of such Convertible Securities, by

(ii) the maximum number of shares of Common Stock (as set forth in the instruments relating thereto, without regard to any provision contained therein for a subsequent adjustment of such number) issuable upon the exercise of such Options or the conversion or exchange of such Convertible Securities, or in the case of Options for Convertible Securities, the exercise of such Options for Convertible Securities and the conversion or exchange of such Convertible Securities.

4.4.6 Multiple Closing Dates. In the event the Corporation shall issue on more than one date Additional Shares of Common Stock that are a part of one transaction or a series of related transactions and that would result in an adjustment to the Series A Conversion Price and/or Series B Conversion Price pursuant to the terms of Subsection 4.4.4, then, upon the final such issuance, the Series A Conversion Price and/or Series B Conversion Price, as the case may be, shall be readjusted to give effect to all such issuances as if they occurred on the date of the first such issuance (and without giving effect to any additional adjustments as a result of any such subsequent issuances within such period).

4.5 Adjustment for Stock Splits and Combinations. If the Corporation shall at any time or from time to time after the Series B Original Issue Date effect a subdivision of the outstanding Common Stock, the Series A Conversion Price and Series B Conversion Price in effect immediately before that subdivision shall be proportionately decreased so that the number of shares of Common Stock issuable on conversion of each share of Series A Preferred Stock and Series B Preferred Stock shall be increased in proportion to such increase in the aggregate number of shares of Common Stock outstanding. If the Corporation shall at any time or from time to time after the Series B Original Issue Date combine the outstanding shares of Common Stock, the Series A Conversion Price and Series B Conversion Price in effect immediately before the combination shall be proportionately increased so that the number of shares of Common Stock issuable on conversion of each share of such series shall be decreased in proportion to such decrease in the aggregate number of shares of Common Stock outstanding. Any adjustment under this subsection shall become effective at the close of business on the date the subdivision or combination becomes effective.

4.6 Adjustment for Certain Dividends and Distributions. In the event the Corporation at any time or from time to time after the Series B Original Issue Date shall make or issue, or fix a record date for the determination of holders of Common Stock entitled to receive, a dividend or other distribution payable on the Common Stock in additional shares of Common Stock, then and in each such event the Series A Conversion Price and Series B Conversion Price in effect immediately before such event shall be decreased as of the time of such issuance or, in the event such a record date shall have been fixed, as of the close of business on such record date, by multiplying the Series A Conversion Price and Series B Conversion Price, as the case may be, then in effect by a fraction:

(1) the numerator of which shall be the total number of shares of Common Stock issued and outstanding immediately prior to the time of such issuance or the close of business on such record date, and

(2) the denominator of which shall be the total number of shares of Common Stock issued and outstanding immediately prior to the time of such issuance or the close of business on such record date plus the number of shares of Common Stock issuable in payment of such dividend or distribution.

Notwithstanding the foregoing, (a) if such record date shall have been fixed and such dividend is not fully paid or if such distribution is not fully made on the date fixed therefor, the Series A Conversion Price and Series B Conversion Price shall be recomputed accordingly as of the close of business on such record date and thereafter the Series A Conversion Price and Series B Conversion Price shall be adjusted pursuant to this subsection as of the time of actual payment of such dividends or distributions; and (b) that no such adjustment shall be made to (i) the Series A Conversion Price if the holders of Series A Preferred Stock simultaneously receive a dividend or other distribution of shares of Common Stock in a number equal to the number of shares of Common Stock as they would have received if all outstanding shares of Series A Preferred Stock had been converted into Common Stock on the date of such event or (ii) the Series B Conversion Price if the holders of Series B Preferred Stock simultaneously receive a dividend or other distribution of shares of Common Stock in a number equal to the number of shares of Common Stock as they would have received if all outstanding shares of Series B Preferred Stock had been converted into Common Stock on the date of such event.

4.7 Adjustments for Other Dividends and Distributions. In the event the Corporation at any time or from time to time after the Series B Original Issue Date shall make or issue, or fix a record date for the determination of holders of Common Stock entitled to receive, a dividend or other distribution payable in securities of the Corporation (other than a distribution of shares of Common Stock in respect of outstanding shares of Common Stock) or in other property and the provisions of Section 1 do not apply to such dividend or distribution, then and in each such event the holders of Preferred Stock shall receive, simultaneously with the distribution to the holders of Common Stock, a dividend or other distribution of such securities or other property in an amount equal to the amount of such securities or other property as they would have received if all outstanding shares of Preferred Stock had been converted into Common Stock on the date of such event.

4.8 Adjustment for Merger or Reorganization, etc. Subject to the provisions of Subsection 2.3, if there shall occur any reorganization, recapitalization, reclassification, consolidation or merger involving the Corporation in which the Common Stock (but not the Preferred Stock) is converted into or exchanged for securities, cash or other property (other than a transaction covered by Subsections 4.5, 4.6 or 4.7), then, following any such reorganization, recapitalization, reclassification, consolidation or merger, each share of Preferred Stock not so converted shall thereafter be convertible in lieu of the Common Stock into which it was convertible prior to such event into the kind and amount of securities, cash or other property which a holder of the number of shares of Common Stock of the Corporation issuable upon conversion of one share of such series or class of Preferred Stock immediately prior to such reorganization, recapitalization, reclassification, consolidation or merger would have been entitled to receive pursuant to such transaction; and, in such case, appropriate adjustment (as determined in good faith by the Board of Directors of the Corporation) shall be made in the

application of the provisions in this Section 4 with respect to the rights and interests thereafter of the holders of such Preferred Stock, to the end that the provisions set forth in this Section 4 (including provisions with respect to changes in and other adjustments of the Series A Conversion Price and/or Series B Conversion Price, as applicable) shall thereafter be applicable, as nearly as reasonably may be, in relation to any securities or other property thereafter deliverable upon the conversion of such shares of the Preferred Stock. For the avoidance of doubt, nothing in this Subsection 4.8 shall be construed as preventing the holders of Preferred Stock from seeking any appraisal rights to which they are otherwise entitled under the DGCL in connection with a merger triggering an adjustment hereunder, nor shall this Subsection 4.8 be deemed conclusive evidence of the fair value of the shares of Preferred Stock in any such appraisal proceeding.

4.9 Certificate as to Adjustments. Upon the occurrence of each adjustment or readjustment of the Series A Conversion Price and/or Series B Conversion Price pursuant to this Section 4, the Corporation at its expense shall, as promptly as reasonably practicable but in any event not later than 30 days thereafter, compute such adjustment or readjustment in accordance with the terms hereof and furnish to each holder of the applicable series of Preferred Stock a certificate setting forth such adjustment or readjustment (including the kind and amount of securities, cash or other property into which the such Preferred Stock is convertible) and showing in detail the facts upon which such adjustment or readjustment is based. The Corporation shall, as promptly as reasonably practicable after the written request at any time of any holder of Preferred Stock (but in any event not later than 10 days thereafter), furnish or cause to be furnished to such holder a certificate setting forth (i) the Series A Conversion Price and Series B Conversion Price then in effect, and (ii) the number of shares of Common Stock and the amount, if any, of other securities, cash or property which then would be received upon the conversion of the Preferred Stock.

4.10 Notice of Record Date. In the event:

(a) the Corporation shall take a record of the holders of its Common Stock (or other capital stock or securities at the time issuable upon conversion of the Preferred Stock) for the purpose of entitling or enabling them to receive any dividend or other distribution, or to receive any right to subscribe for or purchase any shares of capital stock of any class or any other securities, or to receive any other security; or

(b) of any capital reorganization of the Corporation, any reclassification of the Common Stock of the Corporation, or any Deemed Liquidation Event; or

(c) of the voluntary or involuntary dissolution, liquidation or winding-up of the Corporation,

then, and in each such case, the Corporation will send or cause to be sent to the holders of the Preferred Stock a notice specifying, as the case may be, (i) the record date for such dividend, distribution or right, and the amount and character of such dividend, distribution or right, or (ii) the effective date on which such reorganization, reclassification, consolidation, merger, transfer, dissolution, liquidation or winding-up is proposed to take place, and the time, if any is to be fixed, as of which the holders of record of Common Stock (or such other capital stock or securities at the time issuable upon the conversion of the Preferred Stock) shall be entitled to

exchange their shares of Common Stock (or such other capital stock or securities) for securities or other property deliverable upon such reorganization, reclassification, consolidation, merger, transfer, dissolution, liquidation or winding-up, and the amount per share and character of such exchange applicable to the Preferred Stock and the Common Stock. Such notice shall be sent at least 10 days prior to the record date or effective date for the event specified in such notice.

5. Mandatory Conversion.

5.1 Trigger Events. Upon either (a) the closing of the sale of shares of Common Stock to the public in a firm-commitment underwritten public offering pursuant to an effective registration statement under the Securities Act of 1933, as amended, resulting in at least $50 million of gross proceeds to the Corporation and the shares of Common Stock being listed for trading on the New York Stock Exchange or the NASDAQ National Market or (b) the date and time, or the occurrence of an event, specified by vote or written consent of the Requisite Holders (the time of such closing or the date and time specified or the time of the event specified in such vote or written consent is referred to herein as the "**Mandatory Conversion Time**"), (i) all outstanding shares of Preferred Stock shall automatically be converted into shares of Common Stock, at the then effective conversion rate as calculated pursuant to Subsection 4.1.1. and (ii) such shares may not be reissued by the Corporation.

5.2 Procedural Requirements. All holders of record of shares of Preferred Stock shall be sent written notice of the Mandatory Conversion Time and the place designated for mandatory conversion of all such shares of Preferred Stock pursuant to this Section 5. Such notice need not be sent in advance of the occurrence of the Mandatory Conversion Time. Upon receipt of such notice, each holder of shares of Preferred Stock in certificated form shall surrender his, her or its certificate or certificates for all such shares (or, if such holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate) to the Corporation at the place designated in such notice. If so required by the Corporation, any certificates surrendered for conversion shall be endorsed or accompanied by written instrument or instruments of transfer, in form satisfactory to the Corporation, duly executed by the registered holder or by his, her or its attorney duly authorized in writing. All rights with respect to the Preferred Stock converted pursuant to Subsection 5.1, including the rights, if any, to receive notices and vote (other than as a holder of Common Stock), will terminate at the Mandatory Conversion Time (notwithstanding the failure of the holder or holders thereof to surrender any certificates at or prior to such time), except only the rights of the holders thereof, upon surrender of any certificate or certificates of such holders (or lost certificate affidavit and agreement) therefor, to receive the items provided for in the next sentence of this Subsection 5.2. As soon as practicable after the Mandatory Conversion Time and, if applicable, the surrender of any certificate or certificates (or lost certificate affidavit and agreement) for Preferred Stock, the Corporation shall (a) issue and deliver to such holder, or to his, her or its nominees, in the event such shares are certificated, a certificate or certificates, and in the event uncertificated, book entry statement, for the number of full shares of Common Stock issuable on such conversion in accordance with the provisions hereof, and (b) pay cash as provided in Subsection 4.2 in lieu of any fraction of a share of Common Stock otherwise issuable upon such conversion and the payment of any declared but unpaid dividends on the shares of Preferred Stock converted. Such converted Preferred Stock shall be retired and cancelled and may not be reissued as shares of such series, and the Corporation may thereafter take such appropriate action (without the need for stockholder action) as may be necessary to reduce the authorized number of shares of Preferred Stock accordingly.

6. Acquired Shares. Any shares of Preferred Stock that are redeemed or otherwise acquired by the Corporation or any of its subsidiaries shall be automatically and immediately cancelled and retired and shall not be reissued, sold or transferred. Neither the Corporation nor any of its subsidiaries may exercise any voting or other rights granted to the holders of Preferred Stock following any acquisition thereof.

7. Waiver. Any of the rights, powers, preferences and other terms of the Series A Preferred Stock set forth herein may be waived on behalf of all holders of Series A Preferred Stock by the affirmative written consent or vote of the holders of a majority of the shares of Series A Preferred Stock then outstanding. Any of the rights, powers, preferences and other terms of the Series B Preferred Stock set forth herein may be waived on behalf of all holders of Series B Preferred Stock by the affirmative written consent or vote of the holders of at least sixty percent (60%) of the shares of Series B Preferred Stock then outstanding. Any of the rights, powers, preferences and other terms of the Preferred Stock set forth herein may be waived on behalf of all holders of Preferred Stock by the affirmative written consent or vote of the Requisite Holders.

8. Notices. Any notice required or permitted by the provisions of this Article Fourth to be given to a holder of shares of Preferred Stock shall be mailed, postage prepaid, to the post office address last shown on the records of the Corporation, or given by electronic communication in compliance with the provisions of the DGCL, and shall be deemed sent upon such mailing or electronic transmission.

FIFTH: Subject to any additional vote required by the Restated Certificate or Bylaws, in furtherance and not in limitation of the powers conferred by statute, the Board of Directors of the Corporation is expressly authorized to make, repeal, alter, amend and rescind any or all of the Bylaws of the Corporation.

SIXTH: Subject to any additional vote required by the Restated Certificate, the number of directors of the Corporation shall be determined in the manner set forth in the Bylaws of the Corporation.

SEVENTH: Elections of directors need not be by written ballot unless the Bylaws of the Corporation shall so provide.

EIGHTH: Meetings of stockholders may be held within or without the State of Delaware, as the Bylaws of the Corporation may provide. The books of the Corporation may be kept outside the State of Delaware at such place or places as may be designated from time to time by the Board of Directors of the Corporation or in the Bylaws of the Corporation.

NINTH: To the fullest extent permitted by law, a director of the Corporation shall not be personally liable to the Corporation or its stockholders for monetary damages for breach of fiduciary duty as a director. If the DGCL or any other law of the State of Delaware is amended after approval by the stockholders of this Article Ninth to authorize corporate action further eliminating or limiting the personal liability of directors, then the liability of a director of the Corporation shall be eliminated or limited to the fullest extent permitted by the DGCL as so amended.

Any repeal or modification of the foregoing provisions of this Article Ninth by the stockholders of the Corporation shall not adversely affect any right or protection of a director of the Corporation existing at the time of, or increase the liability of any director of the Corporation with respect to any acts or omissions of such director occurring prior to, such repeal or modification.

TENTH: Unless the Corporation consents in writing to the selection of an alternative forum, the Court of Chancery in the State of Delaware shall be the sole and exclusive forum for any stockholder (including a beneficial owner) to bring (i) any derivative action or proceeding brought on behalf of the Corporation, (ii) any action asserting a claim of breach of fiduciary duty owed by any director, officer or other employee of the Corporation to the Corporation or the Corporation's stockholders, (iii) any action asserting a claim against the Corporation, its directors, officers or employees arising pursuant to any provision of the DGCL or the Corporation's certificate of incorporation or bylaws or (iv) any action asserting a claim against the Corporation, its directors, officers or employees governed by the internal affairs doctrine, except for, as to each of (i) through (iv) above, any claim as to which the Court of Chancery determines that there is an indispensable party not subject to the jurisdiction of the Court of Chancery (and the indispensable party does not consent to the personal jurisdiction of the Court of Chancery within ten days following such determination), which is vested in the exclusive jurisdiction of a court or forum other than the Court of Chancery, or for which the Court of Chancery does not have subject matter jurisdiction. If any provision or provisions of this Article Tenth shall be held to be invalid, illegal or unenforceable as applied to any person or entity or circumstance for any reason whatsoever, then, to the fullest extent permitted by law, the validity, legality and enforceability of such provisions in any other circumstance and of the remaining provisions of this Article Tenth (including, without limitation, each portion of any sentence of this Article Tenth containing any such provision held to be invalid, illegal or unenforceable that is not itself held to be invalid, illegal or unenforceable) and the application of such provision to other persons or entities and circumstances shall not in any way be affected or impaired thereby.

ELEVENTH: The following indemnification provisions shall apply to the persons enumerated below.

(1) Right to Indemnification of Directors and Officers. The Corporation shall indemnify and hold harmless, to the fullest extent permitted by applicable law as it presently exists or may hereafter be amended, any person (an "**Indemnified Person**") who was or is made or is threatened to be made a party or is otherwise involved in any action, suit or proceeding, whether civil, criminal, administrative or investigative (a "**Proceeding**"), by reason of the fact that such person, or a person for whom such person is the legal representative, is or was a director or officer of the Corporation or, while a director or officer of the Corporation, is or was serving at the request of the Corporation as a director, officer, employee or agent of another corporation or of a partnership, joint venture, limited liability company, trust, enterprise or nonprofit entity, including service with respect to employee benefit plans, against all liability and loss suffered and expenses (including attorneys' fees) reasonably incurred by such Indemnified Person in such Proceeding. Notwithstanding the preceding sentence, except as otherwise

provided in Section 3 of this Article Eleventh, the Corporation shall be required to indemnify an Indemnified Person in connection with a Proceeding (or part thereof) commenced by such Indemnified Person only if the commencement of such Proceeding (or part thereof) by the Indemnified Person was authorized in advance by the Board of Directors of the Corporation.

(2) Prepayment of Expenses of Directors and Officers. The Corporation shall pay the expenses (including attorneys' fees) incurred by an Indemnified Person in defending any Proceeding in advance of its final disposition, provided, however, that, to the extent required by law, such payment of expenses in advance of the final disposition of the Proceeding shall be made only upon receipt of an undertaking by the Indemnified Person to repay all amounts advanced if it should be ultimately determined that the Indemnified Person is not entitled to be indemnified under this Article Eleventh or otherwise.

(3) Claims by Directors and Officers. If a claim for indemnification or advancement of expenses under this Article Eleventh is not paid in full within thirty (30) days after a written claim therefor by the Indemnified Person has been received by the Corporation, the Indemnified Person may file suit to recover the unpaid amount of such claim and, if successful in whole or in part, shall be entitled to be paid the expense of prosecuting such claim. In any such action the Corporation shall have the burden of proving that the Indemnified Person is not entitled to the requested indemnification or advancement of expenses under applicable law.

(4) Indemnification of Employees and Agents. The Corporation may indemnify and advance expenses to any person who was or is made or is threatened to be made or is otherwise involved in any Proceeding by reason of the fact that such person, or a person for whom such person is the legal representative, is or was an employee or agent of the Corporation or, while an employee or agent of the Corporation, is or was serving at the request of the Corporation as a director, officer, employee or agent of another corporation or of a partnership, joint venture, limited liability company, trust, enterprise or nonprofit entity, including service with respect to employee benefit plans, against all liability and loss suffered and expenses (including attorneys' fees) reasonably incurred by such person in connection with such Proceeding. The ultimate determination of entitlement to indemnification of persons who are non-director or officer employees or agents shall be made in such manner as is determined by the Board of Directors of the Corporation in its sole discretion. Notwithstanding the foregoing sentence, the Corporation shall not be required to indemnify a person in connection with a Proceeding initiated by such person if the Proceeding was not authorized in advance by the Board of Directors of the Corporation.

(5) Advancement of Expenses of Employees and Agents. The Corporation may pay the expenses (including attorneys' fees) incurred by an employee or agent in defending any Proceeding in advance of its final disposition on such terms and conditions as may be determined by the Board of Directors of the Corporation.

(6) Non-Exclusivity of Rights. The rights conferred on any person by this Article Eleventh shall not be exclusive of any other rights which such person may have or hereafter acquire under any statute, provision of the certificate of incorporation, these by-laws, agreement, vote of stockholders or disinterested directors or otherwise.

(7) Other Indemnification. The Corporation's obligation, if any, to indemnify any person who was or is serving at its request as a director, officer or employee of another Corporation, partnership, limited liability company, joint venture, trust, organization or other enterprise shall be reduced by any amount such person may collect as indemnification from such other Corporation, partnership, limited liability company, joint venture, trust, organization or other enterprise.

(8) Insurance. The Board of Directors of the Corporation may, to the full extent permitted by applicable law as it presently exists, or may hereafter be amended from time to time, authorize an appropriate officer or officers to purchase and maintain at the Corporation's expense insurance: (a) to indemnify the Corporation for any obligation which it incurs as a result of the indemnification of directors, officers and employees under the provisions of this Article Eleventh; and (b) to indemnify or insure directors, officers and employees against liability in instances in which they may not otherwise be indemnified by the Corporation under the provisions of this Article Eleventh.

(9) Amendment or Repeal. Any repeal or modification of the foregoing provisions of this Article Eleventh shall not adversely affect any right or protection hereunder of any person in respect of any act or omission occurring prior to the time of such repeal or modification. The rights provided hereunder shall inure to the benefit of any Indemnified Person and such person's heirs, executors and administrators.

TWELFTH: The Corporation renounces any interest or expectancy of the Corporation in, or in being offered an opportunity to participate in, any Excluded Opportunity. An "**Excluded Opportunity**" is any matter, transaction or interest that is presented to, or acquired, created or developed by, or which otherwise comes into the possession of, (i) any director of the Corporation who is not an employee of the Corporation or any of its subsidiaries, or (ii) any holder of Preferred Stock or any partner, member, director, stockholder, employee or agent of any such holder, other than someone who is an employee of the Corporation or any of its subsidiaries (collectively, "**Covered Persons**"), unless such matter, transaction or interest is presented to, or acquired, created or developed by, or otherwise comes into the possession of, a Covered Person expressly and solely in such Covered Person's capacity as a director of the Corporation.

* * *

3. That the foregoing amendment and restatement was approved by the holders of the requisite number of shares of this corporation in accordance with Section 228 of the DGCL.

4. That this Amended and Restated Certificate of Incorporation, which further restates and integrates and amends the provisions of this Corporation's Amended and Restated Certificate of Incorporation, has been duly adopted in accordance with Sections 242 and 245 of the DGCL.

IN WITNESS WHEREOF, this Amended and Restated Certificate of Incorporation has been executed by a duly authorized officer of this corporation on this 25th day of July, 2017.

By: /s/ Arthur Tzianabos
Arthur Tzianabos, Ph.D., President and
Chief Executive Officer

BY-LAWS
OF
HOMOLOGY MEDICINES, INC.
(the "Corporation")

Section 1 CERTIFICATE OF INCORPORATION AND BY-LAWS

1.1 These by-laws are subject to the certificate of incorporation of the corporation. In these by-laws, references to the certificate of incorporation and by-laws mean the provisions of the certificate of incorporation and the by-laws as are from time to time in effect.

Section 2 OFFICES

2.1 Registered Office. The registered office shall be in the City of Wilmington, County of New Castle, State of Delaware.

2.2 Other Offices. The corporation may also have offices at such other places both within and without the State of Delaware as the board of directors may from time to time determine or the business of the corporation may require.

Section 3 STOCKHOLDERS

3.1 Location of Meetings. All meetings of the stockholders shall be held at such place either within or without the State of Delaware as shall be designated from time to time by the board of directors, or if not so designated, at the registered office of the corporation. Notwithstanding the foregoing, the board of directors may, in its sole discretion, determine that the meeting shall not be held at any place, but may instead be held solely by means of remote communication as authorized by Section 211(a)(2) of the Delaware General Corporation Law. If so authorized, and subject to such guidelines and procedures as the board of directors may adopt, stockholders and proxyholders not physically present at a meeting of stockholders may, by means of remote communication, participate in a meeting of stockholders whether such meeting is to be held at a designated place or solely by means of remote communication, provided that (i) the corporation shall implement reasonable measures to verify that each person deemed present and permitted to vote at the meeting by means of remote communication is a stockholder or proxyholder, (ii) the corporation shall implement reasonable measures to provide such stockholders and proxyholders a reasonable opportunity to participate in the meeting and to vote on matters submitted to the stockholders, including an opportunity to read or hear the proceedings of the meeting substantially concurrently with such proceedings, and (iii) if any stockholder or proxyholder votes or takes other action at the meeting by means of remote communication, a record of such vote or other action shall be maintained by the corporation. Any adjourned session of any meeting shall be held at the place designated in the vote of adjournment.

3.2 Annual Meeting. The annual meeting of stockholders shall be held at 10:00 a.m. on the second Wednesday in May in each year, unless that day be a legal holiday at the place where the meeting is to be held, in which case the meeting shall be held at the same hour on the next succeeding day not a legal holiday, or at such other date and time as shall be designated from time to time by the board of directors, at which they shall elect a board of directors and transact such other business as may be required by law or these by-laws or as may properly come before the meeting.

3.3 Special Meeting in Place of Annual Meeting. If the election for directors shall not be held on the day designated by these by-laws, the directors shall cause the election to be held as soon thereafter as convenient, and to that end, if the annual meeting is omitted on the day herein provided therefor or if the election of directors shall not be held thereat, a special meeting of the stockholders may be held in place of such omitted meeting or election, and any business transacted or election held at such special meeting shall have the same effect as if transacted or held at the annual meeting, and in such case all references in these by-laws to the annual meeting of the stockholders, or to the annual election of directors, shall be deemed to refer to or include such special meeting. Any such special meeting shall be called and the purposes thereof shall be specified in the call, as provided in Section 3.5.

3.4 Notice of Annual Meeting. Written notice of the annual meeting stating the place, date and hour of the meeting shall be given to each stockholder entitled to vote at such meeting not less than ten nor more than sixty days before the date of the meeting. Such notice may specify the business to be transacted and actions to be taken at such meeting. No action shall be taken at such meeting unless such notice is given or unless waiver of such notice is given in accordance with Section 5.2 by each stockholder entitled to such notice to whom such notice was not given.

3.5 Other Special Meetings. Special meetings of the stockholders, for any purpose or purposes, unless otherwise prescribed by law or by the certificate of incorporation, may be called by the president and shall be called by the president or secretary at the request in writing of a majority of the board of directors, or at the request in writing of the holders of at least ten percent of all capital stock of the corporation issued and outstanding and entitled to vote at such meeting. Such request shall state the purpose or purposes of the proposed meeting and business to be transacted at any special meeting of the stockholders.

3.6 Notice of Special Meeting. Written notice of a special meeting stating the place, date and hour of the meeting and the purpose or purposes for which the meeting is called, shall be given not less than ten nor more than sixty days before the date of the meeting, to each stockholder entitled to vote at such meeting. No action shall be taken at such meeting unless such notice is given or unless waiver of such notice is given in accordance with Section 5.2 by each stockholder entitled to such notice to whom such notice was not given.

3.7 Stockholder List. The officer who has charge of the stock ledger of the corporation shall prepare and make, at least ten days before every meeting of stockholders, a complete list of the stockholders entitled to vote at the meeting, arranged in alphabetical order, and showing the address of each stockholder and the number of shares registered in the name of each stockholder. Such list shall be open to the examination of any stockholder, for any purpose germane to the meeting for a period of at least ten days prior to the meeting, either (i) on a reasonably accessible electronic network, provided that the information required to gain access to such list is provided with the notice of the meeting, or (ii) during ordinary business hours, at the principal place of business of the corporation. In the event that the corporation determines to make the list available on an electronic network, the corporation may take reasonable steps to ensure that such information is available only to stockholders of the corporation. If the meeting is to be held at a place, then the list shall be produced and kept at the time and place of the meeting during the whole time thereof, and may be inspected by any stockholder who is present. If the meeting is to be held solely by means of remote communication, then the list shall also be open to examination of any stockholder during the entire meeting on a reasonably accessible electronic network, and the information required to access such list shall be provided with the notice of the meeting.

3.8 Quorum of Stockholders. The holders of a majority of the stock issued and outstanding and entitled to vote thereat, present in person or represented by proxy, shall constitute a quorum at all meetings of the stockholders for the transaction of business except as otherwise required by law, by the certificate of incorporation or by these by-laws. Except as otherwise provided by law, no stockholder present at a meeting may withhold his shares from the quorum count by declaring his shares absent from the meeting.

3.9 Adjournment. Any meeting of stockholders may be adjourned from time to time to any other time and to any other place at which a meeting of stockholders may be held under these by-laws, which time and place shall be announced at the meeting, by a majority of votes cast upon the question, whether or not a quorum is present, or, if no stockholder is present or represented by proxy, by any officer entitled to preside at or to act as secretary of such meeting. At such adjourned meeting at which a quorum shall be present or represented any business may be transacted which might have been transacted at the original meeting. If the adjournment is for more than thirty days, or if after the adjournment a new record date is fixed for the adjourned meeting, a notice of the adjourned meeting shall be given to each stockholder of record entitled to vote at the meeting.

3.10 Proxy Representation. Every stockholder may authorize another person or persons to act for him by proxy in all matters in which a stockholder is entitled to participate, whether by waiving notice of any meeting, objecting to or voting or participating at a meeting, or expressing consent or dissent without a meeting. Every proxy must be signed by the stockholder or by his attorney-in-fact. No proxy shall be voted or acted upon after three years from its date unless such proxy provides for a longer period. Except as provided by law, a revocable proxy shall be deemed revoked if the stockholder is present at the meeting for which the proxy was given. A duly executed proxy shall be irrevocable if it states that it is irrevocable and, if, and only as long as, it is coupled with an interest sufficient in law to support an irrevocable power. A proxy may be made irrevocable regardless of whether the interest with which it is coupled is an interest in the stock itself or an interest in the corporation generally. The authorization of a proxy may, but need not be limited to specified action, provided, however, that if a proxy limits its authorization to a meeting or meetings of stockholders, unless otherwise specifically provided such proxy shall entitle the holder thereof to vote at any adjourned session but shall not be valid after the final adjournment thereof.

3.11 Inspectors. The directors or the person presiding at the meeting may, but need not unless required by law, appoint one or more inspectors of election and any substitute inspectors to act at the meeting or any adjournment thereof. Each inspector, before entering upon the discharge of his duties, shall take and sign an oath faithfully to execute the duties of inspector at such meeting with strict impartiality and according to the best of his ability. The inspectors, if any, shall determine the number of shares of stock outstanding and the voting power of each, the shares of stock represented at the meeting, the existence of a quorum and the validity and effect of proxies, and shall receive votes, ballots or consents, hear and determine all challenges and questions arising in connection with the right to vote, count and tabulate all votes, ballots or consents, determine the result, and do such acts as are proper to conduct the election or vote with fairness to all stockholders. On request of the person presiding at the meeting, the inspectors shall make a report in writing of any challenge, question or matter determined by them and execute a certificate of any fact found by them.

3.12 Action by Vote. When a quorum is present at any meeting, whether the same be an original or an adjourned session, a plurality of the votes properly cast for election to any office shall elect to such office and a majority of the votes properly cast upon any question other than an election to an office shall decide the question, except when a larger vote is required by law, by the certificate of incorporation or by these by-laws. No ballot shall be required for any election unless requested by a stockholder present or represented at the meeting and entitled to vote in the election.

3.13 Action Without Meetings. Unless otherwise provided in the certificate of incorporation, any action required to be taken at any annual or special meeting of stockholders of the corporation, or any action which may be taken at any annual or special meeting of such stockholders, may be taken without a meeting, without prior notice and without a vote, if a consent in writing, setting forth the action so taken shall be signed by the holders of outstanding stock having not less than the minimum number of votes that would be necessary to authorize or take such action at a meeting at which all shares entitled to vote thereon were present and voted. Prompt notice of the taking of the corporate action without a meeting by less than unanimous written consent shall be given to those stockholders who have not consented in writing. Consent may be given by electronic transmission to the extent permitted by the Delaware General Corporation Law.

3.14 Organization. Meetings of stockholders shall be presided over by the chairperson of the board of directors, if any, or in his absence by the president, or in his absence by a vice president, or in the absence of the foregoing persons by a chairperson chosen at the meeting by the board. The secretary shall act as secretary of the meeting, but in his absence the chairperson of the meeting may appoint any person to act as secretary of the meeting. The chairperson of the meeting shall announce at the meeting of stockholders the date and time of the opening and the closing of the polls for each matter upon which the stockholders will vote.

3.15 Conduct of Meetings. The board of directors of the corporation may adopt by resolution such rules and regulations for the conduct of the meeting of stockholders as it shall deem appropriate. Except to the extent inconsistent with such rules and regulations as adopted by the board of directors, the chairperson of any meeting of stockholders shall have the right and authority to prescribe such rules, regulations and procedures and to do all such acts as, in the judgment of such chairperson, are appropriate for the proper conduct of the meeting. Such rules, regulations or procedures, whether adopted by the board of directors or prescribed by the chairperson of the meeting, may include, without limitation, the following: (i) the establishment of an agenda or order of business for the meeting; (ii) rules and procedures for maintaining order at the meeting and the safety of those present; (iii) limitations on attendance at or participation in the meeting to stockholders of record of the corporation, their duly authorized and constituted proxies or such other persons as the chairperson of the meeting shall determine; (iv) restrictions on entry to the meeting after the time fixed for the commencement thereof; and (v) limitations on the time allotted to questions or comments by participants. Unless and to the extent determined by the board of directors or the chairperson of the meeting, meetings of stockholders shall not be required to be held in accordance with the rules of parliamentary procedure.

Section 4 DIRECTORS

4.1 Number. The number of directors which shall constitute the whole board shall not be less than one. The first board shall consist of two directors. Thereafter, the stockholders at the annual meeting shall determine the number of directors, and the number of directors may be increased or decreased at any time or from time to time by the stockholders or by the directors by vote of a majority of directors then in office, except that any such decrease by vote of the directors shall only be made to eliminate vacancies existing by reason of the death, resignation or removal of one or more directors. The directors shall be elected at the annual meeting of the stockholders, except as provided in these by-laws. Directors need not be stockholders.

4.2 Tenure. Except as otherwise provided by law, by the certificate of incorporation or by these by-laws, each director shall hold office until the next annual meeting and until his successor is elected and qualified, or until he sooner dies, resigns, is removed or becomes disqualified.

4.3 Powers. The business of the corporation shall be managed by or under the direction of the board of directors which shall have and may exercise all the powers of the corporation and do all such lawful acts and things as are not by law, the certificate of incorporation or these by-laws directed or required to be exercised or done by the stockholders.

4.4 Vacancies. Vacancies and any newly created directorships resulting from any increase in the number of directors may be filled by vote of the stockholders at a meeting called for the purpose, or by a majority of the directors then in office, although less than a quorum, or by a sole remaining director. When one or more directors shall resign from the board, effective at a future date, a majority of the directors then in office, including those who have resigned, shall have power to fill such vacancy or vacancies, the vote or action in writing thereon to take effect when such resignation or resignations shall become effective. The directors shall have and may exercise all their powers notwithstanding the existence of one or more vacancies in their number, subject to any requirements of law or of the certificate of incorporation or of these by-laws as to the number of directors required for a quorum or for any vote or other actions.

4.5 Committees. The board of directors may, by vote of a majority of the whole board, (a) designate, change the membership of or terminate the existence of any committee or committees, each committee to consist of one or more of the directors; (b) designate one or more directors as alternate members of any such committee who may replace any absent or disqualified member at any meeting of the committee; and (c) determine the extent to which each such committee shall have and may exercise the powers and authority of the board of directors in the management of the business and affairs of the corporation, including the power to authorize the seal of the corporation to be affixed to all papers which require it and the power and authority to declare dividends or to authorize the issuance of stock; excepting, however, such powers which by law, by the certificate of incorporation or by these by-laws they are prohibited from so delegating. In the absence or disqualification of any member of such committee and his alternate, if any, the member or members thereof present at any meeting and not disqualified from voting, whether or not constituting a quorum, may unanimously appoint another member of the board of directors to act at the meeting in the place of any such absent or disqualified member. Except as the board of directors may otherwise determine, any committee may make, alter and repeal rules for the conduct of its business, but unless otherwise provided by the board or such rules, its business shall be conducted as nearly as may be in the same manner as is provided by these by-laws for the conduct of business by the board of directors. Each committee shall keep regular minutes of its meetings and report the same to the board of directors upon request.

4.6 Regular Meeting. Regular meetings of the board of directors may be held without call or notice at such place within or without the State of Delaware and at such times as the board may from time to time determine, provided that notice of the first regular meeting following any such determination shall be given to absent directors. A regular meeting of the directors may be held without call or notice immediately after and at the same place as the annual meeting of the stockholders.

4.7 Special Meetings. Special meetings of the board of directors may be held at any time and at any place within or without the State of Delaware designated in the notice of the meeting, when called by the president, or by any director, reasonable notice thereof being given to each director by the secretary or by the president or by any one of the directors calling the meeting.

4.8 Notice. It shall be reasonable and sufficient notice to a director to send notice by mail at least forty-eight hours or by telegram or telecopy or other form of electronic transmission at least twenty-four hours before the meeting, addressed to him at his usual or last known business or residence address or to give notice to him in person or by telephone at least twenty-four hours before the meeting. Notice of a meeting need not be given to any director if a written waiver of notice, executed by him before or after the meeting, is filed with the records of the meeting, or to any director who attends the meeting without protesting prior thereto or at its commencement the lack of notice to him. Neither notice of a meeting nor a waiver of a notice need specify the purposes of the meeting.

4.9 Quorum. Except as may be otherwise provided by law, by the certificate of incorporation or by these by-laws, at any meeting of the directors a majority of the directors then in office shall constitute a quorum. A quorum shall not in any case be less than a majority of the total number of directors constituting the whole board. Any meeting may be adjourned from time to time by a majority of the votes cast upon the question, whether or not a quorum is present, and the meeting may be held as adjourned without further notice.

4.10 Action by Vote. Except as may be otherwise provided by law, by the certificate of incorporation or by these by-laws, when a quorum is present at any meeting the vote of a majority of the directors present shall be the act of the board of directors.

4.11 Action Without a Meeting. Unless otherwise restricted by the certificate of incorporation or these by-laws, any action required or permitted to be taken at any meeting of the board of directors or of any committee thereof may be taken without a meeting if all the members of the board or of such committee, as the case may be, consent thereto in writing, or by electronic transmission, and the writing or writings or electronic transmission or transmissions are filed with the minutes of proceedings of the board, or committee. Such filing shall be in paper form if the minutes are maintained in paper form and shall be in electronic form if the minutes are maintained in electronic form. Such consent shall be treated for all purposes as the act of the board or of such committee, as the case may be.

4.12 Participation in Meetings by Conference Telephone. Unless otherwise restricted by the certificate of incorporation or these by-laws, members of the board of directors or of any committee thereof may participate in a meeting of such board or committee by means of conference telephone or similar communications equipment by means of which all persons participating in the meeting can hear each other. Such participation shall constitute presence in person at such meeting.

4.13 Compensation. Unless otherwise restricted by the certificate of incorporation or these by-laws, the board of directors shall have the authority to fix from time to time the compensation of directors. The directors may be paid their expenses, if any, of attendance at each meeting of the board of directors and the performance of their responsibilities as directors and may be paid a fixed sum for attendance at each meeting of the board of directors and/or a stated salary as director. No such payment shall preclude any director from serving the corporation or its parent or subsidiary corporations in any other capacity and receiving compensation therefor. The board of directors may also allow compensation for members of special or standing committees for service on such committees.

4.14 Interested Directors and Officers.

(a) No contract or transaction between the corporation and one or more of its directors or officers, or between the corporation and any other corporation, partnership, association, or other organization in which one or more of the corporation's directors or officers are directors or officers, or have a financial interest, shall be void or voidable solely for this reason, or solely because the director or officer is present at or participates in the meeting of the board or committee thereof which authorizes the contract or transaction, or solely because his or their votes are counted for such purpose, if:

(1) The material facts as to his relationship or interest and as to the contract or transaction are disclosed or are known to the board of directors or the committee, and the board or committee in good faith authorizes the contract or transaction by the affirmative votes of a majority of the disinterested directors, even though the disinterested directors be less than a quorum; or

(2) The material facts as to his relationship or interest and as to the contract or transaction are disclosed or are known to the stockholders entitled to vote thereon, and the contract or transaction is specifically approved in good faith by vote of the stockholders; or

(3) The contract or transaction is fair as to the corporation as of the time it is authorized, approved or ratified by the board of directors, a committee thereof, or the stockholders.

(b) Common or interested directors may be counted in determining the presence of a quorum at a meeting of the board of directors or of a committee which authorizes the contract or transaction.

4.15 Resignation or Removal of Directors. Unless otherwise restricted by the certificate of incorporation or by law, any director or the entire board of directors may be removed, with or without cause, by the holders of a majority of the stock issued and outstanding and entitled to vote at an election of directors. Any director may resign at any time by delivering his resignation in writing to the president or the secretary or to a meeting of the board of directors. Such resignation shall be effective upon receipt unless specified to be effective at some other time and without in either case the necessity of its being accepted unless the resignation shall so state. No director resigning and no director removed shall have any right to receive compensation as such director for any period following his resignation or removal, except where a right to receive compensation shall be expressly provided in a duly authorized written agreement with the corporation, or any right to damages on account of such removal, whether his compensation be by the month or by the year or otherwise; unless in the case of a resignation, the directors, or in the case of removal, the body acting on the removal, shall in their or its discretion provide for compensation.

Section 5 NOTICES

5.1 Form of Notice. Whenever, under the provisions of law, of the certificate of incorporation or of these by-laws, notice is required to be given to any director or stockholder, such notice may be given by mail, addressed to such director or stockholder, at his address as it appears on the records of the corporation, with postage thereon prepaid, and such notice shall be deemed to be given at the time when the same shall be deposited in the United States mail. Unless written notice by mail is required by law, written notice may also be given by telegram, cable, telecopy, commercial delivery service, telex or similar means, addressed to such director or stockholder at his address as it appears on the records of the corporation, in which case such notice shall be deemed to be given when delivered into the control of the persons charged with effecting such transmission, the transmission charge to be paid by the corporation or the person sending such notice and not by the addressee. Notice may also be given to any stockholder and to any director by any form of electronic transmission, to the same extent that Section 232 of the Delaware General Corporation Law permits notice in such form to be given to stockholders, and will be deemed given at the time provided therein. Oral notice or other in-hand delivery (in person or by telephone) shall be deemed given at the time it is actually given.

5.2 Waiver of Notice. Whenever notice is required to be given under the provisions of law, the certificate of incorporation or these by-laws, a written waiver thereof, signed by the person entitled to notice, or a waiver by electronic transmission by the person entitled to notice, whether before or after the time stated therein, shall be deemed equivalent to notice. Attendance of a person at a meeting shall constitute a waiver of notice of such meeting, except when the person attends a meeting for the express purpose of objecting, at the beginning of the meeting, to the transaction of any business because the meeting is not lawfully called or convened. Neither the business to be transacted at, nor the purpose of, any meeting of the stockholders, directors or members of a committee of the directors need be specified in any written waiver of notice.

Section 6 OFFICERS AND AGENTS

6.1 Enumeration; Qualification. The officers of the corporation shall be a president, a treasurer, a secretary and such other officers, if any, as the board of directors from time to time may in its discretion elect or appoint including without limitation a chairperson of the board of directors and one or more vice presidents. Any officer may be, but none need be, a director or stockholder. Any two or more offices may be held by the same person. Any officer may be required by the board of directors to secure the faithful performance of his duties to the corporation by giving bond in such amount and with sureties or otherwise as the board of directors may determine.

6.2 Powers. Subject to law, to the certificate of incorporation and to the other provisions of these by-laws, each officer shall have, in addition to the duties and powers herein set forth, such duties and powers as are commonly incident to his office and such additional duties and powers as the board of directors may from time to time designate.

6.3 Election. The board of directors at its first meeting after each annual meeting of stockholders shall choose a president, a secretary and a treasurer. Other officers may be appointed by the board of directors at such meeting, at any other meeting or by written consent. At any time or from time to time, the directors may delegate to any officer their power to elect or appoint any other officer or any agents.

6.4 Tenure. Each officer shall hold office until the first meeting of the board of directors following the next annual meeting of the stockholders and until his successor is elected and qualified unless a shorter period shall have been specified in terms of his election or appointment, or in each case until he sooner dies, resigns, is removed or becomes disqualified. Each agent of the corporation shall retain his authority at the pleasure of the directors, or the officer by whom he was appointed or by the officer who then holds agent appointive power.

6.5 Chairperson of the Board of Directors. The chairperson of the board of directors, if any, shall have such duties and powers as shall be designated from time to time by the board of directors. Unless the board of directors otherwise specifies, the chairperson of the board, or if there is none the president, shall preside, or designate the person who shall preside, at all meetings of the stockholders and of the board of directors. References in these by-laws to a chairperson shall include references to persons designated by the board of directors with the title chairman, chairwoman or chair or any similar title.

6.6 President and Vice Presidents. Unless a chief executive officer has been elected by the board of directors, the president shall be the chief executive officer and shall have direct and active charge of all business operations of the corporation and shall have general supervision of the entire business of the corporation, subject to the control of the board of directors. As provided in Section 6.5, in the absence of the chairperson of the board of directors, the president shall preside at all meetings of the stockholders and of the board of directors at which the president is present, except as otherwise voted by the board of directors.

The president or treasurer shall execute bonds, mortgages and other contracts requiring a seal, under the seal of the corporation, except where required or permitted by law to be otherwise signed and executed and except where the signing and execution thereof shall be expressly delegated by the board of directors to some other officer or agent of the corporation.

Any vice presidents shall have such duties and powers as shall be designated from time to time by the board of directors or by the president.

6.7 Treasurer and Assistant Treasurers. The treasurer shall be the chief financial officer of the corporation and shall be in charge of its funds and valuable papers, and shall have such other duties and powers as may be assigned to him from time to time by the board of directors or by the president.

Any assistant treasurers shall have such duties and powers as shall be designated from time to time by the board of directors, the president or the treasurer.

6.8 Secretary and Assistant Secretaries. The secretary shall record all proceedings of the stockholders, of the board of directors and of committees of the board of directors in a book or series of books to be kept therefor and shall file therein all writings of, or related to, action by stockholder or director consent. In the absence of the secretary from any meeting, an assistant secretary, or if there is none or he is absent, a temporary secretary chosen at the meeting, shall record the proceedings thereof. Unless a transfer agent has been appointed, the secretary shall keep or cause to be kept the stock and transfer records of the corporation, which shall contain the names and record addresses of all stockholders and the number of shares registered in the name of each stockholder. The secretary shall have such other duties and powers as may from time to time be designated by the board of directors or the president.

Any assistant secretaries shall have such duties and powers as shall be designated from time to time by the board of directors, the president or the secretary.

6.9 Resignation and Removal. Any officer may resign at any time by delivering his resignation in writing to the president or the secretary or to a meeting of the board of directors. Such resignation shall be effective upon receipt unless specified to be effective at some other time, and without in any case the necessity of its being accepted unless the resignation shall so state. The board of directors may at any time remove any officer either with or without cause. The board of directors may at any time terminate or modify the authority of any agent. No officer resigning and no officer removed shall have any right to any compensation as such officer for any period following his resignation or removal, except where a right to receive compensation shall be expressly provided in a duly authorized written agreement with the corporation, or any right to damages on account of such removal, whether his compensation be by the month or by the year or otherwise; unless in the case of a resignation, the directors, or in the case of removal, the body acting on the removal, shall in their or its discretion provide for compensation.

6.10 Vacancies. If the office of the president or the treasurer or the secretary becomes vacant, the directors may elect a successor by vote of a majority of the directors then in office. If the office of any other officer becomes vacant, any person or body empowered to elect or appoint that office may choose a successor. Each such successor shall hold office for the unexpired term of his predecessor, and in the case of the president, the treasurer and the secretary until his successor is chosen and qualified, or in each case until he sooner dies, resigns, is removed or becomes disqualified.

Section 7 CAPITAL STOCK

7.1 Stock Certificates. Each stockholder shall be entitled to a certificate stating the number and the class and the designation of the series, if any, of the shares held by him, in such form as shall, in conformity to law, the certificate of incorporation and the by-laws, be prescribed from time to time by the board of directors. Such certificate shall be signed by (i) the chairperson of the board of directors or the president or a vice-president and (ii) the treasurer or an assistant treasurer or the secretary or an assistant secretary. Any or all of the signatures on the certificate may be a facsimile. In case an officer, transfer agent or registrar who has signed or whose facsimile signature has been placed on such certificate shall have ceased to be such officer, transfer agent or registrar before such certificate is issued, it may be issued by the corporation with the same effect as if he were such officer, transfer agent, or registrar at the time of its issue.

7.2 Lost Certificates. The board of directors may direct a new certificate or certificates to be issued in place of any certificate or certificates theretofore issued by the corporation alleged to have been lost, stolen or destroyed, upon the making of an affidavit of that fact by the person claiming the certificate of stock to be lost, stolen or destroyed. When authorizing such issue of a new certificate or certificates, the board of directors may, in its discretion and as a condition precedent to the issuance thereof, require the owner of such lost, stolen or destroyed certificate or certificates, or his legal representative, to advertise the same in such manner as it shall require and/or to give the corporation a bond in such sum as it may direct as indemnity against any claim that may be made against the corporation with respect to the certificate alleged to have been lost, stolen or destroyed.

Section 8 TRANSFER OF SHARES OF STOCK

8.1 Transfer on Books. Subject to any restrictions with respect to the transfer of shares of stock, shares of stock may be transferred on the books of the corporation by the surrender to the corporation or its transfer agent of the certificate therefor properly endorsed or accompanied by a written assignment and power of attorney properly executed, with necessary transfer stamps affixed, and with such proof of the authenticity of signature as the board of directors or the transfer agent of the corporation may reasonably require. Except as may be otherwise required by law, by the certificate of incorporation or by these by-laws, the corporation shall be entitled to treat the record holder of stock as shown on its books as the owner of such stock for all purposes, including the payment of dividends and the right to receive notice and to vote or to give any consent with respect thereto and to be held liable for such calls and assessments, if any, as may lawfully be made thereon, regardless of any transfer, pledge or other disposition of such stock until the shares have been properly transferred on the books of the corporation.

It shall be the duty of each stockholder to notify the corporation of his post office address.

Section 9 GENERAL PROVISIONS

9.1 Record Date. In order that the corporation may determine the stockholders entitled to notice of or to vote at any meeting of stockholders or any adjournment thereof, or to express consent to corporate action in writing without a meeting, or entitled to receive payment of any dividend or other distribution or allotment of any rights, or entitled to exercise any rights in respect of any change, conversion or exchange of stock or for the purpose of any other lawful action, the board of directors may fix, in advance, a record date, which shall not be more than sixty days nor less than ten days before the date of such meeting, nor more than sixty days prior to any other action to which such record date relates. A determination of stockholders of record entitled to notice of or to vote at a meeting of stockholders shall apply to any adjournment of the meeting; provided, however, that the board of directors may fix a new record date for the adjourned meeting. If no record date is fixed,

(a) The record date for determining stockholders entitled to notice of or to vote at a meeting of stockholders shall be at the close of business on the day next preceding the day on which notice is given, or, if notice is waived, at the close of business on the day next preceding the day on which the meeting is held;

(b) The record date for determining stockholders entitled to express consent to corporate action in writing without a meeting, when no prior action by the board of directors is necessary, shall be the day on which the first written consent is expressed; and

(c) The record date for determining stockholders for any other purpose shall be at the close of business on the day on which the board of directors adopts the resolution relating to such purpose.

9.2 Dividends. Dividends upon the capital stock of the corporation may be declared by the board of directors at any regular or special meeting or by written consent, pursuant to law. Dividends may be paid in cash, in property, or in shares of the capital stock, subject to the provisions of the certificate of incorporation.

9.3 Payment of Dividends. Before payment of any dividend, there may be set aside out of any funds of the corporation available for dividends such sum or sums as the directors from time to time, in their absolute discretion, think proper as a reserve or reserves to meet contingencies, or for equalizing dividends, or for repairing or maintaining any property of the corporation, or for such other purpose as the directors shall think conducive to the interest of the corporation, and the directors may modify or abolish any such reserve in the manner in which it was created.

9.4 Checks. All checks or demands for money and notes of the corporation shall be signed by such officer or officers or such other person or persons as the board of directors may from time to time designate.

9.5 Fiscal Year. The fiscal year of the corporation shall begin on the first of January in each year and shall end on the last day of December next following, unless otherwise determined by the board of directors.

9.6 Seal. The board of directors may, by resolution, adopt a corporate seal. The corporate seal shall have inscribed thereon the name of the corporation, the year of its organization and the word “Delaware.” The seal may be used by causing it or a facsimile thereof to be impressed or affixed or reproduced or otherwise. The seal may be altered from time to time by the board of directors.

Section 10 INDEMNIFICATION

10.1 It being the intent of the corporation to provide maximum protection available under the law to its officers and directors, the corporation shall indemnify its officers and directors to the full extent the corporation is permitted or required to do so by the Delaware General Corporation Law. In furtherance of and not in limitation of the foregoing, the corporation shall advance expenses, including attorneys’ fees, incurred by an officer or director of the corporation in defending any civil, criminal, administrative or investigative action, suit or proceeding in advance of the final disposition of such action, suit or proceeding upon receipt of an undertaking by or on behalf of such director or officer to repay such advances if it shall ultimately be determined that he is not entitled to be indemnified by the corporation. The corporation shall have the power to purchase and maintain insurance on behalf of any person who is or was a director, officer, employee or agent of the corporation, or who is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise, against any liability asserted against such person and incurred by such person in any such capacity, or arising out of such person’s status as such, whether or not the corporation has the power to indemnify such person under the Delaware General Corporation Law. Notwithstanding the foregoing, the Corporation shall not be required to indemnify or advance expenses to any person in connection with any action, suit, proceeding, claim or counterclaim initiated by or on behalf of such person.

Section 11 AMENDMENTS

11.1 These by-laws may be altered, amended or repealed or new by-laws may be adopted by the stockholders or by the board of directors when such power is conferred upon the board of directors by the certificate of incorporation, at any regular meeting of the stockholders or of the board of directors or at any special meeting of the stockholders or of the board of directors. If the power to adopt, amend or repeal by-laws is conferred upon the board of directors by the certificate of incorporation, it shall not divest or limit the power of the stockholders to adopt, amend or repeal by-laws.

Adopted March 12, 2015

AMENDED AND RESTATED INVESTORS' RIGHTS AGREEMENT

THIS AMENDED AND RESTATED INVESTORS' RIGHTS AGREEMENT (this "**Agreement**"), is made as of July 28, 2017, by and among Homology Medicines, Inc., a Delaware corporation (the "**Company**"), each of the investors listed on Schedule A hereto (each, an "**Investor**," and together with any subsequent investors, or transferees, who become parties hereto as "Investors" in accordance with the terms hereof, the "**Investors**"), and, solely for purposes of Section 2 (other than Subsections 2.1 and 2.10), Subsection 4.1 and Section 6 (other than Subsection 6.6), California Institute of Technology ("**Caltech**").

RECITALS

WHEREAS, certain of the Investors (the "**Existing Investors**") possess registration rights, information rights, rights of first offer, and other rights pursuant to an Investors' Rights Agreement, dated as of December 22, 2015, between the Company and such Investors (as amended, the "**Prior Agreement**");

WHEREAS, the Company and the Existing Investors desire to amend and restate the Prior Agreement in its entirety and to accept the rights created pursuant to this Agreement in lieu of the rights granted to them under the Prior Agreement;

WHEREAS, concurrently with the execution of this Agreement, the Company and certain of the Investors are entering into a Series B Preferred Stock Purchase Agreement (as the same may be amended and/or restated from time to time, the "**Purchase Agreement**"), pursuant to which such Investors have agreed to purchase shares of Series B Preferred Stock (as defined below);

WHEREAS, the Company and Caltech are parties to a License Agreement, dated as of September 14, 2016 (as amended, the "**Caltech Agreement**"), pursuant to which the Company issued to Caltech 533,695 shares of Common Stock and the Company agreed to grant certain registration and participation rights; and

NOW, THEREFORE, the Company and the Existing Investors hereby agree that the Prior Agreement is amended and restated in its entirety as set forth herein, and all of the parties hereto further agree as follows:

1. Definitions. For purposes of this Agreement:

1.1 "**Affiliate**" means, with respect to any specified Person, any other Person who, directly or indirectly, controls, is controlled by, or is under common control with such Person, including without limitation any general partner, managing member, officer or director of such Person or any venture capital fund now or hereafter existing that is controlled by one or more general partners or managing members of, or shares the same management company with, such Person.

1.2 "**Caltech Registrable Securities**" means (i) the 533,695 shares of Common Stock held by Caltech on the date hereof, and (ii) any Common Stock issued as (or issuable upon the conversion or exercise of any warrant, right, or other security that is issued as) a dividend or other distribution with respect to, or in exchange for or in replacement of such shares.

1.3 "**Common Stock**" means shares of the Company's common stock, $0.0001 par value per share.

1.4 "**Damages**" means any loss, damage, claim or liability (joint or several) to which a party hereto may become subject under the Securities Act, the Exchange Act, or other federal or state law, insofar as such loss, damage, claim or liability (or any action in respect thereof) arises out of or is based upon: (i) any untrue statement or alleged untrue statement of a material fact contained in any registration statement of the Company, including any preliminary prospectus or final prospectus contained therein or any amendments or supplements thereto; (ii) an omission or alleged omission to state therein a material fact required to be stated therein, or necessary to make the statements therein not misleading; or (iii) any violation or alleged violation by the indemnifying party (or any of its agents or Affiliates) of the Securities Act, the Exchange Act, any state securities law, or any rule or regulation promulgated under the Securities Act, the Exchange Act, or any state securities law.

1.5 "**Derivative Securities**" means any securities or rights convertible into, or exercisable or exchangeable for (in each case, directly or indirectly)**,** Common Stock, including options and warrants.

1.6 "**Exchange Act**" means the Securities Exchange Act of 1934, as amended, and the rules and regulations promulgated thereunder.

1.7 "**Excluded Registration**" means (i) a registration relating to the sale of securities to employees of the Company or a subsidiary pursuant to a stock option, stock purchase, or similar plan; (ii) a registration relating to an SEC Rule 145 transaction; (iii) a registration on any form that does not include substantially the same information as would be required to be included in a registration statement covering the sale of the Registrable Securities; or (iv) a registration in which the only Common Stock being registered is Common Stock issuable upon conversion of debt securities that are also being registered.

1.8 "**Form S-1**" means such form under the Securities Act as in effect on the date hereof or any successor registration form under the Securities Act subsequently adopted by the SEC.

1.9 "**Form S-3**" means such form under the Securities Act as in effect on the date hereof or any registration form under the Securities Act subsequently adopted by the SEC that permits incorporation of substantial information by reference to other documents filed by the Company with the SEC.

1.10 "**Founders**" means Saswati Chatterjee and Laura Smith.

1.11 "**GAAP**" means generally accepted accounting principles in the United States.

1.12 "**Holder**" means any holder of Registrable Securities who is a party to this Agreement.

1.13 "**Immediate Family Member**" means a child, stepchild, grandchild, parent, stepparent, grandparent, spouse, sibling, mother-in-law, father-in-law, son-in-law, daughter-in-law, brother-in-law, or sister-in-law, including, adoptive relationships, of a natural person referred to herein.

1.14 "**Initiating Holders**" means, collectively, Holders who properly initiate a registration request under this Agreement.

1.15 "**IPO**" means the Company's first underwritten public offering of its Common Stock under the Securities Act.

1.16 "**Key Employee**" means any executive-level employee (including, division director and vice president-level positions) as well as any employee who, either alone or in concert with others, develops, invents, programs, or designs any Company Intellectual Property (as defined in the Purchase Agreement).

1.17 "**Major Investor**" means (i) any Investor that, individually or together with such Investor's Affiliates, holds at least 7,000,000 shares of Registrable Securities after the Closing under the Purchase Agreement (as adjusted for any stock split, stock dividend, combination, or other recapitalization or reclassification effected after the date hereof) and (ii) for purposes of Section 4.1 only, Caltech for so long as they continue to hold all of the Caltech Registrable Securities.

1.18 "**New Securities**" means, collectively, equity securities of the Company, whether or not currently authorized, as well as rights, options, or warrants to purchase such equity securities, or securities of any type whatsoever that are, or may become, convertible or exchangeable into or exercisable for such equity securities.

1.19 "**Person**" means any individual, corporation, partnership, trust, limited liability company, association or other entity.

1.20 "**Preferred Director**" means any director of the Company that the holders of record of the Preferred Stock, exclusively and voting together as a single class, are entitled to elect pursuant to the Restated Certificate.

1.21 "**Preferred Stock**" means, collectively, the Series A Preferred Stock and the Series B Preferred Stock.

1.22 "**Qualified IPO**" means an IPO in which the Company sells shares of its Common Stock with gross proceeds to the Company of at least $50,000,000 and the shares of Common Stock are listed for trading on the New York Stock Exchange or the NASDAQ National Market.

1.23 "**Registrable Securities**" means (i) the Common Stock issuable or issued upon conversion of the Preferred Stock; (ii) the Caltech Registrable Securities, provided, however, that such Caltech Registrable Securities shall not be deemed Registrable Securities and Caltech shall not be deemed a Holder for the purposes of Subsections 2.1, 2.10, 3.1, 3.2 and 6.6; and (ii) any Common Stock issued as (or issuable upon the conversion or exercise of any warrant, right, or other security that is issued as) a dividend or other distribution with respect to, or in exchange for or in replacement of, the shares referenced in clauses (i) and (ii) above; excluding in all cases, however, any Registrable Securities sold by a Person in a transaction in which the applicable rights under this Agreement are not assigned pursuant to Subsection 6.1, and excluding for purposes of Section 2 any shares for which registration rights have terminated pursuant to Subsection 2.13 of this Agreement.

1.24 "**Registrable Securities then outstanding**" means the number of shares determined by adding the number of shares of outstanding Common Stock that are Registrable Securities and the number of shares of Common Stock issuable (directly or indirectly) pursuant to then exercisable and/or convertible securities that are Registrable Securities.

1.25 "**Requisite Investors**" means the holders of shares of Preferred Stock representing at least seventy-one and one-half percent (71.5%) of the voting power of the outstanding shares of Preferred Stock.

1.26 "**Restated Certificate**" means the Company's Amended and Restated Certificate of Incorporation, as amended and/or restated from time to time.

1.27 "**Restricted Securities**" means the securities of the Company required to be notated with the legend set forth in Subsection 2.12(b) hereof.

1.28 "**SEC**" means the Securities and Exchange Commission.

1.29 "**SEC Rule 144**" means Rule 144 promulgated by the SEC under the Securities Act.

1.30 "**SEC Rule 145**" means Rule 145 promulgated by the SEC under the Securities Act.

1.31 "**Securities Act**" means the Securities Act of 1933, as amended, and the rules and regulations promulgated thereunder.

1.32 "**Selling Expenses**" means all underwriting discounts, selling commissions, and stock transfer taxes applicable to the sale of Registrable Securities, and fees and disbursements of counsel for any Holder, except for the fees and disbursements of the Selling Holder Counsel borne and paid by the Company as provided in Subsection 2.6.

1.33 "**Series A Preferred Stock**" means shares of the Company's Series A Preferred Stock, $0.0001 par value per share.

1.34 "**Series B Preferred Stock**" means shares of the Company's Series B Preferred Stock, $0.0001 par value per share.

1.35 "**Voting Agreement**" means the Amended and Restated Voting Agreement of even date herewith by and among the Company, the Investors and the Key Holders, as amended and/or restated from time to time.

2. Registration Rights. The Company covenants and agrees as follows:

2.1 Demand Registration.

(a) Form S-1 Demand. If (i) at any time after the fourth (4th) anniversary of the date of this Agreement, the Company receives a request from Holders of at least thirty percent (30%) of the Registrable Securities then outstanding, that the Company file a Form S-1 registration statement with respect to at least twenty percent (20%) of the Registrable Securities then outstanding and having an anticipated aggregate offering price, net of Selling Expenses, which would exceed $20 million, or (ii) at any time or from time to time after one hundred eighty (180) days after the effective date of the registration statement for the IPO, the Company receives a request from Holders of Registrable Securities that the Company file a Form S-1 registration statement with respect to Registrable Securities having an expected aggregate offering price, net of Selling Expenses, which would exceed $5,000,000, then the Company shall (x) within ten (10) days after the date such request is given, give notice thereof (the "**Demand Notice**") to all Holders other than the Initiating Holders; and (y) as soon as practicable, and in any event within ninety (90) days after the date such request is given by the Initiating Holders, file a Form S-1 registration statement under the Securities Act covering all Registrable Securities that the Initiating Holders requested to be registered and any additional Registrable Securities requested to be included in such registration by any other Holders, as specified by notice given by each such Holder to the Company within twenty (20) days of the date the Demand Notice is given, and in each case, subject to the limitations of Subsections 2.1(c) and 2.3.

(b) Form S-3 Demand. If at any time when it is eligible to use a Form S-3 registration statement, the Company receives a request from a Holder or Holders of Registrable Securities then outstanding that the Company file a Form S-3 registration statement with respect to outstanding Registrable Securities of such Holder or Holders having an anticipated aggregate offering price, net of Selling Expenses, of at least $5,000,000, then the Company shall (i) within ten (10) days after the date such request is given, give a Demand Notice to all Holders other than the Initiating Holders; and (ii) as soon as practicable, and in any event within thirty (30) days after the date such request is given by the Initiating Holders, file a Form S-3 registration statement under the Securities Act covering all Registrable Securities requested to be included in such registration by any other Holders, as specified by notice given by each such Holder to the Company within twenty (20) days of the date the Demand Notice is given, and in each case, subject to the limitations of Subsections 2.1(c) and 2.3.

(c) Notwithstanding the foregoing obligations, if the Company furnishes to Holders requesting a registration pursuant to this Subsection 2.1 a certificate signed by the Company's chief executive officer stating that in the good faith judgment of the Company's Board of Directors it would be materially detrimental to the Company and its stockholders for such registration statement to either become effective or remain effective for as long as such registration statement otherwise would be required to remain effective, because such action would (i) materially interfere with a significant acquisition, corporate reorganization, or other similar transaction involving the Company; (ii) require premature disclosure of material information that the Company has a bona fide business purpose for preserving as confidential; or (iii) render the Company unable to comply with requirements under the Securities Act or Exchange Act, then the Company shall have the right to defer taking action with respect to such filing, and any time periods with respect to filing or effectiveness thereof shall be tolled correspondingly, for a period of not more than one hundred (100) days after the request of the Initiating Holders is given; provided, however, that the Company may not invoke this right more than once in any twelve (12) month period; and provided further that the Company shall not register any securities for its own account or that of any other stockholder during such one hundred (100) day period other than an Excluded Registration.

(d) The Company shall not be obligated to effect, or to take any action to effect, any registration pursuant to Subsection 2.1(a) (i) during the period that is sixty (60) days before the Company's good faith estimate of the date of filing of, and ending on a date that is one hundred eighty (180) days after the effective date of, a Company-initiated registration, provided that the Company is actively employing in good faith commercially reasonable efforts to cause such registration statement to become effective; (ii) after the Company has effected two registrations pursuant to Subsection 2.1(a); or (iii) if the Initiating Holders propose to dispose of shares of Registrable Securities that may be immediately registered on Form S-3 pursuant to a request made pursuant to Subsection 2.1(b). The Company shall not be obligated to effect, or to take any action to effect, any registration pursuant to Subsection 2.1(b) (i) during the period that is thirty (30) days before the Company's good faith estimate of the date of filing of, and ending on a date that is ninety (90) days after the effective date of, a Company-initiated registration, provided that the Company is actively employing in good faith commercially reasonable efforts to cause such registration statement to become effective; or (ii) if the Company has effected two registrations pursuant to Subsection 2.1(b) in any twelve (12) month period. A registration shall not be counted as "effected" for purposes of this Subsection 2.1(d) until such time as the applicable registration statement has been declared effective by the SEC, unless the Initiating Holders withdraw their request for such registration, elect not to pay the registration expenses therefor, and forfeit their right to one demand registration statement pursuant to Subsection 2.6, in which case such withdrawn registration statement shall be counted as "effected" for purposes of this Subsection 2.1(d).

2.2 Company Registration. If the Company proposes to register (including, for this purpose, a registration effected by the Company for stockholders other than the Holders) any of its Common Stock under the Securities Act in connection with the public offering of such securities solely for cash (other than in an Excluded Registration), the Company shall, at such time, promptly give each Holder notice of such registration. Upon the request of each Holder given within twenty (20) days after such notice is given by the Company, the Company shall, subject to the provisions of Subsection 2.3, cause to be registered all of the Registrable Securities that each such Holder has requested to be included in such registration. The Company shall have the right to terminate or withdraw any registration initiated by it under this Subsection 2.2 before the effective date of such registration, whether or not any Holder has elected to include Registrable Securities in such registration. The expenses (other than Selling Expenses) of such withdrawn registration shall be borne by the Company in accordance with Subsection 2.6.

2.3 Underwriting Requirements.

(a) If, pursuant to Subsection 2.1, the Initiating Holders intend to distribute the Registrable Securities covered by their request by means of an underwriting, they shall so advise the Company as a part of their request made pursuant to Subsection 2.1, and the Company shall include such information in the Demand Notice. The underwriter(s) will be selected by the Company and shall be reasonably acceptable to a majority in interest of the Initiating Holders. In such event, the right of any Holder to include such Holder's Registrable Securities in such

registration shall be conditioned upon such Holder's participation in such underwriting and the inclusion of such Holder's Registrable Securities in the underwriting to the extent provided herein. All Holders proposing to distribute their securities through such underwriting shall (together with the Company as provided in Subsection 2.4(e)) enter into an underwriting agreement in customary form with the underwriter(s) selected for such underwriting. Notwithstanding any other provision of this Subsection 2.3, if the underwriter(s) advise(s) the Initiating Holders in writing that marketing factors require a limitation on the number of shares to be underwritten, then the Initiating Holders shall so advise all Holders of Registrable Securities that otherwise would be underwritten pursuant hereto, and the number of Registrable Securities that may be included in the underwriting shall be allocated among such Holders of Registrable Securities, including the Initiating Holders, in proportion (as nearly as practicable) to the number of Registrable Securities owned by each Holder or in such other proportion as shall mutually be agreed to by all such selling Holders; provided, however, that the number of Registrable Securities held by the Holders to be included in such underwriting shall not be reduced unless all other securities are first entirely excluded from the underwriting. To facilitate the allocation of shares in accordance with the above provisions, the Company or the underwriters may round the number of shares allocated to any Holder to the nearest one hundred (100) shares.

(b) In connection with any offering involving an underwriting of shares of the Company's capital stock pursuant to Subsection 2.2, the Company shall not be required to include any of the Holders' Registrable Securities in such underwriting unless the Holders accept the terms of the underwriting as agreed upon between the Company and its underwriters, and then only in such quantity as the underwriters in their sole discretion determine will not jeopardize the success of the offering by the Company. If the total number of securities, including Registrable Securities, requested by stockholders to be included in such offering exceeds the number of securities to be sold (other than by the Company) that the underwriters in their reasonable discretion determine is compatible with the success of the offering, then the Company shall be required to include in the offering only that number of such securities, including Registrable Securities, which the underwriters and the Company in their sole discretion determine will not jeopardize the success of the offering. If the underwriters determine that less than all of the Registrable Securities requested to be registered can be included in such offering, then the Registrable Securities that are included in such offering shall be allocated among the selling Holders in proportion (as nearly as practicable to) the number of Registrable Securities owned by each selling Holder or in such other proportions as shall mutually be agreed to by all such selling Holders. To facilitate the allocation of shares in accordance with the above provisions, the Company or the underwriters may round the number of shares allocated to any Holder to the nearest one hundred (100) shares. Notwithstanding the foregoing, in no event shall (i) the number of Registrable Securities included in the offering be reduced unless all other securities (other than securities to be sold by the Company) are first entirely excluded from the offering, or (ii) the number of Registrable Securities included in the offering be reduced below twenty-five percent (25%) of the total number of securities included in such offering, unless such offering is the IPO, in which case the selling Holders may be excluded further if the underwriters make the determination described above and no other stockholder's securities are included in such offering. For purposes of the provision in this Subsection 2.3(b) concerning apportionment, for any selling Holder that is a partnership, limited liability company, or corporation, the partners, members, retired partners, retired members, stockholders, and Affiliates of such Holder, or the estates and Immediate Family Members of any such partners,

retired partners, members, and retired members and any trusts for the benefit of any of the foregoing Persons, shall be deemed to be a single "selling Holder," and any pro rata reduction with respect to such "selling Holder" shall be based upon the aggregate number of Registrable Securities owned by all Persons included in such "selling Holder," as defined in this sentence.

(c) For purposes of Subsection 2.1, a registration shall not be counted as "effected" if, as a result of an exercise of the underwriter's cutback provisions in Subsection 2.3(a), fewer than fifty percent (50%) of the total number of Registrable Securities that Holders have requested to be included in such registration statement are actually included.

2.4 Obligations of the Company. Whenever required under this Section 2 to effect the registration of any Registrable Securities, the Company shall, as expeditiously as reasonably possible:

(a) prepare and file with the SEC a registration statement with respect to such Registrable Securities and use its commercially reasonable efforts to cause such registration statement to become effective and, upon the request of the Holders of at least seventy-one and one-half percent (71.5%) of the Registrable Securities registered thereunder, keep such registration statement effective for a period of up to one hundred twenty (120) days or, if earlier, until the distribution contemplated in the registration statement has been completed; provided, however, that (i) such one hundred twenty (120) day period shall be extended for a period of time equal to the period the Holder refrains, at the request of an underwriter of Common Stock (or other securities) of the Company, from selling any securities included in such registration, and (ii) in the case of any registration of Registrable Securities on Form S-3 that are intended to be offered on a continuous or delayed basis, subject to compliance with applicable SEC rules, such one hundred twenty (120) day period shall be extended for up to sixty (60) days, if necessary, to keep the registration statement effective until all such Registrable Securities are sold;

(b) prepare and file with the SEC such amendments and supplements to such registration statement, and the prospectus used in connection with such registration statement, as may be necessary to comply with the Securities Act in order to enable the disposition of all securities covered by such registration statement;

(c) furnish to the selling Holders such numbers of copies of a prospectus, including a preliminary prospectus, as required by the Securities Act, and such other documents as the Holders may reasonably request in order to facilitate their disposition of their Registrable Securities;

(d) use its commercially reasonable efforts to register and qualify the securities covered by such registration statement under such other securities or blue-sky laws of such jurisdictions as shall be reasonably requested by the selling Holders; provided that the Company shall not be required to qualify to do business or to file a general consent to service of process in any such states or jurisdictions, unless the Company is already subject to service in such jurisdiction and except as may be required by the Securities Act;

(e) in the event of any underwritten public offering, enter into and perform its obligations under an underwriting agreement, in usual and customary form, with the underwriter(s) of such offering;

(f) use its commercially reasonable efforts to cause all such Registrable Securities covered by such registration statement to be listed on a national securities exchange or trading system and each securities exchange and trading system (if any) on which similar securities issued by the Company are then listed;

(g) provide a transfer agent and registrar for all Registrable Securities registered pursuant to this Agreement and provide a CUSIP number for all such Registrable Securities, in each case not later than the effective date of such registration;

(h) promptly make available for inspection by the selling Holders, any underwriter(s) participating in any disposition pursuant to such registration statement, and any attorney or accountant or other agent retained by any such underwriter or selected by the selling Holders, all financial and other records, pertinent corporate documents, and properties of the Company, and cause the Company's officers, directors, employees, and independent accountants to supply all information reasonably requested by any such seller, underwriter, attorney, accountant, or agent, in each case, as necessary or advisable to verify the accuracy of the information in such registration statement and to conduct appropriate due diligence in connection therewith;

(i) notify each selling Holder, promptly after the Company receives notice thereof, of the time when such registration statement has been declared effective or a supplement to any prospectus forming a part of such registration statement has been filed; and

(j) after such registration statement becomes effective, notify each selling Holder of any request by the SEC that the Company amend or supplement such registration statement or prospectus.

In addition, the Company shall ensure that, at all times after any registration statement covering a public offering of securities of the Company under the Securities Act shall have become effective, its insider trading policy shall provide that the Company's directors may implement a trading program under Rule 10b5-1 of the Exchange Act.

2.5 Furnish Information. It shall be a condition precedent to the obligations of the Company to take any action pursuant to this Section 2 with respect to the Registrable Securities of any selling Holder that such Holder shall furnish to the Company such information regarding itself, the Registrable Securities held by it, and the intended method of disposition of such securities as is reasonably required to effect the registration of such Holder's Registrable Securities.

2.6 Expenses of Registration. All expenses (other than Selling Expenses) incurred in connection with registrations, filings, or qualifications pursuant to Section 2, including all registration, filing, and qualification fees; printers' and accounting fees; fees and disbursements of counsel for the Company; and the reasonable fees and disbursements, not to exceed $35,000 per registration, of one counsel for the selling Holders selected by the Holders of at least seventy-one

and one-half percent (71.5%) of the Registrable Securities included in such registration ("**Selling Holder Counsel**"), shall be borne and paid by the Company; provided, however, that the Company shall not be required to pay for any expenses of any registration proceeding begun pursuant to Subsection 2.1 if the registration request is subsequently withdrawn at the request of the Holders of at least seventy-one and one-half percent (71.5%) of the Registrable Securities to be registered (in which case all selling Holders shall bear such expenses pro rata based upon the number of Registrable Securities that were to be included in the withdrawn registration), unless the Holders of at least seventy-one and one-half percent (71.5%) of the Registrable Securities agree to forfeit their right to one registration pursuant to Subsections 2.1(a) or 2.1(b), as the case may be; provided further that if, at the time of such withdrawal, the Holders shall have learned of a material adverse change in the condition, business, or prospects of the Company from that known to the Holders at the time of their request and have withdrawn the request with reasonable promptness after learning of such information then the Holders shall not be required to pay any of such expenses and shall not forfeit their right to one registration pursuant to Subsections 2.1(a) or 2.1(b). All Selling Expenses relating to Registrable Securities registered pursuant to this Section 2 shall be borne and paid by the Holders pro rata on the basis of the number of Registrable Securities registered on their behalf.

2.7 Delay of Registration. No Holder shall have any right to obtain or seek an injunction restraining or otherwise delaying any registration pursuant to this Agreement as the result of any controversy that might arise with respect to the interpretation or implementation of this Section 2.

2.8 Indemnification. If any Registrable Securities are included in a registration statement under this Section 2:

(a) To the extent permitted by law, the Company will indemnify and hold harmless each selling Holder, and the partners, members, officers, directors, and stockholders of each such Holder; legal counsel and accountants for each such Holder; any underwriter (as defined in the Securities Act) for each such Holder; and each Person, if any, who controls such Holder or underwriter within the meaning of the Securities Act or the Exchange Act, against any Damages, and the Company will pay to each such Holder, underwriter, controlling Person, or other aforementioned Person any legal or other expenses reasonably incurred thereby in connection with investigating or defending any claim or proceeding from which Damages may result, as such expenses are incurred; provided, however, that the indemnity agreement contained in this Subsection 2.8(a) shall not apply to amounts paid in settlement of any such claim or proceeding if such settlement is effected without the consent of the Company, which consent shall not be unreasonably withheld, nor shall the Company be liable for any Damages to the extent that they arise out of or are based upon actions or omissions made in reliance upon and in conformity with written information furnished by or on behalf of any such Holder, underwriter, controlling Person, or other aforementioned Person expressly for use in connection with such registration.

(b) To the extent permitted by law, each selling Holder, severally and not jointly, will indemnify and hold harmless the Company, and each of its directors, each of its officers who has signed the registration statement, each Person (if any), who controls the Company within the meaning of the Securities Act, legal counsel and accountants for the Company, any underwriter (as defined in the Securities Act), any other Holder selling securities in such

registration statement, and any controlling Person of any such underwriter or other Holder, against any Damages, in each case only to the extent that such Damages arise out of or are based upon actions or omissions made in reliance upon and in conformity with written information furnished by or on behalf of such selling Holder expressly for use in connection with such registration; and each such selling Holder will pay to the Company and each other aforementioned Person any legal or other expenses reasonably incurred thereby in connection with investigating or defending any claim or proceeding from which Damages may result, as such expenses are incurred; provided, however, that the indemnity agreement contained in this Subsection 2.8(b) shall not apply to amounts paid in settlement of any such claim or proceeding if such settlement is effected without the consent of the Holder, which consent shall not be unreasonably withheld; and provided further that in no event shall the aggregate amounts payable by any Holder by way of indemnity or contribution under Subsections 2.8(b) and 2.8(d) exceed the proceeds from the offering received by such Holder (net of any Selling Expenses paid by such Holder), except in the case of fraud or willful misconduct by such Holder.

(c) Promptly after receipt by an indemnified party under this Subsection 2.8 of notice of the commencement of any action (including any governmental action) for which a party may be entitled to indemnification hereunder, such indemnified party will, if a claim in respect thereof is to be made against any indemnifying party under this Subsection 2.8, give the indemnifying party notice of the commencement thereof. The indemnifying party shall have the right to participate in such action and, to the extent the indemnifying party so desires, participate jointly with any other indemnifying party to which notice has been given, and to assume the defense thereof with counsel mutually satisfactory to the parties; provided, however, that an indemnified party (together with all other indemnified parties that may be represented without conflict by one counsel) shall have the right to retain one separate counsel, with the fees and expenses to be paid by the indemnifying party, if representation of such indemnified party by the counsel retained by the indemnifying party would be inappropriate due to actual or potential differing interests between such indemnified party and any other party represented by such counsel in such action. The failure to give notice to the indemnifying party within a reasonable time of the commencement of any such action shall relieve such indemnifying party of any liability to the indemnified party under this Subsection 2.8, to the extent that such failure materially prejudices the indemnifying party's ability to defend such action. The failure to give notice to the indemnifying party will not relieve it of any liability that it may have to any indemnified party otherwise than under this Subsection 2.8.

(d) To provide for just and equitable contribution to joint liability under the Securities Act in any case in which either: (i) any party otherwise entitled to indemnification hereunder makes a claim for indemnification pursuant to this Subsection 2.8 but it is judicially determined (by the entry of a final judgment or decree by a court of competent jurisdiction and the expiration of time to appeal or the denial of the last right of appeal) that such indemnification may not be enforced in such case, notwithstanding the fact that this Subsection 2.8 provides for indemnification in such case, or (ii) contribution under the Securities Act may be required on the part of any party hereto for which indemnification is provided under this Subsection 2.8, then, and in each such case, such parties will contribute to the aggregate losses, claims, damages, liabilities, or expenses to which they may be subject (after contribution from others) in such proportion as is appropriate to reflect the relative fault of each of the indemnifying party and the indemnified party

in connection with the statements, omissions, or other actions that resulted in such loss, claim, damage, liability, or expense, as well as to reflect any other relevant equitable considerations. The relative fault of the indemnifying party and of the indemnified party shall be determined by reference to, among other things, whether the untrue or allegedly untrue statement of a material fact, or the omission or alleged omission of a material fact, relates to information supplied by the indemnifying party or by the indemnified party and the parties' relative intent, knowledge, access to information, and opportunity to correct or prevent such statement or omission; provided, however, that, in any such case (x) no Holder will be required to contribute any amount in excess of the public offering price of all such Registrable Securities offered and sold by such Holder pursuant to such registration statement, and (y) no Person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) will be entitled to contribution from any Person who was not guilty of such fraudulent misrepresentation; and provided further that in no event shall a Holder's liability pursuant to this Subsection 2.8(d), when combined with the amounts paid or payable by such Holder pursuant to Subsection 2.8(d), exceed the proceeds from the offering received by such Holder (net of any Selling Expenses paid by such Holder), except in the case of willful misconduct or fraud by such Holder.

(e) Notwithstanding the foregoing, to the extent that the provisions on indemnification and contribution contained in the underwriting agreement entered into in connection with the underwritten public offering are in conflict with the foregoing provisions, the provisions in the underwriting agreement shall control.

(f) Unless otherwise superseded by an underwriting agreement entered into in connection with the underwritten public offering, the obligations of the Company and Holders under this Subsection 2.8 shall survive the completion of any offering of Registrable Securities in a registration under this Section 2, and otherwise shall survive the termination of this Agreement.

2.9 Reports Under Exchange Act. With a view to making available to the Holders the benefits of SEC Rule 144 and any other rule or regulation of the SEC that may at any time permit a Holder to sell securities of the Company to the public without registration or pursuant to a registration on Form S-3, the Company shall:

(a) make and keep available adequate current public information, as those terms are understood and defined in SEC Rule 144, at all times after the effective date of the registration statement filed by the Company for the IPO;

(b) use commercially reasonable efforts to file with the SEC in a timely manner all reports and other documents required of the Company under the Securities Act and the Exchange Act (at any time after the Company has become subject to such reporting requirements); and

(c) furnish to any Holder, so long as the Holder owns any Registrable Securities, forthwith upon request (i) to the extent accurate, a written statement by the Company that it has complied with the reporting requirements of SEC Rule 144 (at any time after ninety (90) days after the effective date of the registration statement filed by the Company for the IPO), the Securities Act, and the Exchange Act (at any time after the Company has become subject to such reporting requirements), or that it qualifies as a registrant whose securities may be resold pursuant

to Form S-3 (at any time after the Company so qualifies); and (ii) such other information as may be reasonably requested in availing any Holder of any rule or regulation of the SEC that permits the selling of any such securities without registration (at any time after the Company has become subject to the reporting requirements under the Exchange Act) or pursuant to Form S-3 (at any time after the Company so qualifies to use such form).

2.10 Limitations on Subsequent Registration Rights. From and after the date of this Agreement, the Company shall not, without the prior written consent of the Holders of at least seventy-one and one-half percent (71.5%) of the Registrable Securities then outstanding, enter into any agreement with any holder or prospective holder of any securities of the Company that (i) would allow such holder or prospective holder to include such securities in any registration unless, under the terms of such agreement, such holder or prospective holder may include such securities in any such registration only to the extent that the inclusion of such securities will not reduce the number of the Registrable Securities of the Holders that are included; or (ii) allow such holder or prospective holder to initiate a demand for registration of any securities held by such holder or prospective holder; provided that this limitation shall not apply to any additional Investor who becomes a party to this Agreement in accordance with Subsection 6.9.

2.11 "Market Stand-off" Agreement. Each Holder hereby agrees that it will not, without the prior written consent of the managing underwriter, during the period commencing on the date of the final prospectus relating to the IPO, and ending on the date specified by the Company and the managing underwriter (such period not to exceed one hundred eighty (180) days, or such other period as may be requested by the Company or an underwriter to accommodate regulatory restrictions on (1) the publication or other distribution of research reports, and (2) analyst recommendations and opinions, including, but not limited to, the restrictions contained in FINRA Rule 2241 or NYSE Rule 472(f)(4), or any successor provisions or amendments thereto), (i) lend; offer; pledge; sell; contract to sell; sell any option or contract to purchase; purchase any option or contract to sell; grant any option, right, or warrant to purchase; or otherwise transfer or dispose of, directly or indirectly, any shares of Common Stock or any securities convertible into or exercisable or exchangeable (directly or indirectly) for Common Stock held immediately before the effective date of the registration statement for the IPO or (ii) enter into any swap or other arrangement that transfers to another, in whole or in part, any of the economic consequences of ownership of such securities, whether any such transaction described in clause (i) or (ii) above is to be settled by delivery of Common Stock or other securities, in cash, or otherwise. The foregoing provisions of this Subsection 2.11 shall apply only to the IPO and shall not apply to the sale of any shares to an underwriter pursuant to an underwriting agreement, any securities of the Company purchased in the Company's IPO, any securities of the Company purchased in open market transactions, or the transfer of any shares to any trust for the direct or indirect benefit of the Holder or the immediate family of the Holder, provided that the trustee of the trust agrees to be bound in writing by the restrictions set forth herein, and provided further that any such transfer shall not involve a disposition for value, and shall be applicable to the Holders only if all officers and directors are subject to the same restrictions and the Company uses commercially reasonable efforts to obtain a similar agreement from all stockholders individually owning more than one percent (1%) of the Company's outstanding Common Stock (after giving effect to conversion into Common Stock of all outstanding Preferred Stock). The underwriters in connection with such registration are intended third-party beneficiaries of this Subsection 2.11 and shall have the right, power and

authority to enforce the provisions hereof as though they were a party hereto. Each Holder further agrees to execute such agreements as may be reasonably requested by the underwriters in connection with such registration that are consistent with this Subsection 2.11 or that are necessary to give further effect thereto. Any discretionary waiver or termination of the restrictions of any or all of such agreements by the Company or the underwriters shall apply pro rata to all Holders subject to such agreements, based on the number of shares subject to such agreements.

2.12 Restrictions on Transfer.

(a) The Preferred Stock and the Registrable Securities shall not be sold, pledged, or otherwise transferred, and the Company shall not recognize and shall issue stop-transfer instructions to its transfer agent with respect to any such sale, pledge, or transfer, except upon the conditions specified in this Agreement, which conditions are intended to ensure compliance with the provisions of the Securities Act. A transferring Holder will cause any proposed purchaser, pledgee, or transferee of the Preferred Stock and the Registrable Securities held by such Holder to agree to take and hold such securities subject to the provisions and upon the conditions specified in this Agreement.

(b) Each certificate, instrument, or book entry representing (i) the Preferred Stock, (ii) the Registrable Securities, and (iii) any other securities issued in respect of the securities referenced in clauses (i) and (ii), upon any stock split, stock dividend, recapitalization, merger, consolidation, or similar event, shall (unless otherwise permitted by the provisions of Subsection 2.12(c)) be notated with a legend substantially in the following form:

> THE SHARES REPRESENTED BY THIS CERTIFICATE HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, AND HAVE BEEN ACQUIRED FOR INVESTMENT AND NOT WITH A VIEW TO, OR IN CONNECTION WITH, THE SALE OR DISTRIBUTION THEREOF. NO SUCH TRANSFER MAY BE EFFECTED WITHOUT AN EFFECTIVE REGISTRATION STATEMENT RELATED THERETO OR A VALID EXEMPTION FROM THE REGISTRATION AND PROSPECTUS DELIVERY REQUIREMENTS OF THE SECURITIES ACT OF 1933, AS AMENDED.
>
> THE SECURITIES REPRESENTED HEREBY MAY BE TRANSFERRED ONLY IN ACCORDANCE WITH THE TERMS OF AN AGREEMENT BETWEEN THE COMPANY AND THE STOCKHOLDER, AS AMENDED FROM TIME TO TIME, A COPY OF WHICH IS ON FILE WITH THE SECRETARY OF THE COMPANY.

The Holders consent to the Company making a notation in its records and giving instructions to any transfer agent of the Restricted Securities in order to implement the restrictions on transfer set forth in this Subsection 2.12.

(c) The holder of such Restricted Securities, by acceptance of ownership thereof, agrees to comply in all respects with the provisions of this Section 2. Before any proposed sale, pledge, or transfer of any Restricted Securities, unless there is in effect a registration statement under the Securities Act covering the proposed transaction, the Holder thereof shall give notice to the Company of such Holder's intention to effect such sale, pledge, or transfer. Each such notice shall describe the manner and circumstances of the proposed sale, pledge, or transfer in sufficient detail and, if reasonably requested by the Company, shall be accompanied at such Holder's expense by either (i) a written opinion of legal counsel who shall, and whose legal opinion shall, be reasonably satisfactory to the Company, addressed to the Company, to the effect that the proposed transaction may be effected without registration under the Securities Act; (ii) a "no action" letter from the SEC to the effect that the proposed sale, pledge, or transfer of such Restricted Securities without registration will not result in a recommendation by the staff of the SEC that action be taken with respect thereto; or (iii) any other evidence reasonably satisfactory to counsel to the Company to the effect that the proposed sale, pledge, or transfer of the Restricted Securities may be effected without registration under the Securities Act, whereupon the Holder of such Restricted Securities shall be entitled to sell, pledge, or transfer such Restricted Securities in accordance with the terms of the notice given by the Holder to the Company. The Company will not require such a legal opinion or "no action" letter (x) in any transaction in compliance with SEC Rule 144; or (y) in any transaction in which such Holder distributes Restricted Securities to an Affiliate of such Holder for no consideration; provided that each transferee agrees in writing to be subject to the terms of this Subsection 2.12. Each certificate, instrument, or book entry representing the Restricted Securities transferred as above provided shall be notated with, except if such transfer is made pursuant to SEC Rule 144, the appropriate restrictive legend set forth in Subsection 2.12(b), except that such certificate instrument, or book entry shall not be notated with such restrictive legend if, in the opinion of counsel for such Holder and the Company, such legend is not required in order to establish compliance with any provisions of the Securities Act.

2.13 Termination of Registration Rights. The right of any Holder to request registration or inclusion of Registrable Securities in any registration pursuant to Subsections 2.1 or 2.2 shall terminate upon the earliest to occur of:

(a) the closing of a Deemed Liquidation Event, as such term is defined in the Restated Certificate; and

(b) the third anniversary of the IPO.

3. Information and Observer Rights.

3.1 Delivery of Financial Statements. For so long as an aggregate of at least 7,000,000 shares of Registrable Securities remain outstanding (subject to adjustment for stock splits, dividends and the like with respect to the Preferred Stock), the Company shall deliver to each Major Investor, provided that the Board of Directors has not reasonably determined that such Major Investor is a competitor of the Company:

(a) as soon as practicable, but in any event within one hundred twenty (120) days after the end of each fiscal year of the Company (i) a balance sheet as of the end of such year, (ii) statements of income and of cash flows for such year, and a comparison between (x) the actual

amounts as of and for such fiscal year and (y) the comparable amounts for the prior year and as included in the Budget (as defined in Subsection 3.1(e)) for such year, with an explanation of any material differences between such amounts and a schedule as to the sources and applications of funds for such year, and (iii) a statement of stockholders' equity as of the end of such year, all such financial statements audited and certified by independent public accountants of recognized standing selected by the Board of Directors of the Company (or the Audit Committee thereof);

(b) as soon as practicable, but in any event within thirty (30) days after the end of each fiscal year of the Company, a statement showing (i) all debt holders and (ii) the number of shares of each class and series of capital stock and securities convertible into or exercisable for shares of capital stock outstanding at the end of the period, the Common Stock issuable upon conversion or exercise of any outstanding securities convertible or exercisable for Common Stock and the exchange ratio or exercise price applicable thereto, and the number of shares of issued stock options and stock options not yet issued but reserved for issuance, if any, all in sufficient detail as to permit the Major Investors to calculate their respective percentage equity ownership in the Company;

(c) as soon as practicable, but in any event within thirty (30) days after the end of each of the first three (3) quarters of each fiscal year of the Company, (i) unaudited statements of income and cash flows for such fiscal quarter, and a comparison between (x) the actual amounts as of and for such fiscal quarter and (y) the comparable amounts for the prior quarter and as included in the Budget for such quarter, with an explanation of any material differences between such amounts and a schedule as to the sources and applications of funds for such quarter, and (ii) an unaudited balance sheet as of the end of such fiscal quarter, all prepared in accordance with GAAP (except that such financial statements may (a) be subject to normal year-end audit adjustments; and (b) not contain all notes thereto that may be required in accordance with GAAP);

(d) as soon as practicable, but in any event within thirty (30) days of the end of each month, an unaudited income statement for such month, and an unaudited balance sheet as of the end of such month, all prepared in accordance with GAAP (except that such financial statements may (i) be subject to normal year-end audit adjustments and (ii) not contain all notes thereto that may be required in accordance with GAAP);

(e) as soon as practicable, but in any event thirty (30) days before the end of each fiscal year, a budget and business plan for the next fiscal year (collectively, the "**Budget**"), prepared on a monthly basis, including balance sheets, income statements, and statements of cash flow for such months and, promptly after prepared, any other budgets or revised budgets prepared by the Company;

(f) with respect to the financial statements called for in Subsection 3.1(c) and Subsection 3.1(d), an instrument executed by the chief financial officer and chief executive officer of the Company certifying that such financial statements were prepared in accordance with GAAP consistently applied with prior practice for earlier periods (except as otherwise set forth in Subsection 3.1(c) and Subsection 3.1(d)) and fairly present the financial condition of the Company and its results of operation for the periods specified therein; and

(g) such other information relating to the financial condition, business, prospects, or corporate affairs of the Company as any Major Investor may from time to time reasonably request; provided, however, that the Company shall not be obligated under this Subsection 3.1 to provide information (i) that the Company reasonably determines in good faith to be a trade secret or confidential information (unless covered by an enforceable confidentiality agreement, in a form acceptable to the Company); or (ii) the disclosure of which would adversely affect the attorney-client privilege between the Company and its counsel.

If, for any period, the Company has any subsidiary whose accounts are consolidated with those of the Company, then in respect of such period the financial statements delivered pursuant to the foregoing sections shall be the consolidated and consolidating financial statements of the Company and all such consolidated subsidiaries.

Notwithstanding anything else in this Subsection 3.1 to the contrary, the Company may cease providing the information set forth in this Subsection 3.1 during the period starting with the date sixty (60) days before the Company's good-faith estimate of the date of filing of a registration statement if it reasonably concludes it must do so to comply with the SEC rules applicable to such registration statement and related offering; provided that the Company's covenants under this Subsection 3.1 shall be reinstated at such time as the Company is no longer actively employing its commercially reasonable efforts to cause such registration statement to become effective.

3.2 Inspection. For so long as an aggregate of at least 7,000,000 shares of Registrable Securities remain outstanding (subject to adjustment for stock splits, dividends and the like with respect to the Preferred Stock), the Company shall permit each Major Investor, provided that the Board of Directors has not reasonably determined that such Major Investor is a competitor of the Company, at such Major Investor's expense, to visit and inspect the Company's properties; examine its books of account and records; and discuss the Company's affairs, finances, and accounts with its officers, during normal business hours of the Company as may be reasonably requested by the Major Investor; provided, however, that the Company shall not be obligated pursuant to this Subsection 3.2 to provide access to any information that it reasonably and in good faith considers to be a trade secret or confidential information (unless covered by an enforceable confidentiality agreement, in form acceptable to the Company) or the disclosure of which would adversely affect the attorney-client privilege between the Company and its counsel.

3.3 Observer Rights. The Company shall invite a representative of (i) 5AM Ventures IV, L.P., **(ii)** Deerfield Healthcare Innovations Fund, L.P. and Deerfield Private Design Fund, L.P., collectively (together, "**Deerfield**") and (iii) TLS Beta Pte. Ltd. to attend all meetings of its Board of Directors and any committee of its Board of Directors in a nonvoting observer capacity and, in this respect, shall give such representative copies of all notices, minutes, consents, and other materials that it provides to its directors at the same time and in the same manner as provided to such directors; provided, however, that such representative shall agree to hold in confidence and trust and to act in a fiduciary manner with respect to all information so provided; and provided further, that the Company reserves the right to withhold any information and to exclude such representative from any meeting or portion thereof if access to such information or attendance at such meeting could adversely affect the attorney-client privilege between the Company and its counsel or result in disclosure of trade secrets or a conflict of interest, or if such designating Investor or its representative is a competitor of the Company.

3.4 Termination of Rights. The covenants set forth in Subsection 3.1, Subsection 3.2 and Subsection 3.3 shall terminate and be of no further force or effect (i) immediately before the consummation of the IPO, (ii) when the Company first becomes subject to the periodic reporting requirements of Section 12(g) or 15(d) of the Exchange Act, or (iii) upon a Deemed Liquidation Event, whichever event occurs first.

3.5 Confidentiality. Each Investor agrees that such Investor will keep confidential and will not disclose, divulge, or use for any purpose (other than to monitor its investment in the Company) any confidential information obtained from the Company pursuant to the terms of this Agreement (including notice of the Company's intention to file a registration statement), unless such confidential information (a) is known or becomes known to the public in general (other than as a result of a breach of this Subsection 3.5 by such Investor), (b) is or has been independently developed or conceived by the Investor without use of the Company's confidential information, or (c) is or has been made known or disclosed to the Investor by a third party without a breach of any obligation of confidentiality such third party may have to the Company; provided, however, that an Investor may disclose confidential information (i) to its attorneys, accountants, consultants, and other professionals to the extent necessary to obtain their services in connection with monitoring its investment in the Company; (ii) to any prospective purchaser of any Registrable Securities from such Investor, if such prospective purchaser agrees to be bound by the provisions of this Subsection 3.5; (iii) to any existing or prospective Affiliate, partner, member, stockholder, or wholly owned subsidiary of such Investor in the ordinary course of business, provided that such Investor informs such Person that such information is confidential and directs such Person to maintain the confidentiality of such information; or (iv) as may otherwise be required by law, provided that the Investor promptly notifies the Company of such disclosure and takes reasonable steps to minimize the extent of any such required disclosure.

4. Rights to Future Stock Issuances.

4.1 Right of First Offer. Subject to the terms and conditions of this Subsection 4.1 and applicable securities laws, if the Company proposes to offer or sell any New Securities, the Company shall first offer such New Securities to each Major Investor. Any Major Investor (other than Caltech) shall be entitled to apportion the right of first offer hereby granted to it in such proportions as it deems appropriate, among (i) itself and (ii) its Affiliates, provided that each such Affiliate agrees to enter into this Agreement and each of the Voting Agreement and Right of First Refusal and Co-Sale Agreement of even date herewith among the Company, the Investors and the other parties named therein, as an "**Investor**" under each such agreement; provided that, Caltech may assign only its rights and obligations under this Subsection 4.1 in accordance with Subsection 6.1.

(a) The Company shall give notice (the "**Offer Notice**") to each Major Investor, stating (i) its bona fide intention to offer such New Securities, (ii) the number of such New Securities to be offered, and (iii) the price and terms, if any, upon which it proposes to offer such New Securities.

(b) By notification to the Company within twenty (20) days after the Offer Notice is given, each Major Investor may elect to purchase or otherwise acquire, at the price and on the terms specified in the Offer Notice, up to that portion of such New Securities which equals

the proportion that the Common Stock then held by such Major Investor (including all shares of Common Stock then issuable (directly or indirectly) upon conversion and/or exercise, as applicable, of the Preferred Stock and any other Derivative Securities then held by such holder) bears to the total Common Stock of the Company then outstanding (assuming full conversion and/or exercise, as applicable, of all Preferred Stock and other Derivative Securities) At the expiration of such twenty (20) day period, the Company shall promptly notify any Major Investor that elects to purchase or acquire all the shares available to it (each, a "**Fully Exercising Investor**") of any other Major Investor's failure to do likewise. During the ten (10) day period commencing after the Company has given such notice, each Fully Exercising Investor may, by giving notice to the Company, elect to purchase or acquire, in addition to the number of shares specified above, up to that portion of the New Securities for which the Major Investors were entitled to subscribe but that were not subscribed for by the Major Investors which is equal to the proportion that the Common Stock issued and held, or issuable (directly or indirectly) upon conversion and/or exercise, as applicable, of Preferred Stock and any other Derivative Securities then held, by such Fully Exercising Investor bears to the Common Stock issued and held, or issuable (directly or indirectly) upon conversion and/or exercise, as applicable, of the Preferred Stock and any other Derivative Securities then held, by all Fully Exercising Investors who wish to purchase such unsubscribed shares. The closing of any sale pursuant to this Subsection 4.1(b) shall occur within the later of ninety (90) days of the date that the Offer Notice is given and the date of initial sale of New Securities pursuant to Subsection 4.1(c).

(c) If all New Securities referred to in the Offer Notice are not elected to be purchased or acquired as provided in Subsection 4.1(b), the Company may, during the ninety (90) day period following the expiration of the periods provided in Subsection 4.1(b), offer and sell the remaining unsubscribed portion of such New Securities to any Person or Persons at a price not less than, and upon terms no more favorable to the offeree than, those specified in the Offer Notice. If the Company does not enter into an agreement for the sale of the New Securities within such period, or if such agreement is not consummated within thirty (30) days of the execution thereof, the right provided hereunder shall be deemed to be revived and such New Securities shall not be offered unless first reoffered to the holders of Preferred Stock in accordance with this Subsection 4.1.

(d) The right of first offer in this Subsection 4.1 shall not be applicable to (i) Exempted Securities (as defined in the Restated Certificate); (ii) shares of Common Stock issued in the IPO; (iii) the issuance of shares of Preferred Stock to pursuant to the Purchase Agreement; and (iv) the issuance of up to 6,944,445 shares of Series B Preferred Stock to Novartis Institutes For Biomedical Research, Inc. or its affiliates ("**Novartis**") in connection with the Company entering into a collaboration arrangement with Novartis.

4.2 Directed IPO. If an IPO is undertaken, the Company will use its reasonable best efforts to cause the managing underwriter(s) of the IPO to designate a number of shares of the Common Stock to be offered in the IPO with an aggregate offering price of at least $10,000,000 (based on the price of the Common Stock in the IPO) for sale under a "directed shares program," and shall instruct such underwriter(s) to allocate such directed shares program to Deerfield. The shares designated by the underwriter(s) for sale under a directed shares program are referred to herein as "directed shares." Deerfield acknowledges that, despite the Company's use of its reasonable best efforts, the underwriter(s) may determine in their sole discretion that it is not

advisable to designate all such shares as directed shares in the IPO, in which case the number of directed shares may be reduced or no directed shares may be designated, as applicable. Deerfield also acknowledges that notwithstanding the terms of this Agreement, the sale of any directed shares to Deerfield pursuant to this Section 4.2 will only be made in compliance with NASD Rules 2110 and 2790 and federal, state, and local laws, rules, and regulations. In the event the sale of directed shares to Deerfield pursuant to this Section 4.2 is prohibited by federal, state, or local laws, rules or regulations (as determined by either (a) the Company or (b) Deerfield), the Company shall undertake its reasonable best efforts to approve and execute a private placement of Common Stock with an aggregate amount of proceeds equal to $10,000,000 (with a per share purchase price equal to the public offering price of the Common Stock in the IPO) with Deerfield concurrent with the closing of the IPO on such terms and conditions as are standard for such transactions and reasonably acceptable to each of the Company and Deerfield.

4.3 Termination. The covenants set forth in Subsection 4.1 and Subsection 4.2 shall terminate and be of no further force or effect upon the earliest of (i) immediately before the consummation of the IPO (provided in the case of Subsection 4.2, that the Company complies with such Subsection in connection with such IPO), (ii) when the Company first becomes subject to the periodic reporting requirements of Section 12(g) or 15(d) of the Exchange Act, or (iii) upon a Deemed Liquidation Event.

5. Additional Covenants.

5.1 Insurance. The Company shall obtain, within ninety (90) days of the date hereof, from financially sound and reputable insurers, Directors and Officers liability insurance, with a limit of liability not less than three million dollars ($3,000,000) in an amount and on terms and conditions satisfactory to the Board of Directors, and will cause such insurance policy to be maintained until such time as the Board of Directors determines that such insurance should be discontinued and shall not be cancelable by the Company without the prior approval by the Board of Directors.

5.2 Employee Agreements. The Company will cause (i) each person now or hereafter employed by it or by any subsidiary (or engaged by the Company or any subsidiary as a consultant/independent contractor) to enter into a nondisclosure and proprietary rights assignment agreement in a form reasonably acceptable to the Board of Directors; and (ii) each Founder and Key Employee to enter into a one (1) year nonsolicitation agreement, in a form reasonably acceptable to the Board of Directors. In addition, the Company shall not amend, modify, terminate, waive, or otherwise alter, in whole or in part, any of the above-referenced agreements or any restricted stock agreement between the Company and any employee, without the consent of the Board of Directors.

5.3 Employee Stock. Unless otherwise approved by the Board of Directors, all future employees and consultants of the Company who purchase, receive options to purchase, or receive awards of shares of the Company’s capital stock after the date hereof shall be required to execute restricted stock or option agreements, as applicable, providing for (i) vesting of shares over a four (4) year period, with the first twenty-five percent (25%) of such shares vesting following twelve (12) months of continued employment or service, and the remaining shares vesting in equal monthly installments over the following thirty-six (36) months, and (ii) a market stand-off

provision substantially similar to that in Subsection 2.11. In addition, unless otherwise approved by the Board of Directors, the Company shall retain a "right of first refusal" on employee transfers until the Company's IPO and shall have the right to repurchase unvested shares at cost upon termination of employment of a holder of restricted stock.

5.4 Matters Requiring Investor Director Approval. So long as the holders of Preferred Stock are entitled to elect a Preferred Director, the Company hereby covenants and agrees with each of the Investors that it shall not, without approval of the Board of Directors, which approval must include the affirmative vote of at least two Preferred Directors:

(a) make, or permit any subsidiary to make, any loan or advance to, or own any stock or other securities of, any subsidiary or other corporation, partnership, or other entity unless it is wholly owned by the Company;

(b) make, or permit any subsidiary to make, any loan or advance to any Person, including, without limitation, any employee or director of the Company or any subsidiary, except advances and similar expenditures in the ordinary course of business or under the terms of an employee stock or option plan approved by the Board of Directors;

(c) guarantee, directly or indirectly, or permit any subsidiary to guarantee, directly or indirectly, any indebtedness except for trade accounts of the Company or any subsidiary arising in the ordinary course of business;

(d) make any investment inconsistent with any investment policy approved by the Board of Directors;

(e) incur any aggregate indebtedness that is not already included in a budget approved by the Board of Directors, other than trade credit incurred in the ordinary course of business;

(f) otherwise enter into or be a party to any transaction with any director, officer, or employee of the Company or any "associate" (as defined in Rule 12b-2 promulgated under the Exchange Act) of any such Person;

(g) hire, terminate, or change the compensation of the executive officers, including approving any option grants or stock awards to executive officers;

(h) change the principal business of the Company, enter new lines of business, or exit the current line of business;

(i) sell, assign, license, pledge, or encumber material technology or intellectual property, other than licenses granted in the ordinary course of business; or

(j) enter into any corporate strategic relationship involving the payment, contribution, or assignment by the Company or to the Company of money or assets greater than $500,000.

5.5 Board Matters. Unless otherwise determined by the vote of a majority of the directors then in office, the Board of Directors shall meet at least quarterly in accordance with an agreed-upon schedule. The Company shall reimburse the non-employee directors and observers for all reasonable out-of-pocket travel expenses incurred (consistent with the Company's travel policy) in connection with attending meetings of the Board of Directors. The Company shall cause to be established, as soon as practicable after such request, and will maintain, an audit committee (the "**Audit Committee**") and compensation committee (the "**Compensation Committee**"), each of which shall consist of three (3) non-management directors. The Audit Committee will have the authority to approve the Budget and all non-budgeted capital expenditures. The Compensation Committee will have the authority to approve all compensation plans, including the issuance of options, stock and other incentive compensation for employees earning more than $200,000 per year. Each non-employee director shall be entitled in such person's discretion to be a member of any Board committee. Each committee of the Board of Directors shall have at least one Preferred Director as a member.

5.6 Successor Indemnification. If the Company or any of its successors or assignees consolidates with or merges into any other Person and is not the continuing or surviving corporation or entity of such consolidation or merger, then to the extent necessary, proper provision shall be made so that the successors and assignees of the Company assume the obligations of the Company with respect to indemnification of members of the Board of Directors as in effect immediately before such transaction, whether such obligations are contained in the Company's Bylaws, its Certificate of Incorporation, or elsewhere, as the case may be.

5.7 Expenses of Counsel. In the event of a transaction which is a Sale of the Company (as defined in the Voting Agreement of even date herewith among the Investors and the Company), the reasonable fees and disbursements, not to exceed $50,000, of one counsel for the Investors ("**Investor Counsel**"), in their capacities as stockholders, shall be borne and paid by the Company. At the outset of considering a transaction which, if consummated would constitute a Sale of the Company, the Company shall obtain the ability to share with the Investor Counsel (and such counsel's clients) and shall share the confidential information (including, without limitation, the initial and all subsequent drafts of memoranda of understanding, letters of intent and other transaction documents and related noncompete, employment, consulting and other compensation agreements and plans) pertaining to and memorializing any of the transactions which, individually or when aggregated with others would constitute the Sale of the Company. The Company shall be obligated to share (and cause the Company's counsel and investment bankers to share) such materials when distributed to the Company's executives and/or any one or more of the other parties to such transaction(s). In the event that Investor Counsel deems it appropriate, in its reasonable discretion, to enter into a joint defense agreement or other arrangement to enhance the ability of the parties to protect their communications and other reviewed materials under the attorney client privilege, the Company shall, and shall direct its counsel to, execute and deliver to Investor Counsel and its clients such an agreement in form and substance reasonably acceptable to Investor Counsel. In the event that one or more of the other party or parties to such transactions require the clients of Investor Counsel to enter into a confidentiality agreement and/or joint defense agreement in order to receive such information, then the Company shall share whatever information can be shared without entry into such agreement and shall, at the same time, in good faith work expeditiously to enable Investor Counsel and its clients to negotiate and enter into the appropriate agreement(s) without undue burden to the clients of Investor Counsel.

5.8 Indemnification Matters. The Company hereby acknowledges that one (1) or more of the directors nominated to serve on the Board of Directors by the Investors (each a "**Fund Director**") may have certain rights to indemnification, advancement of expenses and/or insurance provided by one or more of the Investors and certain of their affiliates (collectively, the "**Fund Indemnitors**"). The Company hereby agrees (a) that it is the indemnitor of first resort (*i.e.*, its obligations to any such Fund Director are primary and any obligation of the Fund Indemnitors to advance expenses or to provide indemnification for the same expenses or liabilities incurred by such Fund Director are secondary), (b) that it shall be required to advance the full amount of expenses incurred by such Fund Director and shall be liable for the full amount of all expenses, judgments, penalties, fines and amounts paid in settlement by or on behalf of any such Fund Director to the extent legally permitted and as required by the Company's Certificate of Incorporation or Bylaws of the Company (or any agreement between the Company and such Fund Director), without regard to any rights such Fund Director may have against the Fund Indemnitors, and, (c) that it irrevocably waives, relinquishes and releases the Fund Indemnitors from any and all claims against the Fund Indemnitors for contribution, subrogation or any other recovery of any kind in respect thereof. The Company further agrees that no advancement or payment by the Fund Indemnitors on behalf of any such Fund Director with respect to any claim for which such Fund Director has sought indemnification from the Company shall affect the foregoing and the Fund Indemnitors shall have a right of contribution and/or be subrogated to the extent of such advancement or payment to all of the rights of recovery of such Fund Director against the Company.

5.9 Right to Conduct Activities. The Company hereby agrees and acknowledges that certain of the Investors and certain of their respective Affiliates are professional venture capital and private equity investment funds (collectively, the "**Funds**"), and as such invest in numerous portfolio companies, some of which may be deemed competitive with the Company's business (as currently conducted or as may be conducted in the future). The parties agree that no Fund or any Fund Affiliate investment fund or any of their Affiliates, or any of their or their Affiliates' partners, officers or representatives which manage or advise any such investment funds shall be considered a competitor of the Company solely as a result of such investment, management or advisory activities for purposes of this Agreement and the Company agrees that, to the extent permitted under applicable law, neither the Funds nor their Affiliates shall be liable to the Company for any claim solely arising out of, or solely based upon, (i) the investment by a Fund or any of their Affiliates in any entity competitive with the Company, or (ii) actions taken by any partner, officer or other representative of a Fund or Fund Affiliate to assist any such competitive company, whether or not such action was taken as a member of the board of directors of such competitive company or otherwise, and whether or not such action has a detrimental effect on the Company; provided, however, that the foregoing shall not relieve (x) any of the Funds from liability associated with the unauthorized disclosure of the Company's confidential information obtained pursuant to this Agreement, or (y) any director or officer of the Company from any liability associated with his or her fiduciary duties to the Company.

5.10 Tax Reporting. The Company will comply with any obligation imposed on the Company to make any filing (including any filing on Internal Revenue Service Form 5471) as a result of any interest that the Company holds in a non-U.S. Person or any activities that the Company conducts outside of the U.S. and shall include in such filing any information necessary to obviate (to the extent possible) any similar obligation to which any shareholder would otherwise be subject with respect to such interest or such activity. The Company shall promptly provide each Investor with a copy of any such filing.

5.11 Restrictions on Publicity. Each Investor agrees not to discuss the Purchase Agreement (including the transactions contemplated thereunder), use the name or logo of the Company or its Affiliates, or refer to the Company or its Affiliates, directly or indirectly, in connection with the sale of the Preferred Stock, in any advertisement, press release, professional or trade publication, or in any other manner without the approval of the Board of Directors.

5.12 Termination of Covenants. The covenants set forth in this Section 5, except for Subsections 5.6, through 5.9, shall terminate and be of no further force or effect (i) immediately before the consummation of the IPO, (ii) when the Company first becomes subject to the periodic reporting requirements of Section 12(g) or 15(d) of the Exchange Act, or (iii) upon a Deemed Liquidation Event, whichever event occurs first.

6. Miscellaneous.

6.1 Successors and Assigns. The rights under this Agreement may be assigned (but only with all related obligations) by a Holder to a transferee of Registrable Securities that (i) is an Affiliate of a Holder; (ii) is a Holder's Immediate Family Member or trust for the benefit of an individual Holder or one or more of such Holder's Immediate Family Members; or (iii) after such transfer, holds at least 20% of such Holder's shares of Registrable Securities immediately prior to such assignment or transfer; provided, however, that (x) the Company is, within a reasonable time after such transfer, furnished with written notice of the name and address of such transferee and the Registrable Securities with respect to which such rights are being transferred; and (y) such transferee agrees in a written instrument delivered to the Company to be bound by and subject to the terms and conditions of this Agreement, including the provisions of Subsection 2.11. For the purposes of determining the number of shares of Registrable Securities held by a transferee, the holdings of a transferee (1) that is an Affiliate or stockholder of a Holder; (2) who is a Holder's Immediate Family Member; or (3) that is a trust for the benefit of an individual Holder or such Holder's Immediate Family Member shall be aggregated together and with those of the transferring Holder; provided further that all transferees who would not qualify individually for assignment of rights shall have a single attorney-in-fact for the purpose of exercising any rights, receiving notices, or taking any action under this Agreement. Notwithstanding the foregoing, Caltech may not assign or otherwise transfer any of its rights under this Agreement without the prior written consent of the Company; provided, however, that Caltech may assign its rights under Subsection 4.1 (together with its obligations) to Osage University Partners after giving the Company prior written notice of such transfer or to any other entity approved in writing in advance by the Company, and such assignee agrees in a written instrument delivered to the Company to be bound by and subject to the terms and conditions of this Agreement, including without limitation the provisions of Subsection 2.11, and any other agreements between the Company and its stockholders applicable to the securities purchased by such assignee. The terms and conditions of this Agreement inure to the benefit of and are binding upon the respective successors and permitted assignees of the parties. Nothing in this Agreement, express or implied, is intended to confer upon any party other than the parties hereto or their respective successors and permitted assignees any rights, remedies, obligations or liabilities under or by reason of this Agreement, except as expressly provided herein.

6.2 Governing Law. This Agreement shall be governed by the internal law of the State of Delaware, without regard to any conflicts of laws principles that could result in the application of laws of any other jurisdiction.

6.3 Counterparts. This Agreement may be executed in two (2) or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Counterparts may be delivered via facsimile, electronic mail (including pdf or any electronic signature complying with the U.S. federal ESIGN Act of 2000, *e.g.*, www.docusign.com) or other transmission method and any counterpart so delivered shall be deemed to have been duly and validly delivered and be valid and effective for all purposes.

6.4 Titles and Subtitles. The titles and subtitles used in this Agreement are for convenience only and are not to be considered in construing or interpreting this Agreement.

6.5 Notices. All notices and other communications given or made pursuant to this Agreement shall be in writing and shall be deemed effectively given upon the earlier of actual receipt or (i) personal delivery to the party to be notified; (ii) when sent, if sent by electronic mail or facsimile during the recipient's normal business hours, and if not sent during normal business hours, then on the recipient's next business day; (iii) five (5) days after having been sent by registered or certified mail, return receipt requested, postage prepaid; or (iv) one (1) business day after the business day of deposit with a nationally recognized overnight courier, freight prepaid, specifying next-day delivery, with written verification of receipt. All communications shall be sent to the respective parties at their addresses as set forth on Schedule A hereto (including any address designated to receive a copy of such communication, or to the principal office of the Company and to the attention of the Chief Executive Officer, in the case of the Company, or to such email address, facsimile number, or address as subsequently modified by written notice given in accordance with this Subsection 6.5. If notice is given to the Company, a copy shall also be sent to Peter N. Handrinos, Latham & Watkins LLP, 200 Clarendon Street, Boston, Massachusetts 02116, facsimile no.: (617) 948-6001, electronic mail: peter.handrinos@lw.com. If any notice or other communication given or made pursuant to this Agreement is required to be given to a group of parties pursuant to the terms hereof, such notice shall be sent to the members of such group substantially simultaneously (and in any event with a 24 hour period).

6.6 Amendments and Waivers. Any term of this Agreement may be amended and the observance of any term of this Agreement may be waived (either generally or in a particular instance, and either retroactively or prospectively) only with the written consent of the Company and the holders of at least seventy-one and one-half percent (71.5%) of the Registrable Securities then outstanding; provided that the Company may in its sole discretion waive compliance with Subsection 2.12(c) (and the Company's failure to object promptly in writing after notification of a proposed assignment allegedly in violation of Subsection 2.12(c) shall be deemed to be a waiver); provided further that any provision hereof may be waived by any waiving party on such party's own behalf, without the consent of any other party; and provided further that the Company may update Schedule A hereto at any time to reflect any transfers of shares of the Company's capital

stock or parties to be added to this Agreement, effected in accordance with the terms hereof, and to correct any errors in the information set forth therein, without the consent of the other parties hereto. Notwithstanding the foregoing, this Agreement may not be amended or terminated and the observance of any term hereof may not be waived with respect to any Investor without the written consent of such Investor, unless such amendment, termination, or waiver applies to all Investors in the same fashion (it being agreed that a waiver of the provisions of Section 4 with respect to a particular transaction shall be deemed to apply to all Investors in the same fashion if such waiver does so by its terms, notwithstanding the fact that certain Investors may nonetheless, by agreement with the Company, purchase securities in such transaction). The Company shall give prompt notice of any amendment or termination hereof or waiver hereunder to any party hereto that did not consent in writing to such amendment, termination, or waiver. Any amendment, termination, or waiver effected in accordance with this Subsection 6.6 shall be binding on all parties hereto, regardless of whether any such party has consented thereto. No waivers of or exceptions to any term, condition, or provision of this Agreement, in any one or more instances, shall be deemed to be or construed as a further or continuing waiver of any such term, condition, or provision.

6.7 Severability. In case any one or more of the provisions contained in this Agreement is for any reason held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality, or unenforceability shall not affect any other provision of this Agreement, and such invalid, illegal, or unenforceable provision shall be reformed and construed so that it will be valid, legal, and enforceable to the maximum extent permitted by law.

6.8 Aggregation of Stock. All shares of Registrable Securities held or acquired by Affiliates (other than Affiliates of Caltech) shall be aggregated together for the purpose of determining the availability of any rights under this Agreement and such Affiliated persons may apportion such rights as among themselves in any manner they deem appropriate.

6.9 Entire Agreement. This Agreement (including any Schedules and Exhibits hereto) constitutes the full and entire understanding and agreement among the parties with respect to the subject matter hereof, and any other written or oral agreement relating to the subject matter hereof existing between the parties is expressly canceled. Upon the effectiveness of this Agreement, the Prior Agreement shall be deemed amended and restated and superseded and replaced in its entirety by this Agreement, and shall be of no further force or effect.

6.10 Dispute Resolution. Any unresolved controversy or claim arising out of or relating to this Agreement, except as (i) otherwise provided in this Agreement, or (ii) any such controversies or claims arising out of the Company's intellectual property rights for which a provisional remedy or equitable relief is sought, shall be submitted to arbitration by one arbitrator mutually agreed upon by the parties, and if no agreement can be reached within thirty (30) days after names of potential arbitrators have been proposed by the American Arbitration Association (the "**AAA**"), then by one arbitrator having reasonable experience in corporate finance transactions of the type provided for in this Agreement and who is chosen by the AAA. The arbitration shall take place in Boston, Massachusetts, in accordance with the AAA rules then in effect, and judgment upon any award rendered in such arbitration will be binding and may be entered in any court having jurisdiction thereof. There shall be limited discovery prior to the arbitration hearing as follows: (a) exchange of witness lists and copies of documentary evidence and documents relating to or arising out of the issues to be arbitrated, (b) depositions of all party witnesses, and

(c) such other depositions as may be allowed by the arbitrators upon a showing of good cause. Depositions shall be conducted in accordance with the Delaware Code of Civil Procedure, the arbitrator shall be required to provide in writing to the parties the basis for the award or order of such arbitrator, and a court reporter shall record all hearings, with such record constituting the official transcript of such proceedings. Each party will bear its own costs in respect of any disputes arising under this Agreement. Each of the parties to this Agreement consents to personal jurisdiction for any equitable action sought in the U.S. District Court for the District of Delaware or the Court of Chancery of the State of Delaware.

WAIVER OF JURY TRIAL: EACH PARTY HEREBY WAIVES ITS RIGHTS TO A JURY TRIAL OF ANY CLAIM OR CAUSE OF ACTION BASED UPON OR ARISING OUT OF THIS AGREEMENT, THE OTHER TRANSACTION DOCUMENTS, THE SECURITIES OR THE SUBJECT MATTER HEREOF OR THEREOF. THE SCOPE OF THIS WAIVER IS INTENDED TO BE ALL-ENCOMPASSING OF ANY AND ALL DISPUTES THAT MAY BE FILED IN ANY COURT AND THAT RELATE TO THE SUBJECT MATTER OF THIS TRANSACTION, INCLUDING, WITHOUT LIMITATION, CONTRACT CLAIMS, TORT CLAIMS (INCLUDING NEGLIGENCE), BREACH OF DUTY CLAIMS, AND ALL OTHER COMMON LAW AND STATUTORY CLAIMS. THIS SECTION HAS BEEN FULLY DISCUSSED BY EACH OF THE PARTIES HERETO AND THESE PROVISIONS WILL NOT BE SUBJECT TO ANY EXCEPTIONS. EACH PARTY HERETO HEREBY FURTHER WARRANTS AND REPRESENTS THAT SUCH PARTY HAS REVIEWED THIS WAIVER WITH ITS LEGAL COUNSEL, AND THAT SUCH PARTY KNOWINGLY AND VOLUNTARILY WAIVES ITS JURY TRIAL RIGHTS FOLLOWING CONSULTATION WITH LEGAL COUNSEL.

6.11 Delays or Omissions. No delay or omission to exercise any right, power, or remedy accruing to any party under this Agreement, upon any breach or default of any other party under this Agreement, shall impair any such right, power, or remedy of such nonbreaching or nondefaulting party, nor shall it be construed to be a waiver of or acquiescence to any such breach or default, or to any similar breach or default thereafter occurring, nor shall any waiver of any single breach or default be deemed a waiver of any other breach or default theretofore or thereafter occurring. All remedies, whether under this Agreement or by law or otherwise afforded to any party, shall be cumulative and not alternative.

6.12 Acknowledgment. The Company acknowledges that the Investors are in the business of venture capital investing and therefore review the business plans and related proprietary information of many enterprises, including enterprises which may have products or services which compete directly or indirectly with those of the Company. Nothing in this Agreement shall preclude or in any way restrict the Investors from investing or participating in any particular enterprise whether or not such enterprise has products or services which compete with those of the Company.

6.13 Additional Investors. Notwithstanding anything to the contrary contained herein, if the Company issues additional shares of Preferred Stock after the date hereof, any purchaser of such shares of Preferred Stock may become a party to this Agreement by executing and delivering an additional counterpart signature page to this Agreement, and thereafter shall be deemed an “Investor” for all purposes hereunder. No action or consent by the Investors shall be required for such joinder to this Agreement by such additional Investor, so long as such additional Investor has agreed in writing to be bound by all of the obligations as an “Investor” hereunder.

6.14 Caltech. Caltech hereby agrees that the rights granted to Caltech hereunder shall be deemed to fully satisfy the obligations of the Company under Sections 5.13 and 5.14 of the Caltech Agreement, and neither Section 5.13 nor Section 5.14 of the Caltech Agreement shall have any further force or effect.

[Remainder of Page Intentionally Left Blank]

IN WITNESS WHEREOF, the parties have executed this Amended and Restated Investors' Rights Agreement as of the date first written above.

HOMOLOGY MEDICINES, INC.

By: /s/ Arthur Tzianabos
Name: Arthur Tzianabos, Ph.D.
Title: President and Chief Executive Officer

[Signature Page to Investors' Rights Agreement]

INVESTORS:

5AM VENTURES IV, L.P.

by 5AM Partners IV, LLC
its General Partner

By: /s/ Scott Rocklage
Name: Scott Rocklage
Title: Managing Member

5AM CO-INVESTORS IV, L.P.

by 5AM Partners IV, LLC
its General Partner

By: /s/ Scott Rocklage
Name: Scott Rocklage
Title: Managing Member

INVESTORS:

ARCH VENTURE FUND VIII, L.P.

By: ARCH Venture Partners VIII, L.P., its General Partner

By: ARCH Venture Partners VIII, LLC, its General Partner

By: /s/ Mark McDonnell
Name: Mark McDonnell
Title: Managing Director

ARCH VENTURE FUND VIII OVERAGE, L.P.

By: ARCH Venture Partners VIII, LLC, its General Partner

By: /s/ Mark McDonnell
Name: Mark McDonnell
Title: Managing Director

INVESTORS:

TLS BETA PTE. LTD.

By: /s/ Khoo Shih
Name: Khoo Shih
Title: Authorized Signatory

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INVESTORS:

DEERFIELD HEALTHCARE INNOVATIONS FUND, L.P.

By: Deerfield Mgmt HIF, L.P., its General Partner

By: J.E. Flynn Capital HIF LLC, its General Partner

By: /s/ David J. Clark
Name: David J. Clark
Title: Authorized Signatory

DEERFIELD PRIVATE DESIGN FUND III, L.P.

By: Deerfield Mgmt III, L.P., its General Partner

By: J.E. Flynn Capital III LLC, its General Partner

By: /s/ David J. Clark
Name: David J. Clark
Title: Authorized Signatory

INVESTORS:

FIDELITY GROWTH COMPANY
COMMINGLED POOL
By: Fidelity Management & Trust Co.

By: /s/ Stacie M. Smith
Name: Stacie M. Smith
Title: Authorized Signatory

FIDELITY MT. VERNON STREET TRUST:
FIDELITY SERIES GROWTH COMPANY FUND

By: /s/ Stacie M. Smith
Name: Stacie M. Smith
Title: Authorized Signatory

FIDELITY MT. VERNON STREET TRUST:
FIDELITY GROWTH COMPANY FUND

By: /s/ Stacie M. Smith
Name: Stacie M. Smith
Title: Authorized Signatory

INVESTORS:

ROCK SPRINGS CAPITAL MASTER FUND LP

By: Rock Springs General Partner LLC

By: /s/ Kris Jenner
Name: Kris Jenner
Title: Managing Member

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INVESTORS:

OSAGE UNIVERSITY PARTNERS II, L.P.

By: Osage University GP II, LP, its general partner

By: Osage Partners, LLC, its general partner

By: /s/ William Harrington
Name: William Harrington
Title: Member

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INVESTORS:

VIDA VENTURES, LLC

By: VV Manager, LLC., its Managing Member

By: /s/ Clive D. Bode
Name: Clive D. Bode
Title: Manager

[Signature Page to Investors' Rights Agreement]

INVESTORS:

ALEXANDRIA VENTURE INVESTMENTS, LLC,
a Delaware limited liability company

By: Alexandria Real Estate Equities, Inc.,
a Maryland corporation, managing member

By: /s/ Aaron Jacobson
Name: Aaron Jacobson
Title: VP – Corporate Counsel

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INVESTORS:

NOVARTIS INSTITUTES FOR BIOMEDICAL RESEARCH, INC.

By: /s/ Scott A. Brown
Name: Scott A. Brown
Title: VP, General Counsel

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INVESTORS:

VIVO PANDA FUND, L.P.

By: Vivo Panda, LLC, its general partner

By: /s/ Mahendra Shah
Name: Mahendra Shah
Title: Managing Member

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INVESTORS:

HBM HEALTHCARE INVESTMENTS (CAYMAN) LTD.

By: /s/ Jean Marc LeSieur
Name: Jean Marc LeSieur
Title: Director

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INVESTORS:

MAVERICK PRIVATE OPPORTUNITIES
FUND, L.P.

By: Maverick Capital Ventures, LLC, its General Partner

By: Maverick Capital Advisors, L.P., its Manager

By: /s/ Ginessa A. Avila
Name: Ginessa A. Avila
Title: Authorized Representative

MAVERICK ADVISORS FUND, L.P.

By: Maverick Capital Ventures, LLC, its General Partner

By: Maverick Capital Advisors, L.P., its Manager

By: /s/ Ginessa A. Avila
Name: Ginessa A. Avila
Title: Authorized Representative

For purposes of Section 6.14 and the rights and obligations referenced therein:

CALIFORNIA INSTITUTE OF TECHNOLOGY
(Caltech)

By: /s/ Fred Farina
Name: Fred Farina
Title: Chief Innovation & Corporate Partnership Officer

[Signature Page to Investors' Rights Agreement]

SCHEDULE A

Investors

5AM Ventures IV, L.P.
5AM Co-Investors IV, L.P.
Address:
2200 Sand Hill Road, Suite 110
Menlo Park, CA 94025

Alexandria Venture Investments, LLC
Address:
385 E. Colorado Blvd., Suite 299
Pasadena, CA 91101

ARCH Venture Fund VIII, L.P.
ARCH Venture Fund VIII Overage, L.P.
Address:
c/o ARCH Venture Partners VIII, L.P.
8755 W. Higgins Road, Suite 1025
Chicago, IL 60631
Attn: Mark McDonnell
Phone: [***]
Fax: [***]
Email: [***]

With a copy, which shall not constitute notice, to:

Proskauer Rose LLP
One International Place
Boston, MA 02110
Attn: [***]
Phone: [***]
Fax: [***]
Email: [***]

Deerfield Healthcare Innovations Fund, L.P.
Deerfield Private Design Fund III, L.P.
Address:
Deerfield Management Company, L.P.
780 Third Avenue, 37th Flr.
New York, NY 10017
Attention: Lawrence Atinsky
Tel: [***]Fax: [***]

With a copy, which shall not constitute notice, to:

Goodwin Procter LLP
100 Northern Ave.
Boston, MA 02210
Attn: [***]Phone: [***]

Fidelity Growth Company Commingled Pool
Address:
Mag & Co.
c/o Brown Brothers Harriman & Co.
Attn: Corporate Actions /Vault
140 Broadway
New York, NY 10005
Email: [***]

Fidelity Mt. Vernon Street Trust: Fidelity Series Growth Company Fund
Address:
State Street Bank & Trust
PO Box 5756
Boston, Massachusetts 02206
Attn: WAVELENGTH + CO Fidelity Mt. Vernon Street Trust: Fidelity Series Growth Company Fund
Email: [***]Fax number: [***]

Fidelity Mt. Vernon Street Trust: Fidelity Growth Company Fund
Address:
BNY Mellon
Attn: Stacey Wolfe
525 William Penn Place Rm 0400
Pittsburgh, PA 15259
Email: [***]
Fax number: [***]

HBM Healthcare Investments (Cayman) Ltd.
Address:
Governors Square, Suite #4-212-2
23 Lime Tree Bay Avenue
West Bay, Grand Cayman
Cayman Islands

Maverick Private Opportunities Fund, L.P.
Maverick Advisors Fund, L.P.
Address:
Maverick Capital, Ltd.
300 Crescent Court, 18th Floor
Dallas, TX 75201
Phone: [***]Fax: [***]
Email: [***]

Novartis Institutes For BioMedical Research, Inc.

Address:
Novartis Institutes for BioMedical Research, Inc.
250 Massachusetts Avenue
Cambridge, MA 02139
Attn: General Counsel

With a copy, which shall not constitute notice, to:

Hogan Lovells US LLP
4085 Campbell Avenue
Suite 100
Menlo Park, CA 94025
Attn: [***]
Phone: [***]
Fax: [***]
Email: [***]

Osage University Partners II, L.P.

Address:
50 Monument Road, Suite 201
Bala Cynwyd, PA 19004
Attn: Beth Grafstrom

Rock Springs Capital Master Fund LP

Address:
650 South Exeter Street
Suite 1070
Baltimore, Maryland 21202
Attention: General Counsel
Email: [***]

TLS Beta Pte. Ltd.

Address:
Attn: Khoo Shih
60B Orchard Road
#06-18 Tower 2
The Atrium@Orchard
Singapore 238891

Vida Ventures, LLC

Address:
Tarrant Management, LLC
TPG Family Office
Attn: Sherri Conn
301 Commerce Street, Suite 3150

Fort Worth, TX 76102

[***]*With a copy, which shall not constitute notice, to*:

Vida Ventures
31 St James Avenue, Boston, MA 02116
Attn: Arjun Goyal
[***]

VIVO PANDA FUND, L.P.
Address:
505 Hamilton Avenue, Suite 207
Palo Alto, CA 94301
Attn: Mahendra Shah

HOMOLOGY MEDICINES

2015 Stock Incentive Plan

1. Purpose.

The purpose of this plan (the "Plan") is to secure for Homology Medicines, Inc., a Delaware corporation (the "Company") and its shareholders the benefits arising from capital stock ownership by employees, officers and directors of, and consultants or advisors to, the Company and its parent and subsidiary corporations who are expected to contribute to the Company's future growth and success. Under the Plan recipients may be awarded both (i) Options (as defined in Section 2.1) to purchase the Company's common stock, par value $0.0001 per share ("Common Stock") and (ii) shares of Common Stock ("Restricted Stock Awards"). Except where the context otherwise requires, the term "Company" shall include any parent and all present and future subsidiaries of the Company as defined in Sections 424(e) and 424(f) of the Internal Revenue Code of 1986, as amended or replaced from time to time (the "Code"). Those provisions of the Plan which make express reference to Section 422 of the Code shall apply only to Incentive Stock Options (as that term is defined below). **Appendix A to this Plan shall apply only to participants in the Plan who are residents of the State of California.**

2. Types of Awards and Administration.

2.1 **Options.** Options granted pursuant to the Plan ("Options") shall be authorized by action of the Board of Directors of the Company (the "Board" or "Board of Directors") and may be either incentive stock options ("Incentive Stock Options") meeting the requirements of Section 422 of the Code or non-statutory Options which are not intended to meet the requirements of Section 422. All Options when granted are intended to be non-statutory Options, unless the applicable Option Agreement (as defined in Section 5.1) explicitly states that the Option is intended to be an Incentive Stock Option. The vesting of Options may be conditioned upon the completion of a specified period of employment with the Company and/or such other conditions or events as the Board may determine. The Board may also provide that Options are immediately exercisable subject to certain repurchase rights in the Company dependent upon the continued employment of the optionee and/or such other conditions or events as the Board may determine.

2.1.1 **Incentive Stock Options.** Incentive Stock Options may only be granted to employees of the Company. For so long as the Code shall so provide, Options granted to any employee under the Plan (and any other incentive stock option plans of the Company) which are intended to constitute Incentive Stock Options shall not constitute Incentive Stock Options to the extent that such Options, in the aggregate, become exercisable for the first time in any one calendar year for shares of Common Stock with an aggregate fair market value (determined as of the respective date or dates of grant) of more than $100,000. If an Option is intended to be an Incentive Stock Option, and if for any reason such Option (or any portion thereof) shall not qualify as an Incentive Stock Option, then, to the extent of such nonqualification, such Option (or portion thereof) shall be regarded as a non-statutory Option appropriately granted under the Plan provided that such Option (or portion thereof) otherwise meets the Plan's requirements relating to non-statutory Options.

2.2 **Restricted Stock Awards.** The Board in its discretion may grant Restricted Stock Awards, entitling the recipient to acquire, for a purchase price determined by the Board, shares of Common Stock subject to such restrictions and conditions as the Board may determine at the time of grant ("Restricted Stock"), including continued employment and/or achievement of pre-.established performance goals and objectives.

2.3 **Administration.** The Plan shall be administered by the Board, whose construction and interpretation of the terms and provisions of the Plan shall be final and conclusive. The Board may in its sole discretion authorize issuance of Restricted Stock, the grant of Options and the issuance of shares upon exercise of such Options as provided in the Plan. The Board shall have authority, subject to the express provisions of the Plan, to construe Restricted Stock Agreements, Option Agreements and the Plan, to prescribe, amend and rescind rules and regulations relating to the Plan, to determine the terms and provisions of Restricted Stock Agreements and Option Agreements, and to make all other determinations in the judgment of the Board necessary or desirable for the administration of the Plan. The Board may correct any defect or supply any omission or reconcile any inconsistency in the Plan or in any Restricted Stock Agreement or Option Agreement in the manner and to the extent it shall deem expedient to carry the Plan into effect and it shall be the sole and final judge of such expediency. No director or person acting pursuant to authority delegated by the Board shall be liable for any action or determination under the Plan made in good faith. The Board may, to the full extent permitted by or consistent with applicable laws or regulations, delegate any or all of its powers under the Plan to a committee (the "Committee") appointed by the Board, and if the Committee is so appointed, to the extent of such delegation, all references to the Board in the Plan shall mean and relate to such Committee, other than references to the Board in this sentence and in Section 18 (as to amendment or termination of the Plan) and Section 22.

3. Eligibility.

Options may be granted, and Restricted Stock may be issued, to persons who are, at the time of such grant or issuance, employees, officers or directors of, or consultants or advisors to, the Company; *provided*, that the class of persons to whom Incentive Stock Options may be granted shall be limited to employees of the Company.

3.1 **10% Shareholder.** If any employee to whom an Incentive Stock Option is to be granted is, at the time of the grant of such Option, the owner of stock possessing more than 10% of the total combined voting power of all classes of stock of the Company (after taking into account the attribution of stock ownership rules of Section 424(d) of the Code) (a "Greater Than 10% Shareholder"), any Incentive Stock Option granted to such individual must: (i) have an exercise price per share of not less than 110% of the fair market value of one share of Common Stock at the time of grant; and (ii) expire by its terms not more than five years from the date of grant.

4. Stock Subject to Plan.

Subject to adjustment as provided in Section 14.2 below, the maximum number of shares of Common Stock which may be issued under the Plan is 16,975,000 shares, all of which may be issued with respect to Incentive Stock Options. If an Option shall expire or terminate for any

reason without having been exercised in full, the unpurchased shares subject to such Option shall again be available for subsequent Option grants or Restricted Stock Awards under the Plan. If shares of Restricted Stock shall be forfeited to, or otherwise repurchased by, the Company pursuant to a Restricted Stock Agreement, such repurchased shares shall again be available for subsequent Option grants or Restricted Stock Awards under the Plan. If shares otherwise issuable upon exercise of an Option are withheld by the Company in payment of the exercise price of an Option or to satisfy tax withholding obligations with respect to such exercise, such withheld shares shall again be available for subsequent Option grants or Restricted Stock Awards under the Plan.

5. Forms of Restricted Stock Agreements and Option Agreements.

5 .1 **Option Agreement.** Each recipient of an Option shall execute an option agreement ("Option Agreement") in such form not inconsistent with the Plan as may be approved by the Board of Directors. Such Option Agreements may differ among recipients.

5.2 **Restricted Stock Agreement.** Each recipient of a grant of Restricted Stock shall execute an agreement ("Restricted Stock Agreement") in such form not inconsistent with the Plan as may be approved by the Board of Directors. Such Restricted Stock Agreements may differ among recipients.

5.3 **"Lock-Up" Agreement.** Unless the Board specifies otherwise, each Restricted Stock Agreement and Option Agreement shall provide that upon the request of the Company or the managing underwriter(s) of any offering of securities of the Company that is the subject of a registration statement filed under the United States Securities Act of 1933, as amended from time to time (the "Act"), the holder of any Option or the purchaser of any Restricted Stock shall, in connection therewith, agree in writing (in such form as the Company or such managing underwriter(s) shall request) to the general effect that for a period of time (not to exceed 180 days, plus such additional number of days (not to exceed 35) as may reasonably be requested to enable the underwriter(s) of such offering to comply with Rule 271l(f) of the Financial Industry Regulatory Authority or any amendment or successor thereto) from the effective date of the registration statement under the Act for such offering, the holder or purchaser will not sell, make any short sale of, loan, grant any option for the purchase of, or otherwise dispose of any shares of the common stock of the Company owned or controlled by him or her.

6. Purchase Price.

6.1 **General.** The purchase price per share of Restricted Stock and per share of stock deliverable upon the exercise of an Option shall be determined by the Board, provided, however, that in the case of any Option, the exercise price shall not be less than 100% of the fair market value of such stock, as determined by the Board, at the time of grant of such Option, or less than 110% of such fair market value in the case of any Incentive Stock Option granted to a Greater Than 10% Shareholder.

6.2 **Payment of Purchase Price.** Option Agreements may provide for the payment of the exercise price by delivery of cash or a check to the order of the Company in an amount equal to the exercise price of such Options, or, to the extent provided in the applicable Option Agreement, ·by one of the following methods:

(i) with the consent of the Board, by delivery to the Company of shares of Common Stock; such surrendered shares shall have a fair market value equal in amount to the exercise price of the Options being exercised,

(ii) with the consent of the Board, a personal recourse note issued by the optionee to the Company in a principal amount equal to such aggregate exercise price and with such other terms, including interest rate and maturity, as the Company may determine in its discretion; provided, however, that the interest rate borne by such note shall not be less than the lowest applicable federal rate, as defined in Section 1274(d) of the Code,

(iii) with the consent of the Board, if the class of Common Stock is registered under the Securities Exchange Act of 1934 at such time, subject to rules as may be established by the Board, by delivery to the Company of a properly executed exercise notice along with irrevocable instructions to a broker to promptly deliver to the Company cash or a check payable and acceptable to the Company for the purchase price,

(iv) with the consent of the Board, by reducing the number of Option shares otherwise issuable to the optionee upon exercise of the Option by a number of shares of Common Stock having a fair market value equal to such aggregate exercise price,

(v) with the consent of the Board, by any combination of such methods of payment.

The fair market value of any shares of Common Stock or other non-cash consideration which may be delivered upon exercise of an Option shall be determined by the Board of Directors. Restricted Stock Agreements may provide for the payment of any purchase price in any manner approved by the Board of Directors at the time of authorizing the issuance thereof.

7. Option Period.

Notwithstanding any other provision of the Plan or any Option Agreement, each Option and all rights thereunder shall expire on the date specified in the applicable Option Agreement, provided that such date shall not be later than ten years after the date on which the Option is granted (or five years in the case of an Incentive Stock Option granted to a Greater Than 10% Shareholder), and in either case, shall be subject to earlier termination as provided in the Plan or Option Agreement.

8. Exercise of Options.

8.1 **General.** Each Option shall be exercisable either in full or in installments at such time or times and during such period as shall be set forth in the Option Agreement evidencing such Option, subject to the provisions of the Plan. To the extent not exercised, installments shall accumulate and be exercisable, in whole or in part, at any time after becoming exercisable, but not later than the date the Option expires.

8.2 **Notice of Exercise.** An Option may be exercised by the optionee by delivering to the Company on any business day a written notice specifying the number of shares of Common Stock the optionee then desires to purchase and specifying the address to which the certificates for such shares are to be mailed (the "Notice"), accompanied by payment for such shares. In addition, the Company may require any individual to whom an Option is granted, as a condition of exercising such Option, to give written assurances (the "Investment Letter") in a substance and form satisfactory to the Company to the effect that such individual is acquiring the Common Stock subject to the Option for his or her own account for investment and not with a view to the resale or distribution thereof, and to such other effects as the Company deems necessary or advisable in order to comply with any securities law(s).

8.3 **Delivery.** As promptly as practicable after receipt of the Notice, the Investment Letter (if required) and payment, the Company shall deliver or cause to be delivered to the optionee certificates for the number of shares with respect to which such Option has been so exercised, issued in the optionee's name; provided, however, that such delivery shall be deemed effected for all purposes when the Company or a stock transfer agent shall have deposited such certificates in the United States mail, addressed to the optionee, at the address specified in the Notice.

9. Nontransferability of Options.

No Option shall be assignable or transferable by the person to whom it is granted, either voluntarily or by operation of law, except by will or the laws of descent and distribution. During the life of an optionee, an Option shall be exercisable only by the optionee.

10. Termination of Employment; Disability; Death. Except as may be otherwise expressly provided in the terms and conditions of the Option Agreement, Options shall terminate on the earliest to occur of:

(i) the date of expiration thereof;

(ii) 0 days after termination of the optionee's employment with, or provision of services to, the Company by the Company for Cause (as hereinafter defined);

(iii) 90 days after the date of voluntary termination of the optionee's employment with, or provision of services to, the Company by the optionee (other than for death or permanent disability as defined below); or

(iv) 90 days after the date of termination of the optionee's employment with, or provision of services to, the Company by the Company without Cause (other than for death or permanent disability as defined below).

Until the date on which the Option so expires, the optionee may exercise that portion of his or her Option which is exercisable at the time of termination of the employment or service relationship.

An employment or service relationship between the Company and the optionee shall be deemed to exist during any period during which the optionee is employed by or providing services to the Company. Whether an authorized leave of absence or an absence due to military or government service shall constitute termination of the employment relationship between the Company and the optionee shall be determined by the Board at the time thereof.

For purposes of this Section 10, the term "Cause" shall mean (a) any material breach by the optionee of any agreement to which the optionee and the Company are both parties, (b) any act (other than retirement) or omission to act by the optionee which may have a material and adverse effect on the Company's business or on the optionee's ability to perform services for the Company, including, without limitation, the commission of any crime (other than minor traffic violations), or (c) any material misconduct or material neglect of duties by the optionee in connection with the business or affairs of the Company. An optionee's employment shall be deemed to have been terminated for Cause if the Company determines within thirty (30) days of the termination of employment (whether such termination was voluntary or involuntary) that termination for Cause was warranted.

In the event of the permanent and total disability or death of an optionee while in an employment or other relationship with the Company, any Option held by such optionee shall terminate on the earlier of the date of expiration of the Option or one year following the date of such disability or death. After disability or death, the optionee (or in the case of death, his or her executor, administrator or any person or persons to whom this option may be transferred by will or by laws of descent and distribution) shall have the right, at any time prior to such termination of an Option, to exercise the Option to the extent the optionee was entitled to exercise such Option as of the date of his or her disability or death. An optionee is permanently and totally disabled if he or she is unable to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment which can be expected to last for a continuous period of not less than 12 months; permanent and total disability shall be determined in accordance with Section 22(e)(3) of the Code and the regulations issued thereunder.

11. Rights as a Shareholder. The holder of an Option shall have no rights as a shareholder with respect to any shares covered by the Option (including, without limitation, any rights to receive dividends or non-cash distributions with respect to such shares) until the date of issue of a stock certificate to him or her for such shares. No adjustment shall be made for dividends or other rights for which the record date is prior to the date such stock certificate is issued.

12. Additional Provisions. The Board of Directors may, in its sole discretion, include additional provisions in Restricted Stock Agreements and Option Agreements, including, without limitation, restrictions on transfer, rights of the Company to repurchase shares of Restricted Stock or shares of Common Stock acquired upon exercise of Options, commitments to pay cash bonuses, to make, arrange for or guaranty loans or to transfer other property to optionees upon exercise of Options, or such other provisions as shall be determined by the Board

of Directors; *provided that* such additional provisions shall not be inconsistent with any other term or condition of the Plan and such additional provisions shall not be such as to cause any Incentive Stock Option to fail to qualify as an Incentive Stock Option within the meaning of Section 422 of the Code.

13. Acceleration, Extension, Etc. The Board of Directors may, in its sole discretion, (i) accelerate the date or dates on which all or any particular Option or Options may be exercised or (ii) extend the period or periods of time during which all, or any particular, Option or Options may be exercised.

14. Adjustment Upon Changes in Capitalization

14.1 **No Effect of Options upon Certain Corporate Transactions.** The existence of outstanding Options shall not affect in any way the right or power of the Company to make or authorize any or all adjustments, recapitalizations, reorganizations or other changes in the Company's capital structure or its business, or any merger or consolidation, or any issue of Common Stock, or any issue of bonds, debentures, preferred or prior preference stock ahead of or affecting the Common Stock or the rights thereof, or the dissolution or liquidation of the Company, or any sale or transfer of all or any part of its assets or business, or any other corporate act or proceeding, whether of a similar character or otherwise.

14.2 **Adjustment Provisions.** If, through or as a result of any merger, consolidation, sale of all or substantially all of the assets of the Company, reorganization, recapitalization, reclassification, stock dividend, stock split, reverse stock split or other similar transaction, (i) the outstanding shares of Common Stock are increased, decreased or exchanged for a different number or kind of shares or other securities of the Company, or (ii) additional shares, or new or different shares or other securities of the Company or other non-cash assets are distributed with respect to such shares of Common Stock or other securities, an appropriate and proportionate adjustment shall be made in (x) the maximum number and kind of shares reserved for issuance under the Plan, (y) the number and kind of shares or other securities subject to any then outstanding Options, and (z) the price for each share or other security subject to any then outstanding Options, so that upon exercise of such Options, in lieu of the shares of Common Stock for which such Options were then exercisable, the relevant optionee shall be entitled to receive, for the same aggregate consideration, the same total number and kind of shares or other securities, cash or property that the owner of an equal number of outstanding shares of Common Stock immediately prior to the event requiring adjustment would own as a result of the event. If any such event shall occur, appropriate adjustment shall also be made in the application of the provisions of this Section 14 and Section 15 with respect to Options and the rights of optionees after the event so that the provisions of such Sections shall be applicable after the event and be as nearly equivalent as practicable in operation after the event as they were before the event.

14.3 **No Adjustment in Certain Cases.** Except as hereinbefore expressly provided, the issue by the Company of shares of stock of any class, or securities convertible into shares of stock of any class, for cash or property or for labor or services, either upon direct sale or upon the exercise of rights or warrants to subscribe therefor, or upon conversion of shares or obligations of the Company convertible into such shares or other securities, shall not affect, and no adjustment by reason thereof shall be made with respect to, the number or price of shares of Common Stock then subject to outstanding options.

14.4 **Board Authority to Make Adjustments.** Any adjustments under this Section 14 will be made by the Board of Directors, whose determination as to what adjustments, if any, will be made and the extent thereof will be final, binding and conclusive. No fractional shares will be issued under the Plan on account of any such adjustments.

15. Effect of Certain Transactions

15 .1 **General.** Except as provided in any Option Agreement or Restricted Stock Agreement to the contrary, if the Company is merged with or into or consolidated with another corporation under circumstances where the stockholders of the Company immediately prior to such merger or consolidation do not own after such merger or consolidation shares representing at least fifty percent (50%) of the voting power of the Company or the surviving or resulting corporation, as the case may be, or if shares representing fifty percent (50%) or more of the voting power of the Company are transferred to an Unrelated Third Party, as hereinafter defined, or if the Company is liquidated, or sells or otherwise disposes of all or substantially all its assets (each such transaction is referred to herein as a "Change in Control Transaction"), the Board, or the board of directors of any corporation assuming the obligations of the Company, may, in its discretion, take any one or more of the following actions, as to some or all outstanding Options or Restricted Stock Awards (and need not take the same action as to each such Option or Restricted Stock Award): (i) provide that such Options shall be assumed, or equivalent Options shall be substituted, by the acquiring or succeeding corporation (or an affiliate thereof) *provided that* any such Options substituted for Incentive Stock Options shall meet the requirements of Section 424(a) of the Code, (ii) upon written notice to the optionees, provide that all unexercised Options (whether vested or unvested) will terminate immediately prior to the consummation of the Change in Control Transaction unless exercised by the optionee to the extent otherwise then exercisable within a specified period following the date of such notice, (iii) upon written notice to the grantees, provide that all unvested shares of Restricted Stock shall be repurchased at cost, (iv) make or provide for a cash payment to the optionees equal to the difference between (A) the fair market value of the per share consideration (whether cash, securities or other property or any combination of the above) the holder of a share of Common Stock will receive upon consummation of the Change in Control Transaction (the "Per Share Transaction Price") times the number of shares of Common Stock subject to outstanding vested Options (to the extent then exercisable at prices not equal to or in excess of the Per Share Transaction Price) and (B) the aggregate exercise price of such outstanding vested Options, in exchange for the termination of such Options, or (v) provide that all or any outstanding Options shall become exercisable and all or any outstanding Restricted Stock Awards shall vest in part or in full immediately prior to such event. To the extent that any Options are exercisable at a price equal to or in excess of the Per Share Transaction Price, the Board may provide that such Options shall terminate immediately upon the consummation of the Change in Control Transaction without any payment being made to the holders of such Options. "Unrelated Third Party" shall mean any person who is not, on the date of adoption of this Plan by the Board, a holder of stock of any class or preference or any stock option of the Company.

15.2 **Substitute Options.** The Company may grant Options in substitution for options held by employees, officers or directors of, or consultants or advisors to, another corporation who become employees, officers or directors of, or consultants or advisors to, the Company, as the result of a merger or consolidation of the employing corporation with the Company or as a result of the acquisition by the Company of property or stock of the employing corporation. The Company may direct that substitute Options be granted on such terms and conditions as the Board considers appropriate in the circumstances.

15.3 **Restricted Stock.** In the event of a business combination or other transaction of the type detailed in Section 15.1, any securities, cash or other property received in exchange for shares of Restricted Stock shall continue to be governed by the provisions of any Restricted Stock Agreement pursuant to which they were issued, including any provision regarding vesting, and such securities, cash, or other property may be held in escrow on such terms as the Board of Directors may direct, to insure compliance with the terms of any such Restricted Stock Agreement.

16. No Special Employment Rights. Nothing contained in the Plan or in any Option Agreement or Restricted Stock Agreement shall confer upon any optionee or holder of Restricted Stock any right with respect to the continuation of his or her employment by the Company or interfere in any way with the right of the Company at any time to terminate such employment or to increase or decrease his or her compensation.

17. Other Employee Benefits. The amount of any compensation deemed to be received by an employee as a result of the issuance of shares of Restricted Stock or the grant or exercise of an Option or the sale of shares received upon issuance of a Restricted Stock Award or exercise of an Option will not constitute compensation with respect to which any other employee benefits of such employee are determined, including, without limitation, benefits under any bonus, pension, profit-sharing, life insurance or salary continuation plan, except as otherwise specifically determined by the Board of Directors.

18. Amendment of the Plan.

18.1 The Board may at any time, and from time to time, modify or amend in any respect or terminate the Plan. If shareholder approval is not obtained within twelve months after any amendment increasing the number of shares authorized under the Plan or changing the class of persons eligible to receive Options under the Plan, no Options granted pursuant to such amendments shall be deemed to be Incentive Stock Options and no Incentive Stock Options shall be issued pursuant to such amendments thereafter.

18.2 The termination or any modification or amendment of the Plan shall not, without the consent of an optionee or the holder of Restricted Stock, adversely affect his or her rights under an Option or Restricted Stock Award previously granted to him or her. With the consent of the recipient of Restricted Stock or optionee affected, the Board may amend outstanding Restricted Stock Agreements or Option Agreements in a manner not inconsistent with the Plan.

19. Withholding. The Company shall have the right to deduct from payments of any kind otherwise due to the optionee or recipient of Restricted Stock, any federal, state or local taxes of any kind required by law to be withheld with respect to issuance of any shares of Restricted Stock or shares issued upon exercise of Options. Prior to delivery of any Common Stock pursuant to the terms of this Plan, the Board has the right to require that the optionee or recipient of Restricted Stock remit to the Company an amount sufficient to satisfy any minimum tax withholding obligation. Subject to the prior approval of the Company, which may be withheld by the Company in its sole discretion, the obligor may elect to satisfy any minimum withholding obligations, in whole or in part, (i) by causing the Company to withhold shares of Common Stock otherwise issuable, or (ii) by delivering to the Company a sufficient number of shares of Common Stock. The shares so withheld shall have a fair market value equal to such minimum withholding obligation. The fair market value of the shares used to satisfy such minimum withholding obligation shall be determined by the Company as of the date that the amount of tax to be withheld is to be determined. A person who has made an election pursuant to this Section 19 may only satisfy his or her withholding obligation with shares of Common Stock which are not subject to any repurchase, forfeiture, unfulfilled vesting or other similar restrictions.

20. Effective Date and Duration of the Plan.

20.1 **Effective Date.** The Plan shall become effective when adopted by the Board of Directors. If shareholder approval is not obtained within twelve months after the date of the Board's adoption of the Plan, no Options previously granted under the Plan shall be deemed to be Incentive Stock Options and no Incentive Stock Options shall be granted thereafter. Amendments to the Plan not requiring shareholder approval shall become effective when adopted by the Board. Amendments requiring shareholder approval shall become effective when adopted by the Board, but if shareholder approval is not obtained within twelve months of the Board's adoption of such amendment, any Incentive Stock Options granted pursuant to such amendment shall be deemed to be non-statutory Options provided that such Options are authorized by the Plan. Subject to this limitation, Options may be granted under the Plan at any time after the effective date and before the date fixed for termination of the Plan.

20.2 **Termination.** Unless sooner terminated by action of the Board of Directors, the Plan shall terminate upon the close of business on the day next preceding the tenth anniversary of the date of its adoption by the Board of Directors.

21. Provision for Foreign Participants. The Board of Directors may, without amending the Plan, modify the terms of Option Agreements or Restricted Stock Agreements to differ from those specified in the Plan with respect to participants who are foreign nationals or employed outside the United States to recognize differences in laws, rules, regulations or customs of such foreign jurisdictions with respect to tax, securities, currency, employee benefit or other matters.

22. Requirements of Law. The Company shall not be required to sell or issue any shares under any Option or Restricted Stock Award if the issuance of such shares shall constitute a violation by the optionee, the Restricted Stock Award recipient, or by the Company of any provision of any law or regulation of any governmental authority. In addition, in connection with the Act, the Company shall not be required to issue any shares upon exercise of any Option unless the Company has received evidence satisfactory to it to the effect that the holder of such Option will not transfer such shares except pursuant to a registration statement in effect under the Act or unless an opinion of counsel satisfactory to the Company has been received by the Company to the effect that such registration is not required in connection with any such transfer. Any determination in this connection by the Board shall be final, binding and conclusive. In the event the shares issuable on exercise of an Option are not registered under the Act or under the securities laws of each relevant state or other jurisdiction, the Company may imprint on the certificate(s) appropriate legends that counsel for the Company considers necessary or advisable to comply with the Act or any such state or other securities law. The Company may register, but in no event shall be obligated to register, any securities covered by the Plan pursuant to the Act; and in the event any shares are so registered the Company may remove any legend on certificates representing such shares. The Company shall not be obligated to take any affirmative action in order to cause the exercise of an Option, the grant of any Restricted Stock Award or the issuance of shares pursuant thereto to comply with any law or regulation of any governmental authority.

23. Conversion of Incentive Stock Options into Non-Qualified Options; Termination. The Board of Directors, with the consent of any optionee, may in its discretion take such actions as may be necessary to convert such optionee's Incentive Stock Options (or any installments or portions of installments thereof) that have not been exercised on the date of conversion into non-statutory Options at any time prior to the expiration of such Incentive Stock Options, regardless of whether the optionee is an employee of the Company or a parent or subsidiary of the Company at the time of such conversion. At the time of such conversion, the Board of Directors (with the consent of the optionee) may impose such conditions on the exercise of the resulting non-statutory Options as the Board of Directors in its discretion may determine, provided that such conditions shall not be inconsistent with this Plan. Nothing in this Plan shall be deemed to give any optionee the right to have such optionee's Incentive Stock Options converted into non-statutory Options, and no such conversion shall occur until and unless the Board of Directors takes appropriate action. The Board of Directors, with the consent of the optionee, may also terminate any portion of any Incentive Stock Option that has not been exercised at the time of such termination.

24. Non-Exclusivity of this Plan; Non-Uniform Determinations. Neither the adoption of this Plan by the Board of Directors nor the approval of this Plan by the stockholders of the Company shall be construed as creating any limitations on the power of the Board of Directors to adopt such other incentive arrangements as it may deem desirable, including, without limitation, the granting of stock options otherwise than under this Plan, and such arrangements may be either applicable generally or only in specific cases.

The determinations of the Board of Directors under this Plan need not be uniform and may be made by it selectively among persons who receive or are eligible to receive Options or Restricted Stock Awards under this Plan (whether or not such persons are similarly situated). Without limiting the generality of the foregoing, the Board of Directors shall be entitled, among

other things, to make non-uniform and selective determinations, and to enter into non-uniform and selective Option Agreements and Restricted Stock Agreements, as to (a) the persons to receive Options or Restricted Stock Awards under this Plan, (b) the terms and provisions of Options or Restricted Stock A wards, (c) the exercise by the Board of Directors of its discretion in respect of the exercise of Options pursuant to the terms of this Plan, and (d) the treatment of leaves of absence pursuant to Section 10 hereof.

25. Governing Law. This Plan and each Option or Restricted Stock Award shall be governed by the laws of Delaware, without regard to its principles of conflicts of law.

APPENDIX A
TO HOMOLOGY MEDICINES, INC. 2015 STOCK INCENTIVE PLAN
FOR CALIFORNIA RESIDENTS ONLY

This Appendix to the Homology Medicines, Inc. 2015 Stock Incentive Plan (the "Plan") shall have application only to participants in the Plan who are residents of the State of California. Capitalized terms contained herein shall have the same meanings given to them in the Plan, unless otherwise provided in this Appendix. **Notwithstanding any provision contained in the Plan to the contrary and to the extent required by applicable law, the following terms and conditions shall apply to all Options and Restricted Stock Awards (collectively "Awards") granted to residents of the State of California, until such time as the Common Stock becomes subject to registration under the Securities Act of 1933:**

1. Awards shall be nontransferable other than by will or the laws of descent and distribution. Notwithstanding the foregoing, and to the extent permitted by Section 422 of the Code, the Board, in its discretion, may permit distribution of an Award to an inter vivos or testamentary trust in which the Award is to be passed to beneficiaries upon the death of the trustor (settler), or by gift to "immediate family" as that term is defined in Rule 16a-l(e) of the United States Exchange Act of 1934.

2. Unless employment is terminated for Cause, the right to exercise an Option in the event of termination of employment, to the extent that the optionee is otherwise entitled to exercise an Option on the date employment terminates, shall be

(a) at least six months from the date of termination of employment if termination was caused by death or permanent disability; and

(b) at least 30 days from the date of termination if termination of employment was caused by other than death or permanent disability;

(c) but in no event later than the remaining term of the Option.

3. Any Award exercised before shareholder approval is obtained shall be rescinded if shareholder approval is not obtained within 12 months of the Board's adoption of the Plan.

INCENTIVE STOCK OPTION
Granted by
Homology Medicines, Inc. (the "Company")
Under the 2015 Stock Incentive Plan

This Option is and shall be subject in every respect to the provisions of the Company's 2015 Stock Incentive Plan, as amended from time to time (the "Plan"), which is incorporated herein by reference and made a part hereof. The holder of this Option (the "Holder") hereby accepts this Option subject to all the terms and provisions of the Plan and agrees that (a) in the event of any conflict between the terms hereof and those of the Plan, the latter shall prevail, and (b) all decisions under and interpretations of the Plan by the Board or the Committee shall be final, binding and conclusive upon the Holder and his or her heirs and legal representatives.

1. **Name of Holder:**

2. **Date of Grant:**

3. **Vesting Start Date:**

4. **Maximum number of shares for which this Option is exercisable:**

5. **Exercise (purchase) price per share:** ***[Note: must be at least fair market value, or 110% of fair market value in case of ISO granted to Greater Than 10% Shareholder]***

6. **Method of Exercise:** This Option may be exercised by the delivery of written notice to the Company setting forth the number of shares with respect to which the Option is to be exercised, together with payment by one of the following methods:

   cash or a personal, certified or bank check or postal money order payable to the order of the Company for an amount equal to the exercise price of the shares being purchased; or

   with the consent of the Company, any of the other methods set forth in the Plan.

   As an additional condition to exercise of this Option, the Holder shall deliver to the Company an investment letter in form and substance satisfactory to the Company and its counsel. No such investment letter shall be required as a condition to such exercise at any time when there shall be an effective registration statement under the Securities Act of 1933, as amended (the "Act") covering the shares for which this Option may be exercised.

7. **Expiration Date of Option:** ***[Note: for ISO, cannot be longer than 10 years from date of grant, or 5 years in case of a Greater Than 10% Shareholder]***

8. **Vesting Schedule:** ***[Note: Company to elect vesting schedule; following is an example of a standard vesting provision]*** This Option shall become exercisable for 25% of the maximum number of shares granted on the first anniversary of the Vesting Start Date, and shall become exercisable for an additional 2.0833% of the maximum number of shares granted on the last day of each one month period thereafter; so that the Option shall be fully vested on the fourth anniversary of the Vesting Start Date. All vesting shall cease upon the date of termination of employment.

   In addition to the foregoing, upon the Holder's election at any time after the Date of Grant of this Option, the Holder shall be entitled to exercise this Option immediately and in full for the maximum number of shares as set forth herein, whether or not fully vested, provided that, upon such exercise, the Holder shall execute a stock restriction agreement containing a "reverse vesting" schedule effectively equivalent to the Vesting Schedule set forth herein, pursuant to which the Holder agrees to sell back any unvested shares at cost should he or she leave the employ of the Company prior to full vesting. Early exercise of this Option in accordance with the preceding sentence may have adverse tax implications, including the loss of potential tax benefits otherwise available to holders of incentive stock options, and the Holder is advised to consult his or her personal tax advisor prior to making any such election.

9. **Termination of Employment.** This Option shall terminate on the earliest to occur of:

   (i) the date of expiration hereof;

   (ii) 0 days after termination of the Holder's employment with the Company by the Company for Cause (as defined in the Plan);

   (iii) 90 days after the date of voluntary termination of employment by the Holder (other than for death or permanent and total disability as defined in the Plan);

   (iv) 90 days after the date of termination of the Holder's employment with the Company by the Company without Cause (other than for death or permanent and total disability as defined in the Plan); or

   (v) one year after the "permanent and total disability" (as defined at Section 10 of the Plan) or death of the Holder.

10. **Company's Right of First Refusal.** Prior to the effective date of a registration statement under the Act, any shares of stock issued pursuant to exercise of this Option shall be subject to the Company's right of first refusal as set forth at Appendix A.

11. **Lock-Up Agreement.** The Holder agrees that upon the request of the Company or the managing underwriter(s) of any offering of securities of the Company that is the subject of a registration statement filed under the Act, for a period of time (not to exceed 180 days, plus such additional number of days (not to exceed 35) as may reasonably be requested to enable the underwriter(s) of such offering to comply with Rule 2711(f) of the Financial Industry Regulatory Authority or any amendment or successor thereto)

from the effective date of the registration statement under the Act for such offering, the Holder will not sell, make any short sale of, loan, grant any option for the purchase of, or otherwise dispose of any shares of Common Stock issued pursuant to the exercise of this Option, without the prior written consent of the Company and such underwriters.

12. **Incentive Stock Option; Disqualifying Disposition.** Although this Option is intended to qualify as an incentive stock option under the Internal Revenue Code of 1986 (the "Code"), the Company makes no representation as to the tax treatment upon exercise of this Option or sale or other disposition of the shares covered by this Option, and the Holder is advised to consult a personal tax advisor. Upon a Disqualifying Disposition of shares received upon exercise of this Option, the Holder will forfeit the favorable income tax treatment otherwise available with respect to the exercise of this Option. A "Disqualifying Disposition" shall have the meaning specified in Section 421(b) of the Code; as of the date of grant of this Option a Disqualifying Disposition is any disposition (including any sale) of such shares before the later of (a) the second anniversary of the date of grant of this Option and (b) the first anniversary of the date on which the Holder acquired such shares by exercising this Option, *provided* that such holding period requirements terminate upon the death of the Holder. The Holder shall notify the Company in writing immediately upon making a Disqualifying Disposition of any shares of Common Stock received pursuant to the exercise of this Option, and shall provide the Company with any information that the Company shall request concerning any such Disqualifying Disposition.

13. **Notice.** Any notice to be given to the Company hereunder shall be deemed sufficient if addressed to the Company and delivered to the office of the Company, Homology Medicines, Inc., c/o 5AM Ventures, Waltham Woods Corporate Center, 890 Winter Street, Suite 140, Waltham, MA 02451, attention of the president, or such other address as the Company may hereafter designate.

Any notice to be given to the Holder hereunder shall be deemed sufficient if addressed to and delivered in person to the Holder at his or her address furnished to the Company or when deposited in the mail, postage prepaid, addressed to the Holder at such address.

*** * * * ***

IN WITNESS WHEREOF, the parties have executed this Option, or caused this Option to be executed, as of the Date of Grant.

Homology Medicines, Inc.

By: _____

The undersigned Holder hereby acknowledges receipt of a copy of the Plan and this Option (including Appendix A hereto), and agrees to the terms of this Option and the Plan.

Holder:

Right of First Refusal

1. General. Prior to the effective date of a registration statement under the Securities Act of 1933, as amended (the "Act"), covering any shares of the Company's Common Stock and until such time as the Company shall have effected a public offering of its Common Stock registered under the Act, in the event that, at any time when the Holder (which term for purposes of this section shall mean the Holder and his or her executors, administrators and any other person to whom this Option may be transferred by will or the laws of descent and distribution) is permitted to do so, the Holder desires to sell, assign or otherwise transfer any of the shares issued upon the exercise of this Option, the Holder shall first offer such shares to the Company by giving written notice of the Holder's desire so to sell, assign or transfer such shares.

2. Notice of Intended Transfer. The notice shall state the number of shares offered, the name of the person or persons to whom it is proposed to sell, assign or transfer such shares and the price at which such shares are intended to be sold, assigned or transferred. Such notice shall constitute an offer to the Company for the Company to purchase the number of shares set forth in the notice at a price per share equal to the price stated therein.

3. Company to Accept or Decline Within 30 Days. The Company may accept the offer as to all, but not less than all, such shares by notifying the Holder in writing within 30 days after receipt of such notice of its acceptance of the offer. If the offer is accepted, the Company shall have 60 days after such acceptance within which to purchase the offered shares at a price per share as aforesaid. If within the applicable time periods the Holder does not receive notice of the Company's intention to purchase the offered shares, or if payment in full of the purchase price is not made by the Company, the offer shall be deemed to have been rejected and the Holder may transfer title to such shares within 90 days from the date of the Holder's written notice to the Company of the Holder's intention to sell, but such transfer shall be made only to the proposed transferee and at the proposed price as stated in such notice and after compliance with any other provisions of this Option applicable to the transfer of such shares.

4. Transferred Shares to Remain Subject to Right of First Refusal. Shares that are so transferred to such transferee shall remain subject to the rights of the Company set forth in this Appendix A. As a condition to such transfer, such transferee shall execute and deliver all such documents as the Company may require to evidence the binding agreement of such transferee so to remain subject to the rights of the Company.

5. Remedies of Company. No sale, assignment, pledge or other transfer of any of the shares covered by this Option shall be effective or given effect on the books of the Company unless all of the applicable provisions of this Appendix A have been duly complied with, and the Company may inscribe on the face of any certificate representing any of such shares a legend referring to the provisions of this Appendix A. If any transfer of shares is made or attempted in violation of the foregoing restrictions, or if shares are not offered to the Company as required hereby, the Company shall have the right to purchase such shares from the owner thereof or his transferee at any time before or after the transfer, as herein provided. In addition to

any other legal or equitable remedies which it may have, the Company may enforce its rights by actions for specific performance (to the extent permitted by law) and may refuse to recognize any transferee as one of its stockholders for any purpose, including, without limitation, for purposes of dividend and voting rights, until all applicable provisions hereof have been complied with.

6. Shares Subject to Right of First Refusal. For purposes of the Right of First Refusal pursuant to this Appendix A, the term "shares" shall mean any and all new, substituted or additional securities or other property issued to the Holder, by reason of his or her ownership of Common Stock pursuant to the exercise of this Option, in connection with any stock dividend, liquidating dividend, stock split or other change in the character or amount of any of the outstanding securities of the Company, or any consolidation, merger or sale of all or substantially all of the assets of the Company.

7. Legends on Stock Certificates. Any certificate representing shares of stock subject to the provisions of this Appendix A may have endorsed thereon one or more legends, substantially as follows:

(i) "Any disposition of any interest in the securities represented by this certificate is subject to restrictions, and the securities represented by this certificate are subject to certain options, contained in a certain agreement between the record holder hereof and the Company, a copy of which will be mailed to any holder of this certificate without charge upon receipt by the Company of a written request therefor."

(ii) "The shares of stock represented by this certificate have not been registered under the Securities Act of 1933 or under the securities laws of any state and may not be pledged, hypothecated, sold or otherwise transferred unless such shares have been registered under the Act or unless the Company has received an opinion of counsel satisfactory to the Company, in form and substance satisfactory to the Company, that such registration is not required."

8. Right of First Refusal to Lapse Upon Registration. The restrictions imposed by this Appendix A shall terminate in all respects upon the effective date of a registration statement under the Act covering any of the Company's Common Stock.

NON-STATUTORY STOCK OPTION

Granted by

Homology Medicines, Inc. (the "Company")

Under the 2015 Stock Incentive Plan

This Option is and shall be subject in every respect to the provisions of the Company's 2015 Stock Incentive Plan, as amended from time to time (the "Plan"), which is incorporated herein by reference and made a part hereof. The holder of this Option (the "Holder") hereby accepts this Option subject to all the terms and provisions of the Plan and agrees that (a) in the event of any conflict between the terms hereof and those of the Plan, the latter shall prevail, and (b) all decisions under and interpretations of the Plan by the Board or the Committee shall be final, binding and conclusive upon the Holder and his or her heirs and legal representatives.

1. **Name of Holder:**

2. **Date of Grant:**

3. **Vesting Start Date:**

4. **Maximum number of shares for which this Option is exercisable:**

5. **Exercise (purchase) price per share:** ***[must be at least fair market value]***

6. **Method of Exercise:** This Option may be exercised by the delivery of written notice to the Company setting forth the number of shares with respect to which the Option is to be exercised, together with payment by one of the following methods:

   cash or a personal, certified or bank check or postal money order payable to the order of the Company for an amount equal to the exercise price of the shares being purchased; or

   with the consent of the Company, any of the other methods set forth in the Plan.

   As an additional condition to exercise of this Option, the Holder shall deliver to the Company an investment letter in form and substance satisfactory to the Company and its counsel. No such investment letter shall be required as a condition to such exercise at any time when there shall be an effective registration statement under the Securities Act of 1933, as amended (the "Act") covering the shares for which this Option may be exercised.

7. **Expiration Date of Option:**

8. **Vesting Schedule:** ***[Note: Company to elect vesting schedule; following is an example of a standard vesting provision]*** This Option shall become exercisable for 25% of the maximum number of shares granted on the first anniversary of the Vesting Start Date, and shall become exercisable for an additional 2.0833% of the maximum number of shares granted on the last day of each one month period thereafter; so that the Option shall be fully vested on the fourth anniversary of the Vesting Start Date. All vesting shall cease upon the date of termination of employment with or provision of services to the Company.

   In addition to the foregoing, upon the Holder's election at any time after the Date of Grant of this Option, the Holder shall be entitled to exercise this Option immediately and in full for the maximum number of shares as set forth herein, whether or not fully vested, provided that, upon such exercise, the Holder shall execute a stock restriction agreement containing a "reverse vesting" schedule effectively equivalent to the Vesting Schedule set forth herein, pursuant to which the Holder agrees to sell back any unvested shares at cost should he or she leave the service of the Company prior to full vesting.

9. **Termination of Employment with or Services to the Company.** This Option shall terminate on the earliest to occur of:

   (i) the date of expiration thereof;

   (ii) 0 days after termination of the Holder's employment with or services to the Company by the Company for Cause (as defined in the Plan);

   (iii) 90 days after the date of voluntary termination of employment with or services to the Company by the Holder (other than for death or permanent and total disability as defined in the Plan);

   (iv) 90 days after the date of termination of the Holder's employment with or services to the Company by the Company without Cause (other than for death or permanent and total disability as defined in the Plan); or

   (v) one year after the "permanent and total disability" (as defined at Section 10 of the Plan) or death of the Holder.

10. **Company's Right of First Refusal.** Prior to the effective date of a registration statement under the Act, any shares of stock issued pursuant to exercise of this Option shall be subject to the Company's right of first refusal as set forth at Appendix A.

11. **Lock-Up Agreement.** The Holder agrees that upon the request of the Company or the managing underwriter(s) of any offering of securities of the Company that is the subject of a registration statement filed under the Act, for a period of time (not to exceed 180 days, plus such additional number of days (not to exceed 35) as may reasonably be requested to enable the underwriter(s) of such offering to comply with Rule 2711(f) of the Financial Industry Regulatory Authority or any amendment or successor thereto)

from the effective date of the registration statement under the Act for such offering, the Holder will not sell, make any short sale of, loan, grant any option for the purchase of, or otherwise dispose of any shares of Common Stock issued pursuant to the exercise of this Option, without the prior written consent of the Company and such underwriters.

12. **Tax Withholding.** The Company's obligation to deliver shares shall be subject to the Holder's satisfaction of any federal, state and local income and employment tax withholding requirements.

13. **Notice.** Any notice to be given to the Company hereunder shall be deemed sufficient if addressed to the Company and delivered to the office of the Company, Homology Medicines, Inc., c/o 5AM Ventures, Waltham Woods Corporate Center, 890 Winter Street, Suite 140, Waltham, MA 02451, attention of the president, or such other address as the Company may hereafter designate.

Any notice to be given to the Holder hereunder shall be deemed sufficient if addressed to and delivered in person to the Holder at his or her address furnished to the Company or when deposited in the mail, postage prepaid, addressed to the Holder at such address.

*** * * * ***

IN WITNESS WHEREOF, the parties have executed this Option, or caused this Option to be executed, as of the Date of Grant.

Homology Medicines, Inc.

By: _____

The undersigned Holder hereby acknowledges receipt of a copy of the Plan and this Option (including Appendix A hereto), and agrees to the terms of this Option and the Plan.

_____

Holder:

Right of First Refusal

1. General. Prior to the effective date of a registration statement under the Securities Act of 1933, as amended (the "Act"), covering any shares of the Company's Common Stock and until such time as the Company shall have effected a public offering of its Common Stock registered under the Act, in the event that, at any time when the Holder (which term for purposes of this section shall mean the Holder and his or her executors, administrators and any other person to whom this Option may be transferred by will or the laws of descent and distribution) is permitted to do so, the Holder desires to sell, assign or otherwise transfer any of the shares issued upon the exercise of this Option, the Holder shall first offer such shares to the Company by giving written notice of the Holder's desire so to sell, assign or transfer such shares.

2. Notice of Intended Transfer. The notice shall state the number of shares offered, the name of the person or persons to whom it is proposed to sell, assign or transfer such shares and the price at which such shares are intended to be sold, assigned or transferred. Such notice shall constitute an offer to the Company for the Company to purchase the number of shares set forth in the notice at a price per share equal to the price stated therein.

3. Company to Accept or Decline Within 30 Days. The Company may accept the offer as to all, but not less than all, such shares by notifying the Holder in writing within 30 days after receipt of such notice of its acceptance of the offer. If the offer is accepted, the Company shall have 60 days after such acceptance within which to purchase the offered shares at a price per share as aforesaid. If within the applicable time periods the Holder does not receive notice of the Company's intention to purchase the offered shares, or if payment in full of the purchase price is not made by the Company, the offer shall be deemed to have been rejected and the Holder may transfer title to such shares within 90 days from the date of the Holder's written notice to the Company of the Holder's intention to sell, but such transfer shall be made only to the proposed transferee and at the proposed price as stated in such notice and after compliance with any other provisions of this Option applicable to the transfer of such shares.

4. Transferred Shares to Remain Subject to Right of First Refusal. Shares that are so transferred to such transferee shall remain subject to the rights of the Company set forth in this Appendix A. As a condition to such transfer, such transferee shall execute and deliver all such documents as the Company may require to evidence the binding agreement of such transferee so to remain subject to the rights of the Company.

5. Remedies of Company. No sale, assignment, pledge or other transfer of any of the shares covered by this Option shall be effective or given effect on the books of the Company unless all of the applicable provisions of this Appendix A have been duly complied with, and the Company may inscribe on the face of any certificate representing any of such shares a legend referring to the provisions of this Appendix A. If any transfer of shares is made or attempted in violation of the foregoing restrictions, or if shares are not offered to the Company as required hereby, the Company shall have the right to purchase such shares from the owner thereof or his transferee at any time before or after the transfer, as herein provided. In addition to

any other legal or equitable remedies which it may have, the Company may enforce its rights by actions for specific performance (to the extent permitted by law) and may refuse to recognize any transferee as one of its stockholders for any purpose, including, without limitation, for purposes of dividend and voting rights, until all applicable provisions hereof have been complied with.

6. Shares Subject to Right of First Refusal. For purposes of the Right of First Refusal pursuant to this Appendix A, the term "shares" shall mean any and all new, substituted or additional securities or other property issued to the Holder, by reason of his or her ownership of Common Stock pursuant to the exercise of this Option, in connection with any stock dividend, liquidating dividend, stock split or other change in the character or amount of any of the outstanding securities of the Company, or any consolidation, merger or sale of all or substantially all of the assets of the Company.

7. Legends on Stock Certificates. Any certificate representing shares of stock subject to the provisions of this Appendix A may have endorsed thereon one or more legends, substantially as follows:

(i) "Any disposition of any interest in the securities represented by this certificate is subject to restrictions, and the securities represented by this certificate are subject to certain options, contained in a certain agreement between the record holder hereof and the Company, a copy of which will be mailed to any holder of this certificate without charge upon receipt by the Company of a written request therefor."

(ii) "The shares of stock represented by this certificate have not been registered under the Securities Act of 1933 or under the securities laws of any state and may not be pledged, hypothecated, sold or otherwise transferred unless such shares have been registered under the Act or unless the Company has received an opinion of counsel satisfactory to the Company, in form and substance satisfactory to the Company, that such registration is not required."

8. Right of First Refusal to Lapse Upon Registration. The restrictions imposed by this Appendix A shall terminate in all respects upon the effective date of a registration statement under the Act covering any of the Company's Common Stock.

Exhibit 10.5

LEASE AGREEMENT

THIS LEASE AGREEMENT (this **"Lease")** is made this 31st day of August, 2016, between **ARE-MA REGION NO. 24, LLC,** a Delaware limited liability company **("Landlord"),** and **HOMOLOGY MEDICINES, INC.,** a Delaware corporation **("Tenant").**

Building:	45 Wiggins Avenue, Bedford, MA 01730
Premises:	That portion of the Building, containing approximately 23,000 rentable square feet, as determined by Landlord, as shown on **Exhibit A.**
Project:	The real property on which the Building in which the Premises are located, together with all improvements thereon and appurtenances thereto as described on **Exhibit B.**
Base Rent:	$36.00 per rentable square foot of the Premises per year

Rentable Area of Premises: 23,000 sq. ft.

Rentable Area of Building: 38,000 sq. ft.

Rentable Area of Project: 171, 154 sq. ft.

Tenant's Share of Operating Expenses of Building: 60.53%

Building's Share of Operating Expenses of Project: 13.44%

Security Deposit: $276,000

Rent Adjustment Percentage: 3%

Base Term:	Beginning on the Commencement Date and ending 60 months and 14 days from the first day of the first full month after the Rent Commencement Date (as defined in Section 2) hereof.
Permitted Use:	Research and development laboratory, related office, storage, and other related uses consistent with the character of the Project and otherwise in compliance with the provisions of Section 7 hereof.

Address for Rent Payment:
P.O. Box 37526
Baltimore, MD 21297-3526

Landlord's Notice Address:
385 E. Colorado Boulevard, Suite 299
Pasadena, CA 91101
Attention: Corporate Secretary

Tenant's Notice Address
Prior to the Commencement Date:
44 Hartwell Avenue, Suite 102
Lexington, MA 02421
Attention: Sam Rasty

Tenant's Notice Address
As of the Commencement Date:
45 Wiggins Avenue
Bedford, MA 01730
Attention: Sam Rasty

The following Exhibits and Addenda are attached hereto and incorporated herein by this reference:

[X] **EXHIBIT A** - PREMISES DESCRIPTION
[X] **EXHIBIT B**- DESCRIPTION OF PROJECT
[X] **EXHIBIT C** - WORK LETTER
[X] **EXHIBIT D** - COMMENCEMENT DATE
[X] **EXHIBIT E** - RULES AND REGULATIONS
[X] **EXHIBIT F** - TENANT'S PERSONAL PROPERTY
[X] **EXHIBIT G** - INTENTIONALLY OMITTED
[X] **EXHIBIT H** - LANDLORD'S FURNITURE

1. **Lease of Premises.** Upon and subject to all of the terms and conditions hereof, Landlord hereby leases the Premises to Tenant and Tenant hereby leases the Premises from Landlord. The portions of the Project which are for the non-exclusive use of tenants of the Project are collectively referred to herein as the **"Common Areas."** Landlord reserves the right to modify Common Areas, provided that such modifications do not materially adversely affect Tenant's use of the Premises for the Permitted Use. Landlord shall endeavor to provide Tenant with at least 30 days' advance written notice of such modifications.

Tenant acknowledges and agrees that Landlord may, in Landlord's sole and absolute discretion, make significant changes to the exterior landscape, parking areas and ingress/egress routes for the Project **("Site Work"),** which Site Work may include, at Landlord's cost and expense, the removal of the stone from the exterior portion of the Building described on **Exhibit A** attached hereto and the replacement of the stone with glazing (collectively, the **"Building Work").** Tenant acknowledges that Landlord may require access to a portion of the Premises following the Commencement Date in order to perform the Building Work. Landlord and its contractors shall have the right to enter the Premises following the Commencement Date to perform the Building Work. Landlord shall use reasonable efforts to coordinate the Building Work with Tenant in order to minimize interference with Tenant's operations at the Premises in connection with the Building Work. Tenant acknowledges that Landlord's performance of the Site Work and Building Work may adversely affect tenant's use of the Common Areas of the Project and Landlord's performance of the Building Work may adversely affect Tenant's use and occupancy of the Premises. Tenant waives all claims against Landlord in connection with the Site Work and the Building Work including, without limitation, claims for rent abatement. Nothing herein shall obligate Landlord to perform the Site Work or the Building Work.

2. **Delivery; Acceptance of Premises; Commencement Date.** Landlord shall deliver the Premises to Tenant on or before the date that is 2 business days after the mutual execution and delivery of this Lease by the parties, vacant (free of other tenants and occupants), free of all personal property and in broom clean condition for the construction of the Tenant Improvements by Tenant **("Delivery"** or **"Deliver").** As used herein, the term **"Tenant Improvements"** shall have the meaning set forth for such term in the Work Letter.

The **"Commencement Date"** shall be the date Landlord Delivers the Premises to Tenant. The **"Rent Commencement Date"** shall be the earlier of (i) date that is 3 months and 14 days after the Commencement Date, or (ii) the date that Tenant commences doing business in any portion of the Premises. Upon request of Landlord, Tenant shall execute and deliver a written acknowledgment of the Commencement Date, the Rent Commencement Date and the expiration date of the Term when such are established in the form of the "Acknowledgement of Commencement Date" attached to this Lease as **Exhibit D;** provided, however, Tenant's failure to execute and deliver such acknowledgment shall not affect Landlord's rights hereunder. The **"Term"** of this Lease shall be the Base Term, as defined above on the first page of this Lease and the Extension Term which Tenant may elect pursuant to Section 40 hereof.

Except as otherwise expressly set forth in this Lease or in the Work Letter: (i) Tenant shall accept the Premises in their condition as of the Commencement Date, subject to all applicable Legal Requirements (as defined in Section 7 hereof); (ii) Landlord shall have no obligation for any defects in the Premises; and (iii) Tenant's taking possession of the Premises shall be conclusive evidence that Tenant accepts the Premises and that the Premises were in good condition at the time possession was taken. Any occupancy of the Premises by Tenant before the Commencement Date shall be subject to all of the terms and conditions of this Lease, excluding the obligation to pay Base Rent and Operating Expenses.

Notwithstanding anything to the contrary contained herein, for the period of 30 consecutive days after the Commencement Date, Landlord shall, at its sole cost and expense (which shall not constitute an Operating Expense), be responsible for any repairs that are required to be made to the Building or Building Systems (as defined in Section 13), unless Tenant or any Tenant Party was responsible for the cause of such repair, in which case Tenant shall pay the cost.

During the Term, Tenant shall lease from Landlord, for $1.00 per year, the removable furniture located within the Premises as of the date of this Lease and listed on **Exhibit H** attached hereto **("Landlord's Furniture").** Tenant shall have no right to remove any of Landlord's Furniture from the Premises without Landlord's prior written consent and Landlord's Furniture shall be returned to Landlord at the expiration or earlier termination of the Term in substantially the same condition as received by Tenant, except for ordinary wear and tear. Notwithstanding the foregoing, if Tenant elects to exercise its Extension Right pursuant to Section 40, then the ownership of Landlord's Furniture shall be deemed transferred to Tenant and the same shall become Tenant's property as of the first day of the Extension Term.

Tenant agrees and acknowledges that neither Landlord nor any agent of Landlord has made any representation or warranty with respect to the condition of all or any portion of the Premises or the Project, and/or the suitability of the Premises or the Project for the conduct of Tenant's business, and Tenant waives any implied warranty that the Premises or the Project are suitable for the Permitted Use. This Lease constitutes the complete agreement of Landlord and Tenant with respect to the subject matter hereof and supersedes any and all prior representations, inducements, promises, agreements, understandings and negotiations which are not contained herein. Landlord in executing this Lease does so in reliance upon Tenant's representations, warranties, acknowledgments and agreements contained herein.

3. Rent.

(a) **Base Rent**. Base Rent for the month in which the Rent Commencement Date occurs and the Security Deposit shall be due and payable on delivery of an executed copy of this Lease to Landlord. Tenant shall pay to Landlord in advance, without demand, abatement, deduction or set-off, equal monthly installments of Base Rent on or before the first day of each calendar month during the Term hereof, in lawful money of the United States of America, at the office of Landlord for payment of Rent set forth above, or to such other person or at such other place as Landlord may from time to time designate in writing. Payments of Base Rent for any fractional calendar month shall be prorated. The obligation of Tenant to pay Base Rent and other sums to Landlord and the obligations of Landlord under this Lease are independent obligations. Tenant shall have no right at any time to abate, reduce, or set-off any Rent (as defined in Section 5) due hereunder except for any abatement as may be expressly provided in this Lease.

Notwithstanding anything to the contrary contained herein, for the period commencing on the Rent Commencement Date through last day of the 6th month following the Rent Commencement Date, Tenant shall only be required to pay Base Rent in the amount of $18.00 per rentable square foot of the Premises per year. Tenant shall commence paying Base Rent in the amount set forth on page 1 of this Lease on the first day of the 7th month after the Rent Commencement Date.

(b) **Additional Rent**. In addition to Base Rent, Tenant agrees to pay to Landlord as additional rent **(**"**Additional Rent**"**)**: (i) commencing on the Rent Commencement Date, Tenant's Share of "Operating Expenses" (as defined in Section 5), and (ii) any and all other amounts Tenant assumes or agrees to pay under the provisions of this Lease, including, without limitation, any and all other sums that may become due by reason of any default of Tenant or failure to comply with the agreements, terms, covenants and conditions of this Lease to be performed by Tenant, after any applicable notice and cure period.

4. **Base Rent Adjustments**.

(a) **Annual Adjustments**. Base Rent shall be increased on each annual anniversary of the first day of the first full month following the Rent Commencement Date (each an **"Adjustment Date**") by multiplying the Base Rent payable immediately before such Adjustment Date by the Rent Adjustment Percentage and adding the resulting amount to the Base Rent payable immediately before such Adjustment Date. Base Rent, as so adjusted, shall thereafter be due as provided herein. Base Rent adjustments for any fractional calendar month shall be prorated.

(b) **Additional Allowance**. In addition to the Tenant Improvement Allowance (as defined in the Work Letter), Landlord shall, subject to the terms of the Work Letter, make available to Tenant the Additional Tenant Improvement Allowance (as defined in the Work Letter). Commencing on the Rent Commencement Date and continuing thereafter on the first day of each month during the Base Term, Tenant shall pay the amount necessary to fully amortize the portion of the Additional Tenant Improvement Allowance actually funded by Landlord, if any, in equal monthly payments with interest at a rate of 8.5% per annum over the Base Term, which interest shall begin to accrue on the date that Landlord first disburses such Additional Tenant Improvement Allowance or any portion(s) thereof. Any of the Additional Tenant Improvement Allowance and applicable interest remaining unpaid as of the expiration or earlier termination of the Lease shall be paid to Landlord in a lump sum at the expiration or earlier termination of this Lease.

5. **Operating Expense Payments**. Landlord shall deliver to Tenant a written estimate of Operating Expenses for each calendar year during the Term (the "**Annual Estimate**"), which may be revised by Landlord from time to time during such calendar year. During each month of the Term, on the same date that Base Rent is due, Tenant shall pay Landlord an amount equal to 1/12th of Tenant's Share of the Annual Estimate. Payments for any fractional calendar month shall be prorated.

The term "**Operating Expenses**" means all costs and expenses of any kind or description whatsoever incurred or accrued each calendar year by Landlord with respect to the Building (including the Building's Share of all costs and expenses of any kind or description incurred or accrued by Landlord with respect to the Project which are not specific to the Building or any other building located in the Project) (including, without duplication, Taxes (as defined in Section 9), capital repairs and improvements amortized over the lesser of 10 years and the useful life of such capital items, and the costs of Landlord's third party property manager or, if there is no third party property manager, administration rent in the amount of 3.0% of Base Rent), excluding only:

(a) the original construction costs of the Project and renovation prior to the date of the Lease and costs of correcting defects in such original construction or renovation;

(b) capital expenditures for expansion of the Project;

(c) interest, principal payments of Mortgage (as defined in Section 27) debts of Landlord, financing costs and amortization of funds borrowed by Landlord, whether secured or unsecured;

(d) depreciation of the Project (except for capital improvements, the cost of which are includable in Operating Expenses);

(e) advertising, legal and space planning expenses and leasing commissions and other costs and expenses incurred in procuring and leasing space to tenants for the Project, including any leasing office maintained in the Project, free rent and construction allowances for tenants;

(f) legal and other expenses incurred in the negotiation or enforcement of leases;

(g) completing, fixturing, improving, renovating, painting, redecorating or other work, which Landlord pays for or performs for other tenants within their premises, and costs of correcting defects in such work;

(h) costs to be reimbursed by other tenants of the Project or Taxes to be paid directly by Tenant or other tenants of the Project, whether or not actually paid;

(i) salaries, wages, benefits and other compensation paid to officers and employees of Landlord who are not assigned in whole or in part to the operation, management, maintenance or repair of the Project;

(j) general organizational, administrative and overhead costs relating to maintaining Landlord's existence, either as a corporation, partnership, or other entity, including general corporate, legal and accounting expenses;

(k) costs (including attorneys' fees and costs of settlement, judgments and payments in lieu thereof) incurred in connection with disputes with tenants, other occupants, or prospective tenants, and costs and expenses, including legal fees, incurred in connection with negotiations or disputes with employees, consultants, management agents, leasing agents, purchasers or mortgagees of the Building;

(l) costs incurred by Landlord due to the violation by Landlord, its employees, agents or contractors or any tenant of the terms and conditions of any lease of space in the Project or any Legal Requirement (as defined in Section 7);

(m) penalties, fines or interest incurred as a result of Landlord's inability or failure to make payment of Taxes and/or to file any tax or informational returns when due, or from Landlord's failure to make any payment of Taxes required to be made by Landlord hereunder before delinquency;

(n) overhead and profit increment paid to Landlord or to subsidiaries or affiliates of Landlord for goods and/or services in or to the Project to the extent the same exceeds the costs of such goods and/or services rendered by unaffiliated third parties on a competitive basis;

(o) costs of Landlord's charitable or political contributions, or of fine art maintained at the Project;

(p) costs in connection with services (including electricity), items or other benefits of a type which are not standard for the Project and which are not available to Tenant without specific charges therefor, but which are provided to another tenant or occupant of the Project, whether or not such other tenant or occupant is specifically charged therefor by Landlord;

(q) costs incurred in the sale or refinancing of the Project;

(r) net income taxes of Landlord or the owner of any interest in the Project, franchise, capital stock, gift, estate or inheritance taxes or any federal, state or local documentary taxes imposed against the Project or any portion thereof or interest therein; and

(s) any expenses otherwise includable within Operating Expenses to the extent actually reimbursed by persons other than tenants of the Project under leases for space in the Project.

Within 90 days after the end of each calendar year (or such longer period as may be reasonably required), Landlord shall furnish to Tenant a statement (an "**Annual Statement**") showing in reasonable detail: (a) the total and Tenant's Share of actual Operating Expenses for the previous calendar year, and (b) the total of Tenant's payments in respect of Operating Expenses for such year. If Tenant's Share of actual Operating Expenses for such year exceeds Tenant's payments of Operating Expenses for such year, the excess shall be due and payable by Tenant as Rent within 30 days after delivery of such Annual

Statement to Tenant. If Tenant's payments of Operating Expenses for such year exceed Tenant's Share of actual Operating Expenses for such year Landlord shall pay the excess to Tenant within 30 days after delivery of such Annual Statement, except that after the expiration, or earlier termination of the Term or if Tenant is delinquent in its obligation to pay Rent, Landlord shall pay the excess to Tenant after deducting all other amounts due Landlord. Landlord's and Tenant's obligations to pay any overpayments or deficiencies due pursuant to this paragraph shall survive the expiration or earlier termination of this Lease.

The Annual Statement shall be final and binding upon Tenant unless Tenant, within 90 days after Tenant's receipt thereof, shall contest any item therein by giving written notice to Landlord, specifying each item contested and the reason therefor. If, during such 90 day period, Tenant reasonably and in good faith questions or contests the accuracy of Landlord's statement of Tenant's Share of Operating Expenses, Landlord will provide Tenant with access to Landlord's books and records in connection with the operation of the Project and such information in connection with the operation of the Project as Landlord reasonably determines to be responsive to Tenant's questions (the "**Expense Information**"). If after Tenant's review of such Expense Information, Landlord and Tenant cannot agree upon the amount of Tenant's Share of Operating Expenses, then Tenant shall have the right to have an independent regionally recognized public accounting firm selected by Tenant and approved by Landlord (which approval shall not be unreasonably withheld or delayed), working pursuant to a fee arrangement other than a contingent fee (at Tenant's sole cost and expense), audit and/or review the Expense Information for the year in question (the "**Independent Review**"). The results of any such Independent Review shall be binding on Landlord and Tenant. If the Independent Review shows that Tenant's actual payments with respect to the Operating Expenses for the calendar year in question exceeded Tenant's Share of Operating Expenses for such calendar year, Landlord shall at Landlord's option either (i) credit the excess amount to the next succeeding installments of estimated Operating Expenses or (ii) pay the excess to Tenant within 30 days after delivery of such statement, except that after the expiration, or earlier termination of this Lease or if Tenant is delinquent in its obligation to pay Rent, Landlord shall pay the excess to Tenant after deducting all other amounts due Landlord. If the Independent Review shows that Tenant's payments with respect to Operating Expenses for such calendar year were less than Tenant's Share of Operating Expenses for the calendar year, Tenant shall pay the deficiency to Landlord within 30 days after delivery of such statement. If the Independent Review shows that Tenant has overpaid Tenant's Share of Operating Expenses by more than 5% then Landlord shall reimburse Tenant for all costs incurred by Tenant for the Independent Review. Operating Expenses for the calendar years in which Tenant's obligation to share therein begins and ends shall be prorated. Notwithstanding anything set forth herein to the contrary, if the Building is not at least 95% occupied on average during any year of the Term, Tenant's Share of Operating Expenses for such year shall be computed as though the Building had been 95% occupied on average during such year.

Tenant acknowledges and agrees that the Rentable Area of Premises and Tenant's Share of Operating Expenses may be adjusted by Landlord by written notice to Tenant (which written notice shall be binding on Tenant) to include "park common" rentable square footage of approximately 400 square feet attributable to a "grab-and-go" food area which Landlord may install at the Project, to the extent such "grab-and-go" food area is actually installed by Landlord. Nothing herein shall obligate Landlord to install any such "grab-and-go" food area at the Project.

"**Tenant's Share**" shall be the percentage set forth on the first page of this Lease as Tenant's Share as reasonably adjusted by Landlord for changes in the physical size of the Premises or the Project occurring thereafter. Landlord may equitably increase Tenant's Share for any item of expense or cost reimbursable by Tenant that relates to a repair, replacement, or service that benefits only the Premises or only a portion of the Project that includes the Premises or that varies with occupancy or use. Base Rent, Tenant's Share of Operating Expenses and all other amounts payable by Tenant to Landlord hereunder are collectively referred to herein as "**Rent**."

6. **Security Deposit**. Tenant shall deposit with Landlord, upon delivery of an executed copy of this Lease to Landlord, a security deposit (the "**Security Deposit**") for the performance of all of Tenant's obligations hereunder in the amount set forth on page 1 of this Lease, which Security Deposit shall be in the form of an unconditional and irrevocable letter of credit (the "**Letter of Credit**"): (i) in form and substance satisfactory to Landlord, (ii) naming Landlord as beneficiary, (iii) expressly allowing Landlord to draw upon it at any time from time to time by delivering to the issuer notice that Landlord is entitled to draw thereunder, (iv) issued by an FDIC-insured financial institution satisfactory to Landlord, and (v) redeemable by presentation of a sight draft in the state of Landlord's choice. If Tenant does not provide Landlord with a substitute Letter of Credit complying with all of the requirements hereof at least 5 days before the stated expiration date of any then current Letter of Credit, Landlord shall have the right to draw the full amount of the current Letter of Credit and hold the funds drawn in cash without obligation for interest thereon as the Security Deposit. The Security Deposit shall be held by Landlord as security for the performance of Tenant's obligations under this Lease. The Security Deposit is not an advance rental deposit or a measure of Landlord's damages in case of Tenant's default. Upon each occurrence of a Default (as defined in Section 20), Landlord may use all or any part of the Security Deposit to pay delinquent payments due under this Lease, future rent damages, and the cost of any damage, injury, expense or liability caused by such Default, without prejudice to any other remedy provided herein or provided by law. Landlord's right to use the Security Deposit under this Section 6 includes the right to use the Security Deposit to pay future rent damages following the termination of this Lease pursuant to Section 21(c) below. Upon any use of all or any portion of the Security Deposit, Tenant shall pay Landlord on demand the amount that will restore the Security Deposit to the amount set forth on Page 1 of this Lease. Tenant hereby waives the provisions of any law, now or hereafter in force, which provide that Landlord may claim from a security deposit only those sums reasonably necessary to remedy defaults in the payment of Rent, to repair damage caused by Tenant or to clean the Premises, it being agreed that Landlord may, in addition, claim those sums reasonably necessary to compensate Landlord for any other loss or damage, foreseeable or unforeseeable, caused by the act or omission of Tenant or any officer, employee, agent or invitee of Tenant. Upon bankruptcy or other debtor-creditor proceedings against Tenant, the Security Deposit shall be deemed to be applied first to the payment of Rent and other charges due Landlord for periods prior to the filing of such proceedings. If Tenant shall fully perform every provision of this Lease to be performed by Tenant, the Security Deposit, or any balance thereof (i.e., after deducting therefrom all amounts to which Landlord is entitled under the provisions of this Lease), shall be returned to Tenant (or, at Landlord's option, to the last assignee of Tenant's interest hereunder) within 90 days after the expiration or earlier termination of this Lease.

If Landlord transfers its interest in the Project or this Lease, Landlord shall either (a) transfer any Security Deposit then held by Landlord to a person or entity assuming Landlord's obligations under this Section 6, or (b) return to Tenant any Security Deposit then held by Landlord and remaining after the deductions permitted herein. Upon such transfer to such transferee or the return of the Security Deposit to Tenant, Landlord shall have no further obligation with respect to the Security Deposit, and Tenant's right to the return of the Security Deposit shall apply solely against Landlord's transferee. The Security Deposit is not an advance rental deposit or a measure of Landlord's damages in case of Tenant's default. Landlord's obligation respecting the Security Deposit is that of a debtor, not a trustee, and no interest shall accrue thereon.

If, as of the expiration of the 24th month after the Rent Commencement Date, (i) Tenant is not in Default of this Lease, and (ii) Tenant has not been in Default of this Lease at any time during the Term of this Lease (collectively, the "**Reduction Requirements**" and each a "**Reduction Requirement**"), then the Security Deposit shall be reduced to $207,000 (the "**Reduced Security Deposit**"). If Tenant provides Landlord with a written request to Landlord for such reduction of the Security Deposit, then, so long as all of the Reduction Requirements have been met, Landlord shall cooperate with Tenant, at no cost, expense or liability to Landlord, to reduce the Letter of Credit then held by Landlord to the amount of the Reduced Security Deposit. If the Security Deposit is reduced as provided herein, then from and after the date of such reduction, the "**Security Deposit**" shall be deemed to be the Reduced Security Deposit, for all purposes of this Lease.

7. **Use**. The Premises shall be used solely for the Permitted Use set forth in the basic lease provisions on page 1 of this Lease, and in compliance with all laws, orders, judgments, ordinances, regulations, codes, directives, permits, licenses, covenants and restrictions now or hereafter applicable to the Premises, and to the use and occupancy thereof, including, without limitation, the Americans With

Disabilities Act, 42 U.S.C. § 12101, et seq. (together with the regulations promulgated pursuant thereto, "**ADA**") (collectively, "Legal Requirements" and each, a "**Legal Requirement**"). Tenant shall, upon 5 days' written notice from Landlord, discontinue any use of the Premises which is declared by any Governmental Authority (as defined in Section 9) having jurisdiction to be a violation of a Legal Requirement. Tenant will not use or permit the Premises to be used for any purpose or in any manner that would void Tenant's or Landlord's insurance, increase the insurance risk, or cause the disallowance of any sprinkler or other credits. Tenant shall not permit any part of the Premises to be used as a "place of public accommodation", as defined in the ADA or any similar legal requirement. Tenant shall reimburse Landlord promptly upon demand for any additional premium charged for any such insurance policy by reason of Tenant's failure to comply with the provisions of this Section or otherwise caused by Tenant's use and/or occupancy of the Premises. Tenant will use the Premises in a careful, safe and proper manner and will not commit or permit waste, overload the floor or structure of the Premises, subject the Premises to use that would damage the Premises or obstruct or interfere with the rights of Landlord or other tenants or occupants of the Project, including conducting or giving notice of any auction, liquidation, or going out of business sale on the Premises, or using or allowing the Premises to be used for any unlawful purpose. Tenant shall cause any equipment or machinery to be installed in the Premises so as to reasonably prevent sounds or vibrations from the Premises from extending into Common Areas, or other space in the Project. Tenant shall not place any machinery or equipment weighing 500 pounds or more in or upon the Premises or transport or move such items through the Common Areas of the Project or in the Project elevators without the prior written consent of Landlord. Tenant shall not, without the prior written consent of Landlord, use the Premises in any manner which will require ventilation, air exchange, heating, gas, steam, electricity or water beyond the existing capacity of the Project as proportionately allocated to the Premises based upon Tenant's Share as usually furnished for the Permitted Use.

Landlord shall, at Landlord's cost and not as part of Operating Expenses, be responsible for the compliance of the Common Areas of the Project with Legal Requirements as of the Commencement Date. Following the Commencement Date, Landlord shall, as an Operating Expense (to the extent such Legal Requirement is generally applicable to similar buildings in the area in which the Project is located) and at Tenant's expense (to the extent such Legal Requirement is triggered by reason of Tenant's, as compared to other tenants of the Project, specific use of the Premises, the Tenant Improvements or Tenant's Alterations) make any alterations or modifications to the Common Areas or the exterior of the Building that are required by Legal Requirements. Except as provided in the 2 immediately preceding sentences, Tenant, at its sole expense, shall make any alterations or modifications to the interior of the Premises that are required by Legal Requirements (including, without limitation, compliance of the Premises with the ADA) related to Tenant's specific use or occupancy of the Premises, the Tenant Improvements or Tenant's Alterations. Notwithstanding any other provision herein to the contrary, Tenant shall be responsible for any and all demands, claims, liabilities, losses, costs, expenses, actions, causes of action, damages or judgments, and all reasonable expenses incurred in investigating or resisting the same (including, without limitation, reasonable attorneys' fees, charges and disbursements and costs of suit) (collectively, "**Claims**") arising out of or in connection with Legal Requirements related to Tenant's specific use or occupancy of the Premises, the Tenant Improvements or Tenant's Alterations, and Tenant shall indemnify, defend, hold and save Landlord harmless from and against any and all Claims arising out of or in connection with any failure of the Premises to comply with any Legal Requirement related to Tenant's specific use or occupancy of the Premises, the Premises Improvements or Tenant's Alterations.

8. **Holding Over**. If, with Landlord's express written consent, Tenant retains possession of the Premises after the termination of the Term, (i) unless otherwise agreed in such written consent, such possession shall be subject to immediate termination by Landlord at any time, (ii) all of the other terms and provisions of this Lease (including, without limitation, the adjustment of Base Rent pursuant to Section 4 hereof) shall remain in full force and effect (excluding any expansion or renewal option or other similar right or option) during such holdover period, (iii) Tenant shall continue to pay Base Rent in the amount payable upon the date of the expiration or earlier termination of this Lease or such other amount as Landlord may indicate, in Landlord's sole and absolute discretion, in such written consent, and (iv) all other payments shall continue under the terms of this Lease. If Tenant remains in possession of the Premises after the expiration or earlier termination of the Term without the express written consent of

Landlord, (A) Tenant shall become a tenant at sufferance upon the terms of this Lease except that the monthly rental shall be equal to 150% of Rent in effect during the last 30 days of the Term, and (B) Tenant shall be responsible for all damages suffered by Landlord resulting from or occasioned by Tenant's holding over, including consequential damages; provided, however, that if Tenant delivers a written inquiry to Landlord within 30 days prior to the expiration or earlier termination of the Term, Landlord will notify Tenant whether the potential exists for consequential damages. No holding over by Tenant, whether with or without consent of Landlord, shall operate to extend this Lease except as otherwise expressly provided, and this Section 8 shall not be construed as consent for Tenant to retain possession of the Premises. Acceptance by Landlord of Rent after the expiration of the Term or earlier termination of this Lease shall not result in a renewal or reinstatement of this Lease.

9. **Taxes**. Landlord shall pay, as part of Operating Expenses, Tenant's Share of all taxes, levies, fees, assessments and governmental charges of any kind, existing as of the Commencement Date or thereafter enacted (collectively referred to as "**Taxes**"), imposed by any federal, state, regional, municipal, local or other governmental authority or agency, including, without limitation, quasi-public agencies (collectively, "**Governmental Authority**") during the Term, including, without limitation, all Taxes: (i) imposed on or measured by or based, in whole or in part, on rent payable to (or gross receipts received by) Landlord under this Lease and/or from the rental by Landlord of the Project or any portion thereof, or (ii) based on the square footage, assessed value or other measure or evaluation of any kind of the Premises or the Project, or (iii) assessed or imposed by or on the operation or maintenance of any portion of the Premises or the Project, including parking, or (iv) assessed or imposed by, or at the direction of, or resulting from Legal Requirements, or interpretations thereof, promulgated by any Governmental Authority, or (v) imposed as a license or other fee, charge, tax, or assessment on Landlord's business or occupation of leasing space in the Project. Landlord may contest by appropriate legal proceedings the amount, validity, or application of any Taxes or liens securing Taxes. Taxes shall not include any net income taxes imposed on Landlord except to the extent such net income taxes are in substitution for any Taxes payable hereunder. If any such Tax is levied or assessed directly against Tenant, then Tenant shall be responsible for and shall pay the same at such times and in such manner as the taxing authority shall require. Tenant shall pay, prior to delinquency, any and all Taxes levied or assessed against any personal property or trade fixtures placed by Tenant in the Premises, whether levied or assessed against Landlord or Tenant. If any Taxes on Tenant's personal property or trade fixtures are levied against Landlord or Landlord's property, or if the assessed valuation of the Project is increased by a value attributable to improvements in or alterations to the Premises, whether owned by Landlord or Tenant and whether or not affixed to the real property so as to become a part thereof, higher than the base valuation on which Landlord from time-to-time allocates Taxes to all tenants in the Project, Landlord shall have the right, but not the obligation, to pay such Taxes. Landlord's determination of any excess assessed valuation shall be binding and conclusive, absent manifest error. The amount of any such payment by Landlord shall constitute Additional Rent due from Tenant to Landlord immediately upon demand.

10. **Parking**. Subject to all matters of record, Force Majeure, a Taking (as defined in Section 19 below) and the exercise by Landlord of its rights hereunder, Tenant shall have the right, at no additional cost during the Term (including the Extension Term), in common with other tenants of the Project pro rata in accordance with the rentable area of the Premises and the rentable areas of the Project occupied by such other tenants, to park in those areas designated for non-reserved parking on a first come first served basis, subject in each case to Landlord's rules and regulations. As of the Commencement Date, Tenant's pro rata share of parking spaces is equal to 2.5 parking spaces per 1,000 rentable square feet of the Premises (or 57 parking spaces). Landlord may allocate parking spaces among Tenant and other tenants in the Project pro rata as described above if Landlord determines that such parking facilities are becoming crowded. Landlord shall not be responsible for enforcing Tenant's parking rights against any third parties, including other tenants of the Project. Landlord shall have the right, exercisable by notice to Tenant given at any time during the Term, to relocate all or a portion of the parking spaces made available to Tenant hereunder to another location within an approximately 2-minute walk of the Project.

11. **Utilities, Services**.

(a) **General**. Landlord shall provide, subject to the terms of this Section 11, water, electricity, heat, light, power, sewer, and other utilities (including gas and fire sprinklers to the extent the Project is plumbed for such services), refuse and trash collection and janitorial services (collectively, "**Utilities**"). Landlord shall pay, as Operating Expenses or subject to Tenant's reimbursement obligation, for all Utilities used on the Premises, Tenant's Share of all maintenance charges for Utilities, and any storm sewer charges or other similar charges for Utilities imposed by any Governmental Authority or Utility provider, and Tenant's Share of any taxes, penalties, surcharges or similar charges thereon. Landlord may cause, at Tenant's expense, any Utilities to be separately metered or charged directly to Tenant by the provider. Tenant shall pay directly to the Utility provider, prior to delinquency, any separately metered Utilities and services which may be furnished to Tenant or the Premises during the Term. Tenant shall pay, as part of Operating Expenses, its share of all charges for jointly metered Utilities based upon consumption, as reasonably determined by Landlord. No interruption or failure of Utilities, from any cause whatsoever other than Landlord's gross negligence or willful misconduct, shall result in eviction or constructive eviction of Tenant, termination of this Lease or the abatement of Rent. Tenant agrees to limit use of water and sewer with respect to Common Areas to normal restroom use. Utilities shall be available to the Premises 24 hours per day, 7 days per week, except in the case of emergencies, as the result of Legal Requirements, the failure of any Utility provider to provide such Utilities, the performance by Landlord or any Utility provider of any installation, maintenance or repairs, or any other temporary interruptions.

(b) **Generator**. Landlord's sole obligation for either providing emergency generators or providing emergency back-up power to Tenant shall be: (i) to provide emergency generators with not less than the capacity of the emergency generators located in the Building as of the Commencement Date, and (ii) to contract with a third party to maintain the emergency generators as per the manufacturer's standard maintenance guidelines. Landlord shall have no obligation to provide Tenant with operational emergency generators or back-up power or to supervise, oversee or confirm that the third party maintaining the emergency generators is maintaining the generators as per the manufacturer's standard guidelines or otherwise. During any period of replacement, repair or maintenance of the emergency generators when the emergency generators are not operational, including any delays thereto due to the inability to obtain parts or replacement equipment, Landlord shall have no obligation to provide Tenant with an alternative back-up generator or generators or alternative sources of back-up power. Tenant expressly acknowledges and agrees that Landlord does not guaranty that such emergency generators will be operational at all times or that emergency power will be available to the Premises when needed.

(c) **Loading Dock**. Tenant may use the loading dock exclusively serving the Premises 24 hours per day, 7 days per week, subject to downtime to maintenance and repairs.

12. **Alterations and Tenant's Property.** Any alterations, additions, or improvements made to the Premises by or on behalf of Tenant, including additional locks or bolts of any kind or nature upon any doors or windows in the Premises, but excluding installation, removal or realignment of furniture systems (other than removal of furniture systems owned or paid for by Landlord) not involving any modifications to the structure or connections (other than by ordinary plugs or jacks) to Building Systems (as defined in Section 13) ("**Alterations**") shall be subject to Landlord's prior written consent, which may be given or withheld in Landlord's sole discretion if any such Alteration affects the structure or Building Systems and shall not be otherwise unreasonably withheld. If Landlord approves any Alterations, Landlord may impose such conditions on Tenant in connection with the commencement, performance and completion of such Alterations as Landlord may deem appropriate in Landlord's sole and absolute discretion. Any request for approval shall be in writing, delivered not less than 15 business days in advance of any proposed construction, and accompanied by plans, specifications, bid proposals, work contracts and such other information concerning the nature and cost of the alterations as may be reasonably requested by Landlord, including the identities and mailing addresses of all persons performing work or supplying materials. Landlord's right to review plans and specifications and to monitor construction shall be solely for its own benefit, and Landlord shall have no duty to ensure that such plans

and specifications or construction comply with applicable Legal Requirements. Tenant shall cause, at its sole cost and expense, all Alterations to comply with insurance requirements and with Legal Requirements and shall implement at its sole cost and expense any alteration or modification required by Legal Requirements as a result of any Alterations. Tenant shall pay to Landlord, as Additional Rent, on demand an amount equal to 2% of all charges incurred by Tenant or its contractors or agents in connection with any Alteration to cover Landlord's overhead and expenses for plan review, coordination, scheduling and supervision. Before Tenant begins any Alteration, Landlord may post on and about the Premises notices of non-responsibility pursuant to applicable law. Tenant shall reimburse Landlord for, and indemnify and hold Landlord harmless from, any expense incurred by Landlord by reason of faulty work done by Tenant or its contractors, delays caused by such work, or inadequate cleanup.

Tenant shall furnish security or make other arrangements satisfactory to Landlord to assure payment for the completion of all Alterations work free and clear of liens, and shall provide (and cause each contractor or subcontractor to provide) certificates of insurance for workers' compensation and other coverage in amounts and from an insurance company satisfactory to Landlord protecting Landlord against liability for personal injury or property damage during construction. Upon completion of any Alterations, Tenant shall deliver to Landlord: (i) sworn statements setting forth the names of all contractors and subcontractors who did the work and final lien waivers from all such contractors and subcontractors; and (ii) "as built" plans for any such Alteration.

Except for Removable Installations (as hereinafter defined), all Installations (as hereinafter defined) shall be and shall remain the property of Landlord during the Term and following the expiration or earlier termination of the Term, shall not be removed by Tenant at any time during the Term, and shall remain upon and be surrendered with the Premises as a part thereof. Notwithstanding the foregoing, Landlord may, at the time its approval of any such Installation is requested, notify Tenant that Landlord requires that Tenant remove such Installation upon the expiration or earlier termination of the Term, in which event Tenant shall remove such Installation in accordance with the immediately succeeding sentence. Upon the expiration or earlier termination of the Term, Tenant shall remove (i) all wires, cables or similar equipment which Tenant has installed in the Premises or in the risers or plenums of the Building, (ii) any Installations for which Landlord has given Tenant notice of removal in accordance with the immediately preceding sentence, and (iii) all of Tenant's Property (as hereinafter defined), and Tenant shall restore and repair any damage caused by or occasioned as a result of such removal, including, without limitation, capping off all such connections behind the walls of the Premises and repairing any holes. During any restoration period beyond the expiration or earlier termination of the Term, Tenant shall pay Rent to Landlord as provided herein as if said space were otherwise occupied by Tenant. If Landlord is requested by Tenant or any lender, lessor or other person or entity claiming an interest in any of Tenant's Property to waive any lien Landlord may have against any of Tenant's Property, and Landlord consents to such waiver, then Landlord shall be entitled to be paid as administrative rent a fee of $1,000 per occurrence for its time and effort in preparing and negotiating such a waiver of lien.

For purposes of this Lease, (x) **"Removable Installations"** means any items listed on **Exhibit F** attached hereto and any items agreed by Landlord in writing to be included on **Exhibit F** in the future, (y) **"Tenant's Property"** means Removable Installations and, other than Installations, any personal property or equipment of Tenant that may be removed without material damage to the Premises, and (z) **"Installations"** means all property of any kind paid for out of the Tl Fund, all Alterations, all fixtures, and all partitions, hardware, built-in machinery, built-in casework and cabinets and other similar additions, equipment, property and improvements built into the Premises so as to become an integral part of the Premises, including, without limitation, fume hoods which penetrate the roof or plenum area, built-in cold rooms, built-in warm rooms, walk-in cold rooms, walk-in warm rooms, deionized water systems, glass washing equipment, autoclaves, chillers, built-in plumbing, electrical and mechanical equipment and systems, and any power generator and transfer switch.

13. **Landlord's Repairs.** Landlord, as an Operating Expense, shall maintain all of the structural, exterior, parking and other Common Areas of the Project, including HVAC, plumbing, fire sprinklers, elevators and all other building systems serving the Premises and other portions of the Project (including, without limitation, the RODI water system and the compressed air system) **("Building**

Systems"), in good repair, reasonable wear and tear and uninsured losses and damages caused by Tenant, or by any of Tenant's agents, servants, employees, invitees and contractors (collectively, **"Tenant Parties")** excluded. Losses and damages caused by Tenant or any Tenant Party shall be repaired by Landlord, to the extent not covered by insurance, at Tenant's sole cost and expense. Landlord reserves the right to stop Building Systems services when necessary (i) by reason of accident or emergency, or (ii) for planned repairs, alterations or improvements, which are, in the judgment of Landlord, desirable or necessary to be made, until said repairs, alterations or improvements shall have been completed. Landlord shall have no responsibility or liability for failure to supply Building Systems services during any such period of interruption; provided, however, that Landlord shall, except in case of emergency, make a commercially reasonable effort to give Tenant 48 hours advance notice of any planned stoppage of Building Systems services for routine maintenance, repairs, alterations or improvements. Landlord shall use reasonable efforts to minimize interference with Tenant's operations in the Premises during such planned stoppages of Building Systems. Tenant shall promptly give Landlord written notice of any repair required by Landlord pursuant to this Section, after which Landlord shall make a commercially reasonable effort to effect such repair. Landlord shall not be liable for any failure to make any repairs or to perform any maintenance unless such failure shall persist for an unreasonable time after Tenant's written notice of the need for such repairs or maintenance. Tenant waives its rights under any state or local law to terminate this Lease or to make such repairs at Landlord's expense and agrees that the parties' respective rights with respect to such matters shall be solely as set forth herein. Repairs required as the result of fire, earthquake, flood, vandalism, war, or similar cause of damage or destruction shall be controlled by Section 18.

14. **Tenant's Repairs.** Subject to Section 13 hereof, Tenant, at its expense, shall repair, replace and maintain in good condition all portions of the Premises, including, without limitation, entries, doors, ceilings, interior windows, interior walls, and the interior side of demising walls. Should Tenant fail to make any such repair or replacement or fail to maintain the Premises, Landlord shall give Tenant notice of such failure. If Tenant fails to commence cure of such failure within 10 days of Landlord's notice, and thereafter diligently prosecute such cure to completion, Landlord may perform such work and shall be reimbursed by Tenant within 10 days after demand therefor; provided, however, that if such failure by Tenant creates or could create an emergency, Landlord may immediately commence cure of such failure and shall thereafter be entitled to recover the costs of such cure from Tenant. Subject to Sections 17 and 18, Tenant shall bear the full uninsured cost of any repair or replacement to any part of the Project that results from damage caused by Tenant or any Tenant Party and any repair that benefits only the Premises.

15. **Mechanic's Liens.** Tenant shall discharge, by bond or otherwise, any mechanic's lien filed against the Premises or against the Project for work claimed to have been done for, or materials claimed to have been furnished to, Tenant within 10 days after the filing thereof, at Tenant's sole cost and shall otherwise keep the Premises and the Project free from any liens arising out of work performed, materials furnished or obligations incurred by Tenant. Should Tenant fail to discharge any lien described herein, Landlord shall have the right, but not the obligation, to pay such claim or post a bond or otherwise provide security to eliminate the lien as a claim against title to the Project and the cost thereof shall be immediately due from Tenant as Additional Rent. If Tenant shall lease or finance the acquisition of office equipment, furnishings, or other personal property of a removable nature utilized by Tenant in the operation of Tenant's business, Tenant warrants that any Uniform Commercial Code Financing Statement filed as a matter of public record by any lessor or creditor of Tenant will upon its face or by exhibit thereto indicate that such Financing Statement is applicable only to removable personal property of Tenant located within the Premises. In no event shall the address of the Project be furnished on the statement without qualifying language as to applicability of the lien only to removable personal property, located in an identified suite held by Tenant.

16. **Indemnification.** Tenant hereby indemnifies and agrees to defend, save and hold Landlord harmless from and against any and all Claims for injury or death to persons or damage to property occurring within or about the Premises, arising directly or indirectly out of use or occupancy of the Premises or a breach or default by Tenant in the performance of any of its obligations hereunder, except to the extent caused by the willful misconduct or negligence of Landlord. Landlord shall not be

liable to Tenant for, and Tenant assumes all risk of damage to, personal property (including, without limitation, loss of records kept within the Premises). Tenant further waives any and all Claims for injury to Tenant's business or loss of income relating to any such damage or destruction of personal property (including, without limitation, any loss of records). Landlord shall not be liable for any damages arising from any act, omission or neglect of any tenant in the Project or of any other third party.

17. **Insurance.** Landlord shall maintain all risk property and, if applicable, sprinkler damage insurance covering the full replacement cost of the Project. Landlord shall further procure and maintain commercial general liability insurance with a single loss limit of not less than $2,000,000 for bodily injury and property damage with respect to the Project. Landlord may, but is not obligated to, maintain such other insurance and additional coverages as it may deem necessary, including, but not limited to, flood, environmental hazard and earthquake, loss or failure of building equipment, errors and omissions, rental loss during the period of repair or rebuilding, workers' compensation insurance and fidelity bonds for employees employed to perform services and insurance for any improvements installed by Tenant or which are in addition to the standard improvements customarily furnished by Landlord without regard to whether or not such are made a part of the Project. All such insurance shall be included as part of the Operating Expenses. The Project may be included in a. blanket policy (in which case the cost of such insurance allocable to the Project will be determined by Landlord based upon the insurer's cost calculations). Tenant shall also reimburse Landlord for any increased premiums or additional insurance which Landlord reasonably deems necessary as a result of Tenant's use of the Premises.

Tenant, at its sole cost and expense, shall maintain during the Term: all risk property insurance with business interruption and extra expense coverage, covering the full replacement cost of all property and improvements installed or placed in the Premises by Tenant at Tenant's expense; workers' compensation insurance with no less than the minimum limits required by law; employer's liability insurance with such limits as required by law; and commercial general liability insurance, with a minimum limit of not less than $2,000,000 per occurrence for bodily injury and property damage with respect to the Premises. The commercial general liability insurance policy shall name Alexandria Real Estate Equities, Inc., and Landlord, its officers, directors, employees, managers, agents, invitees and contractors (collectively, **"Landlord Parties"),** as additional insureds; insure on an occurrence and not a claims-made basis; be issued by insurance companies which have a rating of not less than policyholder rating of A and financial category rating of at least Class X in "Best's Insurance Guide"; shall not be cancelable for nonpayment of premium unless 10 days prior written notice shall have been given to Landlord from the insurer; not contain a hostile fire exclusion; contain a contractual liability endorsement; and provide primary coverage to Landlord (any policy issued to Landlord providing duplicate or similar coverage shall be deemed excess over Tenant's policies). Copies of such policies (if requested by Landlord), or certificates of insurance showing the limits of coverage required hereunder and showing Landlord as an additional insured, along with reasonable evidence of the payment of premiums for the applicable period, shall be delivered to Landlord by Tenant prior to (i) the earlier to occur of (x) the Commencement Date, or (y) the date that Tenant accesses the Premises under this Lease, and (ii) each renewal of said insurance. Tenant's policy may be a "blanket policy" with an aggregate per location endorsement which specifically provides that the amount of insurance shall not be prejudiced by other losses covered by the policy. Tenant shall, at least 5 days prior to the expiration of such policies, furnish Landlord with renewal certificates.

In each instance where insurance is to name Landlord as an additional insured, Tenant shall upon written request of Landlord also designate and furnish certificates so evidencing Landlord as additional insured to: (i) any lender of Landlord holding a security interest in the Project or any portion thereof, (ii) the landlord under any lease wherein Landlord is tenant of the real property on which the Project is located, if the interest of Landlord is or shall become that of a tenant under a ground or other underlying lease rather than that of a fee owner, and/or (iii) any management company retained by Landlord to manage the Project.

The property insurance obtained by Landlord and Tenant shall include a waiver of subrogation by the insurers and all rights based upon an assignment from its insured, against Landlord or Tenant, and their respective officers, directors, employees, managers, agents, invitees and contractors **("Related**

Parties"), in connection with any loss or damage thereby insured against. Neither party nor its respective Related Parties shall be liable to the other for loss or damage caused by any risk insured against under property insurance required to be maintained hereunder, and each party waives any claims against the other party, and its respective Related Parties, for such loss or damage. The failure of a party to insure its property shall not void this waiver. Landlord and its respective Related Parties shall not be liable for, and Tenant hereby waives all claims against such parties for, business interruption and losses occasioned thereby sustained by Tenant or any person claiming through Tenant resulting from any accident or occurrence in or upon the Premises or the Project from any cause whatsoever. If the foregoing waivers shall contravene any law with respect to exculpatory agreements, the liability of Landlord or Tenant shall be deemed not released but shall be secondary to the other's insurer.

Landlord may require insurance policy limits to be raised to conform with requirements of Landlord's lender and/or to bring coverage limits to levels then being generally required of new tenants within the Project; provided, however, that the increased amount of coverage is consistent with coverage amounts then being required by institutional owners of similar projects with tenants occupying similar size premises in the geographical area in which the Project is located.

18. **Restoration.** If, at any time during the Term, the Project or the Premises are damaged or destroyed by a fire or other casualty, Landlord shall notify Tenant within 60 days after discovery of such damage as to the amount of time Landlord reasonably estimates it will take to restore the Project or the Premises, as applicable (the **"Restoration Period").** If the Restoration Period is estimated to exceed 12 months (the **"Maximum Restoration Period"),** Landlord may, in such notice, elect to terminate this Lease as of the date that is 75 days after the date of discovery of such damage or destruction; provided, however, that notwithstanding Landlord's election to restore, Tenant may elect to terminate this Lease by written notice to Landlord delivered within 5 business days of receipt of a notice from Landlord estimating a Restoration Period for the Premises longer than the Maximum Restoration Period. Unless either Landlord or Tenant so elects to terminate this Lease, Landlord shall, subject to receipt of sufficient insurance proceeds (with any deductible to be treated as a current Operating Expense), promptly restore the Premises (excluding the improvements installed by Tenant or by Landlord and paid for by Tenant), subject to delays arising from the collection of insurance proceeds, from Force Majeure events or as needed to obtain any license, clearance or other authorization of any kind required to enter into and restore the Premises issued by any Governmental Authority having jurisdiction over the use, storage, handling, treatment, generation, release, disposal, removal or remediation of Hazardous Materials (as defined in Section 30) in, on or about the Premises (collectively referred to herein as **"Hazardous Materials Clearances");** provided, however, that if repair or restoration of the Premises is not substantially complete as of the end of the Maximum Restoration Period or, if longer, the Restoration Period, Landlord may, in its sole and absolute discretion, elect not to proceed with such repair and restoration, or Tenant may by written notice to Landlord delivered within 5 business days of the expiration of the Maximum Restoration Period or, if longer, the Restoration Period, elect to terminate this Lease, in which event Landlord shall be relieved of its obligation to make such repairs or restoration and this Lease shall terminate as of the date that is 75 days after the later of: (i) discovery of such damage or destruction, or (ii) the date all required Hazardous Materials Clearances are obtained, but Landlord shall retain any Rent paid and the right to any Rent payable by Tenant prior to such election by Landlord or Tenant.

Tenant, at its expense, shall promptly perform, subject to delays arising from the collection of insurance proceeds, from Force Majeure (as defined in Section 34) events or to obtain Hazardous Material Clearances, all repairs or restoration not required to be done by Landlord and shall promptly reenter the Premises and commence doing business in accordance with this Lease. Notwithstanding the foregoing, either Landlord or Tenant may terminate this Lease upon written notice to the other if the Premises are damaged during the last year of the Term and Landlord reasonably estimates that it will take more than 2 months to repair such damage; provided, however, that such notice is delivered within 10 business days after the date that Landlord provides Tenant with written notice of the estimated Restoration Period. Notwithstanding anything to the contrary contained herein, Landlord shall also have the right to terminate this Lease if insurance proceeds are not available for such restoration. Rent shall be abated from the date all required Hazardous Material Clearances are obtained until the Premises are

repaired and **restored**, in the proportion which the area of the Premises, if any, which is not usable by Tenant bears to the total area of the Premises, unless Landlord provides Tenant with other space during the period of repair that is suitable for the temporary conduct of Tenant's business. Such abatement shall be the sole remedy of Tenant, and except as otherwise provided in this Section 18, Tenant waives any right to terminate the Lease by reason of damage or casualty loss.

The provisions of this Lease, including this Section 18, constitute an express agreement between Landlord and Tenant with respect to any and all damage to, or destruction of, all or any part of the Premises, or any other portion of the Project, and any statute or regulation which is now or may hereafter be in effect shall have no application to this Lease or any damage or destruction to all or any part of the Premises or any other portion of the Project, the parties hereto expressly agreeing that this Section 18 sets forth their entire understanding and agreement with respect to such matters.

19. **Condemnation.** If the whole or any material part of the Premises or the Project is taken for any public or quasi-public use under governmental law, ordinance, or regulation, or by right of eminent domain, or by private purchase in lieu thereof (a **"Taking"** or **"Taken"),** and the Taking would in Landlord's reasonable judgment, materially interfere with or impair Landlord's ownership or operation of the Project or would in the reasonable judgment of Landlord and Tenant either prevent or materially interfere with Tenant's use of the Premises (as resolved, if the parties are unable to agree, by arbitration by a single arbitrator with the qualifications and experience appropriate to resolve the matter and appointed pursuant to and acting in accordance with the rules of the American Arbitration Association), then upon written notice by Landlord or Tenant to the other this Lease shall terminate and Rent shall be apportioned as of said date. Landlord and Tenant agree that a Taking of more than 60% of the Premises would constitute a material interference of Tenant's use of the Premises. If part of the Premises shall be Taken, and this Lease is not terminated as provided above, Landlord shall promptly restore the Premises and the Project as nearly as is commercially reasonable under the circumstances to their condition prior to such partial Taking and the rentable square footage of the Building, the rentable square footage of the Premises, Tenant's Share of Operating Expenses and the Rent payable hereunder during the unexpired Term shall be reduced to such extent as may be fair and reasonable under the circumstances. Upon any such Taking, Landlord shall be entitled to receive the entire price or award from any such Taking without any payment to Tenant, and Tenant hereby assigns to Landlord Tenant's interest, if any, in such award. Tenant shall have the right, to the extent that same shall not diminish Landlord's award, to make a separate claim against the condemning authority (but not Landlord) for such compensation as may be separately awarded or recoverable by Tenant for moving expenses and damage to Tenant's trade fixtures, if a separate award for such items is made to Tenant. Tenant hereby waives any and all rights it might otherwise have pursuant to any provision of state law to terminate this Lease upon a partial Taking of the Premises or the Project.

20. **Events of Default.** Each of the following events shall be a default **("Default")** by Tenant under this Lease:

(a) **Payment Defaults.** Tenant shall fail to pay any installment of Rent or any other payment hereunder when due; provided, however, that Landlord will give Tenant notice and an opportunity to cure any failure to pay Rent within 5 days of any such notice not more than once in any 12 month period and Tenant agrees that such notice shall be in lieu of and not in addition to, or shall be deemed to be, any notice required by law.

(b) **Insurance.** Any insurance required to be maintained by Tenant pursuant to this Lease shall be canceled or terminated or shall expire or shall be reduced or materially changed, or Landlord shall receive a notice of nonrenewal of any such insurance and Tenant shall fail to obtain replacement insurance before the expiration of the current coverage.

(c) **Abandonment.** Tenant shall abandon the Premises. Tenant shall not be deemed to have abandoned the Premises if (i) Tenant provides Landlord with reasonable advance notice prior to vacating and, at the time of vacating the Premises, Tenant completes Tenant's obligations with respect to

the Surrender Plan in compliance with Section 28, (ii) Tenant has made reasonable arrangements with Landlord for the security of the Premises for the balance of the Term, and (iii) Tenant continues during the balance of the Term to satisfy all of its obligations under the Lease as they come due.

(d) **Improper Transfer.** Tenant shall assign, sublease or otherwise transfer or attempt to transfer all or any portion of Tenant's interest in this Lease or the Premises except as expressly permitted herein, or Tenant's interest in this Lease shall be attached, executed upon, or otherwise judicially seized and such action is not released within 90 days of the action.

(e) **Liens.** Tenant shall fail to discharge or otherwise obtain the release of any lien placed upon the Premises in violation of this Lease within 10 days after any such lien is filed against the Premises.

(f) **Insolvency Events.** Tenant or any guarantor or surety of Tenant's obligations hereunder shall: (A) make a general assignment for the benefit of creditors; (B) commence any case, proceeding or other action seeking to have an order for relief entered on its behalf as a debtor or to adjudicate it a bankrupt or insolvent, or seeking reorganization, arrangement, adjustment, liquidation, dissolution or composition of it or its debts or seeking appointment of a receiver, trustee, custodian or other similar official for it or for all or of any substantial part of its property (collectively a "**Proceeding for Relief**"); (C) become the subject of any Proceeding for Relief which is not dismissed within 90 days of its filing or entry; or (D) die or suffer a legal disability (if Tenant, guarantor, or surety is an individual) or be dissolved or otherwise fail to maintain its legal existence (if Tenant, guarantor or surety is a corporation, partnership or other entity).

(g) **Estoppel Certificate or Subordination Agreement.** Tenant fails to execute any document required from Tenant under Sections 23 or 27 within 5 days after a second notice requesting such document.

(h) **Other Defaults.** Tenant shall fail to comply with any provision of this Lease other than those specifically referred to in this Section 20, and, except as otherwise expressly provided herein, such failure shall continue for a period of 10 days after written notice thereof from Landlord to Tenant.

Any notice given under Section 20(h) hereof shall: (i) specify the alleged default, (ii) demand that Tenant cure such default, (iii) be in lieu of, and not in addition to, or shall be deemed to be, any notice required under any provision of applicable law, and (iv) not be deemed a forfeiture or a termination of this Lease unless Landlord elects otherwise in such notice; provided that if the nature of Tenant's default pursuant to Section 20(h) is such that it cannot be cured by the payment of money and reasonably requires more than 10 days to cure, then Tenant shall not be deemed to be in default if Tenant commences such cure within said 10 day period and thereafter diligently prosecutes the same to completion; provided, however, that such cure shall be completed no later than 30 days from the date of Landlord's notice.

21. **Landlord's Remedies.**

(a) **Payment By Landlord; Interest.** Upon a Default by Tenant hereunder, Landlord may, without waiving or releasing any obligation of Tenant hereunder, make such payment or perform such act. All sums so paid or incurred by Landlord, together with interest thereon, from the date such sums were paid or incurred, at the annual rate equal to 12% per annum or the highest rate permitted by law (the **"Default Rate"),** whichever is less, shall be payable to Landlord on demand as Additional Rent.

(b) **Late Payment Rent.** Late payment by Tenant to Landlord of Rent and other sums due will cause Landlord to incur costs not contemplated by this Lease, the exact amount of which will be extremely difficult and impracticable to ascertain. Such costs include, but are not limited to, processing and accounting charges and late charges which may be imposed on Landlord under any Mortgage covering the Premises. Therefore, if any installment of Rent due from Tenant is not received by Landlord within 5 days after the date such payment is due, Tenant shall pay to Landlord an additional sum equal to

6% of the overdue Rent as a late charge. Notwithstanding the foregoing, before assessing a late charge the first time in any calendar year, Landlord shall provide Tenant written notice of the delinquency and will waive the right if Tenant pays such delinquency within 5 days thereafter. The parties agree that this late charge represents a fair and reasonable estimate of the costs Landlord will incur by reason of late payment by Tenant. In addition to the late charge, Rent not paid when due shall bear interest at the Default Rate from the 5th day after the date due until paid.

(c) **Remedies.** Upon the occurrence and during the continuance of a Default, Landlord, at its option, without further notice or demand to Tenant, shall have in addition to all other rights and remedies provided in this Lease, at law or in equity, the option to pursue any one or more of the following remedies, each and all of which shall be cumulative and nonexclusive, without any notice or demand whatsoever (except as otherwise expressly provided in Section 21(c)(v) with respect to Landlord's Lump Sum Election). No cure in whole or in part of such Default by Tenant after Landlord has taken any action beyond giving Tenant notice of such Default to pursue any remedy provided for herein (including retaining counsel to file an action or otherwise pursue any remedies) shall in any way affect Landlord's right to pursue such remedy or any other remedy provided Landlord herein or under law or in equity, unless Landlord, in its sole discretion, elects to waive such Default.

(i) This Lease and the Term and estate hereby granted are subject to the limitation that whenever a Default shall have happened and be continuing, Landlord shall have the right, at its election, then or thereafter while any such Default shall continue and notwithstanding the fact that Landlord may have some other remedy hereunder or at law or in equity, to give Tenant written notice of Landlord's intention to terminate this Lease on a date specified in such notice, which date shall be not less than 5 days after the giving of such notice, and upon the date so specified, this Lease and the estate hereby granted shall expire and terminate with the same force and effect as if the date specified in such notice were the date hereinbefore fixed for the expiration of this Lease, and all right of Tenant hereunder shall expire and terminate, and Tenant shall be liable as hereinafter in this Section 21(c) provided. If any such notice is given, Landlord shall have, on such date so specified, the right of re-entry and possession of the Premises and the right to remove all persons and property therefrom and to store such property in a warehouse or elsewhere at the risk and expense, and for the account, of Tenant. Should Landlord elect to re-enter as herein provided or should Landlord take possession pursuant to legal proceedings or pursuant to any notice provided for by law, Landlord may, subject to Section 21(c)(ii) from time to time re-let the Premises or any part thereof for such term or terms and at such rental or rentals and upon such terms and conditions as Landlord may deem advisable, with the right to make commercially reasonable alterations in and repairs to the Premises.

(ii) Landlord shall be deemed to have satisfied any obligation to mitigate its damages by hiring an experienced commercial real estate broker to market the Premises and directing such broker to advertise and show the Premises to prospective tenants.

(iii) In the event of any termination of this Lease as in this Section 21 provided or as required or permitted by law or in equity, Tenant shall forthwith quit and surrender the Premises to Landlord, and Landlord may, without further notice, enter upon, re-enter, possess and repossess the same by summary proceedings, ejectment or otherwise, and again have, repossess and enjoy the same as if this Lease had not been made, and in any such event Tenant and no person claiming through or under Tenant by virtue of any law or an order of any court shall be entitled to possession or to remain in possession of the Premises.

(iv) If this Lease is terminated or if Landlord shall re-enter the Premises as aforesaid, or in the event of the termination of this Lease, or of re-entry, by or under any proceeding or action or any provision of law by reason of a Default by Tenant, Tenant covenants and agrees forthwith to pay and be liable for, on the days originally fixed in this Lease for the payment thereof, amounts equal to the installments of Base Rent and all Additional Rent as they would, under the terms of this Lease become due if this Lease had not been terminated or if Landlord

had not entered or re-entered, as aforesaid, and whether the Premises be relet or remain vacant, in whole or in part, or for a period less than the remainder of the Term, or for the whole thereof, but in the event that the Premises be relet by Landlord, Tenant shall be entitled to a credit in the net amount of rent and other charges received by Landlord in reletting, after deduction of all of Landlord's expenses incurred in reletting the Premises (including, without limitation, tenant improvement, demising and remodeling costs, brokerage fees and the like), and in collecting the rent in connection therewith, in the following manner: Amounts received by Landlord after reletting, if any, shall first be applied against such Landlord's expenses, until the same are recovered, and until such recovery, Tenant shall pay, as of each day when a payment would fall due under this Lease, the amount which Tenant is obligated to pay under the terms of this Lease (Tenant's liability prior to any such reletting and such recovery by Landlord no in any way to be diminished as a result of the fact that such reletting might be for a rent higher than the rent provided for in this Lease); when and if such expenses have been completely recovered by Landlord, the amounts received from reletting by Landlord as have not previously been applied shall be credited against Tenant's obligations as of each day when a payment would fall due under this Lease, and only the net amount thereof shall be payable by Tenant. Further, Tenant shall not be entitled to any credit of any kind for any period after the date when the Term of this Lease is scheduled to expire according to its terms.

Actions, proceedings or suits for the recovery of damages, whether liquidated or other damages, under this Lease, or any installments thereof, may be brought by Landlord from time to time at its election, and nothing contained herein shall be deemed to require Landlord to postpone suit until the date when the Term of this Lease would have expired if it had not been terminated hereunder.

(v) In addition, Landlord, at its election, notwithstanding any other provision of this Lease, by written notice to Tenant (the **"Lump Sum Election"),** shall be entitled to recover from Tenant, as and for liquidated damages, at any time following any termination of this Lease, a lump sum payment representing, at the time of Landlord's written notice of its Lump Sum Election, the sum of:

(A) the then present value (calculated in accordance with accepted financial practice using as the discount rate the yield to maturity on United States Treasury Notes as set forth below) of the amount of unpaid Base Rent and Additional Rent that would have been payable pursuant to this Lease for the remainder of the Term following Landlord's Lump Sum Election if this Lease had not been terminated, and

(B) all other damages and expenses (including attorneys' fees and expenses), if any, which Landlord shall have sustained by reason of the breach of any provision of this Lease; less

(C) the then present value (calculated in accordance with accepted financial practice using as the discount rate the yield to maturity on United States Treasury Notes as set forth below) of the aggregate net fair market rent plus additional charges payable for the Premises (if less than the then present value of Base Rent and Additional Rent that would have been payable pursuant to this Lease) for the remainder of the Term following Landlord's Lump Sum Election, calculated as of the date of Landlord's Lump Sum Election, and taking into account reasonable estimates of the future costs to relet any then vacant portions of the Premises (except to the extent that Tenant has actually paid such costs pursuant to this Section 21) in order to calculate the net rental revenue that Landlord may expect to obtain for the Premises for the balance of the Term.

Landlord's recovery under its Lump Sum Election shall be in addition to Tenant's obligations to pay Base Rent and Additional Rent due and costs incurred prior to the date of Landlord's Lump Sum Election, and in lieu of any Base Rent and Additional Rent which would otherwise have been due under this Section from and after the date of Landlord's Lump Sum Election. The yield to maturity on United States Treasury Notes having a maturity date that is nearest the date that would have been the last day of the Term of the Lease, as reported in the Wall Street Journal or a comparable publication if it ceases to publish such yields, shall be used in calculating present values for purposes of Landlord's Lump Sum Election. For the purposes of this Section, if Landlord makes the Lump Sum Election to recover liquidated damages in accordance with this Section, the total Additional Rent shall be computed by assuming Tenant's Share of Operating Expenses and other Additional Rent to be the same as were payable for the twelve (12) calendar months (or if less than twelve (12) calendar months have been elapsed since the date hereof, the partial year) immediately preceding the date of Landlord's Lump Sum election.

In the event Landlord makes a Lump Sum Election pursuant to this Section 21(c)(v) and Landlord subsequently relets the Premises, Tenant shall be entitled to a credit in the net amount of rent and other charges to be received by Landlord in reletting the Premises, after deduction of all of Landlord's reasonable expenses incurred in reletting the Premises (including, without limitation, tenant improvement, demising and remodeling costs, brokerage fees and the like). This credit shall offset the lump sum amount otherwise owed by Tenant under this Section 21 (c)(v) and, in the event Tenant has already paid the lump sum hereunder, Landlord shall refund such credit amount to Tenant within a reasonable period.

(vi) Nothing herein contained shall limit or prejudice the right of Landlord, in any bankruptcy or insolvency proceeding, to prove for and obtain as liquidated damages by reason of such termination an amount equal to the maximum allowed by any bankruptcy or insolvency proceedings, or to prove for and obtain as liquidated damages by reason of such termination, an amount equal to the maximum allowed by any statute or rule of law, whether such amount shall be greater or less than the excess referred to above. ·

(vii) Nothing in this Section 21 shall be deemed to affect the right of either party to indemnifications pursuant to this Lease.

(viii) If Landlord terminates this Lease upon the occurrence of a Default, Tenant will quit and surrender the Premises to Landlord or its agents, and Landlord may, without further notice, enter upon, re-enter and repossess the Premises by summary proceedings, ejectment or otherwise. The words "enter", "re-enter", and "re-entry" are not restricted to their technical legal meanings.

(ix) If either party shall be in default in the observance or performance of any provision of this Lease, and an action shall be brought for the enforcement thereof in which it shall be determined that such party was in default, the party in default shall pay to the other party all reasonable, out of pocket fees, costs and other expenses which may become payable as a result thereof or in connection therewith, including reasonable attorneys' fees and expenses.

(x) If Default by Tenant shall occur in the keeping, observance or performance of any covenant, agreement, term, provision or condition herein contained, Landlord, without thereby waiving such Default, may perform the same for the account and at the expense of Tenant (a) immediately or at any time thereafter and with only such notice, if any, as may be practicable under the circumstances in the case of Emergency or in case such default will result in a violation of any legal or insurance requirements, or in the imposition of any lien against all or any portion of the Premises or the Project not bonded over to Landlord's satisfaction by Tenant within 10 business days after delivery of notice by Landlord to Tenant, and (b) in any other case if such default continues after any applicable notice and cure period provided in Section 21. All reasonable costs and expenses incurred by Landlord in connection with any such performance by it for the account of Tenant and also all reasonable costs and expenses, including attorneys' fees and disbursements incurred by Landlord in any action or proceeding (including any summary

dispossess proceeding) brought by Landlord to enforce any obligation of Tenant under this Lease and/or right of Landlord in or to the Premises, shall be paid by Tenant to Landlord within 10 days after demand. Landlord shall not be liable for, nor shall Tenant's obligations hereunder be diminished because of, Landlord's failure to relet the Premises or collect rent due in respect of such reletting or otherwise to mitigate any damages arising by reason of Tenant's Default. Landlord shall, however, use commercially reasonable efforts to mitigate the damages arising by reason of the termination of this Lease as a result of a Default by Tenant; provided, however, that in no event shall mitigation require Landlord to consider, among other things, (i) any tenant which does not satisfy Landlord's then current underwriting criteria, in the exercise of Landlord's sole and absolute discretion, for comparable size premises, (ii) subdividing the Premises unless Landlord elects in its sole and absolute discretion to do so, (iii) any change in use of the Premises or any alterations which would lessen the value of the leasehold improvements, (iv) granting any tenant improvement allowances, free rent or other lease concessions, or (v) accepting any tenant if Landlord would have the right to reject such tenant if such tenant were a proposed assignee or sublessee of Tenant including, without limitation, considering the factors described in Section 22(b).

(xi) Independent of the exercise of any other remedy of Landlord hereunder or under applicable law, Landlord may conduct an environmental test of the Premises as generally described in Section 30(c).

(xii) In the event that Tenant is in breach or Default under this Lease, whether or not Landlord exercises its right to terminate or any other remedy, Tenant shall reimburse Landlord upon demand for any out of pocket costs and expenses that Landlord may incur in connection with any such breach or Default, as provided in this Section 21 (c). Such costs shall include legal fees and costs incurred for the negotiation of a settlement, enforcement of rights or otherwise. Tenant shall also indemnify Landlord against and hold Landlord harmless from all costs, expenses, demands and liability, including without limitation, legal fees and costs Landlord shall incur if Landlord shall become or be made a party to any claim or action instituted by Tenant against any third party, or by or against any person holding any interest under or using the Premises by license of or agreement with Tenant.

Except as otherwise provided in this Section 21, no right or remedy herein conferred upon or reserved to Landlord is intended to be exclusive of any other right or remedy, and every right and remedy shall be cumulative and in addition to any other legal or equitable right or remedy given hereunder, or now or hereafter existing. No waiver by either party of any provision of this Lease shall be deemed to have been made unless expressly so made in writing by the party waiving such provision. Landlord and Tenant each shall be entitled, to the extent permitted by law, to seek injunctive relief in case of the violation, or attempted or threatened violation, of any provision of this Lease, or to seek a decree compelling observance or performance of any provision of this Lease, or to seek any other legal or equitable remedy.

22. **Assignment and Subletting.**

(a) **General Prohibition.** Without Landlord's prior written consent subject to and on the conditions described in this Section 22, Tenant shall not, directly or indirectly, voluntarily or by operation of law, assign this Lease or sublease the Premises or any part thereof or mortgage, pledge, or hypothecate its leasehold interest or grant any concession or license within the Premises, and any attempt to do any of the foregoing shall be void and of no effect. If Tenant is a corporation, partnership or limited liability company, the shares or other ownership interests thereof which are not actively traded upon a stock exchange or in the over-the-counter market, a transfer or series of transfers whereby 50% or more of the issued and outstanding shares or other ownership interests of such corporation are, or voting control is, transferred (but excepting transfers upon deaths of individual owners) from a person or persons or entity or entities which were owners thereof at time of execution of this Lease to persons or entities who were not owners of shares or other ownership interests of the corporation, partnership or

limited liability company at time of execution of this Lease, shall be deemed an assignment of this Lease requiring the consent of Landlord as provided in this Section 22. Notwithstanding the foregoing, Tenant shall have the right to obtain financing from institutional investors (including venture capital funding and corporate partners) which regularly invest in private biotechnology companies which results in a change in control of Tenant without such change of control constituting an assignment under this Section 22 requiring Landlord consent, provided that (i) Tenant notifies Landlord in writing of the financing at least 5 business days prior to the closing of the financing, and (ii) provided that in no event shall such financing result in a change in use of the Premises from the use contemplated by Tenant at the commencement of the Term.

(b) **Permitted Transfers.** If Tenant desires to assign, sublease, hypothecate or otherwise transfer this Lease or sublet the Premises other than pursuant to a Permitted Assignment (as defined below), then at least 15 business days, but not more than 45 business days, before the date Tenant desires the assignment or sublease to be effective (the **"Assignment Date"),** Tenant shall give Landlord a notice (the **"Assignment Notice")** containing such information about the proposed assignee or sublessee, including the proposed use of the Premises and any Hazardous Materials proposed to be used, stored handled, treated, generated in or released or disposed of from the Premises, the Assignment Date, any relationship between Tenant and the proposed assignee or sublessee, and all material terms and conditions of the proposed assignment or sublease, including a copy of any proposed assignment or sublease in its final form, and such other information as Landlord may deem reasonably necessary or appropriate to its consideration whether to grant its consent. Landlord may, by giving written notice to Tenant within 15 business days after receipt of the Assignment Notice: (i) grant such consent (provided that Landlord shall further have the right to review and approve or disapprove the proposed form of sublease prior to the effective date of any such subletting), (ii) refuse such consent, in its reasonable discretion; or (iii) terminate this Lease with respect to the space described in the Assignment Notice as of the Assignment Date (an **"Assignment Termination").** Among other reasons, it shall be reasonable for Landlord to withhold its consent in any of these instances: (1) the proposed assignee or subtenant is a governmental agency; (2) in Landlord's reasonable judgment, the use of the Premises by the proposed assignee or subtenant would entail any alterations that would lessen the value of the leasehold improvements in the Premises, or would require increased services by Landlord; (3) in Landlord's reasonable judgment, the proposed assignee or subtenant is engaged in areas of scientific research or other business concerns that are controversial; (4) in Landlord's reasonable judgment, the proposed assignee or subtenant lacks the creditworthiness to support the financial obligations it will incur under the proposed assignment or sublease; (5) in Landlord's reasonable judgment, the character, reputation, or business of the proposed assignee or subtenant is inconsistent with the desired tenant-mix or the quality of other tenancies in the Project or is inconsistent with the type and quality of the nature of the Building; (6) Landlord has received from any prior landlord to the proposed assignee or subtenant a negative report concerning such prior landlord's experience with the proposed assignee or subtenant; (7) Landlord has experienced previous defaults by or is in litigation with the proposed assignee or subtenant; (8) the use of the Premises by the proposed assignee or subtenant will violate any applicable Legal Requirement; (9) the proposed assignee or subtenant, or any entity that, directly or indirectly, controls, is controlled by, or is under common control with the proposed assignee or subtenant, is then an occupant of the Project; (10) the proposed assignee or subtenant is an entity with whom Landlord is negotiating to lease space in the Project; or (11) the assignment or sublease is prohibited by Landlord's lender. If Landlord delivers notice of its election to exercise an Assignment Termination, Tenant shall have the right to withdraw such Assignment Notice by written notice to Landlord of such election within 5 business days after Landlord's notice electing to exercise the Assignment Termination. If Tenant withdraws such Assignment Notice, this Lease shall continue in full force and effect. If Tenant does not withdraw such Assignment Notice, this Lease, and the term and estate herein granted, shall terminate as of the Assignment Date with respect to the space described in such Assignment Notice. No failure of Landlord to exercise any such option to terminate this Lease, or to deliver a timely notice in response to the Assignment Notice, shall be deemed to be Landlord's consent to the proposed assignment, sublease or other transfer. Tenant shall pay to Landlord a fee equal to One Thousand Five Hundred Dollars ($1,500) in connection with its consideration of any Assignment Notice and/or its preparation or review of any consent documents. Notwithstanding the foregoing, Landlord's consent to an assignment of this Lease or a subletting of any portion of the Premises to any entity controlling, controlled by or under common

control with Tenant (a **"Control Permitted Assignment")** shall not be required, provided that Landlord shall have the right to approve the form of any such sublease or assignment, which approval shall not be unreasonably withheld, conditioned or delayed. In addition, Tenant shall have the right to assign this Lease, upon 10 days prior written notice to Landlord but without obtaining Landlord's prior written consent, to a corporation or other entity which is a successor-in-interest to Tenant, by way of merger, consolidation or corporate reorganization, or by the purchase of all or substantially all of the assets or the ownership interests of Tenant provided that (i) such merger or consolidation, or such acquisition or assumption, as the case may be, is for a good business purpose and not principally for the purpose of transferring the Lease, and (ii) the net worth (as determined in accordance with generally accepted accounting principles **("GAAP"))** of the assignee is not less than the greater of the net worth (as determined in accordance with GAAP) of Tenant as of (A) the Commencement Date, or (B) as of the date of Tenant's most current quarterly or annual financial statements, and (iii) such assignee shall agree in writing to assume all of the terms, covenants and conditions of this Lease (a **"Corporate Permitted Assignment").** Control Permitted Assignments and Corporate Permitted Assignments are hereinafter referred to as **"Permitted Assignments."**

(c) **Additional Conditions.** As a condition to any such assignment or subletting, whether or not Landlord's consent is required, Landlord may require:

(i) that any assignee or subtenant agree, in writing at the time of such assignment or subletting, that if Landlord gives such party notice that Tenant is in default under this Lease, such party shall thereafter make all payments otherwise due Tenant directly to Landlord, which payments will be received by Landlord without any liability except to credit such payment against those due under the Lease, and any such third party shall agree to attorn to Landlord or its successors and assigns should this Lease be terminated for any reason; provided, however, in no event shall Landlord or its successors or assigns be obligated to accept such attornment; and

(ii) A list of Hazardous Materials, certified by the proposed assignee or sublessee to be true and correct, which the proposed assignee or sublessee intends to use, store, handle, treat, generate in or release or dispose of from the Premises, together with copies of all documents relating to such use, storage, handling, treatment, generation, release or disposal of Hazardous Materials by the proposed assignee or subtenant in the Premises or on the Project, prior to the proposed assignment or subletting, including, without limitation: permits; approvals; reports and correspondence; storage and management plans; plans relating to the installation of any storage tanks to be installed in or under the Project (provided, said installation of tanks shall only be permitted after Landlord has given its written consent to do so, which consent may be withheld in Landlord's sole and absolute discretion); and all closure plans or any other documents required by any and all federal, state and local Governmental Authorities for any storage tanks installed in, on or under the Project for the closure of any such tanks. Neither Tenant nor any such proposed assignee or subtenant is required, however, to provide Landlord with any portion(s) of the such documents containing information of a proprietary nature which, in and of themselves, do not contain a reference to any Hazardous Materials or hazardous activities.

(d) **No Release of Tenant, Sharing of Excess Rents.** Notwithstanding any assignment or subletting, Tenant and any guarantor or surety of Tenant's obligations under this Lease shall at all times remain fully and primarily responsible and liable for the payment of Rent and for compliance with all of Tenant's other obligations under this Lease. If the Rent due and payable by a sublessee or assignee (or a combination of the rental payable under such sublease or assignment plus any bonus or other consideration therefor or incident thereto in any form) exceeds the sum of the rental payable under this Lease, (excluding however, any Rent payable under this Section) and actual and reasonable brokerage fees, legal costs and any design or construction fees directly related to and required pursuant to the terms of any such sublease) **("Excess Rent"),** then Tenant shall be bound and obligated to pay Landlord as Additional Rent hereunder 50% of such Excess Rent within 10 days following receipt thereof by Tenant. If Tenant shall sublet the Premises or any part thereof, Tenant hereby immediately and irrevocably assigns to Landlord, as security for Tenant's obligations under this Lease, all rent from any such subletting, and Landlord as assignee and as attorney-in-fact for Tenant, or a receiver for Tenant appointed on Landlord's application, may collect such rent and apply it toward Tenant's obligations under this Lease; except that, until the occurrence of a Default, Tenant shall have the right to collect such rent.

(e) **No Waiver.** The consent by Landlord to an assignment or subletting shall not relieve Tenant or any assignees of this Lease or any sublessees of the Premises from obtaining the consent of Landlord to any further assignment or subletting nor shall it release Tenant or any assignee or sublessee of Tenant from full and primary liability under the Lease. The acceptance of Rent hereunder, or the acceptance of performance of any other term, covenant, or condition thereof, from any other person or entity shall not be deemed to be a waiver of any of the provisions of this Lease or a consent to any subletting, assignment or other transfer of the Premises.

(f) **Prior Conduct of Proposed Transferee.** Notwithstanding any other provision of this Section 22, if (i) the proposed assignee or sublessee of Tenant has been required by any prior landlord, lender or Governmental Authority to take remedial action in connection with Hazardous Materials contaminating a property, where the contamination resulted from such party's action or use of the property in question, (ii) the proposed assignee or sublessee is subject to an enforcement order issued by any Governmental Authority in connection with the use, storage, handling, treatment, generation, release or disposal of Hazardous Materials (including, without limitation, any order related to the failure to make a required reporting to any Governmental Authority), or (iii) because of the existence of a pre-existing environmental condition in the vicinity of or underlying the Project, the risk that Landlord would be targeted as a responsible party in connection with the remediation of such pre-existing environmental condition would be materially increased or exacerbated by the proposed use of Hazardous Materials by such proposed assignee or sublessee, Landlord shall have the absolute right to refuse to consent to any assignment or subletting to any such party.

23. **Estoppel Certificate.** Tenant shall, within 10 business days of written notice from Landlord, execute, acknowledge and deliver a statement in writing in any form reasonably requested by a proposed lender or purchaser, (i) certifying that this Lease is unmodified and in full force and effect (or, if modified, stating the nature of such modification and certifying that this Lease as so modified is in full force and effect) and the dates to which the rental and other charges are paid in advance, if any, (ii) acknowledging that there are not any uncured defaults on the part of Landlord hereunder, or specifying such defaults if any are claimed, and (iii) setting forth such further information with respect to the status of this Lease or the Premises as may be requested thereon. Any such statement may be relied upon by any prospective purchaser or encumbrancer of all or any portion of the real property of which the Premises are a part. Tenant's failure to deliver such statement within such time shall, at the option of Landlord, constitute a Default under this Lease, and, in any event, shall be conclusive upon Tenant that the Lease is in full force and effect and without modification except as may be represented by Landlord in any certificate prepared by Landlord and delivered to Tenant for execution.

24. **Quiet Enjoyment.** So long as Tenant is not in Default under this Lease, Tenant shall, subject to the terms of this Lease, at all times during the Term, have peaceful and quiet enjoyment of the Premises against any person claiming by, through or under Landlord.

25. **Prorations.** All prorations required or permitted to be made hereunder shall be made on the basis of a 360 day year and 30 day months.

26. **Rules and Regulations.** Tenant shall, at all times during the Term and any extension thereof, comply with all reasonable rules and regulations at any time or from time to time established by Landlord covering use of the Premises and the Project. The current rules and regulations are attached hereto as **Exhibit E.** If there is any conflict between said rules and regulations and other provisions of this Lease, the terms and provisions of this Lease shall control. Landlord shall not have any liability or obligation for the breach of any rules or regulations by other tenants in the Project and shall not enforce such rules and regulations in a discriminatory manner.

27. **Subordination.** This Lease and Tenant's interest and rights hereunder are hereby made and shall be subject and subordinate at all times to the lien of any Mortgage now existing or hereafter created on or against the Project or the Premises, and all amendments, restatements, renewals, modifications, consolidations, refinancing, assignments and extensions thereof, without the necessity of any further instrument or act on the part of Tenant; provided, however that so long as there is no Default hereunder, Tenant's right to possession of the Premises shall not be disturbed by the Holder of any such Mortgage. Tenant agrees, at the election of the Holder of any such Mortgage, to attorn to any such Holder. Tenant agrees upon demand to execute, acknowledge and deliver such instruments, confirming such subordination, and such instruments of attornment as shall be requested by any such Holder, provided any such instruments contain appropriate non-disturbance provisions assuring Tenant's quiet enjoyment of the Premises as set forth in Section 24 hereof. Tenant hereby appoints Landlord attorney-in-fact for Tenant irrevocably (such power of attorney being coupled with an interest) to execute, acknowledge and deliver any such instrument and instruments for and in the name of Tenant and to cause any such instrument to be recorded. Notwithstanding the foregoing, any such Holder may at any time subordinate its Mortgage to this Lease, without Tenant's consent, by notice in writing to Tenant, and thereupon this Lease shall be deemed prior to such Mortgage without regard to their respective dates of execution, delivery or recording and in that event such Holder shall have the same rights with respect to this Lease as though this Lease had been executed prior to the execution, delivery and recording of such Mortgage and had been assigned to such Holder. The term **"Mortgage"** whenever used in this Lease shall be deemed to include deeds of trust, security assignments and any other encumbrances, and any reference to the **"Holder"** of a Mortgage shall be deemed to include the beneficiary under a deed of trust.

28. **Surrender.** Upon the expiration of the Term or earlier termination of Tenant's right of possession, Tenant shall surrender the Premises to Landlord in the same condition as received, subject to any Alterations or Installations permitted by Landlord to remain in the Premises, free of Hazardous Materials brought upon, kept, used, stored, handled, treated, generated in, or released or disposed of from, the Premises by any person other than a Landlord Party (collectively, **"Tenant HazMat Operations")** and released of all Hazardous Materials Clearances, broom clean, ordinary wear and tear and casualty loss and condemnation covered by Sections 18 and 19 excepted. At least 3 months prior to the surrender of the Premises, Tenant shall deliver to Landlord a narrative description of the actions proposed (or required by any Governmental Authority) to be taken by Tenant in order to surrender the Premises (including any Installations permitted by Landlord to remain in the Premises) at the expiration or earlier termination of the Term, free from any residual impact from the Tenant HazMat Operations and otherwise released for unrestricted use and occupancy (the **"Surrender Plan").** Such Surrender Plan shall be accompanied by a current listing of (i) all Hazardous Materials licenses and permits held by or on behalf of any Tenant Party with respect to the Premises, and (ii) all Hazardous Materials used, stored, handled, treated, generated, released or disposed of from the Premises, and shall be subject to the review and approval of Landlord's environmental consultant. In connection with the review and approval of the Surrender Plan, upon the request of Landlord, Tenant shall deliver to Landlord or its consultant such additional non-proprietary information concerning Tenant HazMat Operations as Landlord shall request. On or before such surrender, Tenant shall deliver to Landlord evidence that the approved Surrender Plan shall have been satisfactorily completed and Landlord shall have the right, subject to reimbursement at Tenant's expense as set forth below, to cause Landlord's environmental consultant to inspect the Premises and perform such additional procedures as may be deemed reasonably necessary to confirm that the Premises are, as of the effective date of such surrender or early termination of the Lease, free from any residual impact from Tenant HazMat Operations. Tenant shall reimburse Landlord, as Additional Rent, for the actual out-of pocket expense incurred by Landlord for Landlord's environmental consultant to review and approve the Surrender Plan and to visit the Premises and verify satisfactory completion of the same, which cost shall not exceed $2.500. Landlord shall have the unrestricted right to deliver such Surrender Plan and any report by Landlord's environmental consultant with respect to the surrender of the Premises to third parties.

If Tenant shall fail to prepare or submit a Surrender Plan approved by Landlord, or if Tenant shall fail to complete the approved Surrender Plan, or if such Surrender Plan, whether or not approved by Landlord, shall fail to adequately address any residual effect of Tenant HazMat Operations in, on or about the Premises, Landlord shall have the right to take such actions as Landlord may deem reasonable or

appropriate to assure that the Premises and the Project are surrendered free from any residual impact from Tenant HazMat Operations, the cost of which actions shall be reimbursed by Tenant as Additional Rent, without regard to the limitation set forth in the first paragraph of this Section 28.

Tenant shall immediately return to Landlord all keys and/or access cards to parking, the Project, restrooms or all or any portion of the Premises furnished to or otherwise procured by Tenant. If any such access card or key is lost, Tenant shall pay to Landlord, at Landlord's election, either the reasonable cost of replacing such lost access card or key or the reasonable cost of reprogramming the access security system in which such access card was used or changing the lock or locks opened by such lost key. Any Tenant's Property, Alterations and property not so removed by Tenant as permitted or required herein shall be deemed abandoned and may be stored, removed, and disposed of by Landlord at Tenant's expense, and Tenant waives all claims against Landlord for any damages resulting from Landlord's retention and/or disposition of such property. All obligations of Tenant hereunder not fully performed as of the termination of the Term, including the obligations of Tenant under Section 30 hereof, shall survive the expiration or earlier termination of the Term, including, without limitation, indemnity obligations, payment obligations with respect to Rent and obligations concerning the condition and repair of the Premises.

29. **Waiver of Jury Trial.** TO THE EXTENT PERMITTED BY LAW, TENANT AND LANDLORD WAIVE ANY RIGHT TO TRIAL BY JURY OR TO HAVE A JURY PARTICIPATE IN RESOLVING ANY DISPUTE, WHETHER SOUNDING IN CONTRACT, TORT, OR OTHERWISE, BETWEEN LANDLORD AND TENANT ARISING OUT OF THIS LEASE OR ANY OTHER INSTRUMENT, DOCUMENT, OR AGREEMENT EXECUTED OR DELIVERED IN CONNECTION HEREWITH OR THE TRANSACTIONS RELATED HERETO.

30. **Environmental Requirements.**

(a) **Prohibition/Compliance/Indemnity.** Tenant shall not cause or permit any Hazardous Materials (as hereinafter defined) to be brought upon, kept, used, stored, handled, treated, generated in or about, or released or disposed of from, the Premises or the Project in violation of applicable Environmental Requirements (as hereinafter defined) by Tenant or any Tenant Party. If Tenant breaches the obligation stated in the preceding sentence, or if the presence of Hazardous Materials in the Premises during the Term or any holding over results in contamination of the Premises, the Project or any adjacent property or if contamination of the Premises, the Project or any adjacent property by Hazardous Materials brought into, kept, used, stored, handled, treated, generated in or about, or released or disposed of from, the Premises by anyone other than Landlord and Landlord's employees, agents and contractors otherwise occurs during the Term or any holding over, Tenant hereby indemnifies and shall defend and hold Landlord, its officers, directors, employees, agents and contractors harmless from any and all actions (including, without limitation, remedial or enforcement actions of any kind, administrative or judicial proceedings, and orders or judgments arising out of or resulting therefrom), costs, claims, damages (including, without limitation, punitive damages and damages based upon diminution in value of the Premises or the Project, or the loss of, or restriction on, use of the Premises or any portion of the Project), expenses (including, without limitation, attorneys', consultants' and experts' fees, court costs and amounts paid in settlement of any claims or actions), fines, forfeitures or other civil, administrative or criminal penalties, injunctive or other relief (whether or not based upon personal injury, property damage, or contamination of, or adverse effects upon, the environment, water tables or natural resources), liabilities or losses (collectively, **"Environmental Claims")** which arise during or after the Term as a result of such contamination. This indemnification of Landlord by Tenant includes, without limitation, costs incurred in connection with any investigation of site conditions or any cleanup, treatment, remedial, removal, or restoration work required by any federal, state or local Governmental Authority because of Hazardous Materials present in the air, soil or ground water above, on, or under the Premises. Without limiting the foregoing, if the presence of any Hazardous Materials on the Premises, , the Building, the Project or any adjacent property caused or permitted by Tenant or any Tenant Party results in any contamination of the Premises, the Building, the Project or any adjacent property, Tenant shall promptly take all actions at its sole expense and in accordance with applicable Environmental Requirements as are necessary to return the Premises, the Building, the Project or any adjacent property to the condition

existing prior to the time of such contamination, provided that Landlord's approval of such action shall first be obtained, which approval shall not unreasonably be withheld so long as such actions would not potentially have any material adverse long-term or short-term effect on the Premises, the Building or the Project. Notwithstanding anything to the contrary contained in this Section 30, Tenant shall not be responsible for, and the indemnification and hold harmless obligation set forth in this paragraph shall not apply to (i) contamination in the Premises which Tenant can prove existed in the Premises immediately prior to the Commencement Date, or (ii) the presence of any Hazardous Materials in the Premises which Tenant can prove migrated from outside of the Premises into the Premises, unless in either case, the presence of such Hazardous Materials (x) is the result of a breach by Tenant of any of its obligations under this Lease, or (y) was caused, contributed to or exacerbated by Tenant or any Tenant Party.

(b) **Business.** Landlord acknowledges that it is not the intent of this Section 30 to prohibit Tenant from using the Premises for the Permitted Use. Tenant may operate its business according to prudent industry practices so long as the use or presence of Hazardous Materials is strictly and properly monitored according to all then applicable Environmental Requirements. As a material inducement to Landlord to allow Tenant to use Hazardous Materials in connection with its business, Tenant agrees to deliver to Landlord prior to the Commencement Date a list identifying each type of Hazardous Materials to be brought upon, kept, used, stored, handled, treated, generated on, or released or disposed of from, the Premises and setting forth any and all governmental approvals or permits required in connection with the presence, use, storage, handling, treatment, generation, release or disposal of such Hazardous Materials on or from the Premises **("Hazardous Materials List").** Tenant shall deliver to Landlord an updated Hazardous Materials List at least once a year and shall also deliver an updated list before any new Hazardous Material is brought onto, kept, used, stored, handled, treated, generated on, or released or disposed of from, the Premises. Tenant shall deliver to Landlord true and correct copies of the following documents (the **"Haz Mat Documents")** relating to the use, storage, handling, treatment, generation, release or disposal of Hazardous Materials prior to the Commencement Date, or if unavailable at that time, concurrent with the receipt from or submission to a Governmental Authority: permits; approvals; reports and correspondence; storage and management plans, notice of violations of any Legal Requirements; plans relating to the installation of any storage tanks to be installed in or under the Project (provided, said installation of tanks shall only be permitted after Landlord has given Tenant its written consent to do so, which consent may be withheld in Landlord's sole and absolute discretion); all closure plans or any other documents required by any and all federal, state and local Governmental Authorities for any storage tanks installed in, on or under the Project for the closure of any such tanks; and a Surrender Plan (to the extent surrender in accordance with Section 28 cannot be accomplished in 3 months). Tenant is not required, however, to provide Landlord with any portion(s) of the Haz Mat Documents containing information of a proprietary nature which, in and of themselves, do not contain a reference to any Hazardous Materials or hazardous activities. It is not the intent of this Section to provide Landlord with information which could be detrimental to Tenant's business should such information become possessed by Tenant's competitors.

(c) **Tenant Representation and Warranty.** Tenant hereby represents and warrants to Landlord that (i) neither Tenant nor any of its legal predecessors has been required by any prior landlord, lender or Governmental Authority at any time to take remedial action in connection with Hazardous Materials contaminating a property which contamination was permitted by Tenant of such predecessor or resulted from Tenant's or such predecessor's action or use of the property in question, and (ii) Tenant is not subject to any enforcement order issued by any Governmental Authority in connection with the use, storage, handling, treatment, generation, release or disposal of Hazardous Materials (including, without limitation, any order related to the failure to make a required reporting to any Governmental Authority). If Landlord determines that this representation and warranty was not true as of the date of this lease, Landlord shall have the right to terminate this Lease in Landlord's sole and absolute discretion.

(d) **Testing.** Landlord shall have the right to conduct annual tests of the Premises to determine whether any contamination of the Premises or the Project has occurred as a result of Tenant's use. Tenant shall be required to pay the cost of such annual test of the Premises if there is violation of this Section 30 or if contamination for which Tenant is responsible under this Section 30 is identified; provided, however, that if Tenant conducts its own tests of the Premises using third party contractors and

test procedures reasonably acceptable to Landlord which tests are certified to Landlord, Landlord shall accept such tests in lieu of the annual tests to be paid for by Tenant. In addition, at any time, and from time to time, prior to the expiration or earlier termination of the Term, Landlord shall have the right to conduct appropriate tests of the Premises and the Project to determine if contamination has occurred as a result of Tenant's use of the Premises. In connection with such testing under this Section 30(d), upon the request of Landlord, Tenant shall deliver to Landlord or its consultant such non-proprietary information concerning the use of Hazardous Materials in or about the Premises by Tenant or any Tenant Party. If contamination has occurred for which Tenant is liable under this Section 30, Tenant shall pay all costs to conduct such tests. If no such contamination is found, Landlord shall pay the costs of such tests (which shall not constitute an Operating Expense). Landlord shall provide Tenant with a copy of all third party, non-confidential reports and tests of the Premises made by or on behalf of Landlord during the Term without representation or warranty and subject to a confidentiality agreement. Tenant shall, at its sole cost and expense, promptly and satisfactorily remediate any environmental conditions identified by such testing in accordance with all Environmental Requirements. Landlord's receipt of or satisfaction with any environmental assessment in no way waives any rights which Landlord may have against Tenant.

(e) **Control Areas.** Tenant shall be allowed to utilize up to its pro rata share of the Hazardous Materials inventory within any control area or zone (located within the Premises), as designated by the applicable building code, for chemical use or storage. As used in the preceding sentence, Tenant's pro rata share of any control areas or zones located within the Premises shall be determined based on the rentable square footage that Tenant leases within the applicable control area or zone. For purposes of example only, if a control area or zone contains 10,000 rentable square feet and 2,000 rentable square feet of a tenant's premises are located within such control area or zone (while such premises as a whole contains 5,000 rentable square feet), the applicable tenant's pro rata share of such control area would be 20%.

(f) **Underground Tanks.** Tenant shall have no right to use or install any underground or other storage tanks at the Project.

(g) **Tenant's Obligations.** Tenant's obligations under this Section 30 shall survive the expiration or earlier termination of the Lease. During any period of time after the expiration or earlier termination of this Lease required by Tenant or Landlord to complete the removal from the Premises of any Hazardous Materials (including, without limitation, the release and termination of any licenses or permits restricting the use of the Premises and the completion of the approved Surrender Plan), Tenant shall continue to pay the full Rent in accordance with this Lease for any portion of the Premises not relet by Landlord in Landlord's sole discretion, which Rent shall be prorated daily.

(h) **Definitions.** As used herein, the term **"Environmental Requirements"** means all applicable present and future statutes, regulations, ordinances, rules, codes, judgments, orders or other similar enactments of any Governmental Authority regulating or relating to health, safety, or environmental conditions on, under, or about the Premises or the Project, or the environment, including without limitation, the following: the Comprehensive Environmental Response, Compensation and Liability Act; the Resource Conservation and Recovery Act; and all state and local counterparts thereto, and any regulations or policies promulgated or issued thereunder. As used herein, the term **"Hazardous Materials"** means and includes any substance, material, waste, pollutant, or contaminant listed or defined as hazardous or toxic, or regulated by reason of its impact or potential impact on humans, animals and/or the environment under any Environmental Requirements, asbestos and petroleum, including crude oil or any fraction thereof, natural gas liquids, liquefied natural gas, or synthetic gas usable for fuel (or mixtures of natural gas and such synthetic gas). As defined in Environmental Requirements, Tenant is and shall be deemed to be the **"operator"** of Tenant's **"facility"** and the **"owner"** of all Hazardous Materials brought on the Premises by Tenant or any Tenant Party, and the wastes, by-products, or residues generated, resulting, or produced therefrom.

31. **Tenant's Remedies/Limitation of Liability.** Landlord shall not be in default hereunder unless Landlord fails to perform any of its obligations hereunder within 30 days after written notice from Tenant specifying such failure (unless such performance will, due to the nature of the obligation, require a period of time in excess of 30 days, then, so long as Landlord continues to use reasonable efforts to perform, after such period of time as is reasonably necessary). Upon any default by Landlord, Tenant shall give notice by registered or certified mail to any Holder of a Mortgage covering the Premises and to any landlord of any lease of property in or on which the Premises are located and Tenant shall offer such Holder and/or landlord a reasonable opportunity to cure the default, including time to obtain possession of the Project by power of sale or a judicial action if such should prove necessary to effect a cure; provided Landlord shall have furnished to Tenant in writing the names and addresses of all such persons who are to receive such notices. All obligations of Landlord hereunder shall be construed as covenants, not conditions; and, except as may be otherwise expressly provided in this Lease, Tenant may not terminate this Lease for breach of Landlord's obligations hereunder.

All obligations of Landlord under this Lease will be binding upon Landlord only during the period of its ownership of the Premises and not thereafter. The term **"Landlord"** in this Lease shall mean only the owner for the time being of the Premises. Upon the transfer by such owner of its interest in the Premises, such owner shall thereupon be released and discharged from all obligations of Landlord thereafter accruing, but such obligations shall be binding during the Term upon each new owner for the duration of such owner's ownership.

32. **Inspection and Access.** Subject to the terms and conditions of this Section 32, Landlord and its agents, representatives, and contractors may enter the Premises at any reasonable time to inspect the Premises and to make such repairs as may be required or permitted pursuant to this Lease and for any other business purpose. Landlord and Landlord's representatives may enter the Premises during business hours on not less than 48 hours advance written notice (except in the case of emergencies in which case no such notice shall be required and such entry may be at any time) for the purpose of effecting any such repairs, inspecting the Premises, showing the Premises to prospective purchasers and, during the last year of the Term, to prospective tenants or for any other business purpose. Landlord may erect a suitable sign (i) on the Premises stating the Premises are available to let during the last 9 months of the Term and (ii) at the Project stating that the Project is available for sale. Landlord may grant easements, make public dedications, designate Common Areas and create restrictions on or about the Premises, provided that no such easement, dedication, designation or restriction materially, adversely affects Tenant's use or occupancy of the Premises for the Permitted Use. At Landlord's request, Tenant shall execute such instruments as may be necessary for such easements, dedications or restrictions. Tenant shall at all times, except in the case of emergencies, have the right to escort Landlord or its agents, representatives, contractors or guests while the same are in the Premises, provided such escort does not materially and adversely affect Landlord's access rights hereunder. During Landlord's access of the Premises, Landlord shall use reasonable efforts to comply with Tenant's reasonable safety and security requirements; provided, however, that Tenant has notified Landlord of such safety and security requirements prior to Landlord's entry into the Premises.

33. **Security.** Tenant acknowledges and agrees that security devices and services, if any, while intended to deter crime may not in given instances prevent theft or other criminal acts and that Landlord is not providing any security services with respect to the Premises. Tenant agrees that Landlord shall not be liable to Tenant for, and Tenant waives any claim against Landlord with respect to, any loss by theft or any other damage suffered or incurred by Tenant in connection with any unauthorized entry into the Premises or any other breach of security with respect to the Premises. Tenant shall be solely responsible for the personal safety of Tenant's officers, employees, agents, contractors, guests and invitees while any such person is in, on or about the Premises and/or the Project. Tenant shall at Tenant's cost obtain insurance coverage to the extent Tenant desires protection against such criminal acts.

34. **Force Majeure.** Except for the payment of Rent, neither Landlord nor Tenant shall be held responsible or liable for delays in the performance of its obligations hereunder when caused by, related to, or arising out of acts of God, sinkholes or subsidence, strikes, lockouts, or other labor disputes, embargoes, quarantines, weather, national, regional, or local disasters, calamities, or catastrophes, inability to obtain labor or materials (or reasonable substitutes therefor) at reasonable costs or failure of,

or inability to obtain, utilities necessary for performance, governmental restrictions, orders, limitations, regulations, or controls, national emergencies, delay in issuance or revocation of permits, enemy or hostile governmental action, terrorism, insurrection, riots, civil disturbance or commotion, fire or other casualty, and other causes or events beyond their reasonable control **("Force Majeure").**

35. **Brokers.** Landlord and Tenant each represents and warrants that it has not dealt with any broker, agent or other person (collectively, **"Broker")** in connection with this transaction and that no Broker brought about this transaction, other than Jones Lang LaSalle and Transwestern RBJ. Landlord and Tenant each hereby agree to indemnify and hold the other harmless from and against any claims by any Broker, other than Jones Lang LaSalle and Transwestern RBJ, claiming a commission or other form of compensation by virtue of having dealt with Tenant or Landlord, as applicable, with regard to this leasing transaction. Landlord shall be responsible for all commissions due to Jones Lang LaSalle and Transwestern RBJ arising out of the execution of this Lease in accordance with the terms of separate written agreement(s) between Landlord and the brokers named in this Section 35.

36. **Limitation on Landlord's Liability.** NOTWITHSTANDING ANYTHING SET FORTH HEREIN OR IN ANY OTHER AGREEMENT BETWEEN LANDLORD AND TENANT TO THE CONTRARY: (A) LANDLORD SHALL NOT BE LIABLE TO TENANT OR ANY OTHER PERSON FOR (AND TENANT AND EACH SUCH OTHER PERSON ASSUME ALL RISK OF) LOSS, DAMAGE OR INJURY, WHETHER ACTUAL OR CONSEQUENTIAL TO: TENANT'S PERSONAL PROPERTY OF EVERY KIND AND DESCRIPTION, INCLUDING, WITHOUT LIMITATION TRADE FIXTURES, EQUIPMENT, INVENTORY, SCIENTIFIC RESEARCH, SCIENTIFIC EXPERIMENTS, LABORATORY ANIMALS, PRODUCT, SPECIMENS, SAMPLES, AND/OR SCIENTIFIC, BUSINESS, ACCOUNTING AND OTHER RECORDS OF EVERY KIND AND DESCRIPTION KEPT AT THE PREMISES AND ANY AND ALL INCOME DERIVED OR DERIVABLE THEREFROM; (B) THERE SHALL BE NO PERSONAL RECOURSE TO LANDLORD FOR ANY ACT OR OCCURRENCE IN, ON OR ABOUT THE PREMISES OR ARISING IN ANY WAY UNDER THIS LEASE OR ANY OTHER AGREEMENT BETWEEN LANDLORD AND TENANT WITH RESPECT TO THE SUBJECT MATTER HEREOF AND ANY LIABILITY OF LANDLORD HEREUNDER SHALL BE STRICTLY LIMITED SOLELY TO LANDLORD'S INTEREST IN THE PROJECT OR ANY PROCEEDS FROM SALE OR CONDEMNATION THEREOF AND ANY INSURANCE PROCEEDS PAYABLE IN RESPECT OF LANDLORD'S INTEREST IN THE PROJECT OR IN CONNECTION WITH ANY SUCH LOSS; AND (C) IN NO EVENT SHALL ANY PERSONAL LIABILITY BE ASSERTED AGAINST LANDLORD IN CONNECTION WITH THIS LEASE NOR SHALL ANY RECOURSE BE HAD TO ANY OTHER PROPERTY OR ASSETS OF LANDLORD OR ANY OF LANDLORD'S OFFICERS, DIRECTORS, EMPLOYEES, AGENTS OR CONTRACTORS. UNDER NO CIRCUMSTANCES SHALL LANDLORD OR ANY OF LANDLORD'S OFFICERS, DIRECTORS, EMPLOYEES, AGENTS OR CONTRACTORS BE LIABLE FOR INJURY TO TENANT'S BUSINESS OR FOR ANY LOSS OF INCOME OR PROFIT THEREFROM.

37. **Severability.** If any clause or provision of this Lease is illegal, invalid or unenforceable under present or future laws, then and in that event, it is the intention of the parties hereto that the remainder of this Lease shall not be affected thereby. It is also the intention of the parties to this Lease that in lieu of each clause or provision of this Lease that is illegal, invalid or unenforceable, there be added, as a part of this Lease, a clause or provision as similar in effect to such illegal, invalid or unenforceable clause or provision as shall be legal, valid and enforceable.

38. **Signs; Exterior Appearance.** Tenant shall not, without the prior written consent of Landlord, which may be granted or withheld in Landlord's sole discretion: (i) attach any awnings, exterior lights, decorations, balloons, flags, pennants, banners, painting or other projection to any outside wall of the Project, (ii) use any curtains, blinds, shades or screens other than Landlord's standard window coverings, (iii) coat or otherwise sunscreen the interior or exterior of any windows, (iv) place any bottles, parcels, or other articles on the window sills, (v) place any equipment, furniture or other items of personal property on any exterior balcony, or (vi) paint, affix or exhibit on any part of the Premises or the Project any signs, notices, window or door lettering, placards, decorations, or advertising media of any type which can be viewed from the exterior of the Premises. Interior signs on doors and the directory tablet shall be inscribed, painted or affixed for Tenant at Landlord's cost, and shall be of a size, color and type reasonably acceptable to Landlord. Nothing may be placed on the exterior of corridor walls or corridor doors other than Landlord's standard lettering. The directory tablet shall be provided exclusively for the display of the name and location of tenants.

Tenant shall have the exclusive right to display, at Tenant's cost and expense, one (1) sign bearing Tenant's name and/or logo (each, a **"Building Sign")** at one (1) location on the building facade reasonably acceptable to Landlord and Tenant. Notwithstanding the foregoing, Tenant acknowledges and agrees that the Building Sign including, without limitation, the size, color and type, shall be subject to Landlord's prior written approval, which shall not be unreasonably withheld, conditioned or delayed, shall be consistent with Landlord's signage program at the Project and shall be subject to any and all other required approvals and applicable Legal Requirements. Landlord shall cooperate with Tenant, at no cost or expense to Landlord, in Tenant's efforts to obtain approvals for Tenant's Building Sign from the applicable Governmental Authorities. Tenant shall be responsible, at Tenant's sole cost and expense, for the maintenance of the Building Sign, for the removal of the Building Sign at the expiration or earlier termination of this Lease and for the repair of all damage resulting from such removal. The Building Sign shall be personal to Homology Medicines, Inc., except that such right may be assigned in connection with any Permitted Assignment.

Tenant shall have the non-exclusive right to display, at Landlord's cost and expense, Tenant's name on the monument sign at the Project serving the Building **("Monument Sign").** Tenant acknowledges and agrees that Tenant's signage on the Monument Sign including, without limitation, the location, size, color and type, shall be subject to Landlord's prior written approval, which shall not be unreasonably withheld and shall be consistent with Landlord's signage program at the Project and applicable Legal Requirements. Tenant shall be responsible, at Tenant's sole cost and expense, for the maintenance of Tenant's signage on the Monument Sign, for the removal of Tenant's signage from the Monument Sign at the expiration or earlier termination of this Lease and for the repair of all damage resulting from such removal. Landlord agrees that the corporate logo, graphics and colors which are registered and in use by Tenant as of the date of this Lease have been approved by Landlord for use on Tenant's signage at the Project.

39. **Right to Expand in Building.**

(a) **Expansion in the Building.** Following the first time after the date of this Lease that Landlord leases the Expansion Space to a third party, Tenant shall thereafter during the Base Term have an ongoing right, but not the obligation, to expand the Premises (the **"Expansion Right")** to include the Expansion Space upon the terms and conditions set forth in this Section. For purposes of this Section 39(a), **"Expansion Space"** shall mean any space in the Building located directly adjacent to the Premises, which is not occupied by a tenant or which is occupied by a then-existing tenant whose lease is expiring within 9 months or less and such tenant does not wish to renew (whether or not such tenant has a right to renew) its occupancy of such space. If there is any Expansion Space after the initial lease up by Landlord of such Expansion Space to a third party, Landlord shall, at such time as Landlord shall elect so long as Tenant's rights hereunder are preserved, deliver to Tenant written notice (the **"Expansion Notice")** of such Expansion Space, together with the terms and conditions on which Landlord is prepared to lease Tenant the Expansion Space; provided that Base Rent for the Expansion Space shall be at the Market Rate (as defined in Section 40(a) below) and the leasing of the Expansion Space to Tenant shall incorporate market concessions and tenant improvements allowances (collectively, **"Market Terms").** Tenant shall be entitled to exercise its right under this Section 39(a) only with respect to the entire Expansion Space identified in the Expansion Notice **("Identified Expansion Space").** Tenant shall have 10 days following delivery of the Expansion Notice to deliver to Landlord written notification of Tenant's exercise of the Expansion Right **("Exercise Notice")** with respect to the Identified Expansion Space. Tenant shall be entitled to lease the Identified Expansion Space upon the terms and conditions set forth in the Expansion Notice and otherwise consistent with the terms of this Lease. If Landlord and Tenant are unable to agree on the Market Terms for the Identified Expansion Space after negotiating in good faith within 5 business days after Tenant's delivery of an Exercise Notice, the applicable Market Terms

will be determined through arbitration in accordance with Section 40(b) below. If Tenant's Expansion Right is exercised during the first 24 months of the Base Term, then the term of the Lease with respect to the Identified Expansion Space shall be co-terminous with the Term of the Lease with respect to the then-existing Premises. If Tenant's Expansion Right is exercised after the expiration of the 24th month of the Base Term, then the Term of the lease with respect to the Identified Expansion Space may not be co-terminous with the Term of the Lease with respect to the then-existing Premises. Notwithstanding anything to the contrary contain herein, in no event shall the Work Letter apply to the Identified Expansion Space. If Tenant fails to deliver an Exercise Notice to Landlord for the Identified Expansion Space within the required 10 day period, Tenant shall be deemed to have waived its rights under this Section 39(a) to lease the Expansion Space, and Landlord shall have the right to lease the Expansion Space to any third party on any terms and conditions acceptable to Landlord. Notwithstanding anything to the contrary contained herein, Tenant shall have no right to exercise the Expansion Right and the provisions of this Section 39(a) shall no longer apply after the date that is 9 months prior to the expiration of the Base Term if Tenant has not exercised its Extension Right pursuant to Section 40.

(b) **Amended Lease.** If: (i) Tenant fails to timely deliver an Exercise Notice, or (ii) following Tenant's delivery of an exercise notice to Landlord, Landlord tenders to Tenant an amendment to this Lease for the rental of the Identified Expansion Space reasonably acceptable to Landlord and Tenant, each in their reasonable discretion, and Tenant fails to execute such Lease amendment within 10 business days following such tender, Tenant shall be deemed to have waived its right to lease the Identified Expansion Space.

(c) **Exceptions.** Notwithstanding the above, the Expansion Right shall, at Landlord's option, not be in effect and may not be exercised by Tenant:

(i) during any period of time that Tenant is in Default under any provision of the Lease; or

(ii) if Tenant has been in Default under any provision of the Lease 3 or more times, whether or not the Defaults are cured, during the 12 month period prior to the date on which Tenant seeks to exercise the Expansion Right.

(d) **Termination.** The Expansion Right shall, at Landlord's option, terminate and be of no further force or effect even after Tenant's due and timely exercise of the Expansion Right, if, after such exercise, but prior to the commencement date of the lease of the Identified Expansion Space, (i) Tenant fails to timely cure any default by Tenant under the Lease; or (ii) Tenant has Defaulted 3 or more times during the period from the date of the exercise of the Expansion Right to the date of the commencement of the lease of the Identified Expansion Space, whether or not such Defaults are cured.

(e) **Rights Personal.** The Expansion Right is personal to Tenant and is not assignable without Landlord's consent, which may be granted or withheld in Landlord's sole discretion separate and apart from any consent by Landlord to an assignment of Tenant's interest in the Lease, except that they may be assigned in connection with any Permitted Assignment of this Lease.

(f) **No Extensions.** The period of time within which the Expansion Right may be exercised shall not be extended or enlarged by reason of Tenant's inability to exercise the Expansion Right.

40. **Right to Extend Term.** Tenant shall have the right to extend the Term of the Lease upon the following terms and conditions:

(a) **Extension Rights.** Tenant shall have 1 right (the **"Extension Right")** to extend the term of this Lease for 3 years (the **"Extension Term")** on the same terms and conditions as this Lease (other than with respect to Base Rent and the Work Letter) by giving Landlord written notice of its election to exercise each Extension Right at least 9 months prior to the expiration of the Base Term of the Lease.

Upon the commencement of the Extension Term, Base Rent shall be payable at the Market Rate (as defined below). Base Rent shall thereafter be adjusted on each annual anniversary of the commencement of such Extension Term by a percentage as agreed upon by Landlord and Tenant at the time the Market Rate is determined. As used herein, **"Market Rate"** shall mean the rate that comparable landlords of comparable buildings have accepted in current transactions from non-equity (i.e., not being offered equity in the buildings) and nonaffiliated tenants of similar financial strength for space of comparable size, quality (including Alterations and other improvements) and floor height in laboratory/office buildings in the Bedford area for a comparable term, with the determination of the Market Rate to take into account all relevant factors, including tenant inducements, percentage of laboratory and office space, views, project amenities, parking costs, leasing commissions, allowances or concessions, if any. Notwithstanding anything to the contrary contained herein, in no event shall the Market Rate for the first year of the Extension Term be less than the Base Rent payable as of the date immediately preceding the commencement of the Extension Term as increased by the Rent Adjustment Percentage.

If, on or before the date which is 240 days prior to the expiration of the Base Term of this Lease, Tenant has not agreed with Landlord's determination of the Market Rate and the rent escalations during the Extension Term after negotiating in good faith, Tenant shall be deemed to have elected arbitration as described in Section 40(b). Tenant acknowledges and agrees that, if Tenant has elected to exercise the Extension Right by delivering notice to Landlord as required in this Section 40(a), Tenant shall have no right thereafter to rescind or elect not to extend the term of the Lease for the Extension Term.

(b) **Arbitration.**

(i) Within 10 days of Tenant's notice to Landlord of its election (or deemed election) to arbitrate Market Rate and escalations, each party shall deliver to the other a proposal containing the Market Rate and escalations that the submitting party believes to be correct **("Extension Proposal").** If either party fails to timely submit an Extension Proposal, the other party's submitted proposal shall determine the Base Rent and escalations for the Extension Term. If both parties submit Extension Proposals, then Landlord and Tenant shall meet within 7 days after delivery of the last Extension Proposal and make a good faith attempt to mutually appoint a single Arbitrator (and defined below) to determine the Market Rate and escalations. If Landlord and Tenant are unable to agree upon a single Arbitrator, then each shall, by written notice delivered to the other within 10 days after the meeting, select an Arbitrator. If either party fails to timely give notice of its selection for an Arbitrator, the other party's submitted proposal shall determine the Base Rent for the Extension Term. The 2 Arbitrators so appointed shall, within 5 business days after their appointment, appoint a third Arbitrator. If the 2 Arbitrators so selected cannot agree on the selection of the third Arbitrator within the time above specified, then either party, on behalf of both parties, may request such appointment of such third Arbitrator by application to any state court of general jurisdiction in the jurisdiction in which the Premises are located, upon 10 days prior written notice to the other party of such intent.

(ii) The decision of the Arbitrator(s) shall be made within 30 days after the appointment of a single Arbitrator or the third Arbitrator, as applicable. The decision of the single Arbitrator shall be final and binding upon the parties. The average of the two closest Arbitrators in a three Arbitrator panel shall be final and binding upon the parties. Each party shall pay the fees and expenses of the Arbitrator appointed by or on behalf of such party and the fees and expenses of the third Arbitrator shall be borne equally by both parties. If the Market Rate and escalations are not determined by the first day of the Extension Term, then Tenant shall pay Landlord Base Rent in an amount equal to the Base Rent in effect immediately prior to the Extension Term and increased by the Rent Adjustment Percentage until such determination is made. After the determination of the Market Rate and escalations, the parties shall make any necessary adjustments to such payments made by Tenant. Landlord and Tenant shall then execute an amendment recognizing the Market Rate and escalations for the Extension Term.

(iii) An **"Arbitrator"** shall be any person appointed by or on behalf of either party or appointed pursuant to the provisions hereof and: (i) shall be (A) a member of the American Institute of Real Estate Appraisers with not less than 10 years of experience in the appraisal of improved office and high tech industrial real estate in the greater Lexington, Bedford and Waltham metropolitan area, or (B) a licensed commercial real estate broker with not less than 15 years experience representing landlords and/or tenants in the leasing of high tech or life sciences space in the greater Lexington, Bedford and Waltham metropolitan area, (ii) devoting substantially all of their time to professional appraisal or brokerage work, as applicable, at the time of appointment and (iii) be in all respects impartial and disinterested. Any Arbitrator who has worked in any capacity for either Landlord or Tenant in the preceding five (5) years shall be disqualified from serving as an Arbitrator under this Section 39(b).

(c) **Rights Personal.** The Extension Rights is personal to Tenant and is not assignable without Landlord's consent, which may be granted or withheld in Landlord's sole discretion separate and apart from any consent by Landlord to an assignment of Tenant's interest in the Lease, except that they may be assigned in connection with any Permitted Assignment of this Lease.

(d) **Exceptions.** Notwithstanding anything set forth above to the contrary, the Extension Right shall, at Landlord's option, not be in effect and Tenant may not exercise the Extension Right:

(i) during any period of time that Tenant is in Default under any provision of this Lease; or

(ii) if Tenant has been in Default under any provision of this Lease 3 or more times, whether or not the Defaults are cured, during the 12 month period immediately prior to the date that Tenant intends to exercise the Extension Right, whether or not the Defaults are cured.

(e) **No Extensions.** The period of time within which the Extension Right may be exercised shall not be extended or enlarged by reason of Tenant's inability to exercise the Extension Right.

(f) **Termination.** The Extension Right shall, at Landlord's option, terminate and be of no further force or effect even after Tenant's due and timely exercise of the Extension Right, if, after such exercise, but prior to the commencement date of the Extension Term, (i) Tenant fails to timely cure any default by Tenant under this Lease; or (ii) Tenant has Defaulted 3 or more times during the period from the date of the exercise of the Extension Right to the date of the commencement of the Extension Term, whether or not such Defaults are cured.

41. **Intentionally Omitted.**

42. **Intentionally Omitted.**

43. **Roof Equipment.** As long as Tenant is not in default under this Lease, Tenant shall have the right at its sole cost and expense, subject to compliance with all Legal Requirements, to install, maintain, and remove on the top of the roof of the Building (based on Tenant's proportionate share of the space available on the roof) one or more satellite dishes, communication antennae, HVAC or other equipment (all of which having a diameter and height acceptable to Landlord) required to support Tenant's operations within the Premises (collectively, the **"Roof Equipment")** on the following terms and conditions:

(a) **Requirements.** Tenant shall submit to Landlord (i) the plans and specifications for the installation of the Roof Equipment, (ii) copies of all required governmental and quasi-governmental permits, licenses, and authorizations that Tenant will and must obtain at its own expense, with the cooperation of Landlord, if necessary for the installation and operation of the Roof Equipment, and (iii) an insurance policy or certificate of insurance evidencing insurance coverage as required by this Lease and any other insurance as reasonably required by Landlord for the installation and operation of the Roof

Equipment. Landlord shall not unreasonably withhold or delay its approval for the installation and operation of the Roof Equipment; provided, however, that Landlord may reasonably withhold its approval if the installation or operation of the Roof Equipment (A) may damage the structural integrity of the Building, (B) may void, terminate, or invalidate any applicable roof warranty, (C) may interfere with any service provided by Landlord or any tenant of the Building, (D) may reduce the leasable space in the Building, (E) is not properly screened from the viewing public, or (E) generate excessive noise.

(b) **No Damage to Roof.** If installation of the Roof Equipment requires Tenant to make any roof cuts or perform any other roofing work, such cuts shall only be made to the roof area of the Building located directly above the Premises and only in the manner designated in writing by Landlord; and any such installation work (including any roof cuts or other roofing work) shall be performed by Tenant, at Tenant's sole cost and expense by a roofing contractor designated by Landlord. If Tenant or its agents shall otherwise cause any damage to the roof during the installation, operation, and removal of the Roof Equipment such damage shall be repaired promptly at Tenant's expense and the roof shall be restored in the same condition it was in before the damage. Landlord shall not charge Tenant Additional Rent for the installation and use of the Roof Equipment. If, however, Landlord's insurance premium or Tax assessment increases as a result of the Roof Equipment, Tenant shall pay such increase as Additional Rent within ten (10) days after receipt of a reasonably detailed invoice from Landlord. Tenant shall not be entitled to any abatement or reduction in the amount of Rent payable under this Lease if for any reason Tenant is unable to use the Roof Equipment. In no event whatsoever shall the installation, operation, maintenance, or removal of the Roof Equipment by Tenant or its agents void, terminate, or invalidate any applicable roof warranty.

(c) **Protection.** The installation, operation, and removal of the Roof Equipment shall be at Tenant's sole risk. Tenant shall indemnify, defend, and hold Landlord harmless from and against any and all claims, costs, damages, liabilities and expenses (including, ·but not limited to, attorneys' fees) of every kind and description that may arise out of or be connected in any way with Tenant's installation, operation, or removal of the Roof Equipment.

(d) **Removal.** At the expiration or earlier termination of this Lease or the discontinuance of the use of the Roof Equipment by Tenant, Tenant shall, at its sole cost and expense, remove the Roof Equipment from the Building. Tenant shall leave the portion of the roof where the Roof Equipment was located in good order and repair, reasonable wear and tear excepted. If Tenant does not so remove the Roof Equipment, Tenant hereby authorizes Landlord to remove and dispose of the Roof Equipment and charge Tenant as Additional Rent for all costs and expenses incurred by Landlord in such removal and disposal. Tenant agrees that Landlord shall not be liable for any Roof Equipment or related property disposed of or removed by Landlord.

(e) **No Interference.** The Roof Equipment shall not interfere with the proper functioning of any telecommunications equipment or devices that have been installed or will be installed by Landlord or for any other tenant or future tenant of the Building. Tenant acknowledges that other tenant(s) may have approval rights over the installation and operation of telecommunications equipment and devices on or about the roof, and that Tenant's right to install and operate the Roof Equipment is subject and subordinate to the rights of such other tenants. Tenant agrees that any other tenant of the Building that currently has or in the future takes possession of any portion of the Building will be permitted to install such telecommunication equipment that is of a type and frequency that will not cause unreasonable interference to the Roof Equipment.

(f) **Relocation.** Landlord shall have the right, at its expense and after 60 days prior notice to Tenant, to relocate the Roof Equipment to another site on the roof of the Building as long as such site reasonably meets Tenant's sight line and interference requirements and does not unreasonably interfere with Tenant's use and operation of the Roof Equipment.

(g) **Access.** Landlord grants to Tenant the right of ingress and egress on a 24 hour 7 day per week basis to install, operate, and maintain the Roof Equipment. Before receiving access to the roof of the Building, Tenant shall give Landlord at least 24 hours' advance written or oral notice, except in emergency situations, in which case 2 hours' advance oral notice shall be given by Tenant. Landlord shall supply Tenant with the name, telephone, and pager numbers of the contact individual(s) responsible for providing access during emergencies.

(h) **Appearance.** If permissible by Legal Requirements, the Roof Equipment shall be painted the same color as the Building so as to render the Roof Equipment virtually invisible from ground level.

(i) **No Assignment.** The right of Tenant to use and operate the Roof Equipment shall be personal solely to Homology Medicines, Inc., and (i) other than in connection with a Permitted Assignment, no other person or entity shall have any right to use or operate the Roof Equipment, and (ii) Tenant shall not assign, convey, or otherwise transfer to any person or entity any right, title, or interest in all or any portion of the Roof Equipment or the use and operation thereof, other than in connection with a Permitted Assignment.

44. **Miscellaneous.**

(a) **Notices.** All notices or other communications between the parties shall be in writing and shall be deemed duly given upon delivery or refusal to accept delivery by the addressee thereof if delivered in person, or upon actual receipt if delivered by reputable overnight guaranty courier, addressed and sent to the parties at their addresses set forth above. Landlord and Tenant may from time to time by written notice to the other designate another address for receipt of future notices.

(b) **Joint and Several Liability.** If and when included within the term **"Tenant,"** as used in this instrument, there is more than one person or entity, each shall be jointly and severally liable for the obligations of Tenant.

(c) **Financial Information.** Tenant shall furnish Landlord with true and complete copies of (i) Tenant's most recent audited annual financial statements within 180 days of the end of each of Tenant's fiscal years during the Term, and (ii) Tenant's most recent unaudited quarterly financial statements within 90 days of the end of each of Tenant's first three fiscal quarters of each of Tenant's fiscal years during the Term, all of which shall be treated by Landlord as confidential information belonging to Tenant. So long as Tenant is a "public company" and its financial information is publicly available, then the foregoing delivery requirements of this Section 43(c) shall not apply.

(d) **Recordation.** Neither this Lease nor a memorandum of lease shall be filed by or on behalf of Tenant in any public record. Landlord may prepare and file, and upon request by Landlord Tenant will execute, a memorandum of lease.

(e) **Interpretation.** The normal rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Lease or any exhibits or amendments hereto. Words of any gender used in this Lease shall be held and construed to include any other gender, and words in the singular number shall be held to include the plural, unless the context otherwise requires. The captions inserted in this Lease are for convenience only and in no way define, limit or otherwise describe the scope or intent of this Lease, or any provision hereof, or in any way affect the interpretation of this Lease.

(f) **Not Binding Until Executed.** The submission by Landlord to Tenant of this Lease shall have no binding force or effect, shall not constitute an option for the leasing of the Premises, nor confer any right or impose any obligations upon either party until execution of this Lease by both parties.

(g) **Limitations on Interest.** It is expressly the intent of Landlord and Tenant at all times to comply with applicable law governing the maximum rate or amount of any interest payable on or in connection with this Lease. If applicable law is ever judicially interpreted so as to render usurious any

interest called for under this Lease, or contracted for, charged, taken, reserved, or received with respect to this Lease, then it is Landlord's and Tenant's express intent that all excess amounts theretofore collected by Landlord be credited on the applicable obligation (or, if the obligation has been or would thereby be paid in full, refunded to Tenant), and the provisions of this Lease immediately shall be deemed reformed and the amounts thereafter collectible hereunder reduced, without the necessity of the execution of any new document, so as to comply with the applicable law, but so as to permit the recovery of the fullest amount otherwise called for hereunder.

(h) **Choice of Law.** Construction and interpretation of this Lease shall be governed by the internal laws of the state in which the Premises are located, excluding any principles of conflicts of laws.

(i) **Time.** Time is of the essence as to the performance of Tenant's obligations under this Lease.

(j) **OFAC.** Tenant and all beneficial owners of Tenant are currently (a) in compliance with and shall at all times during the Term of this Lease remain in compliance with the regulations of the Office of Foreign Assets Control **("OFAC")** of the U.S. Department of Treasury and any statute, executive order, or regulation relating thereto (collectively, the **"OFAC Rules"),** (b) not listed on, and shall not during the term of this Lease be listed on, the Specially Designated Nationals and Blocked Persons List, Foreign Sanctions Evaders List, or the Sectoral Sanctions Identification List, which are all maintained by OFAC and/or on any other similar list maintained by OFAC or other governmental authority pursuant to any authorizing statute, executive order, or regulation, and (c) not a person or entity with whom a U.S. person is prohibited from conducting business under the OFAC Rules.

(k) **Incorporation by Reference.** All exhibits and addenda attached hereto are hereby incorporated into this Lease and made a part hereof. If there is any conflict between such exhibits or addenda and the terms of this Lease, such exhibits or addenda shall control.

(I) **Entire Agreement.** This Lease, including the exhibits attached hereto, constitutes the entire agreement between Landlord and Tenant pertaining to the subject matter hereof and supersedes all prior and contemporaneous agreements, understandings, letters of intent, negotiations and discussions, whether oral or written, of the parties, and there are no warranties, representations or other agreements, express or implied, made to either party by the other party in connection with the subject matter hereof except as specifically set forth herein.

(m) **No Accord and Satisfaction.** No payment by Tenant or receipt by Landlord of a lesser amount than the monthly installment of Base Rent or any Additional Rent will be other than on account of the earliest stipulated Base Rent and Additional Rent, nor will any endorsement or statement on any check or letter accompanying a check for payment of any Base Rent or Additional Rent be an accord and satisfaction. Landlord may accept such check or payment without prejudice to Landlord's right to recover the balance of such Rent or to pursue any other remedy provided in this Lease.

(n) **Hazardous Activities.** Notwithstanding any other provision of this Lease, Landlord, for itself and its employees, agents and contractors, reserves the right to refuse to perform any repairs or services in any portion of the Premises which, pursuant to Tenant's routine safety guidelines, practices or custom or prudent industry practices, require any form of protective clothing or equipment other than safety glasses. In any such case, Tenant shall contract with parties who are acceptable to Landlord, in Landlord's reasonable discretion, for all such repairs and services, and Landlord shall, to the extent required, equitably adjust Tenant's Share of Operating Expenses in respect of such repairs or services to reflect that Landlord is not providing such repairs or services to Tenant.

[Signatures on next page]

IN WITNESS WHEREOF, Landlord and Tenant have executed this Lease as of the day and year first above written.

TENANT:

HOMOLOGY MEDICINES, INC.,
a Delaware corporation

By: /s/Arthur Tzianabos, Ph.D.
Its: President & CEO

LANDLORD:

ARE-MA REGION NO. 24, LLC,
a Delaware limited liability company

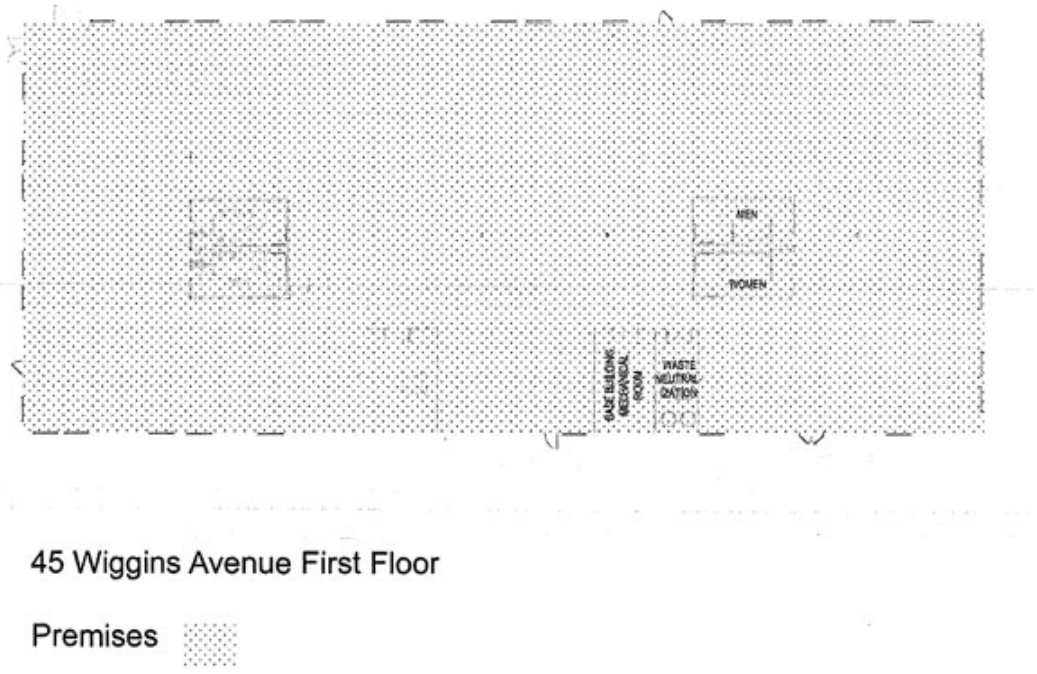
By: ALEXANDRIA REAL ESTATE EQUITIES, L.P.,
a Delaware limited partnership,
managing member

By: ARE-QRS CORP.,
a Maryland corporation,
general partner

By: /s/ Eric S. Johnson
Its: Senior Vice President
RE Legal Affairs

EXHIBIT A TO LEASE

DESCRIPTION OF PREMISES

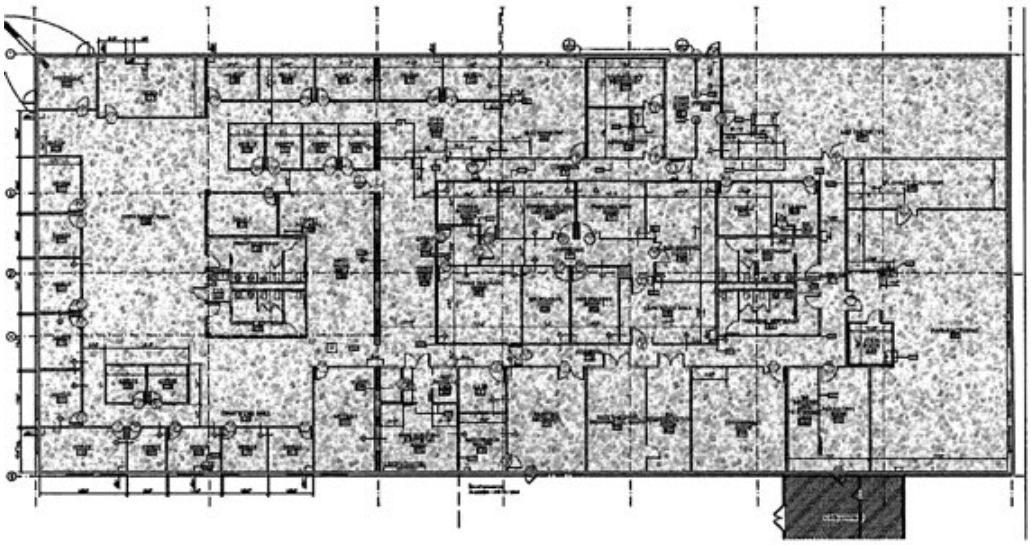


45 Wiggins Avenue First Floor

Premises

ALEXANDRIA

45 Wiggins Ave
First Floor

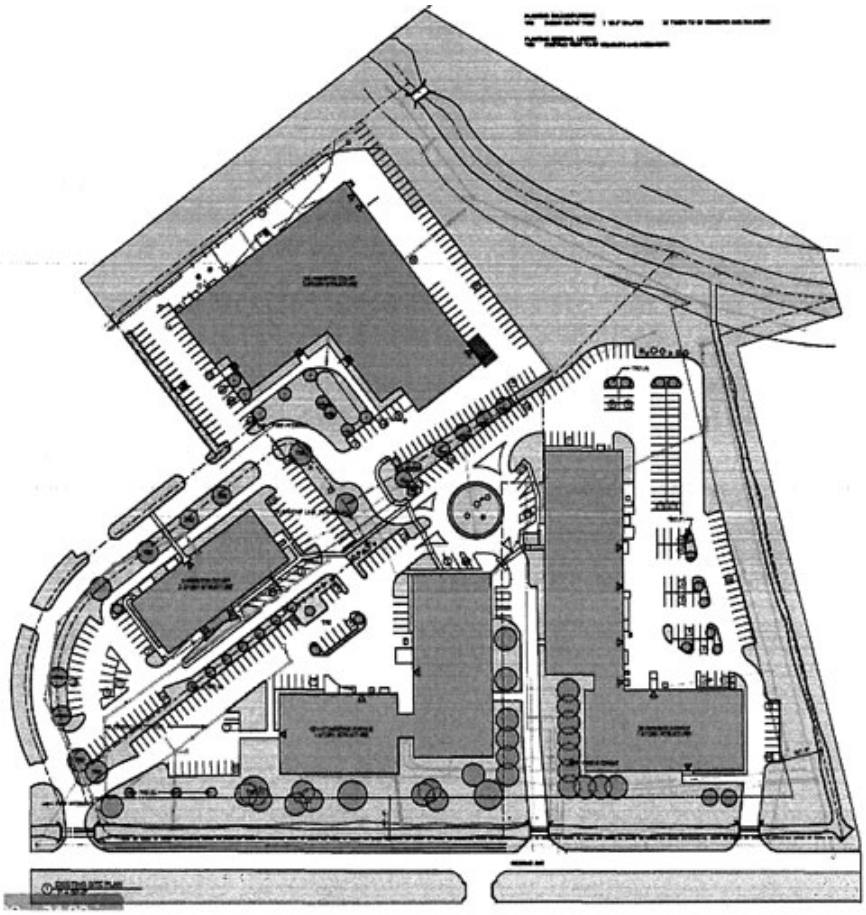


Premises

ALEXANDRIA.

EXHIBIT B TO LEASE

DESCRIPTION OF PROJECT



ALEXANDRIA.

EXHIBIT C TO LEASE

WORK LETTER

THIS WORK LETTER (this **"Work Letter")** is incorporated into that certain Lease Agreement (the **"Lease")** dated as of _____, 2016, by and between **ARE-MA REGION NO. 24, LLC,** a Delaware limited liability company **("Landlord"),** and **HOMOLOGY MEDICINES, INC.,** a Delaware corporation **("Tenant").** Any initially capitalized terms used but not defined herein shall have the meanings given them in the Lease.

1. **General Requirements.**

(a) **Tenant's Authorized Representative.** Tenant designates Michael Silver **("Tenant's Representative")** as the only person authorized to act for Tenant pursuant to this Work Letter. Landlord shall not be obligated to respond to or act upon any request, approval, inquiry or other communication **("Communication")** from or on behalf of Tenant in connection with this Work Letter unless such Communication is in writing from Tenant's Representative. Tenant may change Tenant's Representative at any time upon not less than 5 business days advance written notice to Landlord.

(b) **Landlord's Authorized Representative.** Landlord designates Tim White and Dawn Leaman (either such individual acting alone, **"Landlord's Representative")** as the only persons authorized to act for Landlord pursuant to this Work Letter. Tenant shall not be obligated to respond to or act upon any request, approval, inquiry or other Communication from or on behalf of Landlord in connection with this Work Letter unless such Communication is in writing from Landlord's Representative. Landlord may change either Landlord's Representative at any time upon not less than 5 business days advance written notice to Tenant.

(c) **Architects, Consultants and Contractors.** Landlord and Tenant hereby acknowledge and agree that the architect (the **"Tl Architect")** for the Tenant Improvements (as defined in Section 2(a) below), the general contractor and any subcontractors for the Tenant Improvements shall be selected by Tenant, subject to Landlord's approval, which approval shall not be unreasonably withheld, conditioned or delayed. Landlord hereby approves Tenant's use of The Richmond Group as the general contractor for the Tenant Improvements. Landlord shall be named a third party beneficiary of any contract entered into by Tenant with the Tl Architect, any consultant, any contractor or any subcontractor, and of any warranty made by any contractor or any subcontractor.

2. **Tenant Improvements.**

(a) **Tenant Improvements Defined.** As used herein, **"Tenant Improvements"** shall mean (i) all improvements to the Premises desired by Tenant of a fixed and permanent nature, and (ii) the removal of the VCT tile throughout the Premises and the installation of replacement flooring mutually agreed upon by Landlord and Tenant, each in their reasonable discretion (the **"VCT Tile Replacement").** Other than funding the Tl Allowance (as defined below) as provided herein, Landlord shall not have any obligation whatsoever with respect to the finishing of the Premises for Tenant's use and occupancy. Landlord shall pay the contractor performing the VCT Tile Replacement following Tenant's delivery to Landlord of a draw request in Landlord's standard form, containing such certifications, conditional lien waivers, inspection reports and other matters as Landlord customarily obtains, to the extent of Landlord's approval thereof for payment, no later than 30 days following receipt of such draw request.

(b) **Tenant's Space Plans.** Tenant shall deliver to Landlord schematic drawings and outline specifications (the **"Tl Design Drawings")** detailing Tenant's requirements for the Tenant Improvements within 30 days of the date hereof. Not more than 5 days thereafter, Landlord shall deliver to Tenant any reasonable written objections, questions or comments of Landlord and the Tl Architect with regard to the Tl Design Drawings. Tenant shall cause the Tl Design Drawings to be revised to address any such reasonable written comments and shall resubmit said drawings to Landlord for approval within 5 days thereafter. Such process shall continue until Landlord has approved the Tl Design Drawings.

(c) **Working Drawings.** Not later than 15 business days following the approval of the Tl Design Drawings by Landlord, Tenant shall cause the Tl Architect to prepare and deliver to Landlord for review and comment construction plans, specifications and drawings for the Tenant Improvements **("Tl Construction Drawings"),** which Tl Construction Drawings shall be prepared substantially in accordance with the Tl Design Drawings. Tenant shall be solely responsible for ensuring that the Tl Construction Drawings reflect Tenant's requirements for the Tenant Improvements. Landlord shall deliver its written comments on the Tl Construction Drawings to Tenant not later than 10 business days after Landlord's receipt of the same; provided, however, that Landlord may not disapprove any matter that is consistent with the Tl Design Drawings. Tenant and the Tl Architect shall consider all such comments in good faith and shall, within 10 business days after receipt, notify Landlord how Tenant proposes to respond to such comments. Any disputes in connection with such comments shall be resolved in accordance with Section 2(d) hereof. Provided that the design reflected in the Tl Construction Drawings is consistent with the Tl Design Drawings, Landlord shall approve the Tl Construction Drawings submitted by Tenant. Once approved by Landlord, subject to the provisions of Section 4 below, Tenant shall not materially modify the Tl Construction Drawings except as may be reasonably required in connection with the issuance of the Tl Permit (as defined in Section 3(a) below).

(d) **Approval and Completion.** If any dispute regarding the design of the Tenant Improvements is not settled within 10 business days after notice of such dispute is delivered by one party to the other, Tenant may make the final decision regarding the design of the Tenant Improvements, provided (i) Tenant acts reasonably and such final decision is either consistent with or a compromise between Landlord's and Tenant's positions with respect to such dispute, (ii) that all costs and expenses resulting from any such decision by Tenant shall be payable out of the Tl Fund (as defined in Section 5(d) below), and (iii) Tenant's decision will not affect the base Building, structural components of the Building or any Building systems (in which case Landlord shall make the final decision). Any changes to the Tl Construction Drawings following Landlord's and Tenant's approval of same requested by Tenant shall be processed as provided in Section 4 hereof.

3. **Performance of the Tenant Improvements.**

(a) **Commencement and Permitting of the Tenant Improvements.** Tenant shall commence construction of the Tenant Improvements upon obtaining and delivering to Landlord a building permit (the **"Tl Permit")** authorizing the construction of the Tenant Improvements consistent with the Tl Construction Drawings approved by Landlord. The cost of obtaining the Tl Permit shall be payable from the Tl Fund. Landlord shall assist Tenant in obtaining the Tl Permit. Prior to the commencement of the Tenant Improvements, Tenant shall deliver to Landlord a copy of any contract with Tenant's contractors (including the Tl Architect), and certificates of insurance from any contractor performing any part of the Tenant Improvement evidencing industry standard commercial general liability, automotive liability, "builder's risk", and workers' compensation insurance. Tenant shall cause the general contractor to provide a certificate of insurance naming Landlord, Alexandria Real Estate Equities, Inc., and Landlord's lender (if any) as additional insureds for the general contractor's liability coverages required above.

(b) **Selection of Materials, Etc.** Where more than one type of material or structure is indicated on the Tl Construction Drawings approved by Tenant and Landlord, the option will be within Tenant's reasonable discretion if the matter concerns the Tenant Improvements, and within Landlord's sole and absolute subjective discretion if the matter concerns the structural components of the Building or any Building system.

(c) **Tenant Liability.** Tenant shall be responsible for correcting any deficiencies or defects in the Tenant Improvements.

(d) **Substantial Completion.** Tenant shall substantially complete or cause to be substantially completed the Tenant Improvements in a good and workmanlike manner, in accordance with the Tl Permit subject, in each case, to Minor Variations and normal "punch list" items of a non-material nature which do not interfere with the use of the Premises **("Substantial Completion" or "Substantially Complete").** Upon Substantial Completion of the Tenant Improvements, Tenant shall require the Tl Architect and the general contractor to execute and deliver, for the benefit of Tenant and Landlord, a Certificate of Substantial Completion in the form of the American Institute of Architects **("AIA")** document G704. For purposes of this Work Letter, **"Minor Variations"** shall mean any modifications reasonably required: (i) to comply with all applicable Legal Requirements and/or to obtain or to comply with any required permit (including the Tl Permit); (ii) to comport with good design, engineering, and construction practices which are not material; or (iii) to make reasonable adjustments for field deviations or conditions encountered during the construction of the Tenant Improvements.

4. **Changes.** Any changes requested by Tenant to the Tenant Improvements after the delivery and approval by Landlord of the Tl Design Drawings, shall be requested and instituted in accordance with the provisions of this Section 4 and shall be subject to the written approval of Landlord, which approval shall not be unreasonably withheld, conditioned or delayed.

(a) **Tenant's Right to Request Changes.** If Tenant shall request changes **("Changes"),** Tenant shall request such Changes by notifying Landlord in writing in substantially the same form as the AIA standard change order form (a **"Change Request"),** which Change Request shall detail the nature and extent of any such Change. Such Change Request must be signed by Tenant's Representative. Landlord shall review and approve or disapprove such Change Request within 10 business days thereafter, provided that Landlord's approval shall not be unreasonably withheld, conditioned or delayed.

(b) **Implementation of Changes.** If Landlord approves such Change and Tenant deposits with Landlord any Excess Tl Costs (as defined in Section 5(d) below) required in connection with such Change, Tenant may cause the approved Change to be instituted. If any Tl Permit modification or change is required as a result of such Change, Tenant shall promptly provide Landlord with a copy of such Tl Permit modification or change.

5. **Costs.**

(a) **Budget For Tenant Improvements.** Before the commencement of construction of the Tenant Improvements, Tenant shall obtain a detailed breakdown, by trade, of the costs incurred or that will be incurred, in connection with the design and construction of the Tenant Improvements (the **"Budget"),** and deliver a copy of the Budget to Landlord for Landlord's approval, which shall not be unreasonably withheld, conditioned or delayed. The Budget shall be based upon the Tl Construction Drawings approved by Landlord. If the Budget is greater than the Tl Allowance, Tenant shall deposit with Landlord the difference, in cash, prior to the commencement of construction of the Tenant Improvements, for disbursement by Landlord as described in Section 5(d).

(b) **Tl Allowance.** Landlord shall provide to Tenant a tenant improvement allowance (collectively, the **"Tl Allowance")** as follows:

1. a **"Tenant Improvement Allowance"** in the maximum amount of $15.00 per rentable square foot in the Premises, or $345,000 in the aggregate, which is included in the Base Rent set forth in the Lease; and

2. an **"Additional Tenant Improvement Allowance"** in the maximum amount of $15.00 per rentable square foot in the Premises, or $345,000 in the aggregate, which shall, to the extent used, result in Additional Rent as set forth in Section 4(b) of the Lease.

Before commencing the Tenant Improvements, Tenant shall notify Landlord how much Additional Tenant Improvement Allowance Tenant has elected to receive from Landlord. Such election shall be final and binding on Tenant, and may not thereafter be modified without Landlord's consent, which may be granted or withheld in Landlord's sole and absolute subjective discretion The Tl Allowance shall be disbursed in accordance with this Work Letter.

Tenant shall have no right to the use or benefit (including any reduction to Base Rent) of any portion of the Tl Allowance not required for the construction of (i) the Tenant Improvements described in the Tl Construction Drawings approved pursuant to Section 2(d) or (ii) any Changes pursuant to Section 4; provided, however, that to the extent that any portion of the Tl Allowance remains unused following the completion of the Tenant Improvements and payment in full of all Tl Costs, Tenant may use such unused portion of the Tl Allowance to pay for the cost of Alterations performed by Tenant under Section 12 of the Lease within 12 months after the Commencement Date. Tenant shall have no right to any portion of the Tl Allowance that is not disbursed before the last day of the month that is 12 months after the Commencement Date.

In addition to the Tl Allowance, Landlord shall reimburse Tenant for the reasonable costs of the VCT Tile Replacement.

(c) **Costs lncludable in Tl Fund.** The Tl Fund shall be used solely for the payment of design, permits and construction costs in connection with the construction of the Tenant Improvements, including, without limitation, the cost of electrical power and other utilities used in connection with the construction of the Tenant Improvements, the cost of preparing the Tl Design Drawings and the Tl Construction Drawings, all costs set forth in the Budget, including the cost of Changes (collectively, **"Tl Costs").** Notwithstanding anything to the contrary contained herein, the Tl Fund shall not be used to purchase any furniture, personal property or other non-Building system materials or equipment, including, but not be limited to, non-ducted biological safety cabinets and other scientific equipment not incorporated into the Tenant Improvements; provided, however, that a portion of the Tl Fund may be used for Tenant's voice and data cabling.

(d) **Excess Tl Costs.** Landlord shall have no obligation to bear any portion of the cost of any of the Tenant Improvements except to the extent of the Tl Allowance. If at any time and from time-to-time, the remaining Tl Costs under the Budget exceed the remaining unexpended Tl Allowance, Tenant shall deposit with Landlord, as a condition precedent to Landlord's obligation to fund the Tl Allowance, 100% of the then current Tl Cost in excess of the remaining Tl Allowance **("Excess Tl Costs").** If Tenant fails to deposit, or is late in depositing any Excess Tl Costs with Landlord, Landlord shall have all of the rights and remedies set forth in the Lease for nonpayment of Rent (including, but not limited to, the right to interest at the Default Rate and the right to assess a late charge). For purposes of any litigation instituted with regard to such amounts, those amounts will be deemed Rent under the Lease. The Tl Allowance and Excess Tl Costs is herein referred to as the **"Tl Fund."** Funds deposited by Tenant shall be the first thereafter disbursed to pay Tl Costs. Notwithstanding anything to the contrary set forth in this Section 5(d), Tenant shall be fully and solely liable for Tl Costs and the cost of Minor Variations in excess of the Tl Allowance. If upon Substantial Completion of the Tenant Improvements and the payment of all sums due in connection therewith there remains any undisbursed portion of the Tl Fund, Tenant shall be entitled to such undisbursed Tl Fund solely to the extent of any Excess Tl Costs deposit Tenant has actually made with Landlord.

(e) **Payment for Tl Costs.** During the course of design and construction of the Tenant Improvements, Landlord shall reimburse Tenant for Tl Costs once a month against a draw request in Landlord's standard form, containing evidence of payment of such Tl Costs by Tenant and such certifications, lien waivers (including a conditional lien release for each progress payment and unconditional lien releases for the prior month's progress payments), inspection reports and other matters as Landlord customarily obtains, to the extent of Landlord's approval thereof for payment, no later than 30 days following receipt of such draw request. Upon completion of the Tenant Improvements (and prior to any final disbursement of the Tl Fund), Tenant shall deliver to Landlord: (i) sworn statements setting forth the names of all contractors and first tier subcontractors who did the work and final, unconditional lien waivers from all such contractors and first tier subcontractors; (ii) as-built plans (one copy in print format

and two copies in electronic CAD format) for such Tenant Improvements; (iii) a certification of substantial completion in Form AIA G704, (iv) a certificate of occupancy for the Premises; and (v) copies of all operation and maintenance manuals and warranties affecting the Premises.

6. **Miscellaneous.**

(a) **Consents.** Whenever consent or approval of either party is required under this Work Letter, that party shall not unreasonably withhold, condition or delay such consent or approval, except as may be expressly set forth herein to the contrary.

(b) **Modification.** No modification, waiver or amendment of this Work Letter or of any of its conditions or provisions shall be binding upon Landlord or Tenant unless in writing signed by Landlord and Tenant.

(c) **No Default Funding.** In no event shall Landlord have any obligation to fund any portion of the Tl Allowance during any period that Tenant is in Default under the Lease.

EXHIBIT D TO LEASE

ACKNOWLEDGMENT OF COMMENCEMENT DATE

This **ACKNOWLEDGMENT OF COMMENCEMENT DATE** is made this ____ day of _____, ____, between **ARE-MA REGION NO. 24, LLC,** a Delaware limited liability company **("Landlord"),** and **HOMOLOGY MEDICINES, INC.,** a Delaware corporation **("Tenant"),** and is attached to and made a part of the Lease dated _____, ____ (the **"Lease"),** by and between Landlord and Tenant. Any initially capitalized terms used but not defined herein shall have the meanings given them in the Lease.

Landlord and Tenant hereby acknowledge and agree, for all purposes of the Lease, that the Commencement Date of the Base Term of the Lease is _____, ____, the Rent Commencement Date is _____, ____, and the termination date of the Base Term of the Lease shall be midnight on _____, ____. In case of a conflict between the terms of the Lease and the terms of this Acknowledgment of Commencement Date, this Acknowledgment of Commencement Date shall control for all purposes.

IN WITNESS WHEREOF, Landlord and Tenant have executed this ACKNOWLEDGMENT OF COMMENCEMENT DATE to be effective on the date first above written.

TENANT:

HOMOLOGY MEDICINES, INC.,
a Delaware corporation

By: _____
Its: _____

LANDLORD:

ARE-MA REGION NO. 24, LLC,
a Delaware limited liability company

By: ALEXANDRIA REAL ESTATE EQUITIES, L.P.,
a Delaware limited partnership,
managing member

By: ARE-QRS CORP.,
a Maryland corporation,
general partner

By: _____
Its: _____

EXHIBIT E TO LEASE

Rules and Regulations

1. The sidewalk, entries, and driveways of the Project shall not be obstructed by Tenant, or any Tenant Party, or used by them for any purpose other than ingress and egress to and from the Premises.

2. Tenant shall not place any objects, including antennas, outdoor furniture, etc., in the parking areas, landscaped areas or other areas outside of its Premises, or on the roof of the Project.

3. Except for animals assisting the disabled, no animals shall be allowed in the offices, halls, or corridors in the Project.

4. Tenant shall not disturb the occupants of the Project or adjoining buildings by the use of any radio or musical instrument or by the making of loud or improper noises.

5. If Tenant desires telegraphic, telephonic or other electric connections in the Premises, Landlord or its agent will direct the electrician as to where and how the wires may be introduced; and, without such direction, no boring or cutting of wires will be permitted. Any such installation or connection shall be made at Tenant's expense.

6. Tenant shall not install or operate any steam or gas engine or boiler, or other mechanical apparatus in the Premises, except as specifically approved in the Lease. The use of oil, gas or inflammable liquids for heating, lighting or any other purpose is expressly prohibited. Explosives or other articles deemed extra hazardous shall not be brought into the Project.

7. Parking any type of recreational vehicles is specifically prohibited on or about the Project. Except for the overnight parking of operative vehicles, no vehicle of any type shall be stored in the parking areas at any time. In the event that a vehicle is disabled, it shall be removed within 48 hours. There shall be no "For Sale" or other advertising signs on or about any parked vehicle. All vehicles shall be parked in the designated parking areas in conformity with all signs and other markings. All parking will be open parking, and no reserved parking, numbering or lettering of individual spaces will be permitted except as specified by Landlord.

8. Tenant shall use commercially reasonable efforts to maintain the Premises free from rodents, insects and other pests.

9. Landlord reserves the right to exclude or expel from the Project any person who, in the judgment of Landlord, is intoxicated or under the influence of liquor or drugs or who shall in any manner do any act in violation of the Rules and Regulations of the Project.

10. Tenant shall not cause any unnecessary labor by reason of Tenant's carelessness or indifference in the preservation of good order and cleanliness. Landlord shall not be responsible to Tenant for any loss of property on the Premises, however occurring, or for any damage done to the effects of Tenant by the janitors or any other employee or person.

11. Tenant shall give Landlord prompt notice of any defects in the water, lawn sprinkler, sewage, gas pipes, electrical lights and fixtures, heating apparatus, or any other service equipment affecting the Premises.

12. Tenant shall not permit storage outside the Premises, including without limitation, outside storage of trucks and other vehicles, or dumping of waste or refuse or permit any harmful materials to be placed in any drainage system or sanitary system in or about the Premises.

13. All moveable trash receptacles provided by the trash disposal firm for the Premises must be kept in the trash enclosure areas, if any, provided for that purpose.

14. No auction, public or private, will be permitted on the Premises or the Project.

15. No awnings shall be placed over the windows in the Premises except with the prior written consent of Landlord.

16. The Premises shall not be used for lodging, sleeping or cooking (except that Tenant may use microwave ovens, toasters and coffee makers in the Premises for the benefit of Tenant's employees and contractors in an area designated for such items, but only if the use thereof is at all times supervised by the individual using the same) or for any immoral or illegal purposes or for any purpose other than that specified in the Lease. No gaming devices shall be operated in the Premises.

17. Tenant shall ascertain from Landlord the maximum amount of electrical current which can safely be used in the Premises, taking into account the capacity of the electrical wiring in the Project and the Premises and the needs of other tenants, and shall not use more than such safe capacity. Landlord's consent to the installation of electric equipment shall not relieve Tenant from the obligation not to use more electricity than such safe capacity.

18. Tenant assumes full responsibility for protecting the Premises from theft, robbery and pilferage.

19. Tenant shall not install or operate on the Premises any machinery or mechanical devices of a nature not directly related to Tenant's ordinary use of the Premises and shall keep all such machinery free of vibration, noise and air waves which may be transmitted beyond the Premises.

EXHIBIT F TO LEASE

TENANT'S PERSONAL PROPERTY

Production Basics lab tables
15 - 72" x 30"
3 – 48" x 30"
1 – 60"x 30"

EXHIBIT G TO LEASE

INTENTIONALLY OMITTED

EXHIBIT H TO LEASE

LANDLORD'S FURNITURE

Chairs 64 (combined office, conf room and café)

Desks 62 (combined private offices, shipping area, open office work stations)

Reception desk 1

Conference room tables 3

Café tables 2

Small round tables 4

Filing cabinets 14

Bookshelves 17

Exhibit C

Participation Rights Agreement

See attached.

ALEXANDRIA
Alexandria Equities, LLC
385 E. Colorado Boulevard
Suite 299
Pasadena, California 91101

August __, 2016

Homology Medicines, Inc.
Attention: Chief Executive Officer

Re: 45 Wiggins Avenue, Bedford, MA

Ladies and Gentlemen:

Reference is made to the Letter of Intent, dated July 13, 2016 ("Letter of Intent"), entered into between ARE-MA Region No. 24, LLC, a Delaware limited liability company ("Landlord"), and Homology Medicines, Inc., a Delaware corporation ("Tenant"), relating to the lease of premises at the above-referenced address (the "Lease"). Pursuant to the Letter of Intent, Landlord, or a nominee of Landlord, is to be granted certain rights with respect to Tenant's next round of equity financing following the date hereof. Landlord hereby designates Alexandria Equities, LLC ("Alexandria") as its nominee under the Letter of Intent with respect to the foregoing rights. This letter agreement (this "Participation Rights Agreement") is intended to implement the foregoing provisions of the Letter of Intent and to replace and/or supersede any prior participation rights agreement entered into by and between Alexandria and/or Landlord on the one hand and Tenant on the other hand.

1. Participation in Future Financing. In exchange for good and valuable consideration, the receipt and sufficiency of which Tenant hereby acknowledges, Tenant hereby grants Alexandria the right, but not the obligation, to purchase any amount up to a maximum of $2,000,000 of New Securities (as defined below) that Tenant offers to sell in its next bona fide private equity financing round following the date of this Participation Rights Agreement (the "Qualified Financing") at a price per share and on other terms and conditions that are no less favorable to Alexandria than those upon which the New Securities are sold by Tenant to any other investor in such Qualified Financing; provided that Alexandria is an "accredited investor'' at the time of the Qualified Financing. "New Securities" means any shares of Tenant's equity securities, whether or not currently authorized, as well as rights, options, or warrants to purchase such equity securities, or securities of any type whatsoever that are, or may become, convertible or exchangeable into or exercisable for such equity securities, but shall not include (i) any Exempted Securities, as such term is defined in Tenant's certificate of incorporation as in effect from time to time, (ii) any shares issued in the IPO (as defined below) or (iii) any shares issued pursuant to that certain Series A Preferred Stock Purchase Agreement among Tenant and the Purchasers party thereto dated December 22, 2015 (including, without limitation, the Milestone Closing Shares, as defined therein).

Tenant shall offer to sell the New Securities to Alexandria by sending written notice of such offer to investments@are.com (a "New Securities Notice"). Any New Securities Notice shall describe the provisions of the New Securities in reasonable detail and shall specify the terms and conditions upon which they shall be sold by Tenant. Alexandria may purchase the applicable amount of New Securities by sending written notice to Tenant of Alexandria's election to purchase, specifying the amount of such purchase, within 20 days after receipt of the New

Securities Notice, provided that Alexandria agrees (i) to execute and deliver all necessary documents in connection with such Qualified Financing reasonably requested of Alexandria, including a definitive purchase agreement, voting agreement and such other financing agreements as shall be agreed upon by Tenant and the other investors participating in such Qualified Financing and (ii) if applicable, to tranche its investment in the same proportion as the other investors in such Qualified Financing. Any New Securities not purchased by Alexandria may thereafter be offered for sale and sold by Tenant, on terms and conditions that are no less favorable to Tenant than those specified in the New Securities Notice, at any time within 120 days after the expiration of Alexandria's 20 day response period. Tenant hereby covenants that it will not enter into any agreement that conflicts with this Participation Rights Agreement. Alexandria hereby acknowledges and agrees that the participation rights granted to certain of Tenant's existing stockholders pursuant to that certain Investors' Rights Agreement between Tenant and the Investors party thereto dated November 22, 2015 (as may be amended or amended and restated from time to time) do not conflict with this Participation Rights Agreement.

2. No Conflicts: Further Assurances. Neither the execution and delivery of this Participation Rights Agreement, nor performance of its terms, will directly or indirectly contravene, conflict with or result in a violation of (i) any of the provisions of Tenant's articles or certificate of incorporation or bylaws, (ii) any resolution adopted by Tenant's stockholders, Tenant's board of directors or any committee thereof, or (iii) any contract or agreement of the Tenant. Tenant agrees to execute and deliver, by the proper exercise of its corporate, limited liability company, partnership or other powers, all such other and additional instruments and documents and do all such other acts and things as may be necessary to more fully effectuate this Participation Rights Agreement and its obligations hereunder. Tenant shall use its commercially reasonable efforts to fully effectuate the intent of this Agreement and shall not intentionally take any action to circumvent or avoid its obligations hereunder.

3. Termination. This Participation Rights Agreement shall terminate, and be of no further force or effect, upon the earlier to occur of the following: (i) the final closing of the Qualified Financing, whether or not Alexandria elects to purchase New Securities, but only if Tenant delivers a New Securities Notice to Alexandria and Alexandria has an opportunity to purchase the New Securities, each as set forth in Section 1 above; (ii) immediately prior to the closing date of a transaction that qualifies as a Sale of Tenant (as defined below); (iii) immediately prior to the effective date of Tenant's first underwritten public offering of its securities under the Securities Act of 1933, as amended, and the rules and regulations promulgated thereunder (the "IPO"); and (iv) when Tenant first becomes subject to the periodic reporting requirements of Section 12(g) or 15(d) of the Securities Exchange Act of 1934, as amended, and the rules and regulations promulgated thereunder. A "Sale of Tenant" shall mean either: (a) a transaction or series of related transactions in which shares representing more than fifty percent of the outstanding voting power of Tenant are acquired; or (b) a transaction that qualifies as a Deemed Liquidation Event, as defined in Tenant's then effective certificate of incorporation.

4. Governing Law. The terms and conditions of this Participation Rights Agreement shall be governed by and construed in accordance with Delaware law, without regard to the conflict of laws provisions thereof.

5. Successors and Assigns. The terms and provisions of this Participation Rights Agreement shall be binding upon Alexandria, Landlord and Tenant and their respective successors and assigns, subject at all times to the restrictions set forth herein. Alexandria may not assign this Participation Rights Agreement or any of its rights or obligations hereunder without the prior written consent of Tenant.

6. Confidentiality. Tenant agrees that, except with the prior written consent of Alexandria, it shall at all times keep confidential the terms of this Participation Rights Agreement and the discussions or negotiations relating to this Participation Rights Agreement; provided that Tenant may disclose the terms of this Participation Rights Agreement to its attorneys, accountants and other professional advisors, stockholders, and existing or prospective investors. In addition, Tenant hereby agrees that, except with the prior written consent of Alexandria, it shall not participate in or generate any press release or other release of information to the general public relating to this Participation Rights Agreement or any transactions contemplated by this Participation Rights Agreement.

7. Counterparts. This Participation Rights Agreement may be executed in as many counterparts as the parties hereto deem necessary or convenient, each of which counterparts shall be deemed an original but all of which, together, shall constitute but one and the same document.

8. Entire Agreement. This Participation Rights Agreement constitutes the entire agreement among the parties with respect to the subject matter hereof and supersede all other prior agreements and understandings, both written and oral, between the parties with respect to such subject matter.

[signature page follows]

If you agree that the foregoing accurately sets forth our agreement, please execute this Participation Rights Agreement in the space provided below, whereupon it will become a binding contract between us.

ALEXANDRIA EQUITIES, LLC,
a Delaware limited liability company

By: Alexandria Real Estate Equities, Inc.,
a Maryland corporation,
its managing member

By: _____
Name: _____
Title: _____

ACCEPTED AND AGREED TO:

HOMOLOGY MEDICINES, INC.
a Delaware corporation

By: _____
Name: _____
Title: _____

Exhibit 10.6

EXECUTION

LEASE

ONE PATRIOTS PARK

BEDFORD PATRIOTS PARK, LLC,

a Delaware limited liability company,

as Landlord,

and

HOMOLOGY MEDICINES, INC.,

a Delaware corporation,

as Tenant.

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INDEX OF DEFINED TERMS

ONE PATRIOTS PARK, BEDFORD, MASSACHUSETTS

LEASE

This Lease (the **"Lease"),** dated as of the date set forth in Section 1 of the Summary of Basic Lease Information (the **"Summary"),** below, is made by and between Bedford Patriots Park, LLC, a Delaware limited liability company **("Landlord"),** and Homology Medicines, Inc., a Delaware corporation **("Tenant").**

SUMMARY OF BASIC LEASE INFORMATION

TERMS OF LEASE		DESCRIPTION
1.	Effective Date:	December 21, 2017
2.	Premises (Article 1).	
2.1	Building:	That certain mixed-use office and research and development building containing approximately 143,716 rentable square feet of space located at One Patriots Park, Bedford, MA 01730.
2.2	Premises:	67,165 rentable square feet of space on the first (1st) floor of the Building (the **"Premises"),** as further set forth in Exhibit 2.2 to the Lease.
3.	Lease Term (Article 2).	
3.1	Length of Term:	Approximately eight years and six months, not including the period from the Effective Date to the Phase I Rent Commencement Date (as that term is defined below).
3.2	Lease Commencement Date:	The Effective Date.

3.3 Rent Commencement Date: September 1, 2018 (the "**Phase I Rent Commencement Date**") with respect to 46,195 rentable square feet of the Premises (the "**Phase I Space**"); March 1, 2019 (the "**Phase II Rent Commencement Date**") with respect to the remaining 20,970 rentable square feet of the Premises (the "**Phase II Space**"), as shown in Item 4 of this Lease Summary. If Landlord's delivery of the Phase I Space is delayed, the Phase I Rent Commencement Date shall be delayed on a day for day basis for each day after September 1, 2018 that such possession is delayed. If Landlord's delivery of the Phase II Space is delayed, the Phase II Rent Commencement Date shall be delayed on a day for day basis for each day after March 1, 2019 that such possession is delayed. The delay of the Phase I Rent Commencement Date and of the Phase II Rent Commencement Date shall be Tenant's only remedies at law, in equity, or hereunder for late delivery of the Premises.

3.4 Lease Expiration Date: February 28, 2027, as the Lease Expiration Date may be extended pursuant to Section 2.2 of this Lease.

4. Base Rent (Article 3):

Period	Annual Base Rent	Monthly Installment of Base Rent	Annual Base Rent per Rentable Square Foot
Lease Commencement Date to August 31, 2018	$ 0.00	$ 0.00	$ 0.00
September 1, 2018* to February 28, 2019	$1,824,702.50	$152,058.54	$ 39.50
March 1, 2019* to August 31, 2019	$2,653,017.50	$221,084.79	$ 39.50
September 1, 2019 to August 31, 2020	$2,732,608.03	$227,717.34	$ 40.69
September 1, 2020 to August 31, 2021	$2,814,586.27	$234,548.86	$ 41.91
September 1, 2021 to August 31, 2022	$2,899,023.85	$241,585.32	$ 43.16
September 1, 2022 to August 31, 2023	$2,985,994.57	$248,832.88	$ 44.46
September 1, 2023 to August 31, 2024	$3,075,574.41	$256,297.87	$ 45.79
September 1, 2024 to August 31, 2025	$3,167,841.64	$263,986.80	$ 47.17
September 1, 2025 to August 31, 2026	$3,262,876.89	$271,906.41	$ 48.58
September 1, 2026 to February 28, 2027	$3,360,763.19	$280,063.60	$ 50.04

* starred dates subject to adjustment for late delivery as set forth in Section 3.3 of the Basic Lease Information.

5.	Tenant Improvement Allowance:	$10,853,864.00, as further described in and subject to the terms of, the Tenant Work Letter attached hereto as **Exhibit 1.1.1**.
6.	NNN Lease:	In addition to the Base Rent, Tenant shall be responsible to pay Tenant's Share of Direct Expenses in accordance with the terms of Article 4 of the Lease.
7.	Tenant's Share (Article 4):	For the period beginning on the Phase I Rent Commencement Date and ending at 11:59pm on the day before the Phase II Rent Commencement Date, Tenant's Share shall be approximately 32.15%, based on the Phase I Space and the calculation set forth in Section 4.2.6 of this Lease, below. For the period from and after the Phase II Rent Commencement Date, Tenant's Share shall be approximately 46.74% for the entire Premises, based on the calculation set forth in Section 4.2.6 of this Lease, below.
8.	Permitted Use (Article 5):	The Premises shall be used only for general office, research and development (including laboratory and vivarium, as permitted by Applicable Laws), and as an accessory use to the foregoing, biomanufacturing (but in no more than 25% of the rentable square footage of the Premises in connection with the Initial Tenant Improvements (as defined in the Work Letter), and in no more than 40% of the rentable square footage of the Premises as a result of any subsequent Alterations, all such Alterations to be subject to the provisions of Article 8), and other accessory uses reasonably related to and incidental to such specified uses, all (i) consistent with comparable mixed-use office and research and development projects in the Lexington and Bedford, Massachusetts area, and (ii) in compliance with, and subject to, Applicable Laws and the terms of this Lease. Notwithstanding anything to the contrary contained herein, vivarium uses in the Premises (as it may be expanded or contracted) shall occupy no more than 10% of the rentable square footage of the

		Premises at the time of the Initial Tenant Improvements, and no more than 20% of the rentable square footage of the Premises as a result of any subsequent Alterations, all such Alterations to be subject to the provisions of Article 8.
9.	Security Deposit (Article 21):	$1,496,587.25, subject to reduction in accordance with the terms of Article 21.
10.	Guarantor (Article 21):	None.
11.	Parking Ratio (Article 28):	Three (3) unreserved parking spaces for every 1,000 rentable square feet of the Premises, subject to the terms of Article 28 of the Lease.
12.	Address of Tenant (Section 29.18):	following Substantial Completion of the Tenant Improvements: At the Premises, Attention: Director of Operations before Substantial Completion of the Tenant Improvements: 45 Wiggins Avenue Bedford, MA 01730 Attention: Director of Operations
13.	Address of Landlord (Section 29.18):	See Section 29.18 of the Lease.
14.	Brokers (Section 29.24):	Cresa and Transwestern/RBJ

1. PREMISES, BUILDING, PROJECT, AND COMMON AREAS

1.1 **Premises, Building, Project and Common Areas.**

1.1.1 **The Premises.** Landlord hereby leases to Tenant and Tenant hereby leases from Landlord the premises set forth in Section 2.2 of the Summary (the "**Premises**"). The outline of the Premises is set forth in **Exhibit 1.1.1-1** attached hereto. The parties hereto agree that the lease of the Premises is upon and subject to the terms, covenants and conditions herein set forth, and Tenant covenants as a material part of the consideration for this Lease to keep and perform each and all of such terms, covenants and conditions by it to be kept and performed and that this Lease is made upon the condition of such performance. The parties hereto hereby acknowledge that the purpose of **Exhibit 1.1.1-1** is to show the approximate location of the Premises in the "Building," as that term is defined in Section 1.1.2, below, only, and such Exhibit is not meant to constitute an agreement, representation or warranty as to the construction of the Premises, the precise area thereof or the specific location of the "Common Areas," as that term is defined in Section 1.1.3, below, or the elements thereof or of the accessways to the Premises or the "Project," as that term is defined in Section 1.1.2, below. Tenant shall accept the Premises in its presently existing "as-is" condition and Landlord shall not be obligated to provide or pay for any improvement work or services related to the improvement of the Premises except as otherwise expressly set forth in this Lease or in the Tenant Work Letter attached hereto as **Exhibit 1.1.1-2.** The Premises shall exclude Common Areas, including without limitation exterior faces of exterior walls, the entry, vestibules and main lobby of the Building, elevator lobbies and common lavatories, the common stairways and stairwells, elevators and elevator wells, boiler room, sprinkler rooms, elevator rooms, mechanical rooms, loading and receiving areas, electric and telephone closets, janitor closets, and pipes, ducts, conduits, wires and appurtenant fixtures and equipment serving exclusively or in common with other parts of the Building.

1.1.2 **The Building and The Project.** The Premises are a part of the building set forth in Section 2.1 of the Summary (the "**Building**"). The term "**Project**," as used in this Lease, shall mean (i) the Building and the Common Areas, (ii) the land (which is improved with landscaping, parking facilities and other improvements) upon which the Building and the Common Areas are located, as more particularly described on **Exhibit 1.1.2,** attached, and (iii) at Landlord's discretion, any additional real property, areas, land, buildings or other improvements added thereto outside of the Project.

1.1.3 **Common Areas.** Tenant shall have the non-exclusive right to use in common with other tenants in the Project, and subject to the rules and regulations referred to in Article 5 of this Lease, those portions of the Project which are provided, from time to time, for use in common by Landlord, Tenant and any other tenants of the Project (such areas, together with such other portions of the Project designated by Landlord, in its discretion, including certain areas designated for the exclusive use of certain tenants, including Tenant, or to be shared by Landlord and certain tenants, including Tenant, are collectively referred to herein as the "**Common Areas")**. The Common Areas shall consist of the "**Project Common Areas"** and the "**Building Common Areas".** The term "**Project Common Areas,"** as used in this Lease, shall mean the portion of the Project designated as such by Landlord. The term "**Building Common Areas,"** as used in this Lease, shall mean the portions of the Common Areas located within the Building designated as such by Landlord. The manner in which the Common Areas are maintained and operated shall be at the sole discretion of Landlord and the use thereof shall be subject to such rules, regulations and restrictions as Landlord may make from time to time in accordance with Section 5.2, below. Landlord reserves the right to close temporarily, make alterations or additions to, or change the location of elements of the Project and the Common Areas, provided that, in connection therewith, Landlord shall: (a) perform such closures, alterations, additions or changes in a

commercially reasonable manner; (b) use commercially reasonable efforts to minimize any material interference with Tenant's use of and access to the Premises; and (c) except in the case of emergency, provide at least five (5) business days' notice to Tenant of such closure, alterations, additions, and/or changes.

1.2 **Stipulation of Rentable Square Feet of Premises**. For purposes of this Lease, "rentable square feet" of the Premises shall be deemed to be as set forth in Section 2.2 of the Summary.

1.3 **Intentionally Omitted**.

1.4 **Expansion Right**. Subject to the terms and conditions of this Article, and provided that at the time of delivery of Tenant's Expansion Notice (as hereinafter defined) and as of the Expansion Premises Commencement Date (as hereinafter defined), (x) this Lease is in full force and effect, and (y) Tenant has not been in default under this Lease beyond all applicable notice and cure periods at any time during the thirty-six (36) months immediately preceding the delivery of Tenant's Expansion Notice, Tenant shall have the one-time right (the "**Expansion Right**") to expand the Premises within the Building by leasing approximately 26,200 rentable square feet of space on the first (1st) floor of the Building (the "**Expansion Premises**") currently leased by N2 Biomedical LLC ("**N2**"), which area is the not-shaded area within the Building shown on **Exhibit 1.1.1-1**. Promptly following Tenant's proper delivery of the Tenant's Expansion Notice in accordance with this Section 1.4, Landlord and Tenant shall enter into a lease amendment confirming the terms of this Lease as amended by the inclusion of the Expansion Premises in the Premises leased hereunder.

1.4.1 Conditions of Exercise. In order to exercise such expansion right, Tenant shall give Landlord written notice ("**Tenant's Expansion Notice**") by the earliest to occur of the following dates:

a. on or before February 28, 2020, which Landlord represents is the date that is nine (9) months prior to the expiration date of the lease between Landlord and N2 with respect to the Expansion Premises (the "**N2 Lease**");

b. on or before the date that is four (4) weeks following Landlord's notice to Tenant of the early termination of the N2 Lease following a default by N2 thereunder; and

c. on or before the date that is four (4) weeks following Landlord's notice to Tenant of Landlord's intention to commence marketing the Expansion Premises in anticipation of an early termination of the N2 Lease.

If Tenant shall fail to timely deliver Tenant's Expansion Notice, Tenant shall be deemed to have waived such right and the provisions of this Section 1.4 shall terminate and be of no further force and effect.

1.4.2 Lease of Expansion Premises. If Tenant exercises its Expansion Right in accordance with Section 1.4.1, above, Tenant's lease of the Expansion Premises shall be upon and subject to all of the same terms and conditions as this Lease, except that (i) the Premises shall thereafter consist of 93,365 rentable square feet and Tenant's Share under the Lease shall thereafter be 64.97%; (ii) Base Rent, Additional Rent for Direct Expenses, and utility charges with respect to the Expansion Premises shall be payable commencing on the date (the "**Expansion Premises Rent Commencement Date**") that is the earlier to occur of Tenant's occupancy of the Expansion Premises for the conduct of its business, or five (5) months following the date of Landlord's delivery of the Expansion Premises to Tenant in broom clean condition, free of any occupancy rights, personal property and debris; (iii) the Tenant Improvement Allowance with respect to the Expansion Premises shall be calculated by multiplying $4,231,300.00 times a fraction, the numerator of which is the number of full calendar

months from the Expansion Premises Rent Commencement Date to February 28, 2027 and the denominator of which is the number of full calendar months from the Phase I Rent Commencement Date to February 28, 2027; and (iv) except for delivering the Expansion Premises in the condition described on Exhibit 1.4.2, Landlord shall not be required to perform any leasehold improvements, alterations or any other work to make the Expansion Premises ready for Tenant's use or occupancy, and Tenant shall accept the Expansion Premises in its "as is" condition on the Expansion Premises Commencement Date.

1.4.3 Termination of Expansion Right. The expansion right granted herein is personal to the Tenant named in this Lease and is non-transferable to any Transferee, other than to a Permitted Transferee. Notwithstanding anything to the contrary contained herein, any assignment of this Lease or the subletting of more than seventy-five percent (75%) of the Premises by Tenant pursuant to the provisions of this Lease, other than a Permitted Transfer, shall terminate the Expansion Right and the same shall be null and void and without recourse to either party hereto.

2. LEASE TERM; OPTION TERM

2.1 **Lease Term.** The terms and provisions of this Lease shall be effective as of the date of this Lease. The term of this Lease (the "**Lease Term")** shall be as set forth in Section 3.1 of the Summary, shall commence on the date set forth in Section 3.2 of the Summary (the "**Lease Commencement Date"),** and shall terminate on the date set forth in Section 3.3 of the Summary (the "**Lease Expiration Date")** unless this Lease is sooner terminated as hereinafter provided.

2.2 **Option Term.**

2.2.1 **Option Right.** Landlord hereby grants to the originally named Tenant herein ("**Original Tenant")** one (1) option to extend the Lease Term for a period of five (5) years (the "**Option Term"),** which option shall be irrevocably exercised only by written notice ("**Tenant's Extension Notice")** delivered by Tenant to Landlord not more than eighteen (18) months nor less than fifteen (15) months prior to the expiration of the initial Lease Term or the first Option Term, as applicable provided that the following conditions (the "**Option Conditions")** are satisfied: (i) as of the date of delivery of such notice, Tenant is not in default under this Lease, after the expiration of any applicable notice and cure period; (ii) as of the end of the Lease Term, Tenant is not in default under this Lease, after the expiration of any applicable notice and cure period; (iii) Tenant has not previously been in default under this Lease, after the expiration of any applicable notice and cure period, more than twice; and (iv) the Lease then remains in full force and effect and Original Tenant or a Permitted Assignee occupies at least eighty percent (80%) of the useable square footage of the Premises at the time the option to extend is exercised and as of the commencement of the applicable Option Term. Landlord may, at Landlord's option, exercised in Landlord's sole and absolute discretion, waive any of the Option Conditions in which case the option, if otherwise properly exercised by Tenant, shall remain in full force and effect. Upon the proper exercise of such option to extend, and provided that Tenant satisfies all of the Option Conditions (except those, if any, which are waived by Landlord), the Lease Term, as it applies to the Premises, shall be extended for a period of five (5) years. The rights contained in this Section 2.2 shall be personal to Original Tenant and any Permitted Assignees, and may be exercised by Original Tenant or such Permitted Assignees (and not by any assignee, sublessee or other "Transferee," as that term is defined in Section 14.1 of this Lease, of Tenant's interest in this Lease).

2.2.2 **Option Rent.** The annual Base Rent payable by Tenant during each Option Term (the "**Option Rent")** shall be equal to the greater of: (a) the Base Rent in effect as of the day preceding the Option Term, with 3% annual increases on each anniversary of the first day of the Option Term, and (b) the "Fair Rental Value," as that term is defined below, for the Premises as of the first day

of the Option Term. The "**Fair Rental Value,"** as used in this Lease, shall be equal to the annual fixed base rent per rentable square foot at which tenants (pursuant to leases consummated within the twelve (12) month period preceding the first day of the Option Term), are leasing non-sublease, non-encumbered, non-equity space which is not significantly greater or smaller in size than the subject space, for a comparable lease term, in an arm's length transaction, which comparable space is located in the "Comparable Buildings," as that term is defined below (transactions satisfying the foregoing criteria shall be known as the "**Comparable Transactions"),** taking into consideration all reasonable factors considered by landlords and tenants in the determination of fixed annual rent. The term "**Comparable Buildings"** shall mean the Building and those other mixed-use office and research and development buildings which are comparable to the Building in terms of age (based upon the date of completion of construction or major renovation of to the building), quality of construction, level of services and amenities, size and appearance, and are located in the Bedford and Lexington, Massachusetts submarket. The parties acknowledge that Fair Rental Value may include increases in the rental rate payable over the Option Term, but in no event shall the Fair Rental Value ever decrease during any Option Term.

2.2.3 **Determination of Option Rent.** In the event Tenant timely and appropriately exercises an option to extend the Lease Term, Landlord shall notify Tenant of Landlord's determination of the Fair Rental Value for the Premises for the Option Term no later than eleven (11) months prior to the Lease Expiration Date. If Tenant, on or before the date which is ten (10) business days following the date upon which Tenant receives Landlord's determination of the Fair Rental Value, in good faith objects to Landlord's determination of the Fair Rental Value, then Landlord and Tenant shall attempt to agree upon the Fair Rental Value using their best good-faith efforts. If Landlord and Tenant fail to reach agreement within ten (10) days following Tenant's objection to the Fair Rental Value (the "**Outside Agreement Date"),** then each party shall make a separate determination of the Fair Rental Value, as the case may be, within five (5) days, and such determinations shall be submitted to arbitration in accordance with Sections 2.2.3.1 through 2.2.3.7, below. If Tenant fails to object to Landlord's determination of the Fair Rental Value within the time period set forth herein, then Tenant shall be deemed to have accepted Landlord's determination of Fair Rental Value.

2.2.3.1 If Landlord and Tenant fail to reach agreement prior to the Outside Agreement Date, then Landlord and Tenant shall each appoint one arbitrator who shall be a qualified real estate broker who shall have been active over the ten (10) year period ending on the date of such appointment in the leasing of other comparable mixed-use office and research and development buildings located in the Bedford and Lexington, Massachusetts submarket. The determination of the arbitrators shall be limited solely to the issue of whether Landlord's or Tenant's submitted Fair Rental Value is the closest to the actual Fair Rental Value, taking into account the requirements of Section 2.2.2 of this Lease, as determined by the arbitrators. Each such arbitrator shall be appointed within fifteen (15) days after the Outside Agreement Date. Landlord and Tenant may consult with their selected arbitrators prior to appointment and may select an arbitrator who is favorable to their respective positions. The arbitrators so selected by Landlord and Tenant shall be deemed "**Advocate Arbitrators.**"

2.2.3.2 The two (2) Advocate Arbitrators so appointed shall be specifically required pursuant to an engagement letter to, within ten (10) days of the date of the appointment of the last appointed Advocate Arbitrator, agree upon and appoint a third arbitrator (**"Neutral Arbitrator")** who shall be qualified under the same criteria set forth hereinabove for qualification of the two Advocate Arbitrators, except that neither Landlord or Tenant or either party's Advocate Arbitrator may, directly or indirectly, consult with the Neutral Arbitrator prior or subsequent to his or her appearance. The Neutral Arbitrator shall be retained via an engagement letter jointly prepared by Landlord's counsel and Tenant's counsel.

2.2.3.3 The three arbitrators shall, within thirty (30) days of the appointment of the Neutral Arbitrator, reach a decision as to whether the parties shall use Landlord's or Tenant's submitted Fair Rental Value, and shall notify Landlord and Tenant thereof.

2.2.3.4 The decision of the majority of the three arbitrators shall be binding upon Landlord and Tenant.

2.2.3.5 If either Landlord or Tenant fails to appoint an Advocate Arbitrator within fifteen (15) days after the Outside Agreement Date, then either party may petition the then-President of the Greater Boston Real Estate Board to appoint such Advocate Arbitrator subject to the criteria in Section 2.2.3.1 of this Lease.

2.2.3.6 If the two (2) Advocate Arbitrators fail to agree upon and appoint the Neutral Arbitrator, then either party may petition the then-President of the Greater Boston Real Estate Board to appoint the Neutral Arbitrator, subject to criteria in Section 2.2.3.1 of this Lease.

2.2.3.7 The cost of the Neutral Arbitrator shall be paid by Landlord and Tenant equally and each of Landlord and Tenant shall pay the cost of its respective Advocate Arbitrator.

2.2.3.8 In the event that the Option Rent shall not have been determined pursuant to the terms hereof prior to the commencement of the Option Term, Tenant shall be required to pay Option Rent as determined in accordance with Section 2.2.2, using the Fair Rental Value calculation initially provided by Landlord to Tenant, and upon the final determination of the Fair Rental Value, the payments made by Tenant shall be reconciled with the actual amounts of Option Rent due, and the appropriate party shall make any corresponding payment to the other party.

2.2.3.9 The terms of the Lease during any Option Term shall be the same as the terms during the initial Lease Term, other than as expressly set forth in this Section 2.2.

3. BASE RENT

3.1 Tenant shall pay, without prior notice or demand, at such place as Landlord may from time to time designate in writing, by a check for currency which, at the time of payment, is legal tender for private or public debts in the United States of America or pursuant to wire or electronic payment instructions provided by Landlord, base rent ("**Base Rent")** as set forth in Section 4 of the Summary, payable in equal monthly installments as set forth in Section 4 of the Summary, in advance, on or before the first day of each and every calendar month during the Lease Term, without any setoff or deduction whatsoever. Base Rent for the first full month of the Lease Term shall be paid at the time of Tenant's execution of this Lease. If any Rent payment date (including the Lease Commencement Date) falls on a day of the month other than the first day of such month or if any payment of Rent is for a period which is shorter than one month, the Rent for any fractional month shall accrue on a daily basis for the period from the date such payment is due to the end of such calendar month or to the end of the Lease Term at a rate per day which is equal to 1/365 of the applicable annual Rent. All other payments or adjustments required to be made under the terms of this Lease that require proration on a time basis shall be prorated on the same basis. Base Rent and Additional Rent shall together be denominated "**Rent**". Without limiting the foregoing, Tenant's obligation to pay Rent shall be absolute, unconditional and independent of any Landlord covenants and shall not be discharged or otherwise affected by any law or regulation now or hereafter applicable to the Premises, or any other restriction on Tenant's use, or (except as

expressly provided herein) any casualty or taking, or any failure by Landlord to perform any covenant contained herein, or any other occurrence; and Tenant assumes the risk of the foregoing and waives all rights now or hereafter existing to terminate or cancel this Lease or quit or surrender the Premises or any part thereof, or to assert any defense in the nature of constructive eviction to any action seeking to recover rent. Tenant's covenants contained herein are independent and not dependent, and Tenant hereby waives the benefit of any statute or judicial law to the contrary. Tenant hereby acknowledges and agrees that it has been represented by counsel of its choice and has participated fully in the negotiation of this Lease, that Tenant understands that the remedies available to Tenant in the event of a default by Landlord may be more limited than those that would otherwise be available to Tenant under the common law in the absence of certain provisions of this Lease, and that the so-called "dependent covenants" rule as developed under the common law shall not apply to this Lease or to the relationship of Landlord and Tenant created hereunder.

4. ADDITIONAL RENT

4.1 **General Terms.** Commencing on the Phase I Rent Commencement Date, in addition to paying Base Rent in the amount (if any) specified in Article 3 of this Lease, Tenant shall pay **"Tenant's Share"** of the annual **"Direct Expenses"** as those terms are defined in Sections 4.2.6 and 4.2.2 of this Lease. Such payments by Tenant, together with any and all other amounts payable by Tenant to Landlord pursuant to the terms of this Lease other than Base Rent, are hereinafter collectively referred to as the "**Additional Rent.**" All amounts due under this Article 4 as Additional Rent shall be payable for the same periods and in the same manner as the Base Rent. Without limitation on other obligations of Tenant which survive the expiration of the Lease Term, the obligations of Tenant to pay the Additional Rent provided for in this Article 4 shall survive the expiration of the Lease Term.

4.2 **Definitions of Key Terms Relating to Additional Rent.** As used in this Article 4, the following terms shall have the meanings hereinafter set forth:

4.2.1 Intentionally Omitted.

4.2.2 "**Direct Expenses**" shall mean **"Operating Expenses"** and **"Tax Expenses".**

4.2.3 "**Expense Year**" shall mean each calendar year in which any portion of the Lease Term falls, through and including the calendar year in which the Lease Term expires, provided that Landlord, upon notice to Tenant, may change the Expense Year from time to time to any other twelve (12) consecutive month period, and, in the event of any such change, Tenant's Share of Direct Expenses shall be equitably adjusted for any Expense Year involved in any such change.

4.2.4 "**Operating Expenses**" shall mean all expenses, costs and amounts of every kind and nature which Landlord pays or accrues during any Expense Year because of or in connection with the ownership, management, maintenance, security, repair, replacement, restoration or operation of the Project, or any portion thereof. Without limiting the generality of the foregoing, Operating Expenses shall specifically include any and all of the following: (i) the cost of supplying all utilities to the Common Areas, the cost of operating, repairing, maintaining, and renovating the utility, telephone, mechanical, sanitary, storm drainage, and elevator systems, and the cost of maintenance and service contracts in connection therewith; (ii) the cost of licenses, certificates, permits and inspections and the cost of contesting any governmental enactments which may affect Operating Expenses, and the costs incurred in connection with any federal, state or municipal governmentally mandated transportation demand management program or similar program; (iii) the cost of all insurance carried by Landlord in connection with the Project; (iv) the cost of landscaping, re-lamping, and all supplies, tools, equipment and materials used in the operation, repair and maintenance of the Project, or any portion thereof; (v) the

cost of parking area operation, repair, restoration, and maintenance; (vi) fees and other costs, including a property management fee of not more than 3% of Project revenues (including expense pass-throughs), consulting fees, legal fees and accounting fees, of all contractors and consultants in connection with the management, operation, maintenance and repair of the Project; (vii) payments under any equipment rental agreements and the fair rental value of any management office space; (viii) subject to item (f), below, wages, salaries and other compensation and benefits, including taxes levied thereon, of all persons engaged in the operation, maintenance and security of the Project; (ix) the cost of a dumpster and/or trash compactor at the Building for use by tenants for ordinary office waste (and not for Hazardous Materials); (x) operation, repair, maintenance and replacement of all systems and equipment and components thereof of the Project; (xi) the cost of janitorial, alarm, security and other services, replacement of wall and floor coverings, ceiling tiles and fixtures in common areas, maintenance and replacement of curbs and walkways, repair to roofs and re-roofing; (xii) amortization (including reasonable interest on the unamortized cost) over such period of time as Landlord shall reasonably determine, of the cost of acquiring or the rental expense of personal property used in the maintenance, operation and repair of the Project, or any portion thereof; (xiii) the cost of capital improvements or other costs incurred in connection with the Project; provided, however, that the costs of any capital improvement shall be amortized (including reasonable interest on the amortized cost as reasonably determined by Landlord) over such period of time as Landlord shall reasonably determine; and (xiv) costs, fees, charges or assessments imposed by, or resulting from any mandate imposed on Landlord by, any federal, state or municipal government for fire and police protection, trash removal, community services, or other services which do not constitute "Tax Expenses" as that term is defined in Section 4.2.5, below, (xv) cost of tenant relation programs reasonably established by Landlord, and (xvi) payments under any easement, license, operating agreement, declaration, restrictive covenant, or instrument pertaining to the sharing of costs by the Building, including, without limitation, any covenants, conditions, restrictions, and reciprocal easement agreements affecting the Project, and any agreements with governmental agencies affecting the Project (any of the foregoing that now or hereafter affect the Property, collectively, the "**Underlying Documents**"). In the event that Landlord or Landlord's managers or agents perform services for the benefit of the Building off-site which would otherwise be performed on-site (e.g., accounting), the cost of such services shall be reasonably allocated among the properties benefitting from such service and shall be included in Operating Expenses. Notwithstanding the foregoing, for purposes of this Lease, Operating Expenses shall not, however, include:

(a) costs, including legal fees, space planners' fees, advertising and promotional expenses, and brokerage fees incurred in connection with the original construction or development, or original or future leasing of the Project, and costs, including permit, license and inspection costs, incurred with respect to the installation of tenant improvements made for tenants or incurred in renovating or otherwise improving, decorating, painting or redecorating vacant space for tenants of the Project (excluding, however, such costs relating to any common areas of the Project);

(b) legal fees incurred in connection with disputes with other tenants;

(c) penalties and fines incurred due to Landlord's breach of a law or ordinance;

(d) repairs necessitated by the gross negligence or willful misconduct of Landlord or Landlord's employees, agents, or contractors;

(e) charitable or political contributions and membership fees or other payments to trade organizations other than *de minimis* amounts;

(f) costs in connection with services that are provided to another lessee or occupant of the Building, but are not offered to Tenant;

(g) costs (i.e., interest and penalties) incurred due to Landlord's default beyond applicable notice and cure periods of this Lease to the extent in excess of costs that would have otherwise been incurred; and costs resulting from a dispute with another tenant, mortgagee, or other contract party;

(h) payments to subsidiaries or affiliates of Landlord, or to any other party, in each case as a result of a non-arm's length transaction, for management or other services for the Building, or for supplies or other materials for the Building, to the extent that such payments exceed arm's length competitive prices in the market where the Premises are located for the applicable services, supplies or materials, provided that this subsection shall not exclude from Operating Expenses a property management fee of not more than 3% of Project revenues (including expense pass-throughs);

(i) costs or expenses incurred in connection with the financing or sale of the Building or any portion thereof;

(j) the cost of acquiring investment grade art;

(k) fines, penalties, interest or other amounts imposed in connection with the Landlord's failure to pay any tax when due;

(l) except as set forth in items (xii), (xiii), and (xiv) above, depreciation, interest and principal payments on mortgages and other debt costs, if any, penalties and interest;

(m) costs for which Landlord is reimbursed by any tenant or occupant of the Project (other than as Direct Expenses) or by insurance by its carrier or any tenant's carrier or by anyone else, and electric power costs for which any tenant directly contracts with the local public service company;

(n) any bad debt loss, rent loss, or reserves for bad debts or rent loss;

(o) costs associated with the operation of the business of the partnership or entity which constitutes Landlord, as the same are distinguished from the costs of operation of the Project (which shall specifically include, but not be limited to, accounting costs associated with the operation of the Project). Costs associated with the operation of the business of the partnership or entity which constitutes Landlord include costs of partnership accounting and legal matters, costs of defending any lawsuits with any mortgagee (except as the actions of Tenant may be in issue), costs of selling, syndicating, financing, mortgaging or hypothecating any of Landlord's interest in the Project, and costs incurred in connection with any disputes between Landlord and its employees, between Landlord and Project management, or between Landlord and other tenants or occupants;

(p) the wages and benefits of any employee who does not devote substantially all of his or her employed time to the Project unless such wages and benefits are prorated to reflect time spent on operating and managing the Project vis-a-vis time spent on matters unrelated to operating and managing the Project; provided, that in no event shall Operating Expenses for purposes of this Lease include wages and/or benefits attributable to personnel above the level of Project manager;

(q) amount paid as ground rental for the Project by Landlord;

(r) except for a property management fee, overhead and profit increment paid to Landlord or to subsidiaries or affiliates of Landlord for services in the Project to the extent the same exceeds the costs of such services rendered by qualified, first-class unaffiliated third parties on a competitive basis;

(s) any compensation paid to clerks, attendants or other persons in commercial concessions operated by Landlord, provided that any compensation paid to any concierge at the Project shall be includable as an Operating Expense;

(t) all items and services for which Tenant or any other tenant in the Project reimburses Landlord (other than as Direct Expenses) or which Landlord provides selectively to one or more tenants (other than Tenant) without reimbursement;

(u) rent for any office space occupied by Project management personnel to the extent the size or rental rate of such office space exceeds the size or fair market rental value of office space occupied by management personnel of comparable buildings in the vicinity of the Building, with adjustment where appropriate for the size of the applicable project;

(v) costs incurred to comply with laws relating to the removal of Hazardous Materials (other than Hazardous Materials typically found in comparable buildings, such as recyclable materials and typical construction materials);

(w) Landlord's general overhead expenses not related to the Project;

(x) legal fees, accountants' fees (other than normal bookkeeping expenses) and other expenses incurred in connection with disputes of tenants or other occupants of the Project or associated with the enforcement of the terms of any leases with tenants or the defense of Landlord's title to or interest in the Project or any part thereof;

(y) any reserve funds; and

(z) any item that, if included in Operating Expense, would involve a double collection for such item by Landlord.

If Landlord is not furnishing any particular work or service (the cost of which, if performed by Landlord, would be included in Operating Expenses) to a tenant who has undertaken to perform such work or service in lieu of the performance thereof by Landlord, Operating Expenses shall be deemed to be increased by an amount equal to the additional Operating Expenses which would reasonably have been incurred during such period by Landlord if it had at its own expense furnished such work or service to such tenant. To the extent that any service or cost included within Operating Expenses from time to time is provided to less than all of the tenants and is not the subject of a separate charge, Landlord may charge such Operating Expenses only to the tenants benefitting from such services, on a proportionate basis based on the respective rentable square feet of the tenants benefitting from such services, rather than based on Tenant's Share. If the Project is not at least ninety-five percent (95%) occupied during all or a portion of any Expense Year, Landlord shall make an appropriate adjustment to the components of Operating Expenses for such year to determine the amount of Operating Expenses that would have been incurred had the Project been ninety-five percent (95%) occupied; and the amount so determined shall be deemed to have been the amount of Operating Expenses for such year.

4.2.5 **Taxes**.

4.2.5.1 "**Tax Expenses**" shall mean all federal, state, county, or local governmental or municipal taxes, fees, charges or other impositions of every kind and nature, whether general, special, ordinary or extraordinary (including, without limitation, real estate taxes, general and special assessments, transit taxes, payments in lieu of taxes, business improvement district charges, leasehold taxes or taxes based upon the receipt of rent, including gross receipts or sales taxes applicable to the receipt of rent, unless required to be paid by Tenant, personal property taxes imposed upon the fixtures, machinery, equipment, apparatus, systems and equipment, appurtenances, furniture and other personal property used in connection with the Project, or any portion thereof), which shall be paid or accrued during any Expense Year (without regard to any different fiscal year used by such governmental or municipal authority) because of or in connection with the ownership, leasing and operation of the Project, or any portion thereof.

4.2.5.2 Tax Expenses shall include, without limitation: (i) Any tax on the rent, right to rent or other income from the Project, or any portion thereof, or as against the business of leasing the Project, or any portion thereof; (ii) any assessment, tax, fee, levy or charge in addition to, or in substitution, partially or totally, of any assessment, tax, fee, levy or charge previously included within the definition of real property tax; (iii) any assessment, tax, fee, levy, or charge allocable to or measured by the area of the Premises or the Rent payable hereunder, including, without limitation, any business or gross income tax or excise tax with respect to the receipt of such rent, or upon or with respect to the possession, leasing, operating, management, maintenance, alteration, repair, use or occupancy by Tenant of the Premises, or any portion thereof; and (iv) any assessment, tax, fee, levy or charge, upon this transaction or any document to which Tenant is a party, creating or transferring an interest or an estate in the Premises or the improvements thereon. If at any time during the Lease Term there shall be assessed on Landlord, in addition to or lieu of the whole or any part of the ad valorem tax on real or personal property, a capital levy or other tax on the gross rents or other measures of building operations, or a governmental income, franchise, excise or similar tax, assessment, levy, charge or fee measured by or based, in whole or in part, upon building valuation, gross rents or other measures of building operations or benefits of governmental services furnished to the Building, then any and all of such taxes, assessments, levies, charges and fees, to the extent so measured or based, shall be included within the term Tax Expenses, but only to the extent that the same would be payable if the Building and Land were the only property of Landlord.

4.2.5.3 Any costs and expenses (including, without limitation, reasonable attorneys' and consultants' fees) incurred in attempting to protest, reduce or minimize Tax Expenses shall be included in Tax Expenses in the Expense Year such expenses are incurred. Tax refunds shall be credited against Tax Expenses and refunded to Tenant regardless of when received, based on the Expense Year to which the refund is applicable, provided that in no event shall the amount to be refunded to Tenant for any such Expense Year exceed the total amount paid by Tenant as on account of Tax Expenses under this Article 4 for such Expense Year. The foregoing sentence shall survive the expiration or earlier termination of this Lease. If Tax Expenses for any period during the Lease Term or any extension thereof are increased after payment thereof for any reason, including, without limitation, error or reassessment by applicable governmental or municipal authorities, Tenant shall pay Landlord upon demand Tenant's Share of any such increased Tax Expenses. Notwithstanding anything to the contrary contained in this Section 4.2.5, there shall be excluded from Tax Expenses (i) all excess profits taxes, franchise taxes, gift taxes, capital stock taxes, inheritance and succession taxes, estate taxes, transfer tax or fee, federal and state income taxes, and other taxes to the extent applicable to Landlord's general or net income (as opposed to rents, receipts or income attributable to operations at the Project), (ii) any items included as Operating Expenses, and (iii) any items paid by Tenant under Section 4.5 of this Lease.

4.2.6 "**Tenant's Share**" is based upon the ratio that the rentable square feet of the Premises bears to the rentable square feet of the Building and initially shall mean the percentages set forth in Section 7 of the Summary, subject to adjustment in the event that Tenant expands the Premises within the Building.

4.3 **Calculation and Payment of Additional Rent**. In the event Tenant extends the Lease Term pursuant to Section 2.2, above, or otherwise, then Tenant shall pay to Landlord, in the manner set forth in Section 4.4.1, below, and as Additional Rent, Tenant's Share of Direct Expenses for each Expense Year.

4.3.1 **Statement of Actual Direct Expenses and Payment by Tenant**. Landlord shall give to Tenant within six (6) months following the end of each Expense Year, a statement (the **"Statement"**) which shall state the Direct Expenses incurred or accrued for such preceding Expense Year, and which shall indicate the amount of Tenant's Share of Direct Expenses. Upon receipt of the Statement for each Expense Year commencing or ending during the Lease Term, Tenant shall pay, with its next installment of Base Rent due, the full amount of Tenant's Share of Direct Expenses for such Expense Year, less the amounts, if any, paid during such Expense Year as **"Estimated Direct Expenses,"** as that term is defined in Section 4.4.2, below, and if Tenant paid more as Estimated Direct Expenses than the actual Tenant's Share of Direct Expenses, Tenant shall receive a credit in the amount of Tenant's overpayment against Rent next due under this Lease or, if Landlord elects, Landlord shall reimburse such overpayment amount to Tenant. The failure of Landlord to timely furnish the Statement for any Expense Year shall not prejudice Landlord or Tenant from enforcing its rights under this Article 4. Even though the Lease Term has expired and Tenant has vacated the Premises, when the final determination is made of Tenant's Share of Direct Expenses for the Expense Year in which this Lease terminates, Tenant shall pay to Landlord such amount within thirty (30) days, and if Tenant paid more as Estimated Direct Expenses than the actual Tenant's Share of Direct Expenses, Landlord shall, within thirty (30) days, pay to Tenant the amount of the overpayment. The provisions of this Section 4.4.1 shall survive the expiration or earlier termination of the Lease Term.

Tenant shall have the right for a period of ninety (90) days (the "**Audit Period**") following its receipt of the Statement to examine Landlord's books and records concerning Operating Expenses for the calendar year covered by such Statement in the offices of the property manager or another location reasonably designated by Landlord. Tenant's audit may be conducted by its employees or its designated accountants, provided that the accountants must be employed on a regular fee for services basis and not on a contingency fee basis. If, by notice to Landlord given after such examination but during the Audit Period (which notice shall be accompanied by documentation evidencing the results of Tenant's audit to Landlord's reasonable satisfaction), Tenant disputes the amount of Additional Rent for Operating Expenses shown on the Statement, and Landlord and Tenant are unable to resolve such dispute within thirty (30) days thereafter, then either party may request that the amount of Additional Rent for Operating Expenses for the year in question be determined by an audit conducted by a certified public accountant reasonably selected by both parties, provided that if the parties are unable so to agree on an accountant within ten (10) days after receipt of Tenant's notice, then within twenty (20) days after Tenant's notice is given Tenant may submit the dispute for determination by an arbitration conducted by a single arbitrator in the Boston Office of the American Arbitration Association (**"AAA"**) in accordance with the AAA's Commercial Arbitration Rules. The arbitrator shall be selected by the AAA and shall be a certified public accountant with at least ten (10) years of experience in auditing first class mixed-use office and research and development buildings in the Bedford and Lexington, Massachusetts

submarket. The cost of the accountant selected by both parties, and the arbitrator, if applicable, shall be shared equally by the parties. Tenant and each person reviewing Landlord's books and records or participating in the arbitration shall agree in an instrument prepared by Landlord that all information obtained from Landlord's books and records shall be kept confidential and used only for the purpose of determining amounts properly due under this Lease. If the Additional Rent due with respect to Operating Expenses is finally determined to be less or more than the Additional Rent paid by Tenant on account of Landlord's calculation of Operating Expenses, Landlord shall either promptly refund to Tenant the difference or credit same against Rent next due from Tenant or Tenant shall promptly pay to Landlord the difference, as applicable.

4.3.2 **Statement of Estimated Direct Expenses**. In addition, Landlord shall endeavor to give Tenant a yearly expense estimate statement (the **"Estimate Statement")** which shall set forth Landlord's reasonable estimate (the **"Estimate"**) of what the total amount of Direct Expenses for the then-current Expense Year shall be and the estimated Tenant's Share of Direct Expenses (the "**Estimated Direct Expenses**")**.** The failure of Landlord to timely furnish the Estimate Statement for any Expense Year shall not preclude Landlord from enforcing its rights to collect any Estimated Direct Expenses under this Article 4, nor shall Landlord be prohibited from revising any Estimate Statement or Estimated Direct Expenses theretofore delivered to the extent necessary. Thereafter, Tenant shall pay, with its next installment of Base Rent due, a fraction of the Estimated Direct Expenses for the then-current Expense Year (reduced by any amounts paid pursuant to the last sentence of this Section 4.4.2). Such fraction shall have as its numerator the number of months which have elapsed in such current Expense Year, including the month of such payment, and twelve (12) as its denominator. Until a new Estimate Statement is furnished (which Landlord shall have the right to deliver to Tenant at any time), Tenant shall pay monthly, with the monthly Base Rent installments, an amount equal to one-twelfth (1/12) of the total Estimated Direct Expenses set forth in the previous Estimate Statement delivered by Landlord to Tenant.

4.4 **Taxes and Other Charges for Which Tenant Is Directly Responsible**. Tenant shall be liable for and shall pay ten (10) days before delinquency, taxes levied against Tenant's equipment, furniture, fixtures and any other personal property located in or about the Premises. If any such taxes on Tenant's equipment, furniture, fixtures and any other personal property are levied against Landlord or Landlord's property or if the assessed value of Landlord's property is increased by the inclusion therein of a value placed upon such equipment, furniture, fixtures or any other personal property and if Landlord pays the taxes based upon such increased assessment, which Landlord shall have the right to do regardless of the validity thereof but only under proper protest if requested by Tenant, Tenant shall upon demand (together with reasonable back-up evidencing the same) repay to Landlord the taxes so levied against Landlord or the proportion of such taxes resulting from such increase in the assessment, as the case may be.

5. USE OF PREMISES

5.1 **Permitted Use**. Tenant shall use the Premises solely for the Permitted Use set forth in Section 8 of the Summary and Tenant shall not use or permit the Premises or the Project to be used for any other purpose or purposes whatsoever.

5.2 **Prohibited Uses**. Tenant further covenants and agrees that Tenant shall not use, or suffer or permit any person or persons claiming by, through, or under Tenant to use, the Premises or any part thereof for any use or purpose contrary to the provisions of the Rules and Regulations attached hereto as **Exhibit 5.2-1**, as the same may be amended by Landlord from time to time, or in violation of Applicable Laws or any Underlying Documents which are listed on **Exhibit 5.2-2** or which have been provided or made available to Tenant or of which Tenant otherwise has actual notice. Tenant shall not

do or permit anything to be done in or about the Premises which will in any way damage the reputation of the Project or obstruct or interfere with the rights of other tenants or occupants of the Building, or injure or unreasonably annoy them or use or allow the Premises to be used for any improper, unlawful or objectionable purpose, nor shall Tenant cause, maintain or permit any nuisance in, on or about the Premises. Tenant shall comply with, and Tenant's rights and obligations under the Lease and Tenant's use of the Premises shall be subject and subordinate to, all Underlying Documents which have been provided or made available to Tenant or which are otherwise a matter of public record as of the date hereof.

5.3 **Hazardous Materials**.

5.3.1 **Tenant's Obligations**.

5.3.1.1 **Prohibitions**. As a material inducement to Landlord to enter into this Lease with Tenant, Tenant has fully and accurately completed Landlord's Pre-Leasing Environmental Exposure Questionnaire (the "**Environmental Questionnaire**"), which is attached as **Exhibit 5.3.1.1**. Tenant hereby represents, warrants and covenants that except for those chemicals or materials, and their respective quantities, specifically listed on the Environmental Questionnaire, neither Tenant nor Tenant's subtenants or assigns, or any of their respective employees, contractors and subcontractors of any tier, entities with a contractual relationship with such parties (other than Landlord), or any entity acting as an agent or sub-agent of such parties or any of the foregoing (collectively, "**Tenant Parties**") will produce, use, store or generate any "Hazardous Materials," as that term is defined below, on, under or about the Premises, nor cause or permit any Hazardous Material to be brought upon, placed, stored, manufactured, generated, blended, handled, recycled, used or "Released," as that term is defined below, on, in, under or about the Premises or Project. If any information provided to Landlord by Tenant on the Environmental Questionnaire, or otherwise relating to information concerning Hazardous Materials is false, incomplete, or misleading in any material respect, the same shall be deemed a default by Tenant under this Lease. Upon Landlord's reasonable request, or in the event of any material change in Tenant's use of Hazardous Materials at the Premises, Tenant shall deliver to Landlord an updated Environmental Questionnaire. Landlord's prior written consent shall be required for any Hazardous Materials use for the Premises not described on the initial Environmental Questionnaire, such consent not to be unreasonably withheld, conditioned or delayed. Tenant shall not install or permit any underground storage tank on the Premises. In addition, Tenant agrees that it: (i) shall not cause or suffer to occur, the Release (as defined below) of any Hazardous Materials at, upon, under or within the Premises or any contiguous or adjacent premises; and (ii) shall not engage in activities at the Premises that give rise to, or lead to the imposition of, liability upon Tenant or Landlord or the creation of an environmental lien or use restriction upon the Premises. For purposes of this Lease, "**Hazardous Materials**" means all flammable explosives, petroleum and petroleum products, oil, radon, radioactive materials, toxic pollutants, asbestos, polychlorinated biphenyls ("**PCBs**"), medical waste, chemicals known to cause cancer or reproductive toxicity, pollutants, contaminants, hazardous wastes, toxic substances or related materials, including without limitation any chemical, element, compound, mixture, solution, substance, object, waste or any combination thereof, which is or may hereafter be determined to be hazardous to human health, safety or to the environment due to its radioactivity, ignitability, corrosiveness, reactivity, explosiveness, toxicity, carcinogenicity, infectiousness or other harmful or potentially harmful properties or effects, or defined as, regulated as or included in, the definition of "hazardous substances," "hazardous wastes," "hazardous materials," or "toxic substances" under any Environmental Laws. The term "**Hazardous Materials**" for purposes of this Lease shall also include any mold, fungus or spores, whether or not the same is defined, listed, or otherwise classified as a "hazardous material" under any Environmental Laws, if such mold, fungus or spores may pose a risk to human health or the environment or negatively impact the value of the Premises. For purposes of this

Lease, "**Release**" or "**Released**" or "**Releases**" shall mean any release, deposit, discharge, emission, leaking, spilling, seeping, migrating, injecting, pumping, pouring, emptying, escaping, dumping, disposing, or other movement of Hazardous Materials into the environment.

Any use or storage of Hazardous Materials by Tenant permitted pursuant to this Article 5 shall not exceed Tenant's proportionate share (measured on a per floor basis) of similarly classed Hazardous Materials. Notwithstanding anything contained herein to the contrary, in no event shall Tenant or anyone claiming by through or under Tenant perform work at or above the risk category Biosafety Level 2 as established by the Department of Health and Human Services ("**DHHS**") and as further described in the DHHS publication Biosafety in Microbiological and Biomedical Laboratories (5th Edition) (as it may be or may have been further revised, the "**BMBL**") or such nationally recognized new or replacement standards as Landlord may reasonable designate. Tenant shall comply with all applicable provisions of the standards of the BMBL to the extent applicable to Tenant's operations in the Premises.

5.3.1.2 **Notices to Landlord**. Unless Tenant is required by Applicable Laws to give earlier notice to Landlord, Tenant shall notify Landlord in writing as soon as possible but in no event later than five (5) days after (i) Tenant becomes aware of the occurrence of any actual, alleged or threatened Release of any Hazardous Material in, on, under, from, about or in the vicinity of the Premises (whether past or present), regardless of the source or quantity of any such Release, or (ii) Tenant becomes aware of any regulatory actions, inquiries, inspections, investigations, directives, or any cleanup, compliance, enforcement or abatement proceedings (including any threatened or contemplated investigations or proceedings) relating to or potentially affecting the Premises, or (iii) Tenant becomes aware of any claims by any person or entity relating to any Hazardous Materials in, on, under, from, about or in the vicinity of the Premises, whether relating to damage, contribution, cost recovery, compensation, loss or injury. Collectively, the matters set forth in clauses (i), (ii) and (iii) above are hereinafter referred to as "**Hazardous Materials Claims"**. Tenant shall promptly forward to Landlord copies of all orders, notices, permits, applications and other communications and reports in connection with any Hazardous Materials Claims. Additionally, Tenant shall promptly advise Landlord in writing of Tenant's discovery of any occurrence or condition on, in, under or about the Premises that could subject Tenant or Landlord to any liability, or restrictions on ownership, occupancy, transferability or use of the Premises under any "Environmental Laws," as that term is defined below. Tenant shall not enter into any legal proceeding or other action, settlement, consent decree or other compromise with respect to any Hazardous Materials Claims without first notifying Landlord of Tenant's intention to do so and affording Landlord the opportunity to join and participate, as a party if Landlord so elects, in such proceedings and in no event shall Tenant enter into any agreements which are binding on Landlord or the Project without Landlord's prior written consent. Landlord shall have the right to appear at and participate in, any and all legal or other administrative proceedings concerning any Hazardous Materials Claim. For purposes of this Lease, **"Environmental Laws"** means all applicable present and future laws relating to the protection of human health, safety, wildlife or the environment, including, without limitation, (i) all requirements pertaining to reporting, licensing, permitting, investigation and/or remediation of emissions, discharges, Releases, or threatened Releases of Hazardous Materials, whether solid, liquid, or gaseous in nature, into the air, surface water, groundwater, or land, or relating to the manufacture, processing, distribution, use, treatment, storage, disposal, transport, or handling of Hazardous Materials; and (ii) all requirements pertaining to the health and safety of employees or the public. Environmental Laws include, but are not limited to, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 USC § 9601, et seq., the Hazardous Materials Transportation Authorization Act of 1994, 49 USC § 5101, et seq., the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, and Hazardous and Solid Waste Amendments of 1984, 42 USC § 6901, et seq., the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, 33 USC § 1251, et seq., the Clean Air Act of

1966, 42 USC § 7401, et seq., the Toxic Substances Control Act of 1976, 15 USC § 2601, et seq., the Safe Drinking Water Act of 1974, 42 USC §§ 300f through 300j, the Occupational Safety and Health Act of 1970, as amended, 29 USC § 651 et seq., the Oil Pollution Act of 1990, 33 USC § 2701 et seq., the Emergency Planning and Community Right-To-Know Act of 1986, 42 USC § 11001 et seq., the National Environmental Policy Act of 1969, 42 USC § 4321 et seq., the Federal Insecticide, Fungicide and Rodenticide Act of 1947, 7 USC § 136 et seq., M.G.L. c.21C; oil and hazardous materials as defined in M.G.L. c.21E; and any other state or local law counterparts, as amended, as such Applicable Laws, are in effect as of the Lease Commencement Date, or thereafter adopted, published or promulgated.

5.3.1.3 **Releases of Hazardous Materials**. If any Release of any Hazardous Material in, on, under, from or about the Premises in violation of the Lease, or requiring any Clean-Up (as defined below), in addition to notifying Landlord as specified above, Tenant, at its own sole cost and expense, shall (i) immediately comply with any and all reporting requirements imposed pursuant to any and all Environmental Laws, (ii) provide a written certification to Landlord indicating that Tenant has complied with all applicable reporting requirements, (iii) take any and all necessary investigation, corrective, remedial and other Clean-up action in accordance with any and all applicable Environmental Laws, utilizing an environmental consultant approved by Landlord, all in accordance with the provisions and requirements of this Section 5.3, including, without limitation, Section 5.3.4, and (iv) take any such additional investigative, remedial and corrective actions as Landlord shall in its reasonable discretion deem necessary such that the Premises and Project are remediated to a condition allowing unrestricted use of the Premises (i.e., to a level that will allow any future use of the Premises, including residential, without any engineering controls or deed restrictions), all in accordance with the provisions and requirements of this Section 5.3. Landlord may, as required by any and all Environmental Laws, report the Release of any Hazardous Material to the appropriate governmental authority, identifying Tenant as the responsible party. Tenant shall deliver to Landlord copies of all administrative orders, notices, demands, directives or other communications directed to Tenant from any governmental authority with respect to any Release of Hazardous Materials in, on, under, from, or about the Premises, together with copies of all investigation, assessment, and remediation plans and reports prepared by or on behalf of Tenant in response to any such regulatory order or directive.

5.3.1.4 **Indemnification**.

5.3.1.4.1 **In General**. Without limiting in any way Tenant's obligations under any other provision of this Lease, Tenant shall be solely responsible for and shall protect, defend, indemnify and hold the Landlord Parties harmless from and against any and all claims, judgments, losses, damages, costs, expenses, penalties, enforcement actions, taxes, fines, remedial actions, liabilities (including, without limitation, actual attorneys' fees, litigation, arbitration and administrative proceeding costs, expert and consultant fees and laboratory costs) including, without limitation, consequential damages and sums paid in settlement of claims, which arise during or after the Lease Term, whether foreseeable or unforeseeable, directly or indirectly arising out of or attributable to the presence, use, generation, manufacture, treatment, handling, refining, production, processing, storage, Release or presence of Hazardous Materials in, on, under or about the Premises or Project by any Tenant Party, except to the extent such liabilities result from the negligence or willful misconduct of Landlord following the Lease Commencement Date. The foregoing obligations of Tenant shall include, without limitation: (i) the costs of any required or necessary removal, repair, cleanup or remediation of the Premises and Project, and the preparation and implementation of any closure, removal, remedial or other required plans; (ii) judgments for personal injury or property damages; and (iii) all costs and expenses incurred by Landlord in connection therewith. It is the express intention of the parties to this Lease that Tenant assumes all such liabilities, and holds Landlord harmless from all such liabilities, associated with the environmental condition of the Premises, arising on or after the date Tenant takes possession of the Premises.

5.3.1.4.2 **Limitations.** Notwithstanding anything in this Section 5.3.1.4 to the contrary, Tenant's indemnity of Landlord shall not be applicable to claims based upon Existing Hazardous Materials except to the extent that Tenant's construction activities and/or Tenant's other acts or omissions caused or exacerbated the subject claim. "**Existing Hazardous Materials**" shall mean Hazardous Materials located on the Property in violation of applicable Environmental Laws as of the date of this Lease.

5.3.1.5 **Compliance with Environmental Laws.** Without limiting the generality of Tenant's obligation to comply with Applicable Laws as otherwise provided in this Lease, Tenant shall, at its sole cost and expense, comply with all Environmental Laws with respect to its use and occupancy of the Premises and activities conducted at the Project. Tenant shall obtain and maintain any and all necessary permits, licenses, certifications and approvals appropriate or required for the use, handling, storage, and disposal of any Hazardous Materials used, stored, generated, transported, handled, blended, or recycled by Tenant on the Premises. Landlord shall have a continuing right, without obligation, to require Tenant to obtain, and to review and inspect any and all such permits, licenses, certifications and approvals, together with copies of any and all Hazardous Materials management plans and programs, any and all Hazardous Materials risk management and pollution prevention programs, and any and all Hazardous Materials emergency response and employee training programs respecting Tenant's use of Hazardous Materials. Upon request of Landlord, Tenant shall deliver to Landlord a narrative description explaining the nature and scope of Tenant's activities involving Hazardous Materials and showing to Landlord's satisfaction compliance with all Environmental Laws and the terms of this Lease.

5.3.2 **Assurance of Performance.**

5.3.2.1 **Environmental Assessments In General**. Landlord may, but shall not be required to, engage from time to time such contractors as Landlord determines to be appropriate to perform "Environmental Assessments," as that term is defined below, to ensure Tenant's compliance with the requirements of this Lease with respect to Hazardous Materials. For purposes of this Lease, "**Environmental Assessment**" means an assessment including, without limitation: (i) an environmental site assessment conducted in accordance with the then-current standards of the American Society for Testing and Materials and meeting the requirements for satisfying the "all appropriate inquiries" requirements; and (ii) sampling and testing of the Premises based upon potential recognized environmental conditions or areas of concern or inquiry identified by the environmental site assessment.

5.3.2.2 **Costs of Environmental Assessments.** All costs and expenses incurred by Landlord in connection with any such Environmental Assessment initially shall be paid by Landlord; provided that if any such Environmental Assessment shows that Tenant has failed to comply with the provisions of this Section 5.3, then all of the costs and expenses of such Environmental Assessment shall be reimbursed by Tenant as Additional Rent within thirty (30) days after receipt of written demand therefor.

5.3.3 **Tenant's Obligations upon Surrender.** At the expiration or earlier termination of the Lease Term, Tenant, at Tenant's sole cost and expense, shall: (i) cause an Environmental Assessment of the Premises to be conducted in accordance with Section 15.3; (ii) cause all Hazardous Materials to be removed from the Premises and disposed of in accordance with all Environmental Laws and as necessary to allow the Premises to be used for any purpose; and (iii) cause to be removed all containers installed or used by any Tenant Parties to store any Hazardous Materials on the Premises, and cause to be repaired any damage to the Premises caused by such removal.

5.3.4 **Clean-up**.

5.3.4.1 **Environmental Reports; Clean-Up**. If any written report, including any report containing results of any Environmental Assessment (an "**Environmental Report**") shall indicate (i) the presence of any Hazardous Materials as to which Tenant has a removal or remediation obligation under this Section 5.3, and (ii) that as a result of same, the investigation, characterization, monitoring, assessment, repair, closure, remediation, removal, or other clean-up (the "**Clean-up"**) of any Hazardous Materials is required, Tenant shall immediately prepare and submit to Landlord within thirty (30) days after receipt of the Environmental Report a comprehensive plan, subject to Landlord's written approval, specifying the actions to be taken by Tenant to perform the Clean-up so that the Premises are restored to the conditions required by this Lease. Upon Landlord's approval of the Cleanup plan, Tenant shall, at Tenant's sole cost and expense, without limitation of any rights and remedies of Landlord under this Lease, immediately implement such plan with a consultant reasonably acceptable to Landlord and proceed to Clean-Up Hazardous Materials in accordance with all applicable laws and as required by such plan and this Lease. If, within thirty (30) days after receiving a copy of such Environmental Report, Tenant fails either (a) to complete such Clean-up, or (b) with respect to any Clean-up that cannot be completed within such 30-day period, fails to proceed with diligence to prepare the Clean-up plan and complete the Clean-up as promptly as practicable, then Landlord shall have the right, but not the obligation, and without waiving any other rights under this Lease, to carry out any Clean-up recommended by the Environmental Report or required by any governmental authority having jurisdiction over the Premises, and recover all of the costs and expenses thereof from Tenant as Additional Rent, payable within ten (10) days after receipt of written demand therefor.

5.3.4.2 **No Rent Abatement**. Tenant shall continue to pay all Rent due or accruing under this Lease during any Clean-up, and shall not be entitled to any reduction, offset or deferral of any Base Rent or Additional Rent due or accruing under this Lease during any such Cleanup.

5.3.4.3 **Surrender of Premises**. Tenant shall complete any Clean-up prior to surrender of the Premises upon the expiration or earlier termination of this Lease, and shall fully comply with all Environmental Laws and requirements of any governmental authority with respect to such completion, including, without limitation, fully comply with any requirement to file a risk assessment, mitigation plan or other information with any such governmental authority in conjunction with the Clean-up prior to such surrender. Tenant shall obtain and deliver to Landlord a letter or other written determination from the overseeing governmental authority confirming that the Clean-up has been completed in accordance with all requirements of such governmental authority and that no further response action of any kind is required for the unrestricted use of the Premises ("**Closure Letter"**). Upon the expiration or earlier termination of this Lease, Tenant shall also be obligated to close all permits obtained in connection with Hazardous Materials in accordance with Applicable Laws.

5.3.4.4 **Failure to Timely Clean-Up**. Should any Clean-up for which Tenant is responsible not be completed, or should Tenant not receive the Closure Letter and any governmental approvals required under Environmental Laws in conjunction with such Clean-up prior to the expiration or earlier termination of this Lease, and Tenant's failure to receive the Closure Letter is prohibiting Landlord from leasing the Premises or any part thereof to a third party, or prevents the occupancy or use of the Premises or any part thereof by a third party, then Tenant shall be liable to Landlord as a holdover tenant (as more particularly provided in **Article 16**) until Tenant has fully complied with its obligations under this Section 5.3.

5.3.5 **Confidentiality**. Unless compelled to do so by applicable law, Tenant agrees that Tenant shall not disclose, discuss, disseminate or copy any information, data, findings, communications, conclusions and reports regarding the environmental condition of the Premises to any Person (other than Tenant's consultants, attorneys, property managers and employees that have a need to know such information), including any governmental authority, without the prior written consent of Landlord. In the event Tenant reasonably believes that disclosure is compelled by Applicable Laws, it shall provide Landlord ten (10) days' advance notice of disclosure of confidential information so that Landlord may attempt to obtain a protective order. Tenant may additionally release such information to bona fide prospective purchasers or lenders, subject to any such parties' written agreement to be bound by the terms of this Section 5.3.

5.3.6 **Copies of Environmental Reports**. Within thirty (30) days of receipt thereof, Tenant shall provide Landlord with a copy of any and all environmental assessments, audits, studies and reports regarding Tenant's activities with respect to the Premises, or ground water beneath the Land, or the environmental condition or Clean-up thereof. Tenant shall be obligated to provide Landlord with a copy of such materials without regard to whether such materials are generated by Tenant or prepared for Tenant, or how Tenant comes into possession of such materials.

5.3.7 **Signs, Response Plans, Etc**. Tenant shall be responsible for posting on the Premises any signs required under applicable Environmental Laws. Tenant shall also complete and file any business response plans or inventories required by any applicable Environmental Laws. Tenant shall concurrently file a copy of any such business response plan or inventory with Landlord.

5.3.8 **Survival**. Each covenant, agreement, representation, warranty and indemnification made by Tenant set forth in this Section 5.3 shall survive the expiration or earlier termination of this Lease and shall remain effective until all of Tenant's obligations under this Section 5.3 have been completely performed and satisfied.

6. SERVICES AND UTILITIES

6.1 **Landlord Provided Services**. Landlord shall provide the following services on all days (unless otherwise stated below) during the Lease Term.

6.1.1 Subject to limitations imposed by all governmental rules, regulations and guidelines applicable thereto, Landlord shall provide heating, ventilation (including exhaust) and air conditioning ("**HVAC**") to the Common Areas when necessary for normal comfort in the Building Common Areas.

6.1.2 Landlord shall provide adequate electrical wiring and facilities for connection to Tenant's lighting fixtures and plugs for use by incidental use office equipment, provided that the connected electrical load of the incidental use equipment and the connected electrical load of Tenant's lighting fixtures does not exceed Tenant's Share of the Building limits as of the Effective Date. Tenant shall bear the cost of replacement of lamps, starters and ballasts for non-Building standard lighting fixtures within the Premises.

6.1.3 Landlord shall provide city water from the regular Building outlets for drinking, lavatory and toilet purposes in the Building Common Areas.

6.1.4 Landlord shall provide a dumpster and/or trash compactor at the Building for use by Tenant and other tenants for ordinary office waste (and not for Hazardous Materials) and janitorial, trash services and cleaning to Building Common Areas consistent with Comparable Buildings.

6.1.5 Landlord shall provide passenger elevator service to all floors of the Premises, and shall provide exclusive use of one (1) loading dock, and shared use of one (1) loading dock, as shown on Exhibit 6.1.5. Tenant shall have 24-hour access to its exclusive loading dock at no additional cost.

6.1.6 Landlord agrees to provide and maintain utility connections to the Building and, where applicable, Common Areas, for electricity, water and sewer.

6.2 **Tenant Provided Services and Utilities**. Except as otherwise expressly set forth in Section 6.1, above, Tenant will be responsible, at its sole cost and expense, for the furnishing of all services and utilities to the Premises, including without limitation electricity, water, telephone, janitorial and Premises security services.

6.2.1 Tenant shall be solely responsible for performing all janitorial and trash services and other cleaning of the Premises, all in compliance with Applicable Laws. In the event such service is provided by a third party janitorial service, and not by employees of Tenant, such service shall be a janitorial service approved in advance by Landlord (Landlord shall provide Tenant with a list of approved vendors upon Tenant's request) which approval shall not be unreasonably withheld, conditioned or delayed. The janitorial and cleaning of the Premises shall be adequate to maintain the Premises in a manner consistent with Comparable Buildings.

6.2.2 Subject to Applicable Laws, Landlord's reasonable security measures, and the other provisions of this Lease (including, without limitation, the Rules and Regulations), and except in the event of an emergency, Tenant shall have access to the Building, the Premises and the Common Areas of the Building (including the freight loading dock but not including Common Areas for which Landlord requires the presence of a Building engineer), twenty-four (24) hours per day, seven (7) days per week, every day of the year; provided, however, that Tenant shall only be permitted to have access to and use of the limited-access areas of the Building during the normal operating hours of such portions of the Building.

Tenant shall cooperate fully with Landlord at all times and abide by all reasonable regulations and requirements that Landlord may reasonably prescribe for the proper functioning and protection of the HVAC, electrical, mechanical and plumbing systems.

6.2.3 Tenant shall pay for all water, gas, heat, light, power, telephone, internet service, cable television, other telecommunications and other utilities supplied to the Premises, together with any fees, surcharges and taxes thereon, whether part of Operating Expenses or as provided under this Article 6. As part of the Tenant Improvements, Tenant shall, at Tenant's expense, subject to reimbursement from the Tenant Improvement Allowance, install direct meters for all utility services serving the Premises (except for water and sewer, which shall be or sub- or "check" metered based on water use, and Tenant's cable, telephone, and internet service) for measuring Tenant's consumption of such utility services, other than the HVAC system of the Building. Tenant shall pay all costs and expenses for any separately metered utilities provided exclusively to the Premises directly to the applicable service provider. Utility charges for power, gas and water serving the HVAC system of the Building (which are measured by the control management system of the Building based on air volume provided to each tenant space) shall be check or sub-metered by Landlord and paid as part of Operating Expenses. Landlord may install devices to separately, check or sub-meter any utility use within the Premises (or use other reasonable industry standard methods to reasonably estimate such use, where

applicable) that is not metered in such a manner on the Commencement Date and in such event Tenant shall thereafter pay the cost directly to the applicable service provider, if separately metered, or to Landlord, if check or sub-metered. Additional Rent for any utilities that are not separately metered may be reasonably estimated monthly by Landlord, based on actual readings of sub- and "check" meters where applicable, and shall be paid monthly by Tenant within thirty (30) days after being billed, with a final accounting based upon actual bills received from the utility providers following the conclusion of each fiscal year of the Building.

6.3 **Capacities; Overstandard Tenant Use.** If Tenant uses water, electricity, heat or air conditioning in excess of that supplied by Landlord pursuant to Section 6.1 of this Lease, Tenant shall pay to Landlord, within thirty (30) days after Tenant's receipt of an invoice therefor, the actual cost of such excess consumption; and if Tenant does not cease such excessive usage promptly following written notice from Landlord, Landlord may install devices to separately meter any utility use (or use other reasonable industry standard methods to reasonably estimate such use) and in such event Tenant shall pay the cost directly to Landlord, within thirty (30) days after Tenant's receipt of an invoice therefor, at the rates charged by the public utility company furnishing the same, including the cost of installing, testing and maintaining of such additional metering devices. Tenant's use of electricity and any other utility serving the Premises shall never exceed the capacity of the feeders to the Project or the risers or wiring installation or Tenant's Share of the per floor limits otherwise set forth on **Exhibit 6.3,** attached. If Tenant desires to use heat, ventilation or air conditioning in the Common Areas during hours other than those for which Landlord is obligated to supply such utilities pursuant to the terms of Section 6.1 of this Lease, Tenant shall give Landlord such prior notice, if any, as Landlord shall from time to time establish as appropriate, of Tenant's desired use in order to supply such utilities, and Landlord shall supply such utilities to the Common Areas at such hourly cost per zone to Tenant (which shall be treated as Additional Rent) as Landlord shall from time to time establish based upon its reasonably estimated out-of-pocket costs.

6.4 **Interruption of Use.** Tenant agrees that, to the extent permitted pursuant to Applicable Laws and except to the extent caused by the negligence or willful misconduct of Landlord, Landlord shall not be liable for damages, by abatement of Rent or otherwise, for failure to furnish or delay in furnishing any service required to be provided by Landlord under this Lease, or for any diminution in the quality or quantity thereof, when such failure or delay or diminution is occasioned, in whole or in part, by breakage, repairs, replacements, or improvements, by any strike, lockout or other labor trouble, by inability to secure electricity, gas, water, or other fuel at the Building or Project after reasonable effort to do so, by any riot or other dangerous condition, emergency, accident or casualty whatsoever, by act or default of Tenant or other parties, or by any other cause; and such failures or delays or diminution shall never be deemed to constitute an eviction or disturbance of Tenant's use and possession of the Premises or relieve Tenant from paying Rent or performing any of its obligations under this Lease. Furthermore, except to the extent caused by the negligence or willful misconduct of Landlord, Landlord shall not be liable for a loss of, or injury to, property or for injury to, or interference with, Tenant's business through or in connection with or incidental to a failure to furnish any of the services or utilities as set forth in this Article 6.

Notwithstanding the foregoing to the contrary, in the event that there shall be an interruption, curtailment or suspension of any service required to be provided by Landlord pursuant to Section 6.1 (and no reasonably equivalent alternative service or supply is provided by Landlord) that shall materially interfere with Tenant's use and enjoyment of a material portion of the Premises, and Tenant actually ceases to use the affected portion of the Premises (any such event, a "**Service Interruption"),** and if (i) such Service Interruption shall continue for five (5) consecutive business days following receipt by Landlord of written notice from Tenant describing such Service Interruption (the "**Service**

Interruption Notice"), and (ii) such Service Interruption shall not have been caused, in whole or in part, by reasons beyond Landlord's reasonable control or by an act or omission in violation of this Lease by any Tenant Party or by any negligence of any Tenant Parties, (a Service Interruption that satisfies the foregoing conditions being referred to hereinafter as a "**Material Service Interruption"**) then, as liquidated damages and Tenant's sole remedy at law or equity, Tenant shall be entitled to an equitable abatement of Base Rent and Tenant's Share of Direct Expenses, based on the nature and duration of the Material Service Interruption, the area of the Premises affected, and the then current Rent amounts, for the period that shall begin on the commencement of such Material Service Interruption and that shall end on the day such Material Service Interruption shall cease. To the extent a Material Service Interruption is caused by an event covered by Article 11 or Article 13 of this Lease, then Tenant's right to abate rent shall be governed by the terms of such Article 11 or Article 13, as applicable, and the provisions of this paragraph shall not apply.

6.5 **Triple Net Lease**. Landlord and Tenant acknowledge that, except as otherwise provided to the contrary in this Lease, it is their intent and agreement that this Lease be a "**TRIPLE NET**" lease and that as such, the provisions contained in this Lease are intended to pass on to Tenant or reimburse Landlord for the costs and expenses reasonably associated with this Lease, the Building and the Project, and Tenant's operation therefrom except as expressly described herein. To the extent such costs and expenses payable by Tenant cannot be charged directly to, and paid by, Tenant, such costs and expenses shall be paid by Landlord but reimbursed by Tenant as Additional Rent.

7. REPAIRS

Tenant shall, at Tenant's own expense, keep the Premises, including all improvements, fixtures, furnishings, and systems and equipment within the Premises or elsewhere exclusively serving the Premises, in good order, repair and condition at all times during the Lease Term. In addition, Tenant shall, at Tenant's own expense, but under the supervision and subject to the prior reasonable approval of Landlord, and within any reasonable period of time specified by Landlord, promptly and adequately repair all damage to the Premises and replace or repair all damaged, broken, or worn fixtures and appurtenances, except for damage caused by ordinary wear and tear; provided however, that if Tenant fails to make such repairs within applicable notice and cure periods, Landlord may, but need not, make such repairs and replacements, and Tenant shall pay Landlord the cost thereof, including a management fee of 4% of such costs. Without limitation, Tenant shall be responsible for electrical, plumbing, heating, ventilating and air-conditioning systems and equipment ("**Tenant's HVAC Equipment**") and other utility services serving the Premises from the Building connection point to the Premises (to the extent serving Tenant exclusively). Tenant shall maintain such systems in a commercially reasonable first-class condition and in accordance with any applicable manufacturer specifications relating to any particular component of such systems. Tenant shall secure, pay for, and keep in force contracts ("**Service Contracts**") with qualified, experienced and reputable service companies reasonably approved by Landlord providing for the regular maintenance of such systems. Tenant shall maintain preventive maintenance records relating to the foregoing systems ("**Preventative Maintenance Records**") in accordance with standards for first class office and research and development buildings. Tenant shall deliver a copy of all current Service Contracts to Landlord within 10 business days after each such Service Contract is executed and shall deliver to Landlord a copy of the Preventative Maintenance Records no less often than quarterly or, if requested by Landlord, monthly.

Notwithstanding the foregoing, Landlord shall be responsible for repairs to the exterior walls, foundation and roof (including roof membrane) of the Building, the structural portions of the floors of the Building, and the base building systems and equipment of the Building and Common Areas (to the extent not serving Tenant exclusively), except to the extent that such repairs are required due to the

negligence or willful misconduct of Tenant; provided, however, that if such repairs are due to the negligence or willful misconduct of Tenant, Landlord shall nevertheless make such repairs at Tenant's expense, or, if covered by Landlord's insurance, Tenant shall only be obligated to pay any deductible in connection therewith. Subject to the terms of Article 27, below, Landlord may, but shall not be required to, enter the Premises at all reasonable times and upon reasonable prior notice to make such repairs, alterations, improvements or additions to the Premises or to the Project or to any equipment located in the Project as Landlord shall desire or deem necessary or as Landlord may be required to do by governmental or quasi-governmental authority or court order or decree.

8. ADDITIONS AND ALTERATIONS

8.1 **Landlord's Consent to Alterations**. Tenant may not make any improvements, alterations, additions or changes to the Premises or any mechanical, plumbing, HVAC facilities or other utility or Building systems pertaining to the Premises (collectively, the "**Alterations**") without first procuring the prior written consent of Landlord to such Alterations, which consent shall be requested by Tenant not less than fifteen (15) business days prior to the anticipated commencement thereof. Landlord shall not unreasonably withhold or delay its consent to any proposed nonstructural Alterations, provided that such Alterations (1) are not visible from the outside of the Building, (2) do not affect the use of or require access to any part of the Building other than the Premises, (3) do not do not violate any certificate of occupancy for the Building or any other permits or licenses relating to the Project, (4) do not adversely affect any service required to be furnished to Tenant or to any other tenant or occupant of the Building, (5) do not affect any Building systems or Common Areas, (6) do not reduce the value or utility of the Building, and (7) otherwise comply with the Rules and Regulations and this Article 8. Notwithstanding the foregoing provisions of this Section 8.1, Tenant shall be permitted to make Minor Alterations (defined below) following five (5) business days' notice to Landlord, but without Landlord's prior consent. "**Minor Alterations**" shall mean Alterations that (i) are purely cosmetic in nature (such as painting, carpeting and the like), (ii) do not affect the Building systems or equipment, (iii) are not visible from the exterior of the Building, and (iv) cost less than $50,000.00 for a particular job of work.

8.2 Prior to commencing any Alterations affecting air distribution or disbursement from ventilation systems serving Tenant or the Building, including without limitation the installation of Tenant's exhaust systems, Tenant shall provide Landlord with a third party report from a consultant, and in a form reasonably acceptable to Landlord, showing that such work will not adversely affect the ventilation systems or air quality of the Building (or of any other tenant in the Building) and shall, upon completion of such work, provide Landlord with a certification reasonably satisfactory to Landlord from such consultant confirming that no such adverse effects have resulted from such work.

8.3 **Manner of Construction**. Landlord may impose, as a condition of its consent to any and all Alterations or repairs of the Premises or about the Premises, such requirements as Landlord in its reasonable discretion may deem desirable, including, but not limited to, the requirement that Tenant utilize for such purposes only contractors, subcontractors, materials, mechanics and materialmen selected by Tenant and approved by Landlord (which approval shall not be unreasonably withheld, conditioned or delayed) and the requirement that upon Landlord's request, Tenant shall, at Tenant's expense, remove such Alterations upon the expiration or any early termination of the Lease Term. Notwithstanding the foregoing, if Tenant specifically requests, Landlord shall provide in its written consent to Alterations a statement that either (a) Landlord will not require removal and/or restoration of such Alterations, or (b) Landlord preserves its option to require removal and/or restoration of such Alterations upon the expiration or earlier termination of the Lease Term. Tenant shall construct such Alterations and perform such repairs in a good and workmanlike manner, in conformance with any and all Applicable Laws and, where required by Applicable Law, pursuant to a valid building permit.

Tenant shall not use (and upon notice from Landlord shall cease using) contractors, services, workmen, labor, materials or equipment that, in Landlord's reasonable judgment, would disturb labor harmony with the workforce or trades engaged in performing other work, labor or services in or about the Building or the Common Areas. Upon completion of any Alterations (or repairs), Tenant shall deliver to Landlord final lien waivers from all contractors, subcontractors, design professionals, service providers, suppliers and materialmen who performed such work and whose labor, supplies or services give rise to a lien under Massachusetts law. In addition to Tenant's obligations under Article 9 of this Lease, upon completion of any Alterations, Tenant shall deliver to the Project construction manager a reproducible copy of the "**as built"** drawings of the Alterations in CAD format as well as copies of all permits, approvals and other documents issued by any governmental agency in connection with the Alterations.

8.4 **Payment for Improvements.** Except with respect to the Initial Tenant Improvements (as defined in the Work Letter attached hereto), if Tenant orders any work directly from Landlord, Tenant shall pay to Landlord a flat fee equal to five percent (5%) of the cost of such work to compensate Landlord for all overhead, general conditions, fees and other costs and expenses arising from Landlord's involvement with such work. If Tenant does not order any work directly from Landlord, Tenant shall reimburse Landlord for Landlord's reasonable, actual, out-of-pocket costs and expenses actually incurred in connection with Landlord's review of any proposed Alterations which amount shall not exceed $5,000.00 per request if the plans for such proposed Alterations have been prepared by Landlord's engineers and/or architects for the Building.

8.5 **Construction Insurance.** In addition to the requirements of Article 10 of this Lease, in the event that Tenant makes any Alterations, prior to the commencement of such Alterations, Tenant shall provide Landlord with evidence that Tenant or Tenant's general contractor carries "**Builder's All Risk"** insurance (to the extent that the cost of the work shall exceed $100,000.00) in an amount approved by Landlord covering the construction of such Alterations, and such other insurance as Landlord may reasonably require, it being understood and agreed that all of such Alterations shall be insured by Tenant pursuant to Article 10 of this Lease immediately upon completion thereof. In addition, Tenant's contractors and subcontractors shall be required to carry Commercial General Liability Insurance in an amount approved by Landlord and otherwise in accordance with the requirements of Article 10 of this Lease and such general liability insurance shall name the Landlord Parties (as defined below) as additional insureds. Landlord may, in its discretion, require Tenant to obtain and record a statutory form of lien bond, or obtain performance and payment bonds, or some alternate form of security satisfactory to Landlord in an amount sufficient to ensure the lien-free completion of such Alterations and naming Landlord as a co-obligee, in each case in form and substance reasonably satisfactory to Landlord. In addition, Tenant's contractors and subcontractors shall be required to carry workers compensation insurance with a waiver of subrogation in favor of Landlord Parties.

8.6 **Landlord's Property.** All Alterations, improvements, fixtures, equipment and/or appurtenances which may be installed or placed in or about the Premises, from time to time, shall be at the sole cost of Tenant and shall be and become the property of Landlord and remain in place at the Premises following the expiration or earlier termination of this Lease. Subject to the terms of any written consent provided by Landlord pursuant to Section 8.3, Landlord may, by written notice to Tenant, require Tenant, at Tenant's expense, to remove any Alterations and/or improvements and/or systems and equipment within the Premises and to repair any damage to the Premises and Building caused by such removal and return the affected portion of the Premises to a building standard tenant improved condition as determined by Landlord. If Tenant fails to complete any required removal and/or to repair any damage caused by the removal of any Alterations and/or improvements and/or systems and

equipment in the Premises and return the affected portion of the Premises to a building standard tenant improved condition as reasonably determined by Landlord, Landlord may do so and may charge the actual and reasonable cost thereof to Tenant. Tenant hereby protects, defends, indemnifies and holds Landlord harmless from any liability, cost, obligation, expense or claim of lien in any manner relating to the installation, placement, removal or financing of any such Alterations, improvements, fixtures and/or equipment in, on or about the Premises, which obligations of Tenant shall survive the expiration or earlier termination of this Lease.

9. COVENANT AGAINST LIENS

Tenant shall keep the Project and Premises free from any liens or encumbrances arising out of the work performed, materials or services furnished or obligations incurred by or on behalf of Tenant (which expressly excludes the Landlord Work), and shall protect, defend, indemnify and hold Landlord harmless from and against any claims, liabilities, judgments or costs (including, without limitation, reasonable attorneys' fees and costs) arising out of same or in connection therewith. Tenant shall give Landlord notice at least twenty (20) days prior to the commencement of any work, services or obligations related to the Premises giving rise to any such liens or encumbrances (or such additional time as may be necessary under Applicable Laws) to afford Landlord the opportunity of posting and recording appropriate notices of non-responsibility (to the extent applicable pursuant to then Applicable Laws). Tenant shall remove any such lien or encumbrance by statutory lien bond or otherwise within ten (10) business days after notice by Landlord, and if Tenant shall fail to do so, Landlord may pay the amount necessary to remove such lien or encumbrance, without being responsible for investigating the validity thereof.

10. INSURANCE

10.1 **Indemnification and Waiver.** Except to the extent caused by the gross negligence or willful misconduct of Landlord or the Landlord Parties (as defined below), to the maximum extent permitted pursuant to Applicable Laws, Tenant hereby assumes all risk of damage to property or injury to persons in, upon or about the Premises from any cause whatsoever (including, but not limited to, any personal injuries resulting from a slip and fall in, upon or about the Premises) and agrees that, to the extent permitted pursuant to Applicable Laws, Landlord, its lenders, partners, subpartners and their respective officers, agents, servants, employees, and independent contractors (collectively, "**Landlord Parties")** shall not be liable for, and are hereby released from any responsibility for, any damage either to person or property or resulting from the loss of use thereof, which damage is sustained by Tenant or by other persons claiming through Tenant. Tenant shall indemnify, defend, protect, and hold harmless the Landlord Parties from any and all loss, cost, damage, injury, expense and liability (including without limitation court costs and reasonable attorneys' fees) during the Lease Term, or any period of Tenant's occupancy of the Premises prior to the commencement or after the expiration of the Lease Term, incurred in connection with or arising from (i) any cause in, on or about the Premises (including, but not limited to, a slip and fall), provided that the terms of the foregoing indemnity shall not apply to the extent of any gross negligence or willful misconduct of Landlord, (ii) any negligent acts or omissions of Tenant or of any person claiming by, through or under Tenant, or of the contractors, agents, servants, employees, invitees, guests or licensees of Tenant or any such person, in, on or about the Project, or (iii) any breach of the terms of this Lease by Tenant, either prior to, during, or after the expiration of the Lease Term. Should Landlord be named as a defendant in any suit brought against Tenant in connection with or arising out of Tenant's occupancy of the Premises, Tenant shall pay to Landlord its reasonable costs and expenses incurred in such suit, including without limitation, its actual professional fees such as reasonable appraisers', accountants' and attorneys' fees. The provisions of this Section 10.1 shall survive the expiration or sooner termination of this Lease.

Subject to the waiver of subrogation contained herein, Landlord shall indemnify, defend, protect, and hold harmless Tenant and its officers, agents, servants, employees, and independent contractors from any and all loss, cost, damage, injury, expense and liability (including without limitation court costs and reasonable attorneys' fees) during the Lease Term incurred in connection with or arising from the gross negligence or willful misconduct of Landlord or any Landlord Party.

10.2 **Tenant's Compliance With Landlord's Property Insurance**. Tenant shall, at Tenant's expense, comply with all insurance company requirements pertaining to the use of the Premises. If Tenant's conduct or use of the Premises causes any increase in the premium for such insurance policies then Tenant shall reimburse Landlord for any such increase. Tenant, at Tenant's expense, shall comply with all rules, orders, regulations or requirements of the American Insurance Association (formerly the National Board of Fire Underwriters) and with any similar body.

10.3 **Tenant's Insurance**. Tenant shall maintain the following coverages in the following amounts:

10.3.1 Commercial General Liability Insurance on an occurrence form covering the insured against claims of bodily injury, personal and advertising injury and property damage (including loss of use thereof) arising out of Tenant's operations, products/completed operations, and contractual liability including a Broad Form endorsement covering the insuring provisions of this Lease and the performance by Tenant of the indemnity agreements set forth in Section 10.1 of this Lease, and including, solely on a claims-made basis, products and completed operations coverage, for limits of liability of not less than:

Bodily Injury and	$5,000,000 each occurrence
Property Damage Liability	$5,000,000 annual aggregate
Personal Injury Liability	$5,000,000 each occurrence
	$5,000,000 annual aggregate
	0% Insured's participation

Notwithstanding the foregoing, Tenant shall not be required to obtain insurance coverage for products/completed operations until Tenant conducts activities that could be covered by such insurance.

10.3.2 Property Insurance covering (i) all office furniture, business and trade fixtures, office equipment, free-standing cabinet work, movable partitions, merchandise and all other items of Tenant's property on the Premises installed by, for, or at the expense of Tenant, and (ii) the Tenant Improvements described in Exhibit 1.1.1-2 and any other tenant improvements that exist in the Premises as of the Lease Commencement Date (the "**New Improvements**"). Such insurance shall be written on an "**all risks**" of physical loss or damage basis, for the full replacement cost value (subject to reasonable deductible amounts) new without deduction for depreciation of the covered items and in amounts that meet any co-insurance clauses of the policies of insurance and shall include coverage for damage or other loss caused by fire or other peril including, but not limited to, vandalism and malicious mischief, theft, water damage of any type, including sprinkler leakage, bursting or stoppage of pipes, and explosion.

10.3.3 Business Income Interruption for one (1) year plus Extra Expense insurance in such amounts as will reimburse Tenant for actual direct or indirect loss of earnings and continuing expenses, including rent, attributable to the risks outlined in Section 10.3.2 above.

10.3.4 Worker's Compensation and Employer's Liability or other similar insurance pursuant to all applicable state and local statutes and regulations. The policy will include a waiver of subrogation in favor of the Landlord Parties.

10.4 **Form of Policies.** The minimum limits of policies of insurance required of Tenant under this Lease shall in no event limit the liability of Tenant under this Lease. Landlord, its subsidiaries and affiliates and any other party Landlord so specifies, shall be named as an additional insured under the policies listed in Sections 10.3.1, 10.3.2 and 10.3.3. All insurance policies required to be maintained by Tenant shall (i) be issued by an insurance company having a rating of not less than A:VIII in Best's Insurance Guide or which is otherwise acceptable to Landlord and licensed to do business in The Commonwealth of Massachusetts; (ii) be primary insurance as to all claims thereunder and provide that any insurance carried by Landlord is excess and is non-contributing with any insurance required of Tenant; (iii) be in form and content reasonably acceptable to Landlord (Tenant shall provide full and complete copies of any policies that Landlord reasonably requests); and (iv) provide that said insurer shall endeavor to provide written notice to Landlord and any mortgagee of Landlord, to the extent such names are furnished to Tenant prior to the cancellation of such policy. Tenant shall deliver said policy or policies or certificates thereof to Landlord on or before the earlier to occur of (A) the Lease Commencement Date, and (B) the date upon which Tenant is first provided access to the Premises, and at least ten (10) days before the expiration dates thereof. In the event Tenant shall fail to procure such insurance, or to deliver such policies or certificate within ten (10) days after written notice from Landlord, Landlord may, at its option, procure such policies for the account of Tenant, and the cost thereof shall be paid to Landlord within five (5) days after delivery to Tenant of bills therefor.

10.5 **Subrogation.** Landlord and Tenant intend that their respective property loss risks shall be borne by reasonable insurance carriers to the extent above provided, and Landlord and Tenant hereby agree to look solely to, and seek recovery only from, their respective insurance carriers in the event of a property loss to the extent that such coverage is agreed to be provided hereunder. The parties each hereby waive all rights and claims against each other for such losses, and waive all rights of subrogation of their respective insurers, provided such waiver of subrogation shall not affect the right of the insured to recover thereunder. The parties agree that their respective insurance policies specify now or shall specify that the waiver of subrogation shall not affect the right of the insured to recover thereunder.

10.6 **Additional Insurance Obligations.** Tenant shall carry and maintain during the entire Lease Term, at Tenant's sole cost and expense, increased amounts of insurance and such additional coverages as Landlord may reasonably require.

10.7 **Landlord's Insurance.** Landlord shall maintain: (a) all risk property insurance covering the building structure and any Common Areas (such insurance shall be on a replacement cost basis without any coinsurance provision and shall include business interruption coverage); and (b) general liability insurance with coverage of $1,000,000 per occurrence and $2,000,000 general aggregate. In addition, Landlord may choose to provide other types of insurance covering the building and its operations. The cost of Landlord's insurance shall be included in Operating Expenses.

11. DAMAGE AND DESTRUCTION

11.1 **Repair of Damage to Premises by Landlord.** Tenant shall promptly notify Landlord of any damage to the Premises resulting from fire or any other casualty. If the Premises or any Common Areas serving or providing access to the Premises shall be damaged by fire or other casualty, Landlord shall promptly and diligently, subject to reasonable delays for insurance adjustment or other matters beyond Landlord's reasonable control, and subject to all other terms of this Article 11, restore such Common Areas and the Premises (other than the Tenant Improvements and any Alterations, the

restoration of which shall be done by Tenant) to substantially the same condition as existed prior to the casualty, except for modifications required by zoning and building codes and other laws or by the holder of a mortgage on the Building or Project or any other modifications to the Common Areas deemed desirable by Landlord, which are consistent with the character of the Project, provided that access to the Premises shall not be materially impaired. To the extent permitted pursuant to Applicable Laws, Landlord shall not be liable for any inconvenience or annoyance to Tenant or its visitors, or injury to Tenant's business resulting in any way from such damage or the repair thereof; provided however, that if such fire or other casualty shall have damaged the Premises or Common Areas necessary to Tenant's occupancy, and the Premises are not occupied by Tenant as a result thereof, then during the time and to the extent the Premises are unfit for occupancy, the Rent shall be abated in proportion to the ratio that the amount of rentable square feet of the Premises which is unfit for occupancy for the Permitted Use bears to the total rentable square feet of the Premises.

11.2 **Landlord's Option to Repair**. Notwithstanding the terms of Section 11.1 of this Lease, Landlord may elect not to rebuild and/or restore the Premises, Building and/or Project, and instead terminate this Lease, by notifying Tenant in writing of such termination within sixty (60) days after the date of discovery of the damage, such notice to include a termination date giving Tenant sixty (60) days to vacate the Premises, but Landlord may so elect only if the Building or Project shall be damaged by fire or other casualty or cause, whether or not the Premises are affected, and one or more of the following conditions is present: (i) in Landlord's reasonable judgment, repairs cannot reasonably be completed within one (1) year after the date of discovery of the damage (when such repairs are made without the payment of overtime or other premiums); (ii) the holder of any mortgage on the Building or Project or ground lessor with respect to the Building or Project shall require that the insurance proceeds or any portion thereof be used to retire the mortgage debt, or shall terminate the ground lease, as the case may be; (iii) such damage is not fully covered by Landlord's insurance policies; (iv) Landlord decides to rebuild the Building or Common Areas so that they will be substantially different structurally or architecturally; (v) the damage occurs during the last twelve (12) months of the Lease Term; or (vi) any owner of any other portion of the Project, other than Landlord, does not intend to repair the damage to such portion of the Project; provided, however, that if Landlord does not elect to terminate this Lease pursuant to Landlord's termination right as provided above, and the repairs cannot, in the reasonable opinion of Landlord, be completed within eighteen (18) months after being commenced, Tenant may elect, no earlier than sixty (60) days after the date of the damage and not later than ninety (90) days after the date of such damage, to terminate this Lease by written notice to Landlord effective as of the date specified in the notice, which date shall not be less than thirty (30) days nor more than sixty (60) days after the date such notice is given by Tenant. Notwithstanding the provisions of this Section 11.2, Tenant shall have the right to terminate this Lease under this Section 11.2 only if each of the following conditions is satisfied: (a) the damage to the Project by fire or other casualty was not caused by the negligence or intentional act of Tenant or any Tenant Party; (b) as a result of the damage, Tenant cannot reasonably conduct business from the Premises; and, (c) as a result of the damage to the Project, Tenant does not occupy or use the Premises at all. In addition, Tenant may terminate this Lease if the damage to the Premises occurs during the last twelve (12) months of the Lease Term, and, as a result of such damage, Tenant cannot reasonably conduct business from the Premises for a period of at least one-half (1/2) of the then-remaining term. In no event shall Landlord have any obligation to undertake restoration on account of any casualty except to the extent of the insurance proceeds actually received by Landlord.

12. NONWAIVER

No provision of this Lease shall be deemed waived by either party hereto unless expressly waived in a writing signed thereby. The waiver by either party hereto of any breach of any term, covenant or condition herein contained shall not be deemed to be a waiver of any subsequent breach of

same or any other term, covenant or condition herein contained. The subsequent acceptance of Rent hereunder by Landlord shall not be deemed to be a waiver of any preceding breach by Tenant of any term, covenant or condition of this Lease, other than the failure of Tenant to pay the particular Rent so accepted, regardless of Landlord's knowledge of such preceding breach at the time of acceptance of such Rent. No acceptance of a lesser amount than the Rent herein stipulated shall be deemed a waiver of Landlord's right to receive the full amount due, nor shall any endorsement or statement on any check or payment or any letter accompanying such check or payment be deemed an accord and satisfaction, and Landlord may accept such check or payment without prejudice to Landlord's right to recover the full amount due. No receipt of monies by Landlord from Tenant after the termination of this Lease shall in any way alter the length of the Lease Term or of Tenant's right of possession hereunder, or after the giving of any notice shall reinstate, continue or extend the Lease Term or affect any notice given Tenant prior to the receipt of such monies, it being agreed that after the service of notice or the commencement of a suit, or after final judgment for possession of the Premises, Landlord may receive and collect any Rent due, and the payment of said Rent shall not waive or affect said notice, suit or judgment.

13. CONDEMNATION

13.1 If the whole or substantially all of the Premises, Building or Project shall be taken by power of eminent domain or condemned by any competent authority for any public or quasi-public use or purpose, or if all reasonable access to the Building is so taken or condemned, or if Landlord shall grant a deed or other instrument in lieu of such taking by eminent domain or condemnation, Landlord shall have the option to terminate this Lease effective as of the date possession is required to be surrendered to the authority. Tenant shall not because of such taking assert any claim against Landlord or the authority for any compensation because of such taking and Landlord shall be entitled to the entire award or payment in connection therewith, except that Tenant shall have the right to file any separate claim available to Tenant for any taking of Tenant's personal property and fixtures belonging to Tenant and removable by Tenant upon expiration of the Lease Term pursuant to the terms of this Lease, and for moving expenses, so long as such claims do not diminish the award available to Landlord, its ground lessor with respect to the Building or Project or its mortgagee, and such claim is payable separately to Tenant. All Rent shall be apportioned as of the date of such termination. If any part of the Premises shall be taken, and this Lease shall not be so terminated, the Rent shall be proportionately abated. Notwithstanding anything to the contrary contained in this Article 13, in the event of a temporary taking of all or any portion of the Premises for a period of one (1) year or less, and provided that such temporary taking does not materially preclude or unreasonably diminish Tenant's ability to conduct business from the Premises, then this Lease shall not terminate but the Base Rent and Tenant's Share of Direct Expenses shall be abated for the period of such taking in proportion to the ratio that the amount of rentable square feet of the Premises taken bears to the total rentable square feet of the Premises. Landlord shall be entitled to receive the entire award made in connection with any such temporary taking, provided, however, that Tenant shall be entitled to a share of the award for any loss of fixtures and improvements and for moving and other reasonable expenses that do not otherwise reduce Landlord's recovery. If this Lease does not terminate on account of any such eminent domain or condemnation proceeding, then Landlord shall, to the extent practicable, restore the affected area of the Premises, Building or Project. In no event shall Landlord have any obligation to undertake restoration on account of any condemnation or eminent domain proceeding except to the extent of the award actually received by Landlord.

14. ASSIGNMENT AND SUBLETTING

14.1 **Transfers**. Tenant shall not, without the prior written consent of Landlord, assign, mortgage, pledge, hypothecate, encumber, or permit any lien to attach to, or otherwise transfer, this Lease or any interest hereunder, permit any assignment, or other transfer of this Lease or any interest hereunder by operation of law, sublet the Premises or any part thereof, or enter into any license or concession agreements or otherwise permit the occupancy or use of the Premises or any part thereof by any persons other than Tenant and its employees and contractors (all of the foregoing are hereinafter sometimes referred to collectively as "**Transfers**" and any person to whom any Transfer is made or sought to be made is hereinafter sometimes referred to as a "**Transferee**"). If Tenant desires Landlord's consent to any Transfer, Tenant shall notify Landlord in writing, which notice (the "**Transfer Notice**") shall include (i) the proposed effective date of the Transfer, which shall not be less than twenty (20) days nor more than one hundred eighty (180) days after the date of delivery of the Transfer Notice, (ii) a description of the portion of the Premises to be transferred (the "**Subject Space**"), (iii) all of the terms of the proposed Transfer and the consideration therefor, including calculation of the "**Transfer Premium**," as that term is defined in Section 14.3 below, in connection with such Transfer, the name and address of the proposed Transferee, and a copy of all existing executed and/or proposed documentation pertaining to the proposed Transfer, and (iv) current financial statements of the proposed Transferee certified by an officer, partner or owner thereof, business credit and personal references and history of the proposed Transferee and any other information reasonably required by Landlord which will enable Landlord to determine the financial responsibility, character, and reputation of the proposed Transferee, nature of such Transferee's business and proposed use of the Subject Space. Any Transfer made without Landlord's prior written consent shall, at Landlord's option, be null, void and of no effect, and shall, at Landlord's option, constitute a default by Tenant under this Lease. Whether or not Landlord consents to any proposed Transfer, Tenant shall pay Landlord's reasonable review and processing fees, as well as any reasonable professional fees (including, without limitation, attorneys', accountants', architects', engineers' and consultants' fees) incurred by Landlord, within thirty (30) days after written request by Landlord; provided that such costs shall not exceed $2,500.00 per proposed Transfer so long as such proposed Transfer is subject to the form of Landlord consent attached hereto as **Exhibit 14.1**, without alterations.

14.2 **Landlord's Consent**. Landlord shall not unreasonably withhold, condition or delay its consent to any proposed sublet of the Subject Space or assignment of this Lease on the terms specified in the Transfer Notice. Without limitation as to other reasonable grounds for withholding consent, the parties hereby agree that it shall be reasonable under this Lease and under any Applicable Laws for Landlord to withhold consent to any proposed sublet or assignment where one or more of the following apply, in Landlord's reasonable judgment:

14.2.1 The Transferee is of a character or reputation or engaged in a business which is not consistent with the quality of the Building or the Project;

14.2.2 The Transferee is either a governmental agency or instrumentality thereof;

14.2.3 The Transferee is not a party of reasonable financial worth and/or financial stability in light of the responsibilities to be undertaken in connection with the Transfer on the date consent is requested;

14.2.4 The proposed Transfer would cause a violation of another lease for space in the Project, or would give an occupant of the Project a right to cancel its lease; or

14.2.5 Either the proposed Transferee, or any person or entity which directly or indirectly, controls, is controlled by, or is under common control with, the proposed Transferee, is negotiating with Landlord or has negotiated with Landlord during the six (6) month period immediately preceding the date Landlord receives the Transfer Notice, to lease space in the Project.

14.2.6 In Landlord's reasonable determination, the sub-rent, additional rent or other amounts received or accrued by Tenant from subleasing, assigning or otherwise Transferring all or any portion of the Premises is based on the income or profits of any person, or the assignment or sublease could cause any portion of the amounts received by Landlord pursuant to this Lease to fail to qualify as "rents from real property" within the meaning of section 856(d) of the Internal Revenue Code of 1986, as amended (the "**Code**"), or any similar or successor provision thereto or which would cause any other income of Landlord to fail to qualify as income described in section 856(c)(2) of the Code.

If Landlord consents to any Transfer pursuant to the terms of this Section 14.2 (and does not exercise any recapture rights Landlord may have under Section 14.4 of this Lease), Tenant may within six (6) months after Landlord's consent, but not later than the expiration of said six-month period, enter into such Transfer of the Premises or portion thereof, upon substantially the same terms and conditions as are set forth in the Transfer Notice furnished by Tenant to Landlord pursuant to Section 14.1 of this Lease, provided that if there are any changes in the terms and conditions from those specified in the Transfer Notice (i) such that Landlord would initially have been entitled to refuse its consent to such Transfer under this Section 14.2, Tenant shall again submit the Transfer to Landlord for its approval and other action under this Article 14 (including Landlord's right of recapture, if any, under Section 14.4 of this Lease). Notwithstanding anything to the contrary in this Lease, if Tenant or any proposed Transferee claims that Landlord has withheld or delayed its consent in violation of this Section 14.2 or otherwise has breached its obligations under this Article 14, their sole remedies shall be a suit for contract damages (other than damages for injury to, or interference with, Tenant's business including, without limitation, loss of profits, however occurring) or declaratory judgment and an injunction for the relief sought, and Tenant hereby waives all other remedies, including, without limitation, any right at law or equity to terminate this Lease, on its own behalf and, to the extent permitted under all Applicable Laws, on behalf of the proposed Transferee.

14.3 **Transfer Premium.** If Landlord consents to a Transfer, as a condition thereto which the parties hereby agree is reasonable, Tenant shall pay to Landlord fifty percent (50%) of any "**Transfer Premium,"** as that term is defined in this Section 14.3, received by Tenant from such Transferee (other than any Permitted Transferee). "**Transfer Premium"** shall mean all rent, additional rent or other consideration payable by such Transferee in connection with the Transfer in excess of the Rent and Additional Rent payable by Tenant under this Lease during the term of the Transfer on a per rentable square foot basis if less than all of the Premises is transferred, after deducting the reasonable third party expenses incurred by Tenant for (i) any design and construction costs incurred on account of changes, alterations and improvements to the Premises in connection with the Transfer, (ii) any free base rent and tenant improvement allowances reasonably provided to the Transferee in connection with the Transfer (provided that such free rent and tenant improvement allowances shall be deducted only to the extent the same is included in the calculation of total consideration payable by such Transferee), (iii) any brokerage commissions in connection with the Transfer, and (iv) legal fees and disbursements reasonably incurred in connection with the Transfer (collectively, "**Tenant's Subleasing Costs")**. "**Transfer Premium"** shall also include, but not be limited to, any lump sum payment, key money, bonus money or other cash consideration paid by Transferee to Tenant in connection with such Transfer, and any payment in excess of fair market value for services rendered by Tenant to Transferee or for assets, fixtures, inventory, equipment, or furniture transferred by Tenant to Transferee in connection with such Transfer. The determination of the amount of Landlord's applicable share of the Transfer Premium shall be made on a monthly basis as rent or other consideration is received by Tenant under the Transfer.

14.4 **Landlord's Option as to Sublet Space.** Notwithstanding anything to the contrary contained in this Article 14, in the event Tenant contemplates a Transfer which, together with all prior Transfers then remaining in effect, would cause seventy-five percent (75%) or more of the Premises to be Transferred for more than seventy-five percent (75%) of the then remaining Lease Term (assuming all sublease renewal or extension rights are exercised), Tenant shall give Landlord notice (the "**Intention to Transfer Notice")** of such contemplated Transfer (whether or not the contemplated Transferee or the terms of such contemplated Transfer have been determined). The Intention to Transfer Notice shall specify the portion of and amount of rentable square feet of the Premises which Tenant intends to Transfer (the "**Contemplated Transfer Space"),** the contemplated date of commencement of the Contemplated Transfer (the "**Contemplated Effective Date"),** and the contemplated length of the term of such contemplated Transfer, and shall specify that such Intention to Transfer Notice is delivered to Landlord pursuant to this Section 14.4. Landlord shall have the option, by giving written notice to Tenant (a "**Recapture Notice")** within twenty (20) days after receipt of any Intention to Transfer Notice, to recapture the Contemplated Transfer Space and, at Landlord's election, the balance of the Premises if the Contemplated Transfer Space shall be less than the entire Premises. If Landlord delivers a Recapture Notice, Tenant shall have a right to rescind such Intention to Transfer Notice by delivery of a written notice of rescission made within five (5) business days of the Recapture Notice, in which case this Lease shall continue in full force and effect. If a Recapture Notice is delivered and Tenant does not exercise its right to rescind the Intention to Transfer Notice, the recapture shall be effective and such recapture shall cancel and terminate this Lease with respect to such Contemplated Transfer Space or the entire Premises, as provided in Landlord's Recapture Notice, as of the Contemplated Effective Date. In the event of a recapture by Landlord, if this Lease shall be canceled with respect to less than the entire Premises, the Rent reserved herein shall be prorated on the basis of the number of rentable square feet retained by Tenant in proportion to the number of rentable square feet contained in the Premises, and this Lease as so amended shall continue thereafter in full force and effect, and upon request of either party, the parties shall execute written confirmation of the same. Landlord and Tenant shall share equally in the costs to demise any such portion of the Premises recaptured by Landlord pursuant to this Section 14.4.

14.5 **Effect of Transfer.** If Landlord consents to a Transfer, (i) the terms and conditions of this Lease shall in no way be deemed to have been waived or modified, (ii) such consent shall not be deemed consent to any further Transfer by either Tenant or a Transferee, (iii) Tenant shall deliver to Landlord, promptly after execution, an original executed copy of all documentation pertaining to the Transfer in form reasonably acceptable to Landlord, (iv) Tenant shall furnish upon Landlord's request a complete statement, certified by an independent certified public accountant, or Tenant's chief financial officer, setting forth in detail the computation of any Transfer Premium Tenant has derived and is anticipated to derive from such Transfer, and (v) no Transfer relating to this Lease or agreement entered into with respect thereto, whether with or without Landlord's consent, shall relieve Tenant or any guarantor of the Lease from any liability under this Lease, including, without limitation, in connection with the Subject Space. Landlord or its authorized representatives shall have the right at all reasonable times to audit the books, records and papers of Tenant relating to any Transfer, and shall have the right to make copies thereof. If the Transfer Premium respecting any Transfer shall be found understated, Tenant shall, within thirty (30) days after demand, pay the deficiency, and if understated by more than two percent (2%), Tenant shall pay Landlord's costs of such audit.

14.6 **Sublease/Transfer Restrictions.** Notwithstanding anything contained herein to the contrary and without limiting the generality of Section 14.1 above, Tenant shall not: (a) sublet all or part of the Premises or assign or otherwise Transfer this Lease on any basis such that the rental or other amounts to be paid by the subtenant or assignee thereunder would be based, in whole or in part, on the income or profits derived by the business activities of the subtenant or assignee; (b) sublet all or part of the Premises or assign this Lease to any person or entity in which, under Section 856(d)(2)(B) of the Code, Longfellow Atlantic REIT, Inc., a Delaware corporation (the "**Company**"), or any affiliate of the

Company owns, directly or indirectly (by applying constructive ownership rules set forth in Section 856(d) (5) of the Code), a ten percent (10%) or greater interest; or (c) sublet all or part of the Premises or assign this Lease in any other manner or otherwise derive any income which could cause any portion of the amounts received by Landlord pursuant hereto or any sublease to fail to qualify as "rents from real property" within the meaning of Section 856(d) of the Code, or which could cause any other income received by Landlord to fail to qualify as income described in Section 856(c) (2) of the Code. The requirements of this Section 14.6 shall likewise apply to any further subleasing, assignment or other Transfer by any subtenant or assignee. All references herein to Section 856 of the Code also shall refer to any amendments thereof or successor provisions thereto.

14.7 **Occurrence of Default.** Any Transfer hereunder shall be subordinate and subject to the provisions of this Lease, and if this Lease shall be terminated during the term of any Transfer, Landlord shall have the right to (and each sublease shall provide Landlord with the ability to): (i) treat such Transfer as cancelled and repossess the Subject Space by any lawful means, or (ii) require that such Transferee attorn to and recognize Landlord as its landlord under any such Transfer. If Tenant shall be in default under this Lease, Landlord is hereby irrevocably authorized, as Tenant's agent and attorney-in-fact, to direct any Transferee to make all payments under or in connection with the Transfer directly to Landlord (which Landlord shall apply towards Tenant's obligations under this Lease) until such default is cured. Such Transferee shall rely on any representation by Landlord that Tenant is in default hereunder, without any need for confirmation thereof by Tenant. Upon any assignment, the assignee shall assume in writing all obligations and covenants of Tenant thereafter to be performed or observed under this Lease. No collection or acceptance of rent by Landlord from any Transferee shall be deemed a waiver of any provision of this Article 14 or the approval of any Transferee or a release of Tenant from any obligation under this Lease, whether theretofore or thereafter accruing. In no event shall Landlord's enforcement of any provision of this Lease against any Transferee be deemed a waiver of Landlord's right to enforce any term of this Lease against Tenant or any other person. If Tenant's obligations hereunder have been guaranteed, Landlord's consent to any Transfer shall not be effective unless the guarantor also consents to such Transfer.

14.8 **Non-Transfers.** Notwithstanding anything to the contrary contained in this Article 14, (A) an assignment or subletting of all or a portion of the Premises to an affiliate of Tenant, i.e., an entity which is controlled by, controls, or is under common control with, Tenant, or (B) an assignment of this Lease to an entity that succeeds to all the business or assets of Tenant by merger, consolidation, reorganization or other form of entity reorganization (each of the entities described in (A) and (B), a "**Permitted Transferee**"), shall not be deemed a Transfer under this Article 14, provided that (i) Tenant notifies Landlord of any such assignment or sublease and promptly supplies Landlord with any documents or information requested by Landlord regarding such assignment or sublease or such affiliate; (ii) such assignment or sublease is not a subterfuge by Tenant to avoid its obligations under this Lease; (iii) in the event of an assignment of the Lease or a subletting of all or substantially all of the Premises, the resulting Tenant, or subtenant, as the case may be, shall have a creditworthiness as reasonably determined by Landlord that is no worse than Tenant's creditworthiness as of the date six months prior to the date such merger, consolidation, reorganization or other form of entity reorganization is consummated or such sublet occurs, as applicable; and (iv) such Permitted Transferee shall be of a character and reputation consistent with the quality of the Building. An assignee of Tenant's entire interest that is also a Permitted Transferee may also be known as a "**Permitted Assignee**". "**Control**," as used in this Section 14.8, shall mean the ownership, directly or indirectly, of at least fifty-one percent (51%) of the voting securities of, or possession of the right to vote, in the ordinary direction of its affairs, of at least fifty-one percent (51%) of the voting interest in, any person or entity and the ability to direct the day-to-day affairs of such person or entity. No such permitted assignment or subletting or other Transfer permitted with or without Landlord's consent pursuant to this Article 14 shall serve to release Tenant from any of its obligations under this Lease. In no event shall any transfer of shares in Tenant over a nationally recognized U.S. stock exchange be deemed to be a Transfer.

15. SURRENDER OF PREMISES; OWNERSHIP AND REMOVAL OF TRADE FIXTURES

15.1 **Surrender of Premises.** No act or thing done by Landlord or any agent or employee of Landlord during the Lease Term shall be deemed to constitute an acceptance by Landlord of a surrender of the Premises unless such intent is specifically acknowledged in writing by Landlord. The delivery of keys to the Premises to Landlord or any agent or employee of Landlord shall not constitute a surrender of the Premises or effect a termination of this Lease, whether or not the keys are thereafter retained by Landlord, and notwithstanding such delivery Tenant shall be entitled to the return of such keys at any reasonable time upon request until this Lease shall have been properly terminated. The voluntary or other surrender of this Lease by Tenant, whether accepted by Landlord or not, or a mutual termination hereof, shall not work a merger, and at the option of Landlord shall operate as an assignment to Landlord of all subleases or subtenancies affecting the Premises or terminate any or all such sublessees or subtenancies.

15.2 **Removal of Tenant Property by Tenant.** Upon the expiration of the Lease Term, or upon any earlier termination of this Lease, Tenant shall, subject to the provisions of this Article 15, quit and surrender possession of the Premises to Landlord in as good order and condition as when Tenant took possession and as thereafter improved by Landlord and/or Tenant, excepting reasonable wear and tear, damage by casualty which are the Landlord's obligation to restore, and repairs which are specifically made the responsibility of Landlord hereunder. Upon such expiration or termination, Tenant shall, without expense to Landlord, remove or cause to be removed from the Premises such Alterations that Tenant is required to remove in accordance with Section 8.3 of this Lease, any debris and rubbish, and such items of furniture, equipment, free-standing cabinet work, movable partitions and other articles of personal property owned by Tenant or installed or placed by Tenant at its expense in the Premises, and such similar articles of any other persons claiming under Tenant (unless Landlord, in its sole discretion, waives the requirement that any item of personal property be removed), and Tenant shall repair at its own expense all damage to the Premises and Building resulting from such removal. Tenant's personal property includes only those items that are not built into the Premises and that have not been constructed or installed by Landlord.

15.3 **Environmental Assessment.** Prior to the expiration of the Lease (or within thirty (30) days after any earlier termination), Tenant shall clean and otherwise decommission all interior surfaces, piping, supply lines, waste lines and plumbing in or serving the Premises, and all exhaust or other ductwork in or serving the Premises, in each case that has carried, released or otherwise been exposed to any Hazardous Materials due to Tenant's use or occupancy of the Premises, and shall otherwise clean the Premises so as to permit the Environmental Assessment called for by this Section 15.3 to be issued. Prior to the expiration of this Lease (or within thirty (30) days after any earlier termination), Tenant, at Tenant's expense, shall obtain for Landlord a report (an "**Environmental Assessment")** addressed to Landlord (and, at Tenant's election, Tenant) by a reputable licensed environmental engineer or industrial hygienist that is designated by Tenant and acceptable to Landlord in Landlord's reasonable discretion, which report shall be based on the environmental engineer's inspection of the Premises and shall state, to Landlord's reasonable satisfaction, that (a) the Hazardous Materials described in the first sentence of this paragraph, to the extent, if any, existing prior to such decommissioning, have been removed in accordance with Applicable Laws; (b) all Hazardous Materials described in the first sentence of this paragraph, if any, have been removed in accordance with Applicable Laws from the interior surfaces of the Premises (including floors, walls, ceilings, and counters), piping, supply lines,

waste lines and plumbing, and all such exhaust or other ductwork in the Premises, may be reused by a subsequent tenant or disposed of in compliance with Applicable Laws without incurring special costs or undertaking special procedures for demolition, disposal, investigation, assessment, cleaning or removal of such Hazardous Materials and without giving notice in connection with such Hazardous Materials; and (c) the Premises may be reoccupied for office, research and development, laboratory, and/or vivarium uses, demolished or renovated without incurring special costs or undertaking special procedures for disposal, investigation, assessment, cleaning or removal of Hazardous Materials described in the first sentence of this paragraph and without giving notice in connection with Hazardous Materials. Further, for purposes of clauses (b) and (c), "special costs" or "special procedures" shall mean costs or procedures, as the case may be, that would not be incurred but for the nature of the Hazardous Materials as Hazardous Materials instead of non-hazardous materials. The report shall also include reasonable detail concerning the clean-up measures taken, the clean-up locations, the tests run and the analytic results. Tenant shall submit to Landlord the identity of the applicable consultants and the scope of the proposed Environmental Assessment for Landlord's reasonable review and approval at least thirty (30) days prior to commencing the work described therein or at least sixty (60) days prior to the expiration of the Lease Term, whichever is earlier.

If Tenant fails to perform its obligations under this Section 15.3, without limiting any other right or remedy, Landlord may, on five (5) business days' prior written notice to Tenant perform such obligations at Tenant's expense if Tenant has not commenced to do so within said five (5) day period, and Tenant shall within ten (10) days of written demand reimburse Landlord for all reasonable out-of-pocket costs and expenses incurred by Landlord in connection with such work. Tenant's obligations under this Section 15.3 shall survive the expiration or earlier termination of this Lease. In addition, at Landlord's election, Landlord may inspect the Premises and/or the Project for Hazardous Materials at Landlord's cost and expense within sixty (60) days of Tenant's surrender of the Premises at the expiration or earlier termination of this Lease. Tenant shall pay for all such costs and expenses incurred by Landlord in connection with such inspection if such inspection reveals that a release or threat of release of Hazardous Materials exists at the Project or Premises as a result of the acts or omission of Tenant, its officers, employees, contractors, and agents (except to the extent resulting from (i) Hazardous Materials existing in the Premises as at the delivery of possession to Tenant (in which event Landlord shall be responsible for any Clean-up, as provided in this Lease), or (ii) the acts or omissions of Landlord or Landlord's agents, employees or contractors).

16. HOLDING OVER

If Tenant holds over after the expiration of the Lease Term or earlier termination thereof, with the express written consent of Landlord, such tenancy shall be from month-to-month only, and shall not constitute a renewal hereof or an extension for any further term. If Tenant holds over after the expiration of the Lease Term of earlier termination thereof, without the express written consent of Landlord, such tenancy shall be deemed to be a tenancy by sufferance only, and shall not constitute a renewal hereof or an extension for any further term. In either case, Base Rent shall be payable at a monthly rate equal to (x) the higher of fair market rent and one hundred fifty percent (150%) of the Base Rent applicable during the last rental period of the Lease Term for the first sixty (60) days of such hold over, and (y) the higher of fair market rent and two hundred percent (200%) of the Base Rent applicable during the last rental period of the Lease Term for each day thereafter. Such month-to-month tenancy or tenancy by sufferance, as the case may be, shall be subject to every other applicable term, covenant and agreement contained herein, including without limitation the obligation to pay Additional Rent. Nothing contained in this Article 16 shall be construed as consent by Landlord to any holding over by Tenant, and Landlord expressly reserves the right to require Tenant to surrender possession of the Premises to Landlord as provided in this Lease upon the expiration or other termination of this Lease.

The provisions of this Article 16 shall not be deemed to limit or constitute a waiver of any other rights or remedies of Landlord provided herein or at law. If Tenant fails to surrender the Premises upon the termination or expiration of this Lease, in addition to any other liabilities to Landlord accruing therefrom, Tenant shall protect, defend, indemnify and hold Landlord harmless from all loss, costs (including reasonable attorneys' fees) and liability resulting from such failure, including, without limiting the generality of the foregoing, any claims made by any succeeding tenant founded upon such failure to surrender and/or any lost profits and consequential or indirect damages to Landlord resulting therefrom.

17. ESTOPPEL CERTIFICATES

Each party shall execute, acknowledge and deliver to the other party an estoppel certificate, which, shall be substantially in the form of **Exhibit 17**, attached hereto (or such other form as may be reasonably requested by either party or by any prospective mortgagee or purchaser of the Project, or any portion thereof), indicating therein any exceptions thereto that may exist at that time, and shall also contain any other information reasonably requested by Landlord or Landlord's mortgagee or prospective mortgagee. Any such certificate may be relied upon by any prospective mortgagee or purchaser of all or any portion of the Project. Tenant shall execute and deliver whatever other instruments may be reasonably required for such purposes. Failure of Tenant to timely execute, acknowledge and deliver such estoppel certificate or other instruments shall constitute an acceptance of the Premises and an acknowledgment by Tenant that statements included in the estoppel certificate are true and correct, without exception. At any time during the Lease Term, within ten (10) business days following a request in writing by Landlord, Landlord may require Tenant to provide Landlord with a current financial statement and financial statements of the two (2) years prior to the current financial statement year. Such statements shall be prepared in accordance with generally accepted accounting principles and, if such is the normal practice of Tenant, shall be audited by an independent certified public accountant. If no audited financial statement is prepared, such statement will be certified by the CFO or Treasurer of Tenant.

18. SUBORDINATION

This Lease shall be subject and subordinate to all future ground or underlying leases of the Building or Project and to the lien of any mortgage, trust deed or other encumbrances now or hereafter in force against the Building or Project or any part thereof, if any, and to all renewals, extensions, modifications, consolidations and replacements thereof, and to all advances made or hereafter to be made upon the security of such mortgages or trust deeds, unless the holders of such mortgages, trust deeds or other encumbrances, or the lessors under such ground lease or underlying leases require in writing that this Lease be superior thereto. Tenant covenants and agrees that in the event any proceedings are brought for the foreclosure of any such mortgage or deed in lieu thereof (or if any ground lease is terminated), to attorn, without any deductions or set-offs whatsoever, to the lienholder or purchaser or any successors thereto upon any such foreclosure sale or deed in lieu thereof (or to the ground lessor), if so requested to do so by such purchaser or lienholder or ground lessor. Notwithstanding any other provision of this Lease to the contrary, no holder of any such mortgage, trustee deed or other encumbrance and no such ground lessor, shall be obligated to perform or liable in damages for failure to perform any of Landlord's obligations under this Lease unless and until such holder shall foreclose such mortgage, trust deed or other encumbrance, or the lessors under such ground lease or underlying leases otherwise acquire title to the Property, and then shall only be liable for Landlord's obligations arising or accruing after such foreclosure or acquisition of title, provided the foregoing shall not release any such holder or ground lessor from performing ongoing obligations of Landlord from and after the date of such foreclosure or acquisition of title, such as repair and

maintenance obligations. No such holder shall ever be obligated to perform or be liable in damages for any of Landlord's obligations arising or accruing before such foreclosure or acquisition of title. Landlord's delivery to Tenant of commercially reasonable non-disturbance agreement(s) in favor of Tenant from any ground lessors, mortgage holders or lien holders of Landlord who come into existence following the date hereof but prior to the expiration of the Lease Term shall be in consideration of, and a condition precedent to, Tenant's agreement to subordinate this Lease to any such ground lease, mortgage or lien. Tenant shall, within ten (10) business days of request by Landlord, execute such further instruments or assurances as Landlord may reasonably deem necessary to evidence or confirm the subordination or superiority of this Lease to any such mortgages, trust deeds, ground leases or underlying leases. Tenant acknowledges and agrees that the form of subordination, non-disturbance and attornment agreement attached as Exhibit 18 is acceptable to Tenant for the purposes of this Section 18. Tenant waives the provisions of any current or future statute, rule or law which may give or purport to give Tenant any right or election to terminate or otherwise adversely affect this Lease and the obligations of Tenant hereunder in the event of any foreclosure proceeding or sale.

Landlord's interest herein may be assigned as security at any time to any Mortgagee. Notwithstanding the foregoing or anything to the contrary herein, no Mortgagee succeeding to the interest of Landlord hereunder shall be (i) liable in any way to Tenant for any act or omission, neglect or default on the part of Landlord under this Lease, (ii) responsible for any monies owing by or on deposit with Landlord to the credit of Tenant (except to the extent any such deposit is actually received by such mortgagee or ground lessor), (iii) subject to any counterclaim or setoff which theretofore accrued to Tenant against Landlord, (iv) bound by any amendment or modification of this Lease subsequent to such mortgage, or by any previous prepayment of Rent for more than one (1) month in advance of its due date, which was not approved in writing by the Mortgagee, (v) liable beyond such Mortgagee's interest in the Project, or (vi) responsible for the payment or performance of any work to be done by Landlord under this Lease to render the Premises ready for occupancy by Tenant or for the payment of any tenant improvements allowances. Nothing in clause (i), above, shall be deemed to relieve any Mortgagee succeeding to the interest of Landlord hereunder of its obligation to comply with the obligations of Landlord under this Lease from and after the date of such succession.

No Mortgagee shall, either by virtue of the Mortgage or any assignment of leases executed by Landlord for the benefit of such Mortgagee, be or become a mortgagee in possession or be or become subject to any liability or obligation under the Lease or otherwise until such Mortgagee shall have acquired the interest of Landlord in the Property, by foreclosure or otherwise, or in fact have taken possession of the Property as a mortgagee in possession and then such liability or obligation of Mortgagee under the Lease shall extend only to those liability or obligations accruing subsequent to the date that such Mortgagee has acquired the interest of Landlord in the Premises, or in fact taken possession of the Property as a mortgagee in possession.

19. DEFAULTS; REMEDIES

19.1 **Events of Default.** The occurrence of any of the following shall constitute a default of this Lease by Tenant:

19.1.1 Any failure by Tenant to pay any Rent or any other charge required to be paid under this Lease, or any part thereof, when due and such failure shall continue for five (5) business days after notice of such failure is given to Tenant, except that if Landlord shall have given two (2) such notice in any twelve (12) month period, Tenant shall not be entitled to any further notice of its delinquency in the payment of Rent or any other charge required to be paid under this Lease until such time as twelve (12) consecutive months shall have elapsed without Tenant having defaulted in any such payment; or

19.1.2 Except where a specific time period is otherwise set forth for Tenant's performance in this Lease, in which event the failure to perform by Tenant within such time period shall be a default by Tenant under this Section 19.1.2, any failure by Tenant to observe or perform any other provision, covenant or condition of this Lease to be observed or performed by Tenant where such failure continues for thirty (30) days after written notice thereof from Landlord to Tenant; provided that if the nature of such default is such that the same cannot reasonably be cured within a thirty (30) day period, Tenant shall not be deemed to be in default if it diligently commences such cure within such period and thereafter diligently proceeds to rectify and cure such default; or

19.1.3 Abandonment of the Premises by Tenant, provided that Tenant's non-use of the Premises during any period for which Tenant is entitled to a rent abatement pursuant to Section 11.1 as a result of casualty damage shall not constitute abandonment for purposes of this paragraph, nor shall Tenant's non-use of the Premises during the performance of Alterations approved by Landlord, so long as such Alterations are performed in an expedient manner; or

19.1.4 The failure by Tenant to observe or perform according to the provisions of Articles 5, 14, 17 or 18 of this Lease where such failure continues for more than two (2) business days after notice from Landlord;

19.1.5 If a receiver, guardian, conservator, trustee in bankruptcy or similar officer shall be appointed by a court of competent jurisdiction to take charge of all or any part of Tenant's or any guarantor's property and such appointment is not discharged within 90 days thereafter or if a petition including, without limitation, a petition for reorganization or arrangement is filed by Tenant or any guarantor under any bankruptcy law or is filed against Tenant or any guarantor and, in the case of a filing against Tenant only, the same shall not be dismissed within 90 days from the date upon which it is filed.

The notice periods provided herein are in lieu of, and not in addition to, any notice periods provided by law.

19.2 **Remedies Upon Default.** Upon the occurrence of any event of default by Tenant beyond applicable notice and cure periods, Landlord shall have, in addition to any other remedies available to Landlord at law or in equity (all of which remedies shall be distinct, separate and cumulative), the option to pursue any one or more of the following remedies, each and all of which shall be cumulative and nonexclusive, without any notice or demand whatsoever. Tenant hereby waives, for Tenant and for all those claiming under Tenant, any and all rights now or hereafter existing to redeem by order or judgment of any court or by any legal process or writ, Tenant's right of occupancy of the Premises after any termination of this Lease.

19.2.1 Landlord may, immediately or at any time thereafter, elect to terminate this Lease by notice of termination, by entry, or by any other means available under law, and may recover possession of the Premises as provided herein. Upon termination by notice, by entry, or by any other means available under law, Landlord shall be entitled immediately, in the case of termination by notice or entry, and otherwise in accordance with the provisions of law, to recover possession of the Premises from Tenant and those claiming through or under Tenant. Such termination of this Lease and repossession of the Premises shall be without prejudice to any remedies which Landlord might otherwise have for arrears of rent or for a prior breach of the provisions of this Lease. To the extent permitted pursuant to Applicable Laws, Tenant waives any statutory notice to quit and equitable rights in the nature of further cure or redemption, and Tenant agrees that upon Landlord's termination of this Lease Landlord shall be entitled to re-entry and possession in accordance with the terms hereof. Landlord may, without notice, store Tenant's personal property (and those of any person claiming under Tenant) at the expense and risk of Tenant or, if Landlord so elects, Landlord may sell such personal property at public auction or auctions or at private sale or sales after seven days' notice to Tenant and apply the net proceeds to the earliest of installments of rent or other charges owing Landlord. Tenant agrees that a notice by Landlord alleging any default shall, at Landlord's option (the exercise of such option shall be indicated by the inclusion of the words "notice to quit" in such notice), constitute a statutory notice to quit. If Landlord exercises its option to designate a notice of default hereunder as a statutory notice to quit, any grace periods provided for herein shall run concurrently with any statutory notice periods.

19.2.2 In the case of termination of this Lease pursuant to Section 19.2.1, Tenant shall reimburse Landlord for all expenses arising out of such termination, including without limitation, all costs incurred in collecting amounts due from Tenant under this Lease (including attorneys' fees, costs of litigation and the like); all of Landlord's then unamortized costs of Tenant Improvements in the Premises; all reasonable expenses incurred by Landlord in attempting to relet the Premises or parts thereof (including advertisements, brokerage commissions, Tenant's allowances, costs of preparing space, and the like); and all Landlord's other reasonable expenditures necessitated by the termination. The reimbursement from Tenant shall be due and payable immediately from time to time upon notice from Landlord that an expense has been incurred, without regard to whether the expense was incurred before or after the termination.

19.2.3 Following any termination of this Lease pursuant to Section 19.2.1, Landlord may elect by written notice to Tenant to be indemnified for loss of Rent by a lump sum payment representing the then present value of the amount of Rent that would have been paid in accordance with this Lease for the remainder of the Lease Term minus the then present value of the aggregate fair market rent and additional charges payable for the Premises for the remainder of the Lease Term (if less than the Rent payable hereunder), estimated by Landlord as of the date of the termination, and taking into account Landlord's reasonable projections of vacancy and time required to re-lease the Premises. (For the purposes of calculating the Rent that would have been paid hereunder for the lump sum payment calculation described herein, the last full year's Additional Rent under Article 4 is to be deemed constant for each year thereafter. The Federal Reserve discount rate (or equivalent) shall be used in calculating present values.) Should the parties be unable to agree on a fair market rent, the matter shall be submitted, upon the demand of Landlord, to the Boston, Massachusetts office of the American Arbitration Association, with a request for arbitration in accordance with the rules of the Association by a single arbitrator who shall be an MAI appraiser with at least ten years' experience as an appraiser of comparable buildings in the Cities of Boston and Cambridge. The parties agree that a decision of the arbitrator shall be conclusive and binding upon them. If and for so long as Landlord does not make the election provided for in this Section 19.2.3, Tenant shall indemnify Landlord for the loss of Rent by a payment at the end of each month which would have been included in the Lease Term, representing the

excess of the Rent that would have been paid in accordance with this Lease (Base Rent together with any Additional Rent that would have been payable under Article 4, to be ascertained monthly) over the rent actually derived from the Premises by Landlord for such month (the amount of Rent deemed derived shall be the actual amount less any portion thereof attributable to Landlord's reletting expenses described in Section 19.2.2 that have not been reimbursed by Tenant thereunder).

19.2.4 Free rent amounts, rent holidays, rent waivers, rent forgivenesses and the like (collectively "**Free Rent Amounts**"), if any, have been agreed to by Landlord as inducements for Tenant to enter into and faithfully to perform all of its obligations contained in this Lease. For all purposes under this Lease, upon the occurrence of any default beyond any applicable grace or notice period, any Free Rent Amounts set forth in this Lease shall be deemed void as of the date of execution hereof as though such Free Rent Amounts had never been included in this Lease, and calculations of amounts due hereunder, damages and the like shall be determined accordingly. The foregoing shall occur automatically without the requirement of any further notice or action by Landlord not specifically required by Section 19.1, whether or not this Lease is then or thereafter terminated on account of the event in question, and whether or not Tenant thereafter corrects or cures any such event.

19.2.5 In lieu of any other damages or indemnity and in lieu of full recovery by Landlord of all sums payable under all the foregoing provisions of this Section 19.2, Landlord may by written notice to Tenant elect to recover, and Tenant shall thereupon pay, as minimum liquidated damages under this Section 19.2, an amount equal to the lesser of (i) the aggregate of the Base Rent and Additional Rent for the balance of the Lease Term had it not been terminated or (ii) the aggregate thereof for the 12 months ending one year after the termination date or such lesser period then remaining in the Lease Term, plus in either case (iii) the amount of Base Rent and Additional Rent of any kind accrued and unpaid at the time of termination and minus (iv) the amount of any recovery by Landlord under the foregoing provisions of this Section 19.2 up to the time of payment of such liquidated damages (but reduced by any amounts of reimbursement under Section 19.2.2). Liquidated damages hereunder shall not be in lieu of any claims for reimbursement under Section 19.2.2.

19.2.6 If Landlord does not elect to terminate this Lease on account of any default by Tenant, Landlord may, from time to time, without terminating this Lease, enforce all of its rights and remedies under this Lease, including the right to recover all Rent as it becomes due.

19.2.7 Landlord shall at all times have the rights and remedies (which shall be cumulative with each other and cumulative and in addition to those rights and remedies available under this Section 19.2, or any law or other provision of this Lease), without prior demand or notice except as required by Applicable Laws, to seek any declaratory, injunctive or other equitable relief, and specifically enforce this Lease, or restrain or enjoin a violation or breach of any provision hereof. The provisions of this Section 19.2.7 are not dependent upon the occurrence of a default.

19.2.8 Any obligation imposed by law upon Landlord to relet the Premises after any termination of the Lease shall be subject to the reasonable requirements of Landlord to lease to high quality tenants on such terms as Landlord may from time to time deem appropriate and to develop the Building in a harmonious manner with an appropriate mix of uses, tenants, floor areas and terms of tenancies, and the like, and Landlord shall not be obligated to relet the Premises to any party to whom Landlord or its affiliate may desire to lease other available space in the Building.

19.2.9 Nothing herein shall limit or prejudice the right of Landlord to prove and obtain in a proceeding for bankruptcy, insolvency, arrangement or reorganization, by reason of the termination, an amount equal to the maximum allowed by a statute of law in effect at the time when, and governing the proceedings in which, the damages are to be proved, whether or not the amount is greater to, equal to, or less than the amount of the loss or damage which Landlord has suffered.

19.3 **Subleases of Tenant.** Whether or not Landlord elects to terminate this Lease on account of any default by Tenant, as set forth in this Article 19, Landlord shall have the right to terminate any and all subleases, licenses, concessions or other consensual arrangements for possession entered into by Tenant and affecting the Premises or may, in Landlord's sole discretion, succeed to Tenant's interest in such subleases, licenses, concessions or arrangements. In the event of Landlord's election to succeed to Tenant's interest in any such subleases, licenses, concessions or arrangements, Tenant shall, as of the date of notice by Landlord of such election, have no further right to or interest in the rent or other consideration receivable thereunder.

19.4 **Efforts to Relet.** No re-entry or repossession, repairs, maintenance, changes, alterations and additions, reletting, appointment of a receiver to protect Landlord's interests hereunder, or any other action or omission by Landlord shall be construed as an election by Landlord to terminate this Lease or Tenant's right to possession, or to accept a surrender of the Premises, nor shall same operate to release Tenant in whole or in part from any of Tenant's obligations hereunder, unless express written notice of such intention is sent by Landlord to Tenant. Tenant hereby irrevocably waives any right otherwise available under any law to redeem or reinstate this Lease.

19.5 **Landlord Default.**

19.5.1 **General.** Notwithstanding anything to the contrary set forth in this Lease, Landlord shall not be in default in the performance of any obligation required to be performed by Landlord pursuant to this Lease unless Landlord fails to perform such obligation within thirty (30) days after the receipt of notice from Tenant specifying in detail Landlord's failure to perform; provided, however, if the nature of Landlord's obligation is such that more than thirty (30) days are required for its performance, then Landlord shall not be in default under this Lease if it shall commence such performance within such thirty (30) day period and thereafter diligently pursue the same to completion.

20. COVENANT OF QUIET ENJOYMENT

Landlord covenants that Tenant, on paying the Rent, charges for services and other payments herein reserved and on keeping, observing and performing all the other terms, covenants, conditions, provisions and agreements herein contained on the part of Tenant to be kept, observed and performed, shall, during the Lease Term, peaceably and quietly have, hold and enjoy the Premises subject to the terms, covenants, conditions, provisions and agreements hereof without interference by any persons lawfully claiming by or through Landlord. The foregoing covenant is in lieu of any other covenant of quiet enjoyment, express or implied.

21. SECURITY DEPOSIT

21.1 Concurrently with Tenant's execution of this Lease, Tenant shall deposit with Landlord a letter of credit (the "**L/C Security")** in the amount set forth in Section 9 of the Summary as security for the faithful performance by Tenant of all of its obligations under this Lease as follows:

(a) Tenant shall provide Landlord, and maintain in full force and effect throughout the Term and until the date that is ninety (90) days after the Lease Expiration Date, an evergreen letter of credit substantially in the form of **Exhibit 21.1** issued by an issuer reasonably satisfactory to Landlord, in the amount set forth in Section 9 of the Summary. If at any time during the Term (i) Landlord determines in its sole discretion that the financial condition of such issuer has

changed in any materially adverse way from the financial condition of such issuer as of the date of execution of this Lease including, without limitation, if such issuer is declared insolvent or is placed into receivership or conservatorship by the Federal Deposit Insurance Corporation, or any successor or similar entity, if a trustee, receiver or liquidator is appointed for such issuer, if the credit rating of the long-term debt of the issuer of the letter of credit (according to Moody's, Standard & Poor's or similar national rating agency reasonably identified by Landlord) is downgraded to a grade below investment grade, if the issuer enters into any supervisory agreement with any governmental authority or fails to meet any capital requirements imposed by applicable law, Landlord may require the L/C Security to be replaced by an L/C Security issued by a different issuer, in which event Tenant shall within five (5) days after written notice from Landlord deliver to Landlord a replacement L/C Security issued by a commercial bank or savings and loan association acceptable to Landlord in its sole discretion and that meets all other requirements of this Article. If Tenant has actual notice, or Landlord notifies Tenant at any time, that any issuer of the L/C Security has become insolvent or placed into FDIC receivership, then Tenant shall promptly deliver to Landlord (without the requirement of further notice from Landlord) substitute L/C Security issued by a commercial bank or savings and loan association acceptable to Landlord in its sole discretion and that meets all other requirements of this Article. As used herein with respect to the issuer of the L/C Security, "insolvent" shall mean the determination of insolvency as made by such issuer's primary bank regulator (i.e., the state bank supervisor for state chartered banks; the OCC or OTS, respectively, for federally chartered banks or thrifts; or the Federal Reserve for its member banks).

(b) Landlord may draw upon the L/C Security, and hold and apply the proceeds for the payment of any Rent or any other sum in default, or to compensate Landlord for any other loss or damage that Landlord may suffer by reason of Tenant's default, if: (i) a default beyond applicable notice and cure periods exists (or would have existed with the giving of notice and passage of applicable cure periods, but only if transmittal of a default notice is stayed or barred by applicable bankruptcy or other similar law); (ii) as of the date forty-five (45) days before any L/C Security expires Tenant has not delivered to Landlord an amendment or replacement for such L/C Security, reasonably satisfactory to Landlord, extending the expiry date to the date that is ninety (90) days after the then-current Lease Expiration Date; (iii) Tenant fails to pay any bank charges for Landlord's transfer of the L/C Security when due; or (iv) the issuer of the L/C Security ceases, or announces that it will cease, to maintain an office in the city where Landlord may present drafts under the L/C Security (and fails to permit drawing upon the L/C Security by overnight courier or facsimile). This Section does not limit any other provisions of this Lease allowing Landlord to draw the L/C Security under specified circumstances. In the event of any such draw upon the L/C Security, Tenant shall within 10 business days thereafter provide Landlord with a replacement letter of credit, or amendment to the existing letter of credit increasing the amount of such letter of credit, in the amount of L/C Security, and in the form required hereunder, and Tenant's failure to do so shall be a material breach of this Lease. Landlord shall hold the proceeds of any draw not applied as set forth above as a cash Security Deposit as further described below.

(c) If Landlord transfers its interest in the Premises, then Landlord shall transfer the L/C Security to the transferee of its interest and notify Tenant of such transfer, and Tenant shall at Tenant's expense, within fifteen (15) business days after receiving a request from Landlord, deliver (and, if the issuer requires, Landlord shall consent to) an amendment to the L/C Security naming Landlord's grantee as substitute beneficiary. If the required Security Deposit changes while L/C Security is in force, then Tenant shall deliver (and, if the issuer requires, Landlord shall consent to) a corresponding amendment to the L/C Security.

(d) If and to the extent Landlord is holding the proceeds of the L/C Security in cash from time to time, such cash shall be held by Landlord as security for the faithful performance by Tenant of all of the terms, covenants and conditions of this Lease to be kept and performed by Tenant during the period commencing on the Execution Date and ending upon the expiration or termination of Tenant's obligations under this Lease. If Tenant defaults (beyond applicable notice and cure periods) with respect to any provision of this Lease, including any provision relating to the payment of Rent, then Landlord may (but shall not be required to) use, apply or retain all or any part of the Security Deposit for the payment of any Rent or any other sum in default, or to compensate Landlord for any other loss or damage that Landlord may suffer by reason of Tenant's default as provided in this Lease. The provisions of this Article shall survive the expiration or earlier termination of this Lease. In the event of bankruptcy or other debtor-creditor proceedings against Tenant, any cash security then being held by Landlord shall be deemed to be applied first to the payment of Rent and other charges due Landlord for all periods prior to the filing of such proceedings. Landlord shall deliver or credit to any purchaser or transferee of Landlord's interest in the Premises the funds then held hereunder by Landlord, and thereupon (and upon confirmation by the transferee of such funds, whether expressly or by written assumption of this Lease, generally) Landlord shall be discharged from any further liability with respect to such funds. This provision shall also apply to any subsequent transfers. If Tenant shall fully and faithfully perform every provision of this Lease to be performed by it, then the cash security, if any, or any balance thereof, shall be returned to Tenant (or, at Landlord's option, to the last assignee of Tenant's interest hereunder) within 90 days after the expiration or earlier termination of this Lease. If and to the extent the security held by Landlord hereunder shall be in cash, Landlord shall hold such cash in an account at a banking organization selected by Landlord; provided, however, that Landlord shall not be required to maintain a separate account for the cash security, but may intermingle it with other funds of Landlord. Landlord shall be entitled to all interest and/or dividends, if any, accruing on such cash security.

21.2 The amount of the Security Deposit shall be subject to reduction as provided in this Section 21.2. The initial amount of the Security Deposit shall be as set forth in Section 9 of the Summary. Provided that no default by Tenant under this Lease has previously occurred during the Lease Term that remained uncured after the expiration of all applicable notice and cure periods, Tenant shall have the one-time right, at any time on or before the date that is thirty-six (36) months following the Phase I Rent Commencement Date (the "**Outside Security Reduction Date**") to reduce the L/C Security to the amount of $997,724.83 following: (A) the closing of a round of equity financing related to Tenant's primary business so long as such equity financing, through one or a series of related transactions, results in aggregate net proceeds to Tenant at such closing of at least $50,000,000.00 in unrestricted US funds, with all such funds received by Tenant prior to the Outside Security Reduction Date, or (B) Tenant's closing of one or more partnership transactions that provide immediately available net funds of at least $50,000,000.00, with all such funds received by Tenant from corporate partners prior to the Outside Security Reduction Date, so long as such amounts are not subject to contingencies, achievement of milestones, conditions subsequent, or otherwise subject to repayment by Tenant for any reason whatsoever (e.g., refunds or 'clawbacks,' or debt obligations). The closing of such financing or transactions shall be evidenced by Tenant's delivery of updated financial statements in the form previously provided to Landlord and certified by Tenant's chief financial officer, together with an updated organizational chart of Tenant and such other information evidencing the closing or transaction as Landlord may reasonably request and satisfactory to Landlord in its sole discretion. The reduction of the L/C Security in accordance with the preceding sentences shall be accomplished by the replacement or amendment of the L/C Security in a form complying with the terms of this Article 21.

22. INTENTIONALLY OMITTED

23. SIGNS

23.1 **Signage.** Tenant shall not install any signage (including, without limitation, any signs identifying Tenant's name or advertising Tenant's merchandise or otherwise) in or about the Premises that is visible from the exterior of the Premises or in any other part of the Project except as expressly permitted in this Section 23.1. Landlord shall provide Tenant with a building-standard multi-tenant lobby directory listing and a multi-tenant floor directory listing identifying Tenant. Such signage shall comply with Landlord's then-current Building standard signage program. Subject to Landlord's prior written approval, in its reasonable discretion, and provided all signs are in keeping with the quality, design and style of the Building and Project, and so long as the Premises consists of at least 67,165 rentable square feet (the "**Exterior Signage Threshold"),** Tenant shall have the non-exclusive right to install and thereafter maintain one (1) sign identifying Original Tenant (or any Permitted Transferee following a Permitted Transfer) on the exterior of the Building (the "**Exterior Building Signage")** in a location designated by Landlord. In no event shall Tenant's Exterior Building Signage exceed Tenant's Pro Rata Share of the exterior building signage permitted for tenants in the Building under the Town of Bedford zoning ordinance. Tenant shall be responsible, at its sole cost and expense, for the design, production and lighting of, and obtaining all permits related to, the installation of Tenant's Exterior Building Signage. Notwithstanding anything herein to the contrary, if a default is then continuing or the Exterior Signage Threshold is no longer met, Tenant's right to the Exterior Building Signage shall terminate, and Tenant shall remove the Exterior Building Signage and repair any damage caused by such removal, at Tenant's sole cost, in a commercially reasonable manner that restores the portion of the Building that was subject to the Exterior Building Signage to substantially the condition that existed prior to the installation of the Exterior Building Signage. Tenant shall be responsible for all of the costs to fabricate, install, and maintain the Exterior Signage and to remove the Exterior Building Signage at the expiration of the Lease Term (or earlier at Landlord's request if the Exterior Signage Threshold is no longer met) and shall perform such work using contractors reasonably approved by Landlord. If Tenant's Exterior Building Signage requires municipal or other governmental approval, and such approval is denied, Landlord shall not be deemed to be in default hereunder and this Lease shall continue in full force and effect. Landlord shall have the right to remove or relocate the Exterior Building Signage on a temporary basis in connection with the maintenance and repair of the Building and upon completion thereof shall restore the Exterior Building Signage to its original location at Landlord's cost and expense. In addition, Tenant may install one sign identifying Tenant at the entry to the Premises on each floor of the Premises, which identification signage shall be consistent with building standard signage as determined by Landlord. All permitted signs shall be maintained by Tenant at its expense in a first-class and safe condition and appearance. Upon the expiration or earlier termination of this Lease, Tenant shall remove all of its signs at Tenant's sole cost and expense. Tenant shall repair any damage to the Premises or Project, inside or outside, resulting from the erection, maintenance or removal of any signs. Tenant's signage shall comply with all Applicable Laws.

23.2 **Prohibited Signage and Other Items.** Any signs, notices, logos, pictures, names or advertisements which are installed and that have not been separately approved by Landlord may be removed without notice by Landlord at the sole expense of Tenant. Except as expressly permitted pursuant to Section 23.1, above, Tenant may not install any signs on the exterior or roof of the Project or the Common Areas. Any signs, displays, window coverings, window lettering, or blinds (even if the same are located behind the Landlord-approved window coverings for the Building), or other items or Alterations visible from the exterior of the Premises or Building, shall be subject to the prior approval of Landlord, in its sole discretion. Tenant shall not place or install any projections, antennae, aerials, or similar devices inside or outside of the Building, without the prior written approval of Landlord, subject to Tenant's rights pursuant to Section 23.1, above.

24. COMPLIANCE WITH LAW

Tenant shall not do anything or suffer anything to be done by any Tenant Party in or about the Premises or the Project which will in any way conflict with any law, statute, ordinance or other federal, state or local governmental rule, regulation or requirement now in force or which may hereafter be enacted or promulgated (collectively, "**Applicable Laws**"). At its sole cost and expense, Tenant shall promptly comply with all such Applicable Laws which relate to (i) Tenant's use of the Premises, (ii) any Alterations or Tenant Improvements, or (iii) the Building, but as to the Building, only to the extent such obligations are triggered by Alterations or Tenant Improvements, or Tenant's particular use of the Premises and Project as opposed to office and research and development use, generally. Tenant shall be responsible, at its sole cost and expense, to make all alterations to the Premises as are required to comply with the Applicable Laws to the extent required in this Article 24. Notwithstanding the foregoing terms of this Article 24 to the contrary, Tenant may defer such compliance with Applicable Laws while Tenant contests, in a court of proper jurisdiction, in good faith, the applicability of such Applicable Laws to the Premises or Tenant's specific use or occupancy of the Premises; provided, however, Tenant may only defer such compliance if such deferral shall not (a) prohibit Tenant from obtaining or maintaining a certificate of occupancy for the Premises, (b) prohibit Landlord from obtaining or maintaining a certificate of occupancy for the Building or any portion thereof, (c) unreasonably and materially affect the safety of the employees and/or invitees of Landlord or of any tenant in the Building (including Tenant), (d) create a significant health hazard for the employees and/or invitees of Landlord or of any tenant in the Building (including Tenant), (e) otherwise materially and adversely affect Tenant's use of or access to the Buildings or the Premises, or (f) impose material obligations, liability, fines, or penalties upon Landlord or any other tenant of the Building, or would materially and adversely affect the use of or access to the Building by Landlord or other tenants or invitees of the Building. The judgment of any court of competent jurisdiction or the admission of Tenant in any judicial action, regardless of whether Landlord is a party thereto, that Tenant has violated any of said governmental measures, shall be conclusive of that fact as between Landlord and Tenant. Landlord shall comply with all Applicable Laws relating to the Common Areas of the Building, provided that compliance with such Applicable Laws is not the responsibility of Tenant under this Lease, and provided further that Landlord's failure to comply therewith would prohibit Tenant from obtaining or maintaining a certificate of occupancy for the Premises, or would unreasonably and materially affect the safety of Tenant's employees or create a significant health hazard for Tenant's employees, or would otherwise materially and adversely affect Tenant's use of or access to the Premises. Landlord shall be permitted to include in Operating Expenses any costs or expenses incurred by Landlord under this Article 24 to the extent not prohibited by the terms of Section 4.2.7, above.

25. LATE CHARGES

If any installment of Rent or any other sum due from Tenant shall not be received by Landlord or Landlord's designee within five (5) business days after the date due, then Tenant shall pay to Landlord a late charge equal to five percent (5%) of the overdue amount plus any reasonable attorneys' fees incurred by Landlord by reason of Tenant's failure to pay Rent and/or other charges when due hereunder. Notwithstanding the foregoing, Landlord shall not charge Tenant a late charge for the first (1st) late payment in any twelve (12) month period unless Tenant fails to timely pay such amount within five (5) business days following notice from Landlord that such amount is past due. The late charge shall be deemed Additional Rent and the right to require it shall be in addition to all of Landlord's other rights and remedies hereunder or at law and shall not be construed as liquidated damages or as limiting

Landlord's remedies in any manner. In addition to the late charge described above, any Rent or other amounts owing hereunder which are not paid when due shall bear interest from the date when due until paid at a rate per annum equal to the lesser of (i) the annual "**Bank Prime Loan"** rate cited in the Federal Reserve Statistical Release Publication G.13(415), published on the first Tuesday of each calendar month (or such other comparable index as Landlord and Tenant shall reasonably agree upon if such rate ceases to be published) plus nine (9) percentage points, and (ii) the highest rate permitted by Applicable Law.

26. LANDLORD'S RIGHT TO CURE DEFAULT; PAYMENTS BY TENANT

26.1 **Landlord's Cure.** All covenants and agreements to be kept or performed by Tenant under this Lease shall be performed by Tenant at Tenant's sole cost and expense and without any reduction of Rent, except to the extent, if any, otherwise expressly provided herein. If Tenant shall fail to perform any obligation under this Lease, and such failure shall continue in excess of the time allowed under Section 19.1.2, above, unless a specific time period is otherwise stated in this Lease, Landlord may, but shall not be obligated to, make any such payment or perform any such act on Tenant's part without waiving its rights based upon any default of Tenant and without releasing Tenant from any obligations hereunder.

26.2 **Tenant's Reimbursement.** Except as may be specifically provided to the contrary in this Lease, Tenant shall pay to Landlord, upon delivery by Landlord to Tenant of statements therefor: (i) sums equal to expenditures reasonably made and obligations incurred by Landlord in connection with the remedying by Landlord of Tenant's defaults pursuant to the provisions of Section 26.1; (ii) sums equal to all losses, costs, liabilities, damages and expenses referred to in Article 10 of this Lease; and (iii) sums equal to all expenditures made and obligations incurred by Landlord in collecting or attempting to collect the Rent or in enforcing or attempting to enforce any rights of Landlord under this Lease or pursuant to law, including, without limitation, all reasonable legal fees and other amounts so expended. Tenant's obligations under this Section 26.2 shall survive the expiration or sooner termination of the Lease Term.

27. ENTRY BY LANDLORD

Landlord reserves the right at all reasonable times and upon not less than one (1) day's prior notice to Tenant which may be given by telephone or electronic mail (except in the case of an emergency or with respect to regularly scheduled services) to enter the Premises to (i) inspect them; (ii) show the Premises to prospective purchasers, or to current or prospective mortgagees, ground or underlying lessors or insurers or, during the last twelve (12) months of the Lease Term, to prospective tenants; (iii) post notices of nonresponsibility (to the extent applicable pursuant to then Applicable Law); or (iv) alter, improve or repair the Premises or the Building, or for structural alterations, repairs or improvements to the Building or the Building's systems and equipment. Provided that Landlord employs commercially reasonable efforts to minimize interference with the conduct of Tenant's business in connection with entries into the Premises, Landlord may make any such entries without creating a default by Landlord and shall take such reasonable steps as required to accomplish the stated purposes. In an emergency, Landlord shall have the right to use any means that Landlord may deem proper to open the doors in and to the Premises. Landlord also shall have the right at any time, without the same constituting an actual or constructive eviction and without incurring any liability to Tenant therefor, to change the arrangement or location of entrances or passageways, doors and doorways, and corridors, elevators, stairs, toilets, or other public parts of the Building and to change the name, address, number or designation by which the Premises is commonly known, provided any such change does not (A) unreasonably reduce, interfere with or deprive Tenant of access to the Premises, or (B) reduce the rentable area (except by a *de minimis* amount) of the Premises. Any entry into the Premises by

Landlord in the manner hereinbefore described shall not be deemed to be a forcible or unlawful entry into, or a detainer of, the Premises, or an actual or constructive eviction of Tenant from any portion of the Premises and the Base Rent (and any other item of Rent) shall under no circumstances abate while said repairs, alterations, improvements, additions or restorations are being made, by reason of loss or interruption of business of Tenant, or otherwise. If Tenant shall not be present when for any reason entry into the Premises shall be necessary or permissible, Landlord or Landlord's agents, representatives, contractors or employees may enter the same without rendering Landlord or such agents liable therefor if during such entry Landlord or Landlord's agents shall accord reasonable care under the circumstances to Tenant's Property, and without in any manner affecting this Lease. Tenant shall, at all times during the Term, be responsible for ensuring that Landlord has any and all keys, cards, codes or other means necessary to access the Premises. Except in case of emergency or in connection with regularly-scheduled services, Tenant shall have the option, upon receipt of Landlord's notice of its intention to enter the Premises, to provide for an employee of Tenant to accompany Landlord's agent or agents during such entry to the Premises.

28. TENANT PARKING

During the Term, Tenant shall have the right to park the number of standard size automobiles and small utility vehicles set forth in Section 10 of the Summary in the parking facilities that serve the Project. Notwithstanding the foregoing, the number of parking spaces specified in Section 10 of the Summary shall be reduced by (a) the number of parking spaces at the Project that are not available for parking passenger cars on account of the installation or use of Exterior Equipment and/or Special Systems (but only to the extent Landlord has not accepted responsibility for such Special Systems pursuant to Section 29.33), and shall be further reduced by (b) a number which is the number of parking spaces at the Project that are not available for parking passenger cars on account of the installation or use of Special Systems for which Landlord has accepted responsibility pursuant to Section 29.33, multiplied by Tenant's Share. All such parking shall be on a first-come, first-serve basis in common with others entitled to use the same. Tenant's continued right to exercise its parking rights hereunder is conditioned upon Tenant abiding by all rules and regulations which are prescribed from time to time for the orderly operation and use of the parking facilities (including any sticker or other identification system established by Landlord and the prohibition of vehicle repair and maintenance activities in the parking facilities), and Tenant shall cooperate in seeing that any Tenant Parties and Tenant visitors also comply with such rules and regulations. Tenant's use of the parking facilities for the Project shall be at Tenant's sole risk and Tenant acknowledges and agrees that Landlord shall have no liability whatsoever for damage to the vehicles of Tenant, its employees and/or visitors, or for other personal injury or property damage or theft relating to or connected with the parking rights granted herein or any of Tenant's, its employees' and/or visitors' use of the parking facilities. Tenant's rights under this Article 28 shall not be assigned or sublicensed except in connection with an assignment or sublease permitted under Article 14.

29. MISCELLANEOUS PROVISIONS

29.1 **Terms; Captions.** The words "**Landlord**" and "**Tenant**" as used herein shall include the plural as well as the singular. The necessary grammatical changes required to make the provisions hereof apply either to corporations or partnerships or individuals, men or women, as the case may require, shall in all cases be assumed as though in each case fully expressed. The captions of Articles and Sections are for convenience only and shall not be deemed to limit, construe, affect or alter the meaning of such Articles and Sections.

29.2 **Binding Effect**. Subject to all other provisions of this Lease, each of the covenants, conditions and provisions of this Lease shall extend to and shall, as the case may require, bind or inure to the benefit not only of Landlord and of Tenant, but also of their respective heirs, personal representatives, successors or assigns, provided this clause shall not permit any assignment by Tenant contrary to the provisions of Article 14 of this Lease.

29.3 **No Air Rights**. No rights to any view or to light or air over any property, whether belonging to Landlord or any other person, are granted to Tenant by this Lease. If at any time any windows of the Premises are temporarily darkened or the light or view therefrom is obstructed by reason of any repairs, improvements, maintenance or cleaning in or about the Project, the same shall be without liability to Landlord and without any reduction or diminution of Tenant's obligations under this Lease.

29.4 **Modification of Lease**. Should any current or prospective mortgagee or ground lessor for the Building or Project require a modification of this Lease, which modification will not cause an increased cost or expense to Tenant or in any other way materially and adversely change the rights and obligations of Tenant hereunder, then and in such event, Tenant agrees that this Lease may be so modified and agrees to execute whatever documents are reasonably required therefor and to deliver the same to Landlord within ten (10) business days following a request therefor.

29.5 **Transfer of Landlord's Interest**. Tenant acknowledges that Landlord has the right to transfer all or any portion of its interest in the Project or Building and in this Lease, and Tenant agrees that in the event of any such transfer, Landlord shall automatically be released from all liability under this Lease and Tenant agrees to look solely to such transferee for the performance of Landlord's obligations hereunder after the date of transfer and such transferee shall be deemed to have fully assumed and be liable for all obligations of this Lease to be performed by Landlord and Tenant shall attorn to such transferee.

29.6 **Prohibition Against Recording**. Landlord and Tenant agree not to record this Lease. Notwithstanding the preceding sentence to the contrary, at the request of either Landlord or Tenant, the parties shall execute a document in recordable form containing only such information as is necessary to constitute a Notice of Lease under Massachusetts law. All costs of preparation and recording such notice shall be borne by the party requesting the execution of such Notice of Lease. At the expiration or earlier termination of this Lease, Tenant shall provide Landlord with an executed termination of the Notice of Lease in recordable form, which obligation shall survive such expiration or earlier termination.

29.7 **Landlord's Title**. Landlord's title is and always shall be paramount to the title of Tenant. Nothing herein contained shall empower Tenant to do any act which can, shall or may encumber the title of Landlord.

29.8 **Relationship of Parties**. Nothing contained in this Lease shall be deemed or construed by the parties hereto or by any third party to create the relationship of principal and agent, partnership, joint venturer or any association between Landlord and Tenant.

29.9 **Application of Payments**. Landlord shall have the right to apply payments received from Tenant pursuant to this Lease, regardless of Tenant's designation of such payments, to satisfy any obligations of Tenant hereunder, in such order and amounts as Landlord, in its sole discretion, may elect.

29.10 **Time of Essence**. Time is of the essence with respect to the performance of every provision of this Lease in which time of performance is a factor.

29.11 **Partial Invalidity**. If any term, provision or condition contained in this Lease shall, to any extent, be invalid or unenforceable, the remainder of this Lease, or the application of such term, provision or condition to persons or circumstances other than those with respect to which it is invalid or unenforceable, shall not be affected thereby, and each and every other term, provision and condition of this Lease shall be valid and enforceable to the fullest extent possible permitted by law.

29.12 **No Warranty**. In executing and delivering this Lease, Tenant has not relied on any representations, including, but not limited to, any representation as to the amount of any item comprising Additional Rent or the amount of the Additional Rent in the aggregate or that Landlord is furnishing the same services to other tenants, at all, on the same level or on the same basis, or any warranty or any statement of Landlord which is not expressly set forth herein.

29.13 **Landlord Exculpation**. The liability of Landlord or the Landlord Parties to Tenant for any default by Landlord under this Lease or arising in connection herewith or with Landlord's operation, management, leasing, repair, renovation, alteration or any other matter relating to the Project or the Premises shall be limited solely and exclusively to an amount which is equal to the interest of Landlord in the Project. Neither Landlord, nor any of the Landlord Parties shall have any personal liability therefor, and Tenant hereby expressly waives and releases such personal liability on behalf of itself and all persons claiming by, through or under Tenant. The limitations of liability contained in this Section 29.13 shall inure to the benefit of Landlord's and the Landlord Parties' present and future partners, beneficiaries, officers, directors, trustees, shareholders, agents and employees, and their respective partners, heirs, successors and assigns. Under no circumstances shall any present or future partner of Landlord (if Landlord is a partnership), or trustee or beneficiary (if Landlord or any partner of Landlord is a trust), have any liability for the performance of Landlord's obligations under this Lease. Notwithstanding any contrary provision herein, neither Landlord nor the Landlord Parties shall be liable under any circumstances for consequential or indirect damages, including without limitation injury or damage to, or interference with, Tenant's business, loss of profits, loss of rents or other revenues, loss of business opportunity, loss of goodwill or loss of use, in each case, however occurring.

29.14 **Entire Agreement**. It is understood and acknowledged that there are no oral agreements between the parties hereto affecting this Lease and this Lease constitutes the parties' entire agreement with respect to the leasing of the Premises and supersedes and cancels any and all previous negotiations, arrangements, brochures, agreements and understandings, if any, between the parties hereto or displayed by Landlord to Tenant with respect to the subject matter thereof, and none thereof shall be used to interpret or construe this Lease. None of the terms, covenants, conditions or provisions of this Lease can be modified, deleted or added to except in writing signed by the parties hereto.

29.15 **REIT**. Tenant acknowledges that the Company, an affiliate of Landlord, elects to be taxed as a real estate investment trust (a "**REIT**") under the Code. Tenant hereby agrees to modifications of this Lease required to retain or clarify the Company's status as a REIT, provided such modifications: (a) are reasonable, (b) do not adversely affect in a material manner Tenant's use of the Premises as herein permitted, and (c) do not increase the Base Rent, Additional Rent and other sums to be paid by Tenant or Tenant's other obligations pursuant to this Lease, or reduce any rights of Tenant under this Lease, then Landlord may submit to Tenant an amendment to this Lease incorporating such required modifications, and Tenant shall execute, acknowledge and deliver such amendment to Landlord within ten (10) days after Tenant's receipt thereof.

29.16 **Right to Lease**. Landlord reserves the absolute right to effect such other tenancies in the Project as Landlord in the exercise of its sole business judgment shall determine to best promote the interests of the Building or Project. Tenant does not rely on the fact, nor does Landlord represent, that any specific tenant or type or number of tenants shall, during the Lease Term, occupy any space in the Building or Project.

29.17 **Force Majeure**. Any prevention, delay or stoppage due to strikes, lockouts, labor disputes, acts of God, acts of war, terrorist acts, governmental action or inaction, inability to obtain services, labor, or materials or reasonable substitutes therefor, governmental actions, civil commotions, fire or other casualty, and other causes beyond the reasonable control of the party obligated to perform, except with respect to the obligations imposed with regard to Rent and other charges to be paid by Tenant pursuant to this Lease (collectively, a "**Force Majeure**"), notwithstanding anything to the contrary contained in this Lease, shall excuse the performance of such party for a period equal to any such prevention, delay or stoppage and, therefore, if this Lease specifies a time period for performance of an obligation of either party, that time period shall be extended by the period of any delay in such party's performance caused by a Force Majeure.

29.18 **Notices**. All notices, demands, statements, designations, approvals or other communications (collectively, "**Notices**") given or required to be given by either party to the other hereunder or by law shall be in writing, shall be (A) sent by United States certified or registered mail, postage prepaid, return receipt requested ("**Mail**"), (B) delivered by a nationally recognized overnight courier, or (D) delivered personally. Any Notice shall be sent, transmitted, or delivered, as the case may be, to Tenant at the appropriate address set forth in Section 11 of the Summary, or to such other place as Tenant may from time to time designate in a Notice to Landlord, and to Landlord at the addresses set forth below, or to such other places as Landlord may from time to time designate in a Notice to Tenant. Any Notice will be deemed given (i) three (3) days after the date it is posted if sent by Mail, (ii) the date the overnight courier delivery is made, or (iii) the date personal delivery is made. As of the date of this Lease, any Notices to Landlord must be sent, transmitted, or delivered, as the case may be, to the following addresses:

Bedford Patriots Park, LLC
c/o Longfellow Real Estate Partners
260 Franklin Street, Suite 1920
Boston, MA 02110
Attention: Asset Management

and

DLA Piper LLP (US)
33 Arch Street
Boston, MA 02110
Attention: Geoff Howell, Esq.

29.19 **Joint and Several**. If there is more than one Tenant, the obligations imposed upon Tenant under this Lease shall be joint and several.

29.20 **Authority**. If Tenant is a corporation, trust or partnership, Tenant hereby represents and warrants that Tenant (a) is a duly formed and existing entity qualified to do business in the State of Delaware and is qualified as a foreign entity authorized to do business in The Commonwealth of Massachusetts and (b) has full right and authority to execute and deliver this Lease, and (c) each person signing on behalf of Tenant is authorized to do so.

29.21 **Attorneys' Fees**. In the event that either Landlord or Tenant should bring suit for the possession of the Premises, for the recovery of any sum due under this Lease, or because of the breach of any provision of this Lease or for any other relief against the other, then all costs and expenses, including reasonable attorneys' fees, incurred by the prevailing party therein shall be paid by the other party.

29.22 **Governing Law; WAIVER OF TRIAL BY JURY**. This Lease shall be construed and enforced in accordance with the laws of The Commonwealth of Massachusetts. Landlord and Tenant waive trial by jury in any action to which they are parties, and further agree that any action arising out of this Lease (except an action for possession by Landlord, which may be brought in whatever manner or place provided by law) shall be brought in the Trial Court, Superior Court Department, in the county where the Premises are located.

29.23 **Submission of Lease**. Submission of this instrument for examination or signature by Tenant does not constitute a reservation of, option for or option to lease, and it is not effective as a lease or otherwise until execution and delivery by both Landlord and Tenant.

29.24 **Brokers**. Landlord and Tenant hereby warrant to each other that they have had no dealings with any real estate broker or agent in connection with the negotiation of this Lease, excepting only the real estate brokers or agents specified in Section 13 of the Summary (the "**Brokers**"), and that they know of no other real estate broker or agent who is entitled to a commission in connection with this Lease. Each party agrees to indemnify and defend the other party against and hold the other party harmless from any and all claims, demands, losses, liabilities, lawsuits, judgments, costs and expenses (including without limitation reasonable attorneys' fees) with respect to any leasing commission or equivalent compensation alleged to be owing on account of any dealings with any real estate broker or agent, other than the Brokers, occurring by, through, or under the indemnifying party. The terms of this Section 29.24 shall survive the expiration or earlier termination of the Lease Term. Landlord shall pay a commission to the Brokers pursuant to a separate written agreement between Landlord and the Brokers.

29.25 **Project or Building Name, Address and Signage**. Landlord shall have the right at any time to change the name and/or address of the Project or Building and to install, affix and maintain any and all signs on the exterior and on the interior of the Project or Building as Landlord may, in Landlord's sole discretion, desire. Tenant shall not use the name of the Project or Building or use pictures or illustrations of the Project or Building in advertising or other publicity or for any purpose other than as the address of the business to be conducted by Tenant in the Premises, without the prior written consent of Landlord.

29.26 **Counterparts**. This Lease may be executed in counterparts with the same effect as if both parties hereto had executed the same document. Both counterparts shall be construed together and shall constitute a single lease. Delivery by fax or by electronic mail file attachment of any executed counterpart to this Lease will be deemed the equivalent of the delivery of the original executed instrument.

29.27 **Confidentiality**. Tenant acknowledges that the content of this Lease, any information regarding the Building or Project received from Landlord, and any related documents are confidential information. Tenant shall keep such confidential information strictly confidential and shall not disclose such confidential information to any person or entity other than Tenant's financial, legal, and space planning consultants on a 'need to know' basis, provided that such other parties are made aware of Tenant's obligations under this Section 29.27 and Tenant shall be responsible for any disclosure by such parties in violation of this paragraph.

29.28 **Development of the Project**.

29.28.1 **Subdivision**. Landlord reserves the right to subdivide all or a portion of the Building or Project. Tenant agrees to execute and deliver, upon demand by Landlord and in the form requested by Landlord, any additional documents needed to conform this Lease to the circumstances resulting from a subdivision and any all maps in connection therewith. Notwithstanding anything to the contrary set forth in this Lease, the separate ownership of any buildings and/or Common Areas by an entity other than Landlord shall not affect the calculation of Direct Expenses or Tenant's payment of Tenant's Share of Direct Expenses.

29.28.2 **Construction of Property and Other Improvements**. Tenant acknowledges that portions of the Project may be under construction following Tenant's occupancy of the Premises, and that such construction may result in levels of noise, dust, obstruction of access, etc. which are in excess of that present in a fully constructed project. Tenant hereby waives any and all rent offsets or claims of constructive eviction which may arise in connection with such construction. Landlord shall use commercially reasonable efforts to mitigate the impact of such noise, dust, obstruction, etc. and such construction shall not unreasonably interfere with Tenant's use of and access to the Premises.

29.29 **No Violation**. Tenant hereby warrants and represents that neither its execution of nor performance under this Lease shall cause Tenant to be in violation of any agreement, instrument, contract, law, rule or regulation by which Tenant is bound, and Tenant shall protect, defend, indemnify and hold Landlord harmless against any claims, demands, losses, damages, liabilities, costs and expenses, including, without limitation, reasonable attorneys' fees and costs, arising from Tenant's breach of this warranty and representation.

29.30 **Communications and Computer Lines**. Tenant may install, maintain, replace, remove or use any communications or computer wires and cables serving the Premises (collectively, the "**Lines**"), provided that Tenant shall obtain Landlord's prior written consent (which consent shall not be unreasonably withheld, conditioned or delayed), use an experienced and qualified contractor approved in writing by Landlord, and comply with all of the other provisions of Articles 7 and 8 of this Lease. Tenant shall pay all costs in connection therewith. Landlord reserves the right, upon notice to Tenant prior to the expiration or earlier termination of this Lease, to require that Tenant, at Tenant's sole cost and expense, remove any Lines located in or serving the Premises prior to the expiration or earlier termination of this Lease.

29.31 **Intentionally Omitted**.

29.32 **Rooftop and Outdoor Rights**.

29.32.1 **Grant of Rights**. For so long as the Premises consists of at least 67,165 rentable square feet, Landlord grants Tenant the appurtenant, exclusive, and irrevocable (except upon the expiration or earlier termination of this Lease, or as otherwise provided in this Section 29.32) license at no additional charge (other than to the extent included in Operating Expenses), but otherwise subject to the terms and conditions of this Lease, to: (a) use a portion of the roof of the Building reasonably agreed to by Landlord (the "**Rooftop Installation Area**") to operate, maintain, repair, and replace reasonable amounts of telecommunications and mechanical equipment for Tenant's own use, such as supplemental HVAC equipment, satellite dishes, microwave dishes, antennas and the like (collectively, "**Rooftop Equipment**"), appurtenant to the Permitted Uses and installed as part of Tenant Improvements or otherwise as permitted pursuant to Article 8; (b) use that portion of the land outside the Building marked on **Exhibit 29.32.1** as "N Tank" (the "**Nitrogen Tank Area**") to operate, maintain, repair, and replace a liquid nitrogen tank and related appurtenances (collectively, the "**Nitrogen Tank**")

of a size reasonably approved by Landlord for Tenant's own use, appurtenant to the Permitted Uses and installed as part of Tenant Improvements or otherwise as permitted pursuant to Article 8; and (c) use that portion of the land outside the Building marked on Exhibit 29.32.1 as "Gen." (the "**Generator Area**") to operate, maintain, repair, and replace an emergency electric generator (the "**Generator**") of a size reasonably approved by Landlord for Tenant's own use, appurtenant to the Permitted Uses and installed as part of Tenant Improvements or otherwise as permitted pursuant to Article 8. Together, the Rooftop Equipment, the Nitrogen Tank, and the Generator Area are referred to herein as "**Exterior Equipment**." Together, the Rooftop Installation Area, the Nitrogen Tank Area, and the Generator Area are referred to herein as the "**Exterior Areas**."

29.32.2 **Installation and Maintenance of Rooftop Equipment, Nitrogen Tank, and Generator**. Tenant shall install Exterior Equipment, if any, at its sole cost and expense, at such times and in such manner as Landlord may reasonably designate and in accordance with all of the provisions of this Lease, including without limitation Article 8. Under no circumstance shall installation, modification, or removal of Exterior Equipment (including appurtenances such as fencing or barriers) be considered Minor Alterations. Tenant shall not install or operate Exterior Equipment until it receives prior written approval of the plans for such work in accordance with Article 8. Prior to either Landlord or Tenant commencing the installation of Exterior Equipment, Tenant shall provide Landlord with copies of all required permits, licenses and authorizations that Tenant will obtain at its own expense and that Tenant will maintain at all times during the operation of such Exterior Equipment. Landlord may withhold approval if the installation or operation of any Exterior Equipment reasonably would be expected to damage the structural integrity of the Building. Tenant shall maintain any Exterior Equipment in compliance with all Applicable Laws, including any municipal noise ordinance. Tenant shall cooperate with Landlord as reasonably required to accommodate any building or grounds work (including re-roofing of the Building) during the Lease Term and Tenant shall be responsible for any costs associated with working around, moving or temporarily relocating Tenant's Exterior Equipment. Tenant's access to the rooftop for the purposes of exercising its rights and obligations under this Section 29.32 shall be limited to normal building hours by prior appointment with the property manager, except in the case of emergencies threatening life or personal property. Tenant shall engage Landlord's roofer (provided the charges of Landlord's roofer are competitive in the marketplace) before beginning any rooftop installations or repairs of Rooftop Equipment, whether under this Section 29.32 or otherwise, and shall always comply with the roof warranty governing the protection of the roof and modifications to the roof. Tenant shall obtain a letter from Landlord's roofer following completion of such work stating that the roof warranty remains in effect. Tenant, at its sole cost and expense, shall cause a qualified contractor to inspect the Rooftop Installation Area as frequently as consistent with applicable laws and best practices observed by other users of equipment of similar size, function, and manner of installation as the Rooftop Equipment, but in no event less frequently than once per calendar month; shall correct any loose bolts, fittings or other appurtenances; and shall repair any damage to the roof caused by the installation or operation of Rooftop Equipment. Tenant, at its sole cost and expense, shall cause a qualified contractor to inspect each of the Nitrogen Tank Area and the Generator Area as frequently as consistent with applicable laws and best practices observed by other users of equipment of similar size, function, and manner of installation as the applicable element of Exterior Equipment, but in no event less frequently than once per calendar month; shall correct any loose bolts, fittings or other appurtenances related to the applicable Exterior Equipment and shall repair any damage to the areas surrounding the Nitrogen Tank Area and/or the Generator Area caused by the installation or operation of the Exterior Equipment or its appurtenances. Tenant shall pay Landlord following a written request therefor, with the next payment of Rent, (i) all applicable taxes or governmental charges, fees, or impositions imposed on Landlord because of Tenant's use of the Exterior Areas and (ii) the amount of any increase in Landlord's insurance premiums as a result of the installation of any Exterior Equipment. All Rooftop Equipment shall be screened or otherwise designed so that it is not visible from the ground level of the Project. The Nitrogen Tank and Generator shall be fenced in or otherwise protected in accordance with best practices observed by other users of similarly-sized equipment with similar functions in the Lexington and Bedford, Massachusetts area.

29.32.3 **Indemnification**. Tenant agrees that the installation, operation and removal of Exterior Equipment shall be at its sole risk. Tenant shall indemnify and defend Landlord and the other Indemnitees against any liability, claim or cost, including reasonable attorneys' fees, incurred in connection with the loss of life, personal injury, damage to property or business or any other loss or injury (except to the extent due to the negligent act or omission or willful misconduct of Landlord or its employees, agents or contractors) arising out of the installation, use, operation, or removal of Exterior Equipment by Tenant or its employees, agents, or contractors, including any liability arising out of Tenant's violation of this Section 29.32. Landlord assumes no responsibility for interference in the operation of Exterior Equipment caused by other tenants' equipment, or for interference in the operation of other tenants' equipment caused by the Exterior Equipment, and Tenant hereby waives any claims against Landlord arising from such interference. The provisions of this paragraph shall survive the expiration or earlier termination of this Lease.

29.32.4 **Removal of Exterior Equipment**. Upon the expiration or earlier termination of the Lease, Tenant, unless and to the extent otherwise instructed by Landlord in writing, at Tenant's sole cost and expense, shall remove Exterior Equipment from the Exterior Areas in accordance with the provisions of this Lease; and (ii) leave each of the Exterior Areas in good order and repair (including returning the Exterior Areas to parking use, if applicable), reasonable wear and tear and damage by casualty that is not the responsibility of Tenant to restore excepted. If Tenant does not remove Exterior Equipment and restore the Exterior Areas when so required, Landlord may remove and dispose of such appurtenances and personal property and charge Tenant for all costs and expenses incurred.

29.32.5 **Interference by Rooftop Equipment**. Landlord may have granted and may hereafter grant roof rights to other parties in other locations on the roof of the Building that are not included within the Rooftop Installation Area, and Landlord shall use commercially reasonable efforts to cause such other parties to minimize interference with Rooftop Equipment. If Rooftop Equipment (i) causes physical damage to the structural integrity of the Building, (ii) materially interferes with any telecommunications, mechanical or other systems located at or servicing (as of the Commencement Date) the Building or any building, premises or location in the vicinity of the Building, (iii) interferes with any other service provided to other tenants in the Building by rooftop installations installed prior to the installation of Rooftop Equipment or (iv) interferes with any other tenants' business, in each case in excess of that permissible under F.C.C. or other regulations (to the extent that such regulations apply and do not require such tenants or those providing such services to correct such interference or damage), Tenant shall within five (5) business days of notice of a claim of interference or damage cooperate with Landlord or any other tenant or third party making such claim to determine the source of the damage or interference and effect a prompt solution at Tenant's expense (if Rooftop Equipment caused such interference or damage). In the event Tenant disputes Landlord's allegation that Rooftop Equipment is causing a problem with the Building (including, but not limited to, the electrical, HVAC, and mechanical systems of the Building) and/or any other Building tenants' equipment in the Building, in writing delivered within five (5) business days of receiving Landlord's notice claiming such interference, then Landlord and Tenant shall meet to discuss a solution, and if within seven (7) days of their initial meeting Landlord and Tenant are unable to resolve the dispute, then the matter shall be submitted to arbitration in accordance with the provisions set forth below. The parties shall direct the Boston office of the AAA to appoint an arbitrator who shall have a minimum of ten (10) years' experience in commercial real estate disputes and who shall not be affiliated with either Landlord or Tenant. Both Landlord and Tenant shall have the opportunity to present evidence and outside

consultants to the arbitrator. The arbitration shall be conducted in accordance with the expedited commercial real estate arbitration rules of the AAA insofar as such rules are not inconsistent with the provisions of this Lease (in which case the provisions of this Lease shall govern). The cost of the arbitration (exclusive of each party's witness and attorneys' fees, which shall be paid by such party) shall be borne equally by the parties. Within ten (10) days of appointment, the arbitrator shall determine whether or not Rooftop Equipment is causing a problem with the Building and/or the equipment of any other Building tenant, and the appropriate resolution, if any. The arbitrator's decision shall be final and binding on the parties. If Tenant shall fail to cooperate with Landlord in resolving any such interference or if Tenant shall fail to implement the arbitrator's decision within ten (10) days after it is issued, Landlord may at any time thereafter (i) declare a default and/or (ii) relocate the item(s) of Rooftop Equipment in dispute in a manner consistent with the arbitral decision.

29.32.6 **Relocation of Exterior Equipment**. Based on Landlord's good faith determination that such relocation is reasonably necessary, Landlord reserves the right to cause Tenant to relocate Exterior Equipment to comparably functional space by giving Tenant prior notice of such intention to relocate. If within thirty (30) days after receipt of such notice Tenant has not agreed with Landlord on the space to which such Exterior Equipment is to be relocated, the timing of such relocation, and the terms of such relocation, then Landlord shall have the right to make all such determinations in its reasonable judgment. Landlord agrees to pay the reasonable cost of moving Exterior Equipment to such other space, taking such other steps necessary to ensure comparable functionality of the applicable Exterior Equipment, and finishing such space to a condition comparable to the location of such Exterior Equipment immediately preceding such relocation. Such payment by Landlord shall not constitute an Operating Expense under this Lease. Tenant shall arrange for the relocation of the applicable Exterior Equipment within sixty (60) days after a comparable space is agreed upon or selected by Landlord, as the case may be. In the event Tenant fails to arrange for said relocation within the sixty- (60-) day period, Landlord shall have the right to arrange for the relocation of such Exterior Equipment at Landlord's expense, all of which shall be performed in a manner designed to minimize interference with Tenant's business.

29.32.7 **Ownership of Exterior Equipment**. During the Term of the Lease, the Exterior Equipment shall be treated as Tenant's personal property for all purposes. Upon the expiration or earlier termination of the Lease, the Exterior Equipment shall, unless otherwise elected by Landlord in writing, become the property of Landlord. If Landlord elects to have Tenant remove all or any portion of the Exterior Equipment from the Property, Tenant, at Tenant's sole cost and expense, shall (i) remove the Exterior Equipment from the applicable Exterior Area in accordance with the provisions of this Lease and (ii) leave the applicable Exterior Area in good order and repair, reasonable wear and tear excepted. If Landlord elects to have Tenant remove an element of Exterior Equipment, then Landlord may, at Tenant's expense, require environmental testing by a consultant and with a scope of work reasonably acceptable to Landlord to determine if there has been a release of oil or hazardous substances with respect to the use by Tenant of the Exterior Equipment or the storage of any materials in connection therewith by Tenant. If the environmental report determines that an Environmental Condition (as hereinafter defined) exists in the vicinity of the Exterior Area involving oil or hazardous substances of the type used in connection therewith, and Tenant does not reasonably demonstrate that the Environmental Condition was caused by a party other than Tenant, its agents, employees or contractors, then Tenant shall further investigate and remediate the affected area and be responsible for complying with all applicable environmental laws in connection therewith. If Landlord determines that additional environmental testing is necessary to verify that the Environmental Condition has been fully remediated, then Tenant shall reimburse Landlord for the cost associated therewith. If Tenant does not remove any item of Exterior Equipment when so required, upon notice and ten (10) days to cure, such Exterior Equipment shall become Landlord's property and, at Landlord's election, Landlord may

remove and dispose of the applicable Exterior Equipment and charge Tenant for all costs and expenses incurred as Additional Rent. An "**Environmental Condition"** shall mean the presence of any oil or hazardous substances that require investigation, removal, or remediation under any of applicable environmental laws. The provisions of this paragraph shall survive the expiration or earlier termination of the Lease.

29.33 **Shared Special Systems**. In connection with Tenant's Initial Improvements, Tenant may, but shall not be required to, install any of the following systems serving the Premises, subject to the provisions of the Work Letter and Article 8 of this Lease: pH neutralization system, emergency generator, central vacuum, compressed air, and RO water system (each, a "**Special System**"). At such time as Tenant requests Landlord approval for Tenant's Initial Improvements indicating that Tenant intends to install a Special System, Landlord shall have the right, if Landlord approves of the plans and specifications for such Special System in accordance with the terms of this Lease, to treat such Special System as a common system serving other tenants of the Building in addition to Tenant by notice given to Tenant contemporaneously with the approval of such plans. In the event that Landlord elects to treat any such Special System as a common system, (a) the procurement, design, and construction contracts for any such Special System shall be subject to Landlord approval; (b) Landlord shall obtain the general operating permits (as distinguished from building permits, certificates of occupancy, and other installation permits applicable to Alterations), if any, required for the installation and use of the applicable Special System by tenants at the Building generally in Landlord's own name, and Tenant shall be responsible for obtaining (with the cooperation of Landlord, but without any obligation for Landlord to incur out-of-pocket expenses) any amendments to such permit that may be required from time to time for Tenant's particular use; and (c) Landlord shall reimburse Tenant for Landlord's proportionate share of the actual out of pocket costs incurred by Tenant to design and install such Special System, calculated based on the rentable square footage of the Premises and the rentable square footage of the Building exclusive of the Premises to be served by such system, as determined by Landlord. Such reimbursements shall be made as work on such Special System progresses, in each case in accordance with the disbursement procedures set forth in the Work Letter with respect to the Tenant Improvement Allowance (as if the amount to be contributed by Landlord were Tenant Improvement Allowance) and a budget approved by Landlord. The work to design and construct the Special System shall be documented by a change order (prepared on a time and materials, not-to-exceed basis) to Tenant's design and construction contracts so that it is separately accounted for from all other Initial Tenant Improvements. Landlord shall have the right to review the books and records for the construction of the Tenant's Initial Improvements to confirm that any such costs were properly allocated and such work shall be performed on an "open book" basis. Upon such time, if any, as Landlord connects another tenant to a Special System, Landlord shall assume responsibility for the operation and maintenance of such Special System, Tenant shall assign all warranties to the Special System to Landlord, and the portion of the Premises containing the Special System shall be eliminated from the Premises, without affecting any other terms or conditions of the Lease, which change shall be documented in an amendment to this Lease prepared by Landlord.

29.33.1 Upon Landlord's assumption of responsibility, if any, for any Special System, the following provisions shall apply:

(1) Tenant's use of such Special System(s) shall be at Tenant's sole risk to the extent permitted pursuant to Applicable Laws (Landlord making no representation or warranty regarding the sufficiency of such Special System(s)for Tenant's use, Tenant acknowledging that it shall have designed and constructed the same);

(2) Tenant's use of such Special System(s) shall be undertaken by Tenant in compliance with all Applicable Laws, including Environmental Laws, and Tenant shall obtain (in cooperation with Landlord, but without any obligation on the part of Landlord to incur out-of-pocket costs), any and all permits required in connection with such use;

(3) Tenant acknowledges that Landlord may discontinue one or more of such Special System(s) at Landlord's election by prior written notice given to Tenant at least 30 days in advance. If Landlord elects to discontinue any such service, then Landlord shall provide Tenant with a location mutually agreeable to Landlord and Tenant for Tenant to install its an alternate system for Tenant's exclusive use on the terms and conditions set forth in Article 8 of this Lease;

(4) The costs to operate and maintain such Special System(s) shall be included in Operating Expenses. Tenant use of such Special System(s) shall not exceed Tenant's Share of the capacity available to tenants of any such Special System;

(5) The use of such Special System(s) shall be subject to the Rules and Regulations.

(6) Tenant acknowledges and agrees that there are no warranties of any kind, whether express or implied, made by Landlord or otherwise with respect to such Special System(s) or any services (if any) provided in such Special System(s), and Tenant disclaims any and all such warranties.

(7) Tenant's sole remedy for any breach or default by Landlord under this Section 29.33 beyond applicable notice and cure periods shall be to terminate its use of the Special System in question, and Tenant hereby, to the maximum extent possible, knowingly waives the provisions of any law or regulation, now or hereafter in effect that provides additional or other remedies to Tenant as a result of any breach by Landlord hereunder or under any such law or regulation.

29.34 **Trash Compactor**. In connection with Tenant's Initial Improvements, Tenant may, but shall not be required to, install a trash compactor (the "**Trash Compactor**") in a location determined by Landlord, subject to the provisions of the Work Letter and Article 8 of this Lease. Tenant shall install the Trash Compactor, if any, at its sole cost and expense, at such times and in such manner as Landlord may reasonably designate and in accordance with all of the provisions of this Lease, including without limitation Article 8. Tenant shall not install or operate the Trash Compactor until it receives prior written approval of the plans for such work in accordance with the provisions applicable to Initial Tenant Improvements. Prior to commencing the installation of the Trash Compactor, Tenant shall provide Landlord with copies of all required permits, licenses and authorizations, which Tenant shall have obtained at its own expense. The procurement, design, and construction contracts for any such Trash Compactor shall be subject to Landlord approval, and Landlord shall reimburse Tenant for Landlord's proportionate share of the actual out of pocket costs incurred by Tenant to design and install such Trash Compactor, calculated based on the rentable square footage of the Premises and the rentable square footage of the Building exclusive of the Premises to be served by the Trash Compactor, as determined by Landlord. Such reimbursements shall be made following installation of the Trash Compactor, in accordance with the disbursement procedures set forth in the Work Letter with respect to the Tenant Improvement Allowance (as if the amount to be contributed by Landlord were Tenant Improvement Allowance) and a budget approved by Landlord. The work to obtain and install the Trash Compactor shall be documented by a change order (prepared on a time and materials, not-to-exceed basis) to Tenant's design and construction contracts so that it is separately accounted for from all other Initial Tenant Improvements. Landlord shall have the right to review the books and records for the

construction of the Tenant's Initial Improvements to confirm that any such costs were properly allocated and such work shall be performed on an "open book" basis. Upon the completion of the installation of the Trash Compactor, Landlord shall assume responsibility for the operation and maintenance of the Trash Compactor and Tenant shall assign all warranties to the Trash Compactor to Landlord.

29.34.1 Upon Landlord's assumption of responsibility for any Trash Compactor, the following provisions shall apply:

(1) Tenant's use of such Trash Compactor shall be at Tenant's sole risk to the extent permitted pursuant to Applicable Laws (Landlord making no representation or warranty regarding the sufficiency of such Trash Compactor for Tenant's use, Tenant acknowledging that it shall have procured and installed the same);

(2) Tenant's use of such Trash Compactor shall be undertaken by Tenant in compliance with all Applicable Laws, including Environmental Laws, and Tenant shall obtain any and all permits required in connection with such use;

(3) Tenant acknowledges that Landlord may discontinue the availability of the Trash Compactor at Landlord's election by prior written notice given to Tenant at least 30 days in advance. If Landlord elects to discontinue any such service, then Landlord shall provide Tenant with a location mutually agreeable to Landlord and Tenant for Tenant to install its an alternate system for Tenant's exclusive use on the terms and conditions set forth in Article 8 of this Lease;

(4) The costs to operate and maintain the Trash Compactor shall be included in Operating Expenses. Tenant use of such Trash Compactor shall not exceed Tenant's Share of the capacity available to tenants of any such Trash Compactor;

(5) The use of such Trash Compactor shall be subject to the Rules and Regulations.

(6) Tenant acknowledges and agrees that there are no warranties of any kind, whether express or implied, made by Landlord or otherwise with respect to such Trash Compactor, and Tenant disclaims any and all such warranties.

29.35 Tenant's sole remedy for any breach or default by Landlord under this Section 29.34 beyond applicable notice and cure periods shall be to terminate its use of the Trash Compactor, and Tenant hereby, to the maximum extent possible, knowingly waives the provisions of any law or regulation, now or hereafter in effect that provides additional or other remedies to Tenant as a result of any breach by Landlord hereunder or under any such law or regulation.

[SIGNATURES ON FOLLOWING PAGE]

IN WITNESS WHEREOF, Landlord and Tenant have caused this Lease to be executed the day and date first above written as a sealed Massachusetts instrument.

LANDLORD:

BEDFORD PATRIOTS PARK, LLC,
a Delaware limited liability company

By: /s/ Jamison N. Peschel
Name: Jamison N. Peschel
Its: Authorized Signatory

TENANT:

HOMOLOGY MEDICINES , INC.,
a _____ corporation

By: /s/ Arthur Tzianabos
Name: Arthur Tzianabos
Its: CEO

By: /s/ Brad Smith
Name: Brad Smith
Its: CFO

EXHIBIT 1.1.1-1

PREMISES

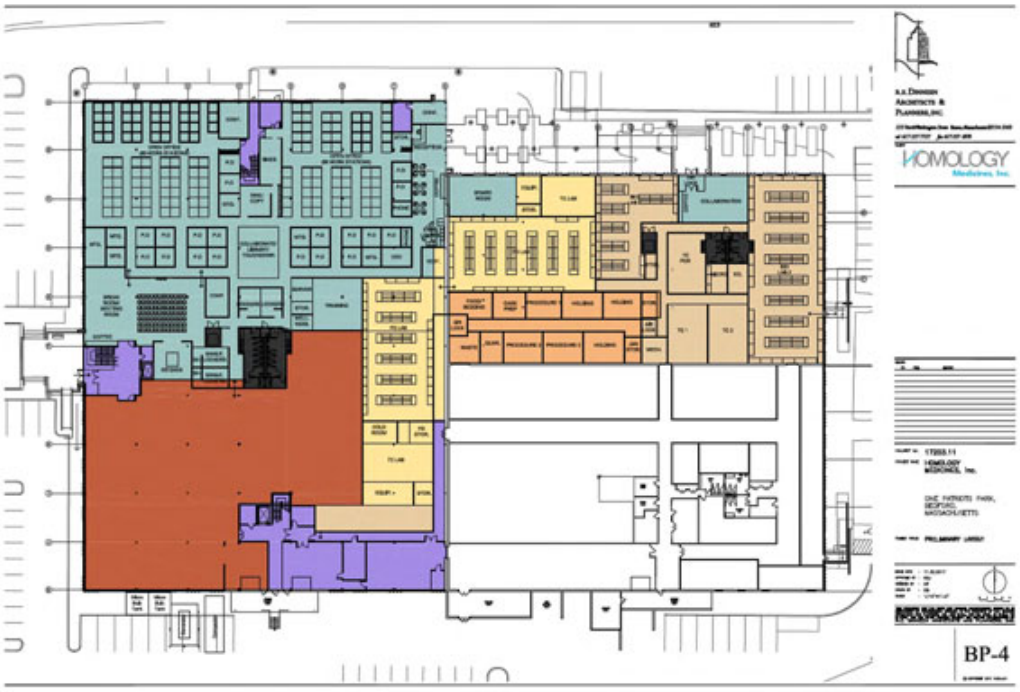


EXHIBIT 1.1.1-2

TENANT WORK LETTER

This Tenant Work Letter sets forth the terms and conditions relating to the construction of the initial tenant improvements in the Premises ("**Initial Tenant Improvements**"). This Tenant Work Letter is essentially organized chronologically and addresses the issues of the construction of the Initial Tenant Improvements, in sequence, as such issues will arise during the actual construction of such improvements. All references in this Tenant Work Letter to Articles or Sections of "this Lease" shall mean the relevant portion of the Lease to which this Tenant Work Letter is attached as Exhibit 1.1.1-2 and of which this Tenant Work Letter forms a part, and all references in this Tenant Work Letter to Sections of "this Tenant Work Letter" shall mean the relevant portion of this Tenant Work Letter.

1. (a) Landlord, at Landlord's expense (not to exceed $6,716.50), shall provide the services of Landlord's architect to create an initial fit plan for the Premises (the "**Fit Plan**"). Tenant shall cause to be prepared by R.E. Dinneen, or another architect approved by Landlord in Landlord's reasonable discretion, at Tenant's sole cost and expense ("**Tenant's Architect**"), and Tenant shall submit to Landlord, for Landlord's review and approval, detailed plans, working drawings and detailed specifications of the Tenant Improvements (including, if Tenant so desires and Landlord determines that such installation is feasible, the installation of an additional exhaust shaft near the "back stairway" of the Building in a location designated by Landlord or in another location acceptable to Landlord, which if so constructed, shall be deemed a part of the Premises for all purposes under the Lease) ("**Tenant's Plans**"), which Tenant's Plans shall be (i) substantially in conformance with the Fit Plan, (ii) in proper form for submission by Tenant in connection with Tenant's pursuit of Tenant's Permits (as defined herein) as set forth below and (iii) in compliance with all applicable provisions of this Lease. The submission of Tenant's Plans to Landlord in accordance with the previous sentence shall occur at a mutually agreed-upon time, but in no event later than 90 days following the Effective Date. Landlord's approval of Tenant's Plans ("**Landlord's Approval**") shall not be deemed to be an agreement by Landlord that Tenant's Plans or the work described therein are in compliance with any Applicable Laws, nor shall such approval impose any liability on Landlord. Within fifteen (15) days of its receipt of Tenant's Plans in the form and manner provided for herein, Landlord will respond to Tenant with either Landlord's Approval or with a statement of any deficiencies in Tenant's Plans. Tenant shall retain (a) Landlord's mechanical, plumbing and electrical engineer for the Building, (b) DPS Engineering, or (c) another engineer approved by Landlord in Landlord's sole discretion. Tenant shall reimburse Landlord for actual costs incurred by Landlord in connection with its review of Tenant's Plans which amount shall not exceed $5,000.00. Under no circumstances shall Tenant begin construction of any portion of the Tenant Improvements until Tenant's Plans have been approved by Landlord and Tenant's Permits (as defined herein) are in effect.

(b) Within ten (10) days following Landlord's Approval, Tenant shall apply for, and thereafter use reasonable efforts to obtain, all necessary governmental permits and approvals for the Tenant Improvements and all other governmental permits and approvals as shall be necessary in order for Tenant to promptly open and operate the Premises for the Permitted Use as required herein (collectively, "**Tenant's Permits**"). No plans and/or specifications shall be filed or submitted to any governmental authority in connection with Tenant's Permits without Tenant's first having obtained Landlord's approval of the same. Landlord agrees to cooperate with and provide reasonable assistance to Tenant in connection with Tenant's pursuit of Tenant's Permits, provided that Landlord shall have no obligation to incur any out-of-pocket cost or expense in connection therewith. Tenant shall keep Landlord reasonably apprised of the progress of Tenant's Permits, including without limitation Tenant's promptly providing Landlord with copies of all applications, submissions and correspondence given or received in connection with Tenant's Permits. Upon the issuance of any Tenant's Permits and the expiration of any applicable appeal period(s) applicable thereto without any appeal having been filed (the "**Permits Date"),** Tenant shall immediately notify Landlord thereof, which notice shall include copies of Tenant's Permits.

2. (a) Tenant shall, at its expense, in accordance with the terms and conditions of this Exhibit 1.1.1-2, be responsible for the construction of all improvements and alterations necessary to prepare the Premises to conform with Tenant's Plans (all such construction and related work, the "**Tenant Improvements**"). Tenant shall commence the Tenant Improvements promptly following the Permits Date and thereafter promptly prosecute the same to completion and in accordance with a schedule that shall have been submitted to and approved by Landlord in its reasonable discretion prior to the commencement of the Tenant Improvements, but in any event Tenant shall achieve Substantial Completion of the Tenant Improvements no later than the day that is twelve (12) months following the Permits Date. The term "**Substantial Completion**" shall mean when Tenant has obtained a final certificate of occupancy with respect to the Premises and Tenant Improvements in accordance with the terms and conditions of this Exhibit 1.1.1-2 and with the provisions of Article 8 of the Lease. Landlord shall have the right to attend all design and construction project meetings for the Tenant Improvements and Tenant shall provide Landlord with at least two (2) business days' prior written notice of the date, time and location of such meetings.

(b) Tenant shall select a contractor (the "**Contractor**"), subject to the approval of Landlord, which approval will not be unreasonably withheld and shall be granted or denied within fifteen (15) calendar days of request for such approval. With its request for approval of the Contractor, Tenant shall furnish to Landlord such information concerning the proposed Contractor's background and experience as Landlord may reasonably require.

3. (a) Prior to the commencement of the Tenant Improvements, Tenant shall pay for and deliver to Landlord policies and certificates of insurance in amounts and with such companies as shall be reasonably satisfactory to Landlord, such as, but not limited to Public Liability, Property Damage and Workmen's Compensation, to protect Landlord and Tenant during the period of performing Tenant Improvements. Landlord and the Contractor shall be named as insured parties in such policies or certificates of insurance and the same shall remain in effect during the period of the performance of the Tenant Improvements.

(b) All of the Tenant Improvements shall be in accordance with all Applicable Laws, and all rules and regulations of any governmental department or bureau having jurisdiction thereover and shall not conflict with, or be incompatible with the Building and Building systems, and the Tenant Improvements shall be completed free of all liens and encumbrances.

(c) Upon Substantial Completion of the Tenant Improvements, Tenant will remove all debris and excess materials related to the Tenant Improvements from the Building and the Premises.

(d) Without limiting the applicability of Article 8 of this Lease, the labor employed by Tenant or the Contractor shall always be harmonious and compatible with the labor employed by Landlord or any contractors or sub-contractors of Landlord.

(e) In the event Tenant or the Contractor shall enter upon the Premises or any other part of the Building, as may be permitted by Landlord, Tenant shall indemnify and save Landlord free and harmless from and against any and all claims arising from or out of any entry thereon or the performance of the Tenant Improvements and from and against any and all claims arising from or claimed to arise from any act or neglect of Tenant or Tenant's representatives or from any failure to act, or for any other reason whatsoever arising out of said entry or such work.

4. Tenant hereby authorizes Michael Silver as Tenant's representative to act on its behalf and represent its interests with respect to all matters which pertain to the Tenant Improvements, and to make decisions binding upon Tenant with respect to such matters. Landlord hereby authorizes Jill Ratke to be Landlord's representative in connection with the Tenant Improvements. Tenant hereby expressly recognizes and agrees that no other person claiming to act on behalf of the Landlord is authorized to do so, and any costs, expenses liabilities or obligations incurred or paid by Tenant in reliance on the discretion of any such other person shall be Tenant's sole responsibility.

5. In the event of a conflict between the terms and provisions of the Lease and the terms and provisions of this Exhibit 1.1.1-2, the terms and provisions of this Exhibit 1.1.1-2 shall control.

6. All of the Tenant Improvements shall be performed in a good and workmanlike manner and in a way that does not disturb the occupancy of other tenants of the Building and shall conform to Applicable Laws and requirements of Landlord's underwriters. Landlord's approval of plans and specifications shall not constitute an acknowledgment that work done in conformity therewith will so conform. Tenant shall obtain and convey to Landlord approvals from all agencies with jurisdiction over matters relative to electrical, gas, water, heating and cooling, and telephone work; and shall secure its own building and occupancy permits including scheduled inspections.

7. (a) As used in this Section 7:

"**Tenant Improvement Allowance**" shall mean $10,853,864.00.

"**Landlord's Construction Funds**" shall mean the funds that constitute the Tenant Improvement Allowance.

(b) Following (1) the approval of Tenant's Plans, (2) the issuance of Tenant's Permits, and (3) Landlord's receipt of the documents and other materials described below, or other evidence reasonably requested by Landlord, and from time to time thereafter, Landlord shall make advances to Tenant of Landlord's Construction Funds. Landlord's Construction Funds may be advanced to fund the following costs incurred by Tenant in connection with the Tenant Improvements: (a) construction, (b) project management, (c) space planning, architect, engineering and other related services performed by third parties unaffiliated with Tenant, (d) building permits and other planning and inspection fees, (e) costs and expenses for labor, material, equipment and fixtures, (f) building permits and other taxes, fees, charges and levies by governmental authorities for permits or for inspections of the Tenant Improvements, and (g) a project management fee payable to Landlord or its affiliates equal to two percent (2%) of the Tenant Improvement Allowance (the "**Oversight Fee**"). In no event, however, shall the Landlord's Construction Funds be used for (w) payments to Tenant or any affiliates of Tenant, (x) the purchase of any furniture, personal property or other non-building system equipment, (y) costs resulting from any default by Tenant of its obligations under this Lease or (z) costs that are recoverable or reasonably recoverable by Tenant from a third party (e.g., insurers, warrantors, or tortfeasors). Landlord shall, subject to compliance with all of the other terms, conditions and provisions of the Lease, make disbursements of Landlord's Construction Funds (hereinafter, each a "**Disbursement**") to Tenant in no more than twelve (12) installments in accordance with the following conditions:

(i) Disbursements shall be made, at Tenant's request to Landlord, on the basis of written requests in accordance with the method described below, and Landlord shall act upon such requests within forty-five (45) business days following the receipt of a written request for each Disbursement, which action may include, without limitation, funding the requested Disbursement, or specifying the basis for not funding (provided, however, that Landlord shall fund any undisputed portion of the requested Disbursement) and, when applicable, requesting reasonable additional information and reasonable supporting documentation.

(ii) Disbursements shall require the following requisitions, certifications and waivers:

(A) a requisition on AIA Forms G702 and G703, duly executed and certified by Tenant and Tenant's Architect;

(B) a receipt for all prior payments received by, as applicable, the Contractor and any subcontractor(s) in a form acceptable to Landlord in its reasonable discretion, other than for those prior payments for which Tenant has previously provided receipts to Landlord, and copies of any requisitions, certificates or affidavits required by the applicable construction contract;

(C) a waiver and subordination of lien in form reasonably acceptable to Landlord (the "**Lien Form**"), executed by, as applicable, the Contractor or subcontractor(s), providing that upon payment of the subject requisition, the Contractor or subcontractor(s) waives any and all lien rights for labor and materials, or rental equipment, appliances or tools, performed or furnished through the end of the payment period date (the "**Payment Period Date**"), except for retainage, unpaid agreed or pending change orders, and disputed claims, each as stated in the Lien Form; and

(D) a further certification by Tenant and Tenant's Architect, in form acceptable to Landlord, that the work and materials to be paid for with respect to any particular Disbursement are substantially in accordance with all of the terms and provisions of the applicable construction contract, Tenant's Plans and all Applicable Laws and legal requirements.

(iii) Each Disbursement (other than the final Disbursement) shall be made in an amount equal to the product of (x) Landlord's Percentage (as hereinafter defined) multiplied by (y) the lesser of: (A) the amount requested, or (B) the amount actually payable to, as applicable, the Contractor or subcontractor(s), in each case including any applicable retainage to be released in respect of work and materials satisfactorily completed and in place with respect to that particular request for a Disbursement (exclusive of work and materials to the extent included in any prior funded requests for a Disbursement), but in all cases subject to a five percent (5%) retention until all conditions to the final Disbursement are satisfied as set forth below and net of the Oversight Fee. "**Landlord's Percentage**" shall mean a fraction expressed as a percentage, the numerator of which is the Landlord's Construction Funds and the denominator of which is the total cost of the Tenant Improvements. Tenant shall fund the remainder in each instance.

(iv) Landlord may withhold or refuse to pay any Disbursement hereunder if a Notice of Contract has been filed under Section 4 of the Chapter 254 of the Massachusetts General Laws, as amended (the "**Mechanic's Lien Law**"), unless with respect to the subject requisition, an accurately completed and valid Lien Form has been provided to Landlord and is deemed reasonably acceptable to Landlord, or if any other statutory lien has been filed or established relating to claims for labor, materials, or supplies, whether under the Mechanic's Lien Law or otherwise. In the event that Landlord has not funded any requisition within twenty-five (25) days after the applicable Payment Period Date as set forth in, as applicable, the Lien Form which was submitted with the subject requisition, Landlord may, at its option, withhold or refuse to fund the requisition and require Tenant to resubmit an updated requisition in accordance with the terms and provisions set forth herein, with an updated Lien Form, as applicable.

(v) No Disbursements will be made for materials prior to the incorporation of the materials into the Premises.

(vi) The requisition for the final Disbursement to pay Landlord's Percentage of remaining costs of the Tenant Improvements as described in Section 7(b), above, including any retainage withheld pursuant to the prior Disbursements (provided that in no event shall the aggregate disbursements by Landlord exceed the Tenant Improvement Allowance), shall also require: (A) a certificate from Tenant and Tenant's Architect that the Tenant Improvements have been fully completed in accordance with Tenant's Plans and all Applicable Laws; (B) receipt of a permanent certificate of occupancy for the Premises; (C) delivery of full and complete as-built plans, including the records set of as-built plans maintained by Tenant's Contractor; (D) satisfaction of all conditions for final payment under the applicable construction contract, (E) final lien waivers from the Contractor and each applicable subcontractor (which may be conditioned upon receipt of payment), in form and substance acceptable to Landlord, providing that subject to the payment of the retainage, the Contractor or, as applicable, subcontractor waives any and all lien rights for labor and materials, or rental equipment, appliances or tools, performed or furnished for the Premises; (F) to the extent retainage has been implemented under the applicable construction contracts, final lien waivers (which may be conditioned upon receipt of payment) from each sub-contractor and supplier; and (G) to the extent a lien waiver has not been provided as to the remaining amounts due under the applicable construction contract, the expiration of all statutory lien periods with no lien having been filed with respect to the Premises, the Building, or the Project which remain outstanding. Notwithstanding anything herein to the contrary, Tenant's final requisition with respect to the Tenant Improvement Allowance shall be submitted no later than August 31, 2019 (the "**Outside Requisition Date**"). Tenant shall not have any right to utilize amounts of the Tenant Improvement Allowance not requisitioned by the Outside Requisition Date.

EXHIBIT 1.1.2

LEGAL DESCRIPTION

40-44 Wiggins Avenue, a/k/a One Patriots Park, Bedford, Massachusetts

PARCEL I

That certain parcel of land on (he westerly side of Wiggins Avenue in Bedford, Middlesex County, Massachusetts, being shown as Parcel] B on a plan entitled "Plan of Land in Bedford, Mass." owned by Moore & MacLeod dated October 21,1967 and recorded with Middlesex South District Registry of Deeds in Plan Book 1450 as Plan 109 and bounded and described as follows:

NORTHWESTERLY	by Wiggins Avenue, as shown on said plan, 179.08 feet;
SOUTHEASTERLY	by land of Griffith Really Trust, as shown on said plan, 608.30 feet;
SOUTHWESTERLY	by Parcel A, as shown on said plan, 408.95 feet;
NORTHWESTERLY	by Parcel A, as shown on Said plan, 597.61 feet; and
NORTHEASTERLY	by Parcel A, as shown on said plan,42.01 feet.

PARCEL II

The land in Bedford, Courtly of Middlesex and Commonwealth of Massachusetts, on the Westerly side of Wiggins Avenue, being shown as Parcel E on a plan entitled "Plan of Land in Bedford, Mass., Owned by Moore & MacLeod", dated November 27, 1968, drawn by Joseph W. Moore, Inc. and recorded with Middlesex South District Registry of Deeds in Book 11622, Page 408, and bounded and described as follows:

EASTERLY	by the Westerly line of Wiggins Avenue as shown on said plan by two lines, sixteen and 97/100 (16.97) and one hundred twenty-two and 55/100 (122.55) feet, respectively
SOUTHEASTERLY	by the curved Intersection of Wiggins Avenue and an unnamed way as shown on said plan, seventy and 21/100 (70.21) feel;
SOUTHERLY	by the side line of said way and by Parcel D as shown on said plan six hundred fifty-eight and 76/100 (658.76) feet and sixty-nine and 53/100 (69.53) feet respectively
WESTERLY	by said Parcel D as shown on said plan, two hundred sixty-two and 26/100(262.26) feet; and
NORTHERLY	by land of Millipore as shown on said plan by two lines, five hundred eighty-seven and 22/100 (587.22) feet and two hundred thirty-five and 1/100 (235.01) feet, respectively.

PARCEL III

The land, together with the buildings thereon, situated in Bedford, Middlesex County, Massachusetts, hounded and described as follows:

NORTHEASTERLY	by Wiggins Avenue as shown on a plan hereinafter mentioned 112.57 feet;
SOUTHWESTERLY	by Land of Panametrics as shown on said plan 42.01 feet;
SOUTHEASTERLY	by land of Panmetries as shown on Said plan 597.61 feet;
NORTHEASTERLY	by land of Panametrics as shown on said plan 408.95 feet;
SOUTHEASTERLY	by land of Griffiths Realty Trust as shown on said plan 372.71 feet;
SOUTHEASTERLY	by land of the B & M as shown on said plan ft.8.78 feet;
SOUTHWESTERLY	by land of B & M as shown on said plan 862.33 feel;
NORTHWESTERLY	by land of Millipore, as shown on said plan, by two distances measuring, respectively, 157,50 and 71.41 feet;
NORTHEASTERLY	by Parcel “E”, as shown on said plan, 262.26 feet;
NORTHWESTERLY	by Parcel “E”, as shown on said plan, 69.53 feet;
NORTHWESTERLY	by Parcel “E”, as shown on said plan, 658.76 feet;
NORTHWESTERLY	by Parcel “E”, as shown on said plan, 70.21 feet.

being shown as Parcels “C” and “D” on a plan entitled “Plan of Land in Bedford, Mass, owned by Moore and MacLeod” dated November 27, 1968 and recorded In Middlesex South Registry of Deeds in book 11622, Pages 048.

EXHIBIT 1.4.2

EXPANSION PREMISES DELIVERY CONDITION

Landlord shall deliver the Expansion Premises with the following work substantially complete:

- Demolition of existing tenant improvements
- Replacement of the roofing above the Expansion Premises with materials and workmanship consistent with the roofing above the original Premises under the Lease.
- Delivery of an HVAC system with structural support, such system to have functionality consistent with the HVAC installed by Landlord in the original Premises (taking into account the relative sizes of the Expansion Premises and the original Premises).
- Electrical work sufficient to operate demo/temporary power and lighting, fire alarms, and Building mechanical systems.

EXHIBIT 5.2-1

RULES AND REGULATIONS

1. Tenant and its employees shall not in any way obstruct the sidewalks, halls, stairways, or elevators of the Building, and shall use the same only as a means of passage to and from their respective offices. At no time shall Tenant permit its employees to loiter in Common Areas or elsewhere in and about the Property.

2. Corridor doors, when not in use, shall be kept closed.

3. No animals, except appropriately certified and licensed service animals, shall be brought into or kept in, on or about the Premises, except in the vivarium maintained by Tenant from time to time or with the consent of the property manager.

4. The restroom fixtures shall be used only for the purpose for which they were constructed and no rubbish, ashes, or other substances of any kind shall be thrown into them. Tenant will bear the expense of any damage resulting from misuse.

5. Tenant shall not place any additional lock or locks on any exterior door in the Building or on any door in the Building core within the Premises, including doors providing access to the telephone and electric closets and the slop sink, without Landlord's prior written consent; provided, however, that Tenant shall have control of all keys to doors within the Premises, but will provide Landlord with a master copy of same. At Landlord's option, all keys shall be surrendered to Landlord at the expiration or earlier termination of the Lease.

6. Landlord reserves the right to exclude or expel from the Building any persons who, in the judgment of Landlord, is intoxicated under the influence of liquor or drugs, or shall do any act in violation of the rules and regulations of the Building.

7. Areas used in common by tenants shall be subject to such additional reasonable regulations as are posted therein.

8. Landlord reserves the right to close and keep locked all entrance and exit doors of the Building during the hours Landlord may deem advisable for the adequate protection of the property. Use of the Building and the leased Premises before 8 AM or after 6 PM, or any time during Sundays or legal holidays shall be allowed only to persons with a key/card key to the Premises or guests accompanied by such persons. At these times, all occupants and their guests must sign in at the concierge when entering and exiting the Building. Any persons found in the Building after hours without such keys/card keys are subject to the surveillance of building staff.

9. Tenant will not interfere with or obstruct any perimeter heating, air conditioning or ventilating units.

10. Landlord and Tenant shall mutually agree on the termite and pest extermination service to control termites and pests in the Premises. Except as included in Landlord's services, tenants shall bear the cost and expense of such extermination services.

11. Tenant shall not install, operate or maintain in the Premises or in any other area of the Building, any electrical equipment which does not bear the U/L (Underwriters Laboratories) or IEC (International Electrotechnical Conference) seal of approval, or which would overload the electrical system or any part thereof beyond its capacity for proper, efficient and safe operation as reasonably determined by Landlord, taking into consideration the overall electrical system, the capacities reserved to Tenant in the Lease, and the present and future requirements therefor in the Building. Tenant shall not use more than Tenant's Share of telephone lines available to service the Building, unless Tenant provides its own conduits and service at its sole expense.

12. Tenant shall not operate or permit to be operated on the Premises any coin or token operated vending machine or similar device (including, without limitation, telephones, lockers, toilets, scales, amusement devices and machines for sale of beverages food, candy, cigarettes or other goods), except for those vending machines or similar devices which are for the sole and exclusive use of tenant's employees.

13. Bicycles and other vehicles are not permitted inside or on the walkways outside the Building, except in those areas specifically designated by Landlord for such purposes.

14. Landlord may from time to time adopt appropriate systems and procedures for the security or safety of the Building, its occupants, entry and use, or its contents, provided that Tenant shall have access to the Building 24 hours per day, 7 days a week. Tenant, Tenant's agents, employees, contractors, guests and invitees shall comply with Landlord's reasonable requirements relative thereto.

15. Canvassing, soliciting, and peddling in or about the Building is prohibited. Tenant shall cooperate and use reasonable efforts to prevent the same.

16. At no time shall Tenant permit or shall Tenant's agents, employees, contractors, guests, or invitees smoke in any Common Area of the Building.

17. Tenant shall, at its sole cost and expense: keep any garbage, trash, rubbish and refuse in vermin-proof containers within the interior of the Premises until removed.

18. Lab operators who travel outside lab space must abide by the "one glove" rule and Landlord and Tenant shall mutually agree on those areas where lab coats are not allowed.

19. Lab operators carrying any lab related materials requiring the use of elevators or stairs may only travel in Tenant's freight elevator. At no time should any lab materials travel in passenger elevators or the stairwells. Lab-related materials shall enter the Premises only through Tenant's dedicated loading dock.

20. Any dry ice brought into the Building must be delivered only through Tenant's dedicated loading dock (and Tenant's freight elevator, if applicable).

21. Chemical lists and MSDS sheets must be readily available at the entrance to each lab area. In the event of an emergency, first responders will require this information in order to properly evaluate the situation.

With respect to animals:

(a) No animals, animal waste, food or supplies relating to the animals maintained from time to time in the animal storage areas of the Premises shall be transported within the Building (other than within the Premises) except as specifically provided in the Rules and Regulations.

(b) At all times that animals are transported within the Building, they shall be transported in an appropriate cage or other container.

(c) At no time shall any animals, animal waste, food or supplies relating to the animals be brought into, transported through, or delivered to the lobby of the Building or be transported within the Building in elevators other than the freight elevator.

EXHIBIT 5.2-2

1. Order of Taking-Award of Damages-Estimate of Betterments by the Town of Bedford for the layout of a town way between Summer Street and South Road known as Wiggins Avenue dated August 7, 1967 and recorded in Book 11370, Page 284.

2. Order of Conditions issued by the Town of Bedford Conservation Commission (DEP File No. 103¬161) recorded in Book 26835, Page 228.

3. Mortgage and Security Agreement by and between Bedford Patriots Park, LLC and Middlesex Savings Bank recorded in Book 65991, Page 139.

4. Collateral Assignment of Leases and Rents by and between Bedford Patriots Park, LLC and Middlesex Savings Bank dated August 27, 2015 and recorded in Book 65991, Page 156.

EXHIBIT 5.3.1.1

ONE PATRIOTS PARK

ENVIRONMENTAL QUESTIONNAIRE

ENVIRONMENTAL QUESTIONNAIRE
FOR COMMERCIAL AND INDUSTRIAL PROPERTIES

Property Name: _____

Property Address: _____

Instructions: The following questionnaire is to be completed by the Lessee representative with knowledge of the planned operations for the specified building/location. Please print clearly and attach additional sheets as necessary.

1.0 PROCESS INFORMATION

Describe planned use, and include brief description of manufacturing processes employed.

_____

_____

_____

2.0 HAZARDOUS MATERIALS

Are hazardous materials used or stored? If so, continue with the next question. If not, go to Section 3.0.

2.1 Are any of the following materials handled on the Property? Yes No

(A material is handled if it is used, generated, processed, produced, packaged, treated, stored, emitted, discharged, or disposed.) If so, complete this section. If this question is not applicable, skip this section and go on to Section 5.0.

Explosives	Fuels	Oils
Solvents	Oxidizers	Organics/Inorganics
Acids	Bases	Pesticides
Gases	PCBs	Radioactive Materials
Other (please specify)		

2-2. If any of the groups of materials checked in Section 2.1, please list the specific material(s), use(s), and quantity of each chemical used or stored on the site in the Table below. If convenient, you may substitute a chemical inventory and list the uses of each of the chemicals in each category separately.

Material	Physical State (Solid, Liquid, or Gas)	Usage	Container Size	Number of Containers	Total Quantity

2-3. Describe the planned storage area location(s) for these materials. Please include site maps and drawings as appropriate.

3.0 HAZARDOUS WASTES

Are hazardous wastes generated? Yes No

If yes, continue with the next question. If not, skip this section and go to Section 4.0.

3.1 Are any of the following wastes generated, handled, or disposed of (where applicable) on the Property?

Hazardous wastes	Industrial Wastewater
Waste oils	PCBs
Air emissions	Sludges
Regulated Wastes	Other (please specify)

3-2. List and quantify the materials identified in Question 3-1 of this section.

WASTE GENERATED	RCRA listed Waste?	SOURCE	APPROXIMATE MONTHLY QUANTITY	WASTE CHARACTERIZATION	DISPOSITION

3-3. Please include name, location, and permit number (e.g. EPA ID No.) for transporter and disposal facility, if applicable). Attach separate pages as necessary.

Transporter/Disposal Facility Name	Facility Location	Transporter (T) or Disposal (D) Facility	Permit Number

3-4. Are pollution controls or monitoring employed in the process to prevent or minimize the release of wastes into the environment? Yes No

3-5. If so, please describe.

4.0 USTS/ASTS

4.1 Are underground storage tanks (USTs), aboveground storage tanks (ASTs), or associated pipelines used for the storage of petroleum products, chemicals, or liquid wastes present on site (lease renewals) or required for planned operations (new tenants)? Yes__ No__

If not, continue with Section 5.0. If yes, please describe capacity, contents, age, type of the USTs or ASTs, as well any associated leak detection/spill prevention measures. Please attach additional pages if necessary.

Capacity	Contents	Year Installed	Type (Steel, Fiberglass, etc.)	Associated Leak Detection / Spill Prevention Measures*

*Note: The following are examples of leak detection / spill prevention measures:

Integrity testing	Inventory reconciliation	Leak detection system
Overfill spill protection	Secondary containment	Cathodic protection

4-2. Please provide copies of written tank integrity test results and/or monitoring documentation, if available.

4-3. Is the UST/AST registered and permitted with the appropriate regulatory agencies? If so, please attach a copy of the required permits. Yes No

4-4. If this Questionnaire is being completed for a lease renewal, and if any of the USTs/ASTs have leaked, please state the substance released, the media(s) impacted (e.g., soil, water, asphalt, etc.), the actions taken, and all remedial responses to the incident.

4-5. If this Questionnaire is being completed for a lease renewal, have USTs/ASTs been removed from the Property? Yes No

If yes, please provide any official closure letters or reports and supporting documentation (e.g., analytical test results, remediation report results, etc.).

4-6. For Lease renewals, are there any above or below ground pipelines on site used to transfer chemicals or wastes? Yes No

For new tenants, are installations of this type required for the planned operations?

Yes No

If yes to either question, please describe.

_____

_____

_____

5.0 ASBESTOS CONTAINING BUILDING MATERIALS

Please be advised that an asbestos survey may have been performed at the Property. If provided, please review the information that identifies the locations of known asbestos containing material or presumed asbestos containing material. All personnel and appropriate subcontractors should be notified of the presence of these materials, and informed not to disturb these materials. Any activity that involves the disturbance or removal of these materials must be done by an appropriately trained individual/contractor.

6.0 REGULATORY

6-1. Does the operation have or require a National Pollutant Discharge Elimination System (NPDES) or equivalent permit?
Yes If so, please attach a copy of this permit.

6-2. Has a Hazardous Materials Business Plan been developed for the site?Yes If so, please attach a copy.

CERTIFICATION

I am familiar with the real property described in this questionnaire. By signing below, I represent and warrant that the answers to the above questions are complete and accurate to the best of my knowledge. I also understand that Lessor will rely on the completeness and accuracy of my answers in assessing any environmental liability risks associated with the property.

Signature: _____

Name: _____

Title: _____

Date: _____

Telephone: _____

EXHIBIT 6.1.5

LOADING DOCK LOCATIONS

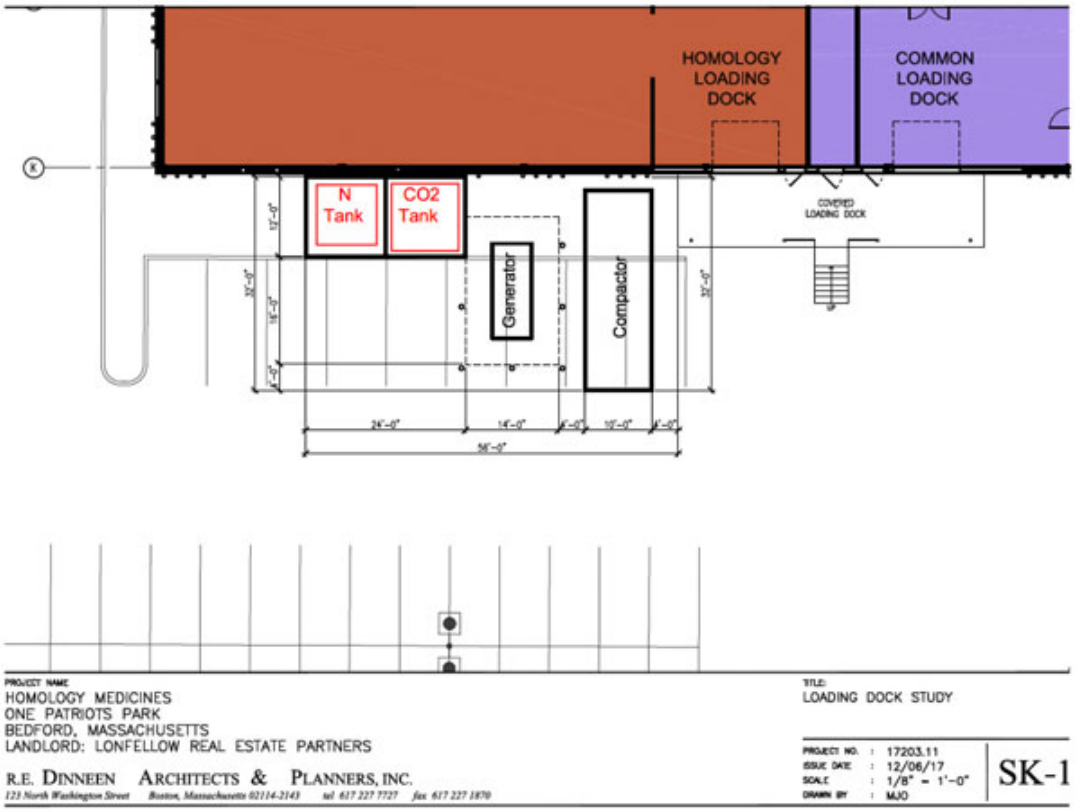


EXHIBIT 14.1

CONSENT TO SUBLEASE AGREEMENT

THIS CONSENT TO SUBLEASE AGREEMENT (this **"Agreement"**) is made as of _____, by and among _____, a _____ (**"Landlord"**), _____, a _____ (**"Tenant"**), and _____, a _____ (**"Subtenant"**).

R E C I T A L S

A. Reference is hereby made to that certain Lease dated as of _____ (the **"Lease"**) between Landlord and Tenant for certain premises (the **"Premises"**) located at _____, _____, Massachusetts (the **"Building"**).

B. Pursuant to the terms of Article 14 of the Lease, Tenant has requested Landlord's consent to that certain Sublease dated on or about the date hereof, between Tenant and Subtenant (the **"Sublease"**), with respect to a subletting by Subtenant of a portion of the Premises consisting of approximately _____ rentable square feet of space on the _____ of the Building, as more particularly described in the Sublease (the **"Sublet Premises")**. A copy of the Sublease is attached hereto as Exhibit A. Landlord is willing to consent to the Sublease upon the terms and conditions contained herein.

C. All defined terms not otherwise expressly defined herein shall have the respective meanings given in the Lease.

A G R E E M E N T

1. Landlord's Consent. Landlord hereby consents to the Sublease; provided, however, notwithstanding anything contained in the Sublease to the contrary, such consent is granted by Landlord only upon the terms and conditions set forth in this Agreement. The Sublease is subject and subordinate to the Lease. Landlord shall not be bound by any of the terms, covenant, conditions, provisions or agreements of the Sublease. Subtenant acknowledges for the benefit of Landlord that Subtenant accepts the Sublet Premises in their presently existing, "as-is" condition and that Landlord has made no representation or warranty to Subtenant as to the compliance of the Sublet Premises with any law, statute, ordinance, rule or regulation. Tenant and Subtenant hereby represent and warrant to Landlord that the copy of the Sublease attached hereto is a full, complete and accurate copy of the Sublease, and that there are no other documents or instruments relating to the use of the Sublet Premises by Subtenant other than the Sublease.

2. Reimbursement of Landlord. Within thirty (30) days after invoice, Tenant shall reimburse Landlord all of Landlord's reasonable costs and expenses incurred in connection with its review and consent of the Sublease and preparation and negotiation of this Agreement. Notwithstanding the foregoing, Tenant's obligation to reimburse Landlord shall be limited by the caps set forth in Section 14.1 of the Lease.

3. Non-Release of Tenant; Further Transfers. Neither the Sublease nor this Consent shall release or discharge Tenant from any liability, whether past, present or future, under the Lease or alter the primary liability of Tenant to pay the rent and perform and comply with all of the obligations of Tenant to be performed under the Lease (including the payment of all bills rendered by Landlord for charges incurred by Subtenant for services and materials supplied to the Sublet Premises). Neither the Sublease nor this Consent shall be construed as a waiver of Landlord's right to consent to any further subletting either by Tenant or by the Subtenant, or to any assignment by Tenant of the Lease or assignment by the Subtenant of the Sublease, or as a consent to any portion of the Sublet Premises being used or occupied by any other party. Landlord may consent to subsequent sublettings and assignments of the Lease or any amendments or modifications thereto without notifying Subtenant or anyone else liable under the Sublease and without obtaining their consent. No such action by Landlord shall relieve such persons from any liability to Landlord or otherwise with regard to the Sublet Premises.

4. Relationship With Landlord. Tenant hereby assigns and transfers to Landlord the Tenant's interest in the Sublease and all rentals and income arising therefrom, subject to the terms of this Section 4. Landlord, by consenting to the Sublease, agrees that until a default shall occur in the performance of Tenant's obligations under the Lease, Tenant may receive, collect and enjoy the rents accruing under the Sublease. In the event Tenant shall default in the performance of its obligations to Landlord under the Lease (whether or not Landlord terminates the Lease), Landlord may at its option by notice to Tenant, either (i) terminate the Sublease, (ii) elect to receive and collect, directly from Subtenant, all rent and any other sums owing and to be owed under the Sublease, as further set forth in Section 4.1, below, or (iii) elect to succeed to Tenant's interest in the Sublease and cause Subtenant to attorn to Landlord, as further set forth in Section 4.2, below.

4.1 Landlord's Election to Receive Rents. Landlord shall not, by reason of the Sublease, nor by reason of the collection of rents or any other sums from the Subtenant pursuant to Section 4, item (ii), above, be deemed liable to Subtenant for any failure of Tenant to perform and comply with any obligation of Tenant, and Tenant hereby irrevocably authorizes and directs Subtenant, upon receipt of any written notice from Landlord stating that a default exists in the performance of Tenant's obligations under the Lease, to pay to Landlord the rents and any other sums due and to become due under the Sublease. Tenant agrees that Subtenant shall have the right to rely upon any such statement and request from Landlord, and that Subtenant shall pay any such rents and any other sums to Landlord without any obligation or right to inquire as to whether such default exists and notwithstanding any notice from or claim from Tenant to the contrary. Tenant shall not have any right or claim against Subtenant for any such rents or any other sums so paid by Subtenant to Landlord. Landlord shall credit Tenant with any rent received by Landlord under such assignment but the acceptance of any payment on account of rent from the Subtenant as the result of any such default shall in no manner whatsoever be deemed an attornment by Landlord to Subtenant or by Subtenant to Landlord, be deemed a waiver by Landlord of any provision of the Lease, or serve to release Tenant from any liability under the terms, covenants, conditions, provisions or agreements under the Lease. Notwithstanding the foregoing, any other payment of rent from the Subtenant directly to Landlord, regardless of the circumstances or reasons therefor, shall in no manner whatsoever be deemed an attornment by the Subtenant to Landlord in the absence of a specific written agreement signed by Landlord to such an effect.

4.2 Landlord's Election of Tenant's Attornment. In the event Landlord elects, at its option, to cause Subtenant to attorn to Landlord pursuant to Section 4, item (iii), above, Landlord shall undertake the obligations of Tenant under the Sublease from the time of the exercise of the option, but Landlord shall not (i) be liable for any prepayment of more than one (1) month's rent or any security deposit paid by Subtenant, (ii) be liable for any previous act or omission of Tenant under the Lease or for any other defaults of Tenant under the Sublease, (iii) be subject to any defenses or offsets previously accrued which Subtenant may have against Tenant, or (iv) be bound by any changes or modifications made to the Sublease without the written consent of Landlord.

4.3 Operational Matters. Notwithstanding Landlord's consent to the Sublease as set forth herein, Landlord shall not be obligated to accept from Subtenant any payments of Base Rent or Tenant's Share of Direct Expenses due under the Lease, all of which shall be paid by Tenant as set forth in the Lease. Requests for Building services as provided under the Lease, including without limitation repair and maintenance services or any other services or obligations to be performed by Landlord under the terms of the Lease, shall be made by Tenant, and Landlord shall have no obligation to respond to any direct request of Subtenant regarding the same.

4.4 No Waiver. The acceptance of any amounts by Landlord from Subtenant or any other party shall not be deemed a waiver by Landlord of the obligation of Tenant to pay any or all amounts due and owing under the Lease. The performance of any obligation required by Tenant under the Lease by Subtenant or any other party shall not be deemed a waiver by Landlord of the duty of Tenant to perform such obligation or any other obligation as to which performance is or becomes due under the Lease.

4.5 Acts of Subtenant. Any act or omission by Subtenant, or by any other person or entity for whose acts or omissions Tenant is liable or responsible under the terms of the Lease, that violates any of the provisions of the Lease, shall be deemed a violation of the Lease by Tenant, subject to any applicable notice and cure provisions contained in the Lease.

4.6 Indemnification. Subtenant hereby assumes all risk of damage to property or injury to persons in, upon or about the Sublet Premises from any cause whatsoever (including, but not limited to, any personal injuries resulting from a slip and fall in, upon or about the Sublet Premises) and agrees that Landlord, its partners, subpartners and their respective officers, agents, servants, employees, and independent contractors shall not be liable for, and are hereby released from any responsibility for, any damage either to person or property or resulting from the loss of use thereof, which damage is sustained by Subtenant or by other persons claiming through Subtenant. Tenant shall indemnify, defend, protect, and hold Landlord harmless from any and all loss, cost, damage, expense and liability (including without limitation court costs and reasonable attorneys' fees) incurred in connection with or arising from any cause in, on or about the Sublet Premises (including, but not limited to, a slip and fall), any acts, omissions or negligence of Subtenant or of any person claiming by, through or under Subtenant, or of the contractors, agents, servants, employees, invitees, guests or licensees of Subtenant or any such person, in, on or about the Building, provided that the terms of the foregoing indemnity shall not apply to the gross negligence or willful misconduct of Landlord. The provisions of this Section 4.6 shall survive the expiration or sooner termination of the Sublease with respect to any claims or liability arising in connection with any event occurring prior to such expiration or termination.

4.7 Insurance. Prior to Subtenant's occupancy of the Sublet Premises, Subtenant shall provide Landlord with certificates of all of the insurance required to be carried by Subtenant by the terms of the Sublease, which shall show Landlord as being an additional insured thereunder. The waiver of subrogation contained in Section 10.5 of the Lease shall apply as between Landlord and Subtenant.

4.8 No Consent to Alterations or Particular Use. Notwithstanding anything contained in the Sublease to the contrary, Landlord's consent to the Sublease as contained in this Agreement shall not be deemed to be a consent to (i) any alteration or work of improvement that Tenant or Subtenant may desire or intend in the Sublet Premises, (ii) any use of hazardous, radioactive or toxic materials in or about the Sublet Premises, or (iii) any signage proposed to be installed for the benefit of Subtenant.

5. General Provisions.

5.1 Consideration for Sublease. Tenant and Subtenant represent and warrant that there are no additional payments of rent or any other consideration of any type payable by Subtenant to Tenant with regard to the Sublet Premises other than as disclosed in the Sublease. Nothing in this Consent to Sublease Agreement shall be deemed to waive or modify the provisions of Section 14.3 of the Lease, the conditions of which are incorporated herein by reference.

5.2 Brokerage Commission. Tenant and Subtenant covenant and agree that under no circumstances shall Landlord be liable for any brokerage commission or other charge or expense in connection with the Sublease and Tenant and Subtenant agree to protect, defend indemnify and hold Landlord harmless from and against the same and from any cost or expense (including, but not limited to, attorneys' fees) incurred by Landlord in resisting any claim for any such brokerage commission.

5.3 Controlling Law. The terms and provisions of this Agreement shall be construed in accordance with and governed by the laws of The Commonwealth of Massachusetts.

5.4 Binding Effect. This Agreement shall be binding upon and inure to the benefit of the parties hereto, their heirs, successors and permitted assigns. As used herein, the singular number includes the plural.

5.5 Captions. The paragraph captions utilized herein are in no way intended to interpret or limit the terms and conditions hereof; rather, they are intended for purposes of convenience only.

5.6 Partial Invalidity. If any term, provision or condition contained in this Agreement shall, to any extent, be invalid or unenforceable, the remainder of this Agreement, or the application of such term, provision or condition to persons or circumstances other than those with respect to which it is invalid or unenforceable, shall not be affected thereby, and each and every other term, provision and condition of this Agreement shall be valid and enforceable to the fullest extent permitted by law.

5.7 Attorneys' Fees. If either party commences litigation against the other for the specific performance of this Agreement, for damages for the breach hereof or otherwise for enforcement of any remedy hereunder, the parties hereto agree to and hereby do waive any right to a trial by jury and, in the event of any such commencement of litigation, the prevailing party shall be entitled to recover from the other party such costs and reasonable attorneys' fees as may have been incurred.

[Signatures on following page.]

IN WITNESS WHEREOF, the parties have executed this Consent to Sublease Agreement as of the day and year first above written.

Landlord:

_____,
a _____

By: _____

Name: _____

Title: _____

Tenant:

_____,
a _____

By: _____

Name: _____

Title: _____

Subtenant:

_____,
a _____

By: _____

Name: _____

Title: _____

EXHIBIT A

COPY OF SUBLEASE

EXHIBIT 17

ONE PATRIOTS PARK

FORM OF TENANT'S ESTOPPEL CERTIFICATE

The undersigned as Tenant under that certain Lease (the **"Lease"**) made and entered into as of _____, 2017 by and between Bedford Patriots Park, LLC as Landlord, and the undersigned as Tenant, for Premises on the _____ floor(s) of the office building located at One Patriots Park, Bedford, Massachusetts, certifies as follows:

1. Attached hereto as **Exhibit A** is a true and correct copy of the Lease and all amendments and modifications thereto. The documents contained in **Exhibit A** represent the entire agreement between the parties as to the Premises.

2. The undersigned currently occupies the Premises described in the Lease, the Lease Term commenced on _____, and the Lease Term expires on _____, and the undersigned has no option to terminate or cancel the Lease or to purchase all or any part of the Premises, the Building and/or the Project.

3. Base Rent became payable on _____.

4. The Lease is in full force and effect and has not been modified, supplemented or amended in any way except as provided in **Exhibit A.**

5. Tenant has not transferred, assigned, or sublet any portion of the Premises nor entered into any license or concession agreements with respect thereto except as follows:

6. Intentionally Omitted.

7. All monthly installments of Base Rent, all Additional Rent and all monthly installments of estimated Additional Rent have been paid when due through _____. The current monthly installment of Base Rent is $_____.

8. All conditions of the Lease to be performed by Landlord necessary to the enforceability of the Lease have been satisfied and Landlord is not in default thereunder. In addition, the undersigned has not delivered any notice to Landlord regarding a default by Landlord thereunder. The Lease does not require Landlord to provide any rental concessions or to pay any leasing brokerage commissions.

9. No rental has been paid more than thirty (30) days in advance and no security has been deposited with Landlord except as provided in the Lease.

10. As of the date hereof, there are no existing defenses or offsets, or, to the undersigned's knowledge, claims or any basis for a claim, that the undersigned has against Landlord.

11. If Tenant is a corporation or partnership, each individual executing this Estoppel Certificate on behalf of Tenant hereby represents and warrants that Tenant is a duly formed and existing entity qualified to do business in Massachusetts and that Tenant has full right and authority to execute and deliver this Estoppel Certificate and that each person signing on behalf of Tenant is authorized to do so.

12. There are no actions pending against the undersigned under the bankruptcy or similar laws of the United States or any state.

13. To the best of Tenant's knowledge, Tenant is in full compliance with all federal, state and local laws, ordinances, rules and regulations affecting its use of the Premises, including, but not limited to, those laws, ordinances, rules or regulations relating to hazardous or toxic materials. Tenant has never permitted or suffered, nor does Tenant have any knowledge of, the generation, manufacture, treatment, use, storage, disposal or discharge of any hazardous, toxic or dangerous waste, substance or material in, on, under or about the Project or the Premises or any adjacent premises or property in violation of any federal, state or local law, ordinance, rule or regulation.

14. To the undersigned's knowledge, all tenant improvement work to be performed by Landlord under the Lease has been completed in accordance with the Lease and has been accepted by the undersigned and all reimbursements and allowances due to the undersigned under the Lease in connection with any tenant improvement work have been paid in full. All work (if any) in the common areas required by the Lease to be completed by Landlord has been completed and all parking spaces required by the Lease have been furnished and/or all parking ratios required by the Lease have been met.

The undersigned acknowledges that this Estoppel Certificate may be delivered to Landlord or to a prospective mortgagee or prospective purchaser, and acknowledges that said prospective mortgagee or prospective purchaser will be relying upon the statements contained herein in making the loan or acquiring the property of which the Premises are a part and that receipt by it of this certificate is a condition of making such loan or acquiring such property.

Executed at _____ on the ____ day of _____, 20___.

"Tenant":

HOMOLOGY MEDICINES, INC.

By: _____
Its: _____

EXHIBIT 18

FORM

LEASE SUBORDINATION, ATTORNMENT AND NON-DISTURBANCE AGREEMENT

This Lease Subordination, Attornment and Non-Disturbance Agreement (hereinafter, the "Agreement") is made this _____ day of _____, 2015, by and among BEDFORD PATRIOTS PARK, LLC (hereinafter, the "Landlord" or "Borrower"), with an address of C/O Longfellow Real Estate Partners, LLC, 260 Franklin Street, Suite 1920, Boston, Massachusetts 02110, HOMOLOGY MEDICINES, INC. (hereinafter, the "Tenant"), with an address of One Patriots Park, Bedford, Massachusetts 01730, and MIDDLESEX SAVINGS BANK (hereinafter, the "Mortgagee"), with a principal place of business at 6 Main Street, Natick, Massachusetts 01760.

Introductory Provisions

A. Mortgagee is relying on this Agreement as an inducement to Mortgagee in making and maintaining a loan (hereinafter, the "Loan") secured by, among other things, a certain Mortgage and Security Agreement dated as of _____, 2017 (hereinafter, the "Mortgage") given by Borrower covering property commonly known as and numbered 1 Patriots Place, Bedford, Massachusetts (hereinafter, the "Property").

B. Tenant is the holder of and tenant under that certain lease (hereinafter, the "Lease") dated _____, 2017, made with Landlord or Landlord's predecessor, covering certain premises (hereinafter, the "Demised Premises") at the Property.

C. Mortgagee, Landlord, and Tenant desire to confirm their understanding with respect to the Mortgage and the Lease.

NOW, THEREFORE, in consideration of the foregoing, the mutual covenants and agreements contained herein, and other valuable consideration, the receipt and adequacy of which are hereby acknowledged, and with the understanding by Tenant that Mortgagee will rely hereon in making and maintaining the Loan, Mortgagee, Landlord, and Tenant agree as follows:

1. The Lease and the rights of Tenant thereunder are subordinate to the Mortgage and any renewal, substitution, extension or replacement thereof and each advance made thereunder as though said Mortgage, and each such renewal, substitution, extension or replacement were executed, recorded and the advance made before the execution of the Lease.

2. So long as Tenant is not in default (beyond any period expressed in the Lease within which Tenant may cure such default) in the payment of rent or in the performance or observance of any of the terms, covenants or conditions of the Lease on Tenant's part to be performed or observed, (i) Tenant's occupancy of the Demised Premises shall not be disturbed by Mortgagee in the exercise of any of its rights under the Mortgage during the term of the Lease or any extension or renewal thereof, made in accordance with the terms of the Lease, and (ii) Mortgagee will not join Tenant as a party defendant in any action or proceeding for the purpose of terminating Tenant's interest and estate under the Lease because of any default under the Mortgage.

3. In the event any proceedings are brought for the foreclosure of the Mortgage, or if the Property or the Demised Premises are sold pursuant to the power of sale under the Mortgage, Tenant shall attorn to the purchaser upon any such foreclosure sale and shall recognize such purchaser thereafter as the Landlord under the Lease. Such attornment shall be effective and self-operative without the execution of any further instrument on the part of any of the parties hereto. Tenant agrees, however, to execute and deliver at any time and from time to time, upon the request of any holder(s) of any of the indebtedness or other obligations secured by the Mortgage, or upon request of any such purchaser, (a) any instrument or certificate which, in the reasonable judgment of such holder(s), or such purchaser, may be necessary or appropriate in any such foreclosure proceeding or otherwise to evidence such attornment, and (b) an instrument or certificate regarding the status of the Lease, consisting of statements, if true (and if not true, specifying in what respect), (i) that the Lease is in full force and effect, (ii) the date through which rentals have been paid, (iii) the duration and date of the commencement of the term of the Lease, (iv) the nature of any amendments or modifications to the Lease, (v) that no default, or state of facts, which with the passage of time, or notice, or both, would constitute a default, exists on the part of either party to the Lease, and (vi) the dates on which payments of additional rent, if any, are due under the Lease.

4. If Mortgagee shall succeed to the interest of Landlord under the Lease, or if any purchaser acquires the Property, or the Demised Premises, upon any foreclosure of the Mortgage, Mortgagee or such purchaser, as the case may be, shall have the same remedies by entry, action or otherwise in the event of any default by Tenant (beyond any period expressed in the Lease within which Tenant may cure such default) in the payment of rent or in the performance or observance of any of the terms, covenants and conditions of the Lease on Tenant's part to be performed or observed that the Landlord had or would have had if Mortgagee or such purchaser had not succeeded to the interest of the present Landlord. From and after any such attornment, Mortgagee or such purchaser shall be bound to Tenant under all the terms, covenants and conditions of the Lease, and Tenant shall, from and after such attornment to Mortgagee, or such purchaser, have the same remedies against Mortgagee, or such purchaser, for the breach of an agreement contained in the Lease that Tenant might have had under the Lease against Landlord if Mortgagee or such purchaser had not succeeded to the interest of Landlord; provided, however, that Mortgagee or such purchaser shall only be bound during the period of its ownership, all Tenant claims shall be satisfied only out of the interest, if any, of Mortgagee or such purchaser in the Property, and Mortgagee and such purchaser shall not be (a) liable for any act or omission of any prior landlord (including the Landlord); or (b) liable for or incur any obligation with respect to the construction of the Property or any improvements therein; or (c) subject to any offsets or defenses which Tenant might have against any prior landlord (including the Landlord) except as specifically set forth in the Lease; or (d) bound by any rent or additional rent which Tenant might have paid for more than the then current rental period to any prior landlord (including the Landlord); or (e) bound by or responsible for any security deposit or prepaid rent not actually received by Mortgagee; or (f) liable for or incur any obligation with respect to any breach of warranties of any nature made by any prior landlord (including the Landlord under the Lease, including without limitation, any warranties respecting use, compliance with zoning, landlord's title, landlord's authority, habitability and/or fitness for any purpose, or possession; or (g) liable for consequential damages.

5. Nothing herein contained is intended, nor shall it be construed, to abridge or adversely affect any right or remedy of the Landlord under the Lease, or any subsequent Landlord, in the event of any default by Tenant (beyond any period expressed in the Lease within which Tenant may cure such default) in the payment of rent or in the performance or observance of any of the terms, covenants or conditions of the Lease on Tenant's part to be performed or observed.

6. Tenant agrees to provide Mortgagee with a copy of each notice of default given to Landlord under the Lease, at the same time as such notice of default is given to the Landlord, and that in the event of any default by the Landlord under the Lease, Tenant will take no action to terminate the Lease (a) if the default is not curable by Mortgagee (so long as the default does not interfere with Tenant's use and occupation of the Demised Premises), or (b) if the default is curable by Mortgagee, unless the default remains uncured for a period of thirty (30) days after written notice thereof shall have been mailed, postage prepaid, to Landlord at Landlord's address, and to Mortgagee at its address stated in (or pursuant to) Section 7 below; provided, however, that if any such default is such that it reasonably cannot be cured within said thirty-day period, such period shall be extended for such additional period of time as shall be reasonably necessary (including, without limitation, a reasonable period of time to obtain possession of the Property and to foreclose the Mortgage), if Mortgagee gives Tenant written notice of Mortgagee's election to undertake the cure of the default and if curative action (including, without limitation, action to obtain possession and foreclose) is instituted within a reasonable period of time and is thereafter diligently pursued. Mortgagee shall have no obligation to cure any default under the Lease.

7. Any notice or communication required or permitted hereunder shall be in writing, and shall be given or delivered by United States mail, registered or certified, postage fully prepaid, return receipt requested, or by recognized courier service addressed to the party to whom it is being given at its address set forth above, or such other address as such party may have specified theretofore by notice delivered in accordance with this sentence. Any such notice shall be deemed to have been given and received on the date delivered or tendered for delivery during normal business hours as herein provided.

8. This Agreement may not be modified orally or in any manner than by an agreement in writing signed by the parties hereto or their respective successors in interest. This Agreement shall inure to the benefit of and be binding upon the parties hereto, their respective heirs, personal representatives, successors and assigns, and any purchaser or purchasers at foreclosure of the Property or any portion thereof, and their respective heirs, personal representatives, successors and assigns.

9. In the event the Mortgagee notifies Tenant of an event of default under the Loan and demands that Tenant pay its rent and all other sums due under the Lease to Mortgagee, Tenant agrees that it will honor such demand and pay its rent and all other sums due under the Lease to the Mortgagee.

[Signatures on following pages]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be duly executed as of the date first above written.

MORTGAGEE:
MIDDLESEX SAVINGS BANK

By: _____
Name: _____
Title: _____

TENANT:
HOMOLOGY MEDICINES, INC.

By: _____
Name: _____
Title: _____

COMMONWEALTH OF MASSACHUSETTS

_____, ss.

On this date, _____,20____, before me, the undersigned notary public, personally appeared _____, the _____of _____, a _____ proved to me through satisfactory evidence of identification, which were _____to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose.

_____
Notary Public
My commission expires:

COMMONWEALTH OF MASSACHUSETTS

_____, ss.

On this date, _____, 20____, before me, the undersigned notary public, personally appeared _____, the _____of Middlesex Savings Bank, a corporation, proved to me through satisfactory evidence of identification, which were _____to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose.

_____
Notary Public
My commission expires:

Bedford Patriots Park, LLC, as Landlord under the Lease, and Mortgagor under the Mortgage, agrees for itself and its successors and assigns that:

The above agreement does not:

1.1.2 constitute a waiver by Mortgagee of any of its rights under the Mortgage or any of the other Loan documents; or

1.1.3 in any way release Mortgagor or Borrower from their obligations to comply with the terms, provisions, conditions, covenants and agreements and clauses of the Mortgage and other Loan documents;

1.1.4 The provisions of the Mortgage remain in full force and effect and must be complied with by Borrower; and

1.1.5 Following an event of default under the Mortgage, Tenant may pay all rent and other sums due under the Lease to Mortgagee as provided for above.

BORROWER/MORTGAGOR

BEDFORD PATRIOTS PARK, LLC

By: _____
Name: _____
Title: _____

COMMONWEALTH OF MASSACHUSETTS

_____, ss.

On this date, _____, 20____, before me, the undersigned notary public, personally appeared_____, the _____ of Bedford Patriots Park, LLC, a Delaware limited liability company, proved to me through satisfactory evidence of identification, which were _____, to be the person whose name is signed on the preceding or attached document, and acknowledged to me that he signed it voluntarily for its stated purpose.

_____
Notary Public
My commission expires:

EXHIBIT 21.1

FORM LETTER OF CREDIT

IRREVOCABLE STANDBY LETTER OF CREDIT NO. _____

DATE:_____, 20____

BENEFICIARY:

_____

_____

_____

APPLICANT:

_____

_____

_____

AMOUNT: US$_____($_____ and 00/100 U.S. DOLLARS)

EXPIRATION DATE: _____, 20____

LOCATION: AT OUR COUNTERS IN_____

DEAR SIR/MADAM:

WE HEREBY ESTABLISH OUR IRREVOCABLE STANDBY LETTER OF CREDIT NO. _____ IN YOUR FAVOR AVAILABLE BY YOUR DRAFT IN THE FORM OF "ANNEX 1" ATTACHED DRAWN ON US AT SIGHT AND ACCOMPANIED BY THE FOLLOWING DOCUMENTS:

A DATED STATEMENT SIGNED BY AN AUTHORIZED OFFICER OF THE

BENEFICIARY READING AS FOLLOWS:

(A) WE ARE ENTITLED TO DRAW ON THE LETTER OF CREDIT PURSUANT TO THE TERMS OF THAT CERTAIN LEASE BY AND BETWEEN _____, AS LANDLORD, AND _____, AS TENANT

OR

(B) _____ HEREBY CERTIFIES THAT IT HAS RECEIVED NOTICE FROM _____ THAT THE LETTER OF CREDIT NO. _____ WILL NOT BE RENEWED, AND THAT IT HAS NOT RECEIVED A REPLACEMENT OF THIS LETTER OF CREDIT FROM _____ SATISFACTORY TO _____ AT LEAST FORTY-FIVE (45) DAYS PRIOR TO THE EXPIRATION DATE OF THIS LETTER OF CREDIT.

THE LEASE MENTIONED IN THIS LETTER OF CREDIT IS FOR IDENTIFICATION PURPOSES ONLY AND IT IS NOT INTENDED THAT SAID AGREEMENT BE INCORPORATED HEREIN OR FORM PART OF THIS LETTER OF CREDIT.

DRAFT(S) AND DOCUMENTS MUST INDICATE THE NUMBER AND DATE OF THIS LETTER OF CREDIT. PARTIAL DRAWINGS ARE PERMITTED.

THIS LETTER OF CREDIT SHALL BE AUTOMATICALLY EXTENDED FOR AN ADDITIONAL PERIOD OF ONE YEAR, WITHOUT AMENDMENT OR CONDITION, FROM THE PRESENT OR EACH FUTURE EXPIRATION DATE UNLESS AT LEAST FORTY-FIVE (45) DAYS PRIOR TO THE THEN CURRENT EXPIRATION DATE WE NOTIFY YOU AND THE APPLICANT BY REGISTERED MAIL/OVERNIGHT COURIER SERVICE AT THE ABOVE ADDRESSES THAT THIS LETTER OF CREDIT WILL NOT BE EXTENDED BEYOND THE CURRENT EXPIRATION DATE.

THIS LETTER OF CREDIT MAY BE TRANSFERRED (AND THE PROCEEDS HEREOF ASSIGNED), AT THE EXPENSE OF THE APPLICANT (WHICH PAYMENT SHALL NOT BE A CONDITION TO ANY TRANSFER), ONE OR MORE TIMES BUT IN EACH INSTANCE ONLY IN THE FULL AMOUNT AVAILABLE TO BE DRAWN UNDER THE LETTER OF CREDIT.

ALL DEMANDS FOR PAYMENT SHALL BE MADE BY PRESENTATION OF THE DATED CERTIFICATION PRIOR TO _____ A.M. _____ TIME, ON A BUSINESS DAY AT OUR OFFICE (THE “BANK’S OFFICE”) AT: _____, ATTENTION: STANDBY LETTER OF CREDIT SECTION OR BY FACSIMILE TRANSMISSION AT: (___) _____; AND SIMULTANEOUSLY UNDER TELEPHONE ADVICE TO: (___) _____, ATTENTION: STANDBY LETTER OF CREDIT NEGOTIATION SECTION WITH ORIGINALS TO FOLLOW BY OVERNIGHT COURIER SERVICE.

PAYMENT AGAINST CONFORMING PRESENTATIONS HEREUNDER SHALL BE MADE BY BANK IN IMMEDIATELY AVAILABLE U.S. FUNDS DURING NORMAL BUSINESS HOURS OF THE BANK’S OFFICE WITHIN TWO (2) BUSINESS DAYS AFTER PRESENTATION NOTWITHSTANDING ANYTHING TO THE CONTRARY IN THE UNIFORM CUSTOMS AND PRACTICE FOR DOCUMENTARY CREDITS (1997 REVISION), INTERNATIONAL CHAMBER OF COMMERCE, PUBLICATION NO. 600.

WE HEREBY CERTIFY THAT THIS IS AN UNCONDITIONAL AND IRREVOCABLE CREDIT AND AGREE WITH THE DRAWERS, ENDORSERS AND BONAFIDE HOLDERS THAT THE DRAFTS DRAWN UNDER AND IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF THIS LETTER OF CREDIT SHALL BE DULY HONORED UPON PRESENTATION TO THE DRAWEE, IF NEGOTIATED ON OR BEFORE THE EXPIRATION DATE OF THIS CREDIT.

EXCEPT TO THE EXTENT INCONSISTENT WITH THE EXPRESS TERMS HEREOF, THIS LETTER OF CREDIT IS SUBJECT TO THE UNIFORM CUSTOMS AND PRACTICE FOR DOCUMENTARY CREDITS (1997 REVISION), INTERNATIONAL CHAMBER OF COMMERCE, PUBLICATION NO. 600.

AUTHORIZED SIGNATURE

AUTHORIZED SIGNATURE

ANNEX 1

BILL OF EXCHANGE

DATE:

AT SIGHT OF THIS BILL OF EXCHANGE

PAY TO THE ORDER OF _____

US _____DOLLARS (US $_____)

DRAWN UNDER

CREDIT NUMBER NO. **DATED**

TO:

_____

Authorized Signature

EXHIBIT “A”

DATE:
TO:_____ RE: STANDBY LETTER OF CREDIT

_____ NO._____

ISSUED BY_____

LADIES AND GENTLEMEN:

FOR VALUE RECEIVED, THE UNDERSIGNED BENEFICIARY HEREBY IRREVOCABLY TRANSFERS TO:

(NAME OF TRANSFEREE) _____

(ADDRESS) _____

_____

ALL RIGHTS OF THE UNDERSIGNED BENEFICIARY TO DRAW UNDER THE ABOVE LETTER OF CREDIT UP TO ITS AVAILABLE AMOUNT AS SHOWN ABOVE AS OF THE DATE OF THIS TRANSFER.

BY THIS TRANSFER, ALL RIGHTS OF THE UNDERSIGNED BENEFICIARY IN SUCH LETTER OF CREDIT ARE TRANSFERRED TO THE TRANSFEREE. TRANSFEREE SHALL HAVE THE SOLE RIGHTS AS BENEFICIARY THEREOF, INCLUDING SOLE RIGHTS RELATING TO ANY AMENDMENTS, WHETHER INCREASES OR EXTENSIONS OR OTHER AMENDMENTS, AND WHETHER NOW EXISTING OR HEREAFTER MADE. ALL AMENDMENTS ARE TO BE ADVISED DIRECT TO THE TRANSFEREE WITHOUT NECESSITY OF ANY CONSENT OF OR NOTICE TO THE UNDERSIGNED BENEFICIARY.

THE ORIGINAL OF SUCH LETTER OF CREDIT IS RETURNED HEREWITH, AND WE ASK YOU TO ENDORSE THE TRANSFER ON THE REVERSE THEREOF, AND

FORWARD IT DIRECTLY TO THE TRANSFEREE WITH YOUR CUSTOMARY NOTICE OF TRANSFER.

SINCERELY,

_____
(BENEFICIARY’S NAME)

_____
SIGNATURE OF BENEFICIARY

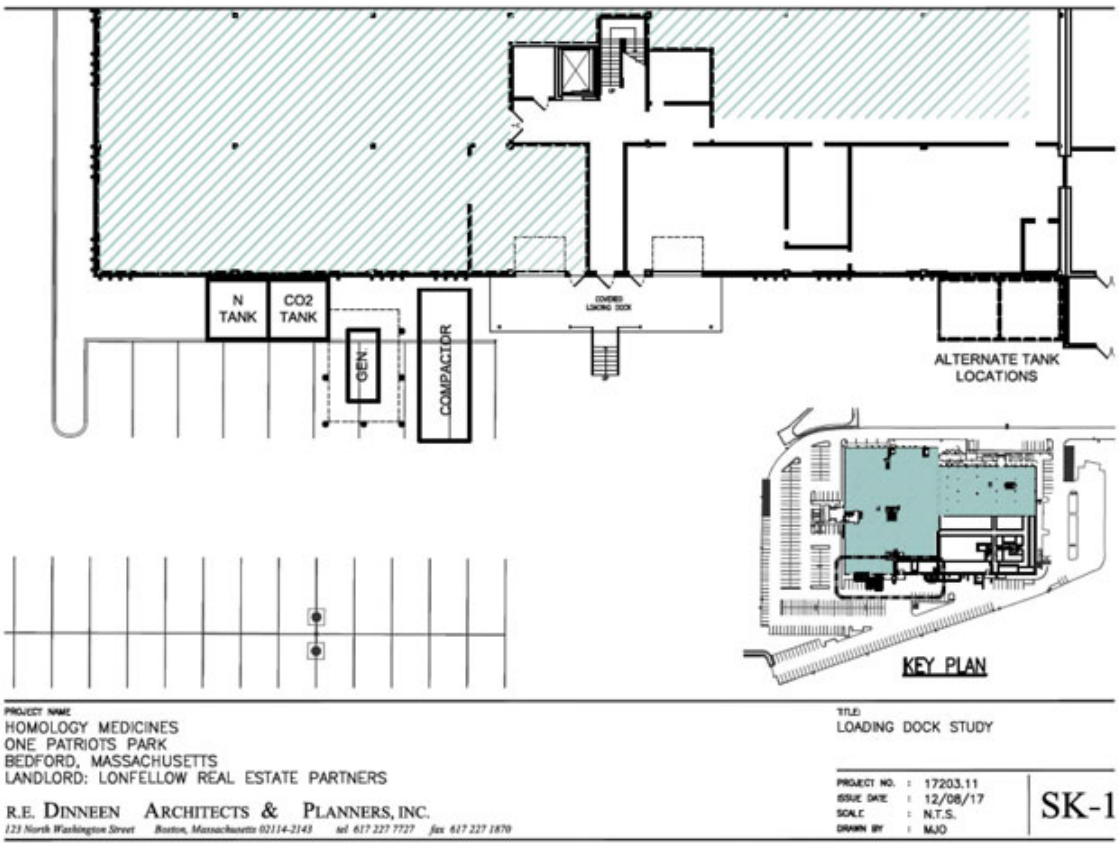
SIGNATURE AUTHENTICATED

_____
(Name of Bank)

_____
(authorized signature)

EXHIBIT 29.32.1

INSTALLATION AREA (NITROGEN TANK AND GENERATOR)



HOMOLOGY MEDICINES, INC.

December 7, 2015

Sam Rasty
[***]

Dear Sam:

It is my pleasure to offer you employment with Homology Medicines, Inc. (the "**Company**"). Your position will be **Chief Operating Officer,** reporting directly to the President. Your effective date of hire as a regular, full-time employee will be January 18, 2016 (your "**Start Date**").

Compensation: This is an exempt position. The Company will pay you an annual salary of $335,000.00, payable in accordance with the Company's regular payroll practices and subject to all applicable tax reporting and withholding requirements.

Signing Bonus: The Company agrees to pay you a one-time cash signing bonus in an amount equal to $100,000 (the **"Signing Bonus"**), payable upon the Company's first regular payroll date following the Start Date and subject to all applicable tax reporting and withholding requirements. Notwithstanding the foregoing, you acknowledge and agree that if you voluntarily resign or the Company terminates your employment for Cause (each, a "**Termination Event**") prior to the second anniversary of your Start Date, you shall repay a portion of the Signing Bonus to the Company within 30 days of such Termination Event without reduction for any taxes withheld by the Company upon its payment to you of the Signing Bonus, as follows: (i) if there is a Termination Event prior to the first anniversary of your Start Date, you shall repay to the Company 50% of the Signing Bonus and (ii) if there is a Termination Event on or after the first anniversary of your Start Date, but prior to the second anniversary of your Start Date, you shall repay to the Company 33% of the Signing Bonus. By signing below, you authorize the Company to immediately offset against and reduce any amounts otherwise due to you for any amounts due to the Company in respect of your obligation to repay the Signing Bonus under this paragraph.

Performance Bonus: During employment, you will be eligible for yearly bonuses with an initial bonus target of 30% of your base salary, based on the achievement, as determined by the Company's Board of Directors (the "**Board**"), of goals and objectives established by the Board. Any bonus you receive will be paid on or before January 1 of the year following the fiscal year in which it is earned, provided that you remain employed by the Company at the time of such payment. Your compensation package, including your base salary and target bonus, will be reviewed at least annually by the Company following discussion between yourself and the Board.

Equity: As soon as practicable following your Start Date, and subject to Board approval, the Company will grant you an incentive stock option (the **"Standard Option"**) to purchase 1,115,472 shares of the Company's common stock, $0.0001 par value per share (the **"Common Stock"**), at an exercise price equal to the fair market value per share on the date of grant. Further, as soon as practicable following your Start Date, and subject to Board approval, the Company will grant you an additional incentive stock option (the **"Signing Option,"** and together with the Standard Option, the **"Options"**) to purchase a number of shares of Common Stock equal to $100,000 divided by the price per share at which the Company sells shares of its Series A Preferred Stock to investors for cash in its Series A Preferred Stock financing, at an exercise price equal to the fair market value per share on the date of grant. The Options will vest (i.e., become exercisable) as to 25% of the underlying shares on the first anniversary of your Start Date, and as to an additional 2.0833% of the underlying shares every month thereafter, so that the Options will be fully vested on the four-year anniversary of your Start Date. In addition, if you are terminated without Cause (as defined below) within twelve (12) months of a change of control of the Company 100% of the shares subject to the Options that are unvested at the time of such termination shall immediately vest. The Options will be subject to the Company's 2015 Stock Incentive Plan and to the terms of the Company's standard form of incentive stock option agreement.

Additional Benefits: As a regular, full-time employee you are eligible to participate in any employee benefit plans which the Company may offer to its senior executives. These plans may from time to time be amended or terminated with or without prior notice. You will also be eligible for twenty (20) days of paid time off (PTO), five (5) of which may be carried over from year to year if unused. You will also be entitled to paid legal holidays in accordance with the Company's normal policies.

Expense Reimbursement. You will be reimbursed for all travel, lodging, meals and other out-of-pocket expenses incurred by you in the performance of your duties, in accordance with the expense reimbursement policies of the Company for senior executives as in effect from time to time.

Term of Employment: Your employment at all times will be at will, meaning that you are not being offered employment for a definite period and that either you or the Company may terminate the employment relationship at any time for any reason. We request, however, that you provide us with at least thirty days' advance notice in the event that you intend to terminate your employment.

Termination by the Company Without Cause: If your employment is terminated by the Company without Cause (as defined below), you will receive a severance of three (3) months base salary continuation (paid on the Company's normal payroll cycle) and three (3) months reimbursement of COBRA premiums for health benefit coverage for you and your immediate family (less applicable contributions by you and paid on the Company's normal payroll cycle for benefits), as in effect immediately prior to such termination, so long as you are eligible to elect COBRA benefits, provided, however that if the Company's health insurance plan is terminated during such three (3) months period such that you are no longer eligible for COBRA benefits, the Company will pay to you the amount of the COBRA premiums for health benefit coverage that otherwise would have been paid to the health insurance provider, which amount shall be paid on the same schedule as the Company would have paid such premiums to the provider for the remaining portion of such three (3) months period.

As used herein, **"Cause"** shall mean (i) commission of any immoral or illegal act or any gross or willful misconduct or material breach of any Company policy, agreement with, or duty owed to the Company, (ii) theft, fraud. embezzlement, or other intentional misappropriation of funds, (iii) destruction of Company property with intent or through gross negligence, or (iv) any material breach of any obligation or duty to the Company or any of its affiliates (whether arising by statute, common law, or agreement) relating to confidentiality, noncompetition, non-solicitation, or proprietary rights.

As a condition to the Company's obligation to make the severance payments described above, you must (i) execute a customary release of work-related claims against the Company and its affiliates that is acceptable to the Company and (ii) abide by your post-termination obligations contained in the NDA (as defined below).

Employment Eligibility: The Immigration Reform and Control Act requires employers to verify employment eligibility and identity of new employees. On your first day of employment, you must provide us with appropriate documents to establish your eligibility to work in the United States (e.g., social security card, driver's license, US passport). We will not be able to employ you if you fail to comply with this requirement.

Work Environment: The Company maintains a smoke-free, drug-free workplace policy and supports equal employment opportunities for all of its employees.

No Conflicts: By accepting this offer below, you represent (i) that you are subject to no agreements which might restrict your conduct at the Company, and (ii) that you understand that if you become aware at any time during your employment with the Company that you are subject to any agreements which might restrict your conduct at the Company, you are required to immediately inform the Company of the existence of such agreements or your employment by the Company will be subject to immediate termination.

Employee NDA: Enclosed for your review is a copy of the Company's Non-Disclosure, Non-Competition and Assignment of Intellectual Property Agreement (**"NDA"**). This offer is conditioned on your signing the NDA and your continued willingness thereafter to abide by the terms of the NDA. You are required to sign the NDA when you countersign this offer letter.

Background Check: This offer is contingent upon satisfactory completion of a background check. The enclosed Background Check Disclosure and Authorization details the scope of the background check that may be done by the Company, Please review this disclosure and promptly return your signed authorization. If you decide not to authorize a background check, your offer will be rescinded and your acceptance of our offer declined.

Miscellaneous:

This letter constitutes our entire offer regarding the terms and conditions of your employment with the Company. It supersedes any other agreements or promises made to you by any one regarding the subject matter hereof, whether oral or written.

Please indicate your acceptance of this offer by signing below and returning a signed copy of this letter to my attention at the Company by December 14, 2015.

We are looking forward to working with you. Please contact me if you have any questions or need more information.

Sincerely,

/s/ Kush Parmar
Kush Parmar, President

Accepted and agreed:

/s/ Sam Rasty
Sam Rasty

12/14/2015
Date

HOMOLOGY MEDICINES, INC.

February 14, 2016

Albert B. Seymour
[***]
[***]

Dear Albert:

It is my pleasure to offer you employment with Homology Medicines, Inc. (the **"Company"**). Your position will be **Chief Scientific Officer**, reporting directly to the President/CEO. Your effective date of hire as a regular, full-time employee will be March 28, 2016 (your "**Start Date**").

Compensation: This is an exempt position. The Company will pay you an annual salary of $350,000.00, payable in accordance with the Company's regular payroll practices and subject to all applicable tax reporting and withholding requirements.

Bonus: During employment, you will be eligible for yearly bonuses with an initial bonus target of 35% of your base salary, based on the achievement, as determined by the Company's Board of Directors (the "**Board**"), of goals and objectives established by the Board. Any bonus you receive will be paid on or before January 1 of the year following the fiscal year in which it is earned, provided that you remain employed by the Company at the time of such payment. Your compensation package, including your base salary and target bonus, will be reviewed at least annually by the Company following discussion between yourself and the Board.

Equity: Further, subject to Board approval, the Company will grant you an incentive stock option (the **"Option"**) to purchase 1,201,283 shares of the Company's common stock, $0.0001 par value per share (the **"Option Shares"**), at an exercise price equal to the fair market value per share on the date of grant. The option will vest (i.e., become exercisable) as to 25% of the underlying shares on the first anniversary of your Start Date, and as to an additional 2.0833% of the underlying shares every month thereafter, so that the option will be fully vested on the four-year anniversary of your Start Date. In addition, if you are terminated without Cause (as defined below) within twelve (12) months of a change of control of the Company, 100% of the shares subject to the option that are unvested at the time of such termination shall immediately vest. The option will be subject to the Company's 2015 Stock Incentive Plan and to the terms of the Company's standard form of incentive stock option agreement.

Additional Benefits: As a regular, full-time employee you are eligible to participate in any employee benefit plans which the Company may offer to its senior executives. These plans may, from time to time, be amended or terminated with or without prior notice. You will also be eligible for twenty (20) days of paid time off (PTO), five (5) of which may be carried over from year to year if unused. You will also be entitled to paid legal holidays in accordance with the Company's normal policies.

Expense Reimbursement. You will be reimbursed for all travel, lodging, meals and other out-of-pocket expenses incurred by you in the performance of your duties, in accordance with the expense reimbursement policies of the Company for senior executives as in effect from time to time.

Term of Employment: Your employment at all times will be at will, meaning that you are not being offered employment for a definite period and that either you or the Company may terminate the employment relationship at any time for any reason. We request, however, that you provide us with at least thirty days' advance notice in the event that you intend to terminate your employment.

Termination by the Company Without Cause: lf your employment is terminated by the Company without Cause (as defined below), you will receive a severance of six (6) months base salary continuation (paid on the Company's normal payroll cycle), six (6) months of pro-rated target annual bonus (paid over the six-month period), and six (6) months reimbursement of COBRA premiums for health benefit coverage for you and your immediate family (less applicable contributions by you and paid on the Company's normal payroll cycle for benefits), as in effect immediately prior to such termination, so long as you are eligible to elect COBRA benefits, provided, however that if the Company's health insurance plan is terminated during such six (6) months period such that you are no longer eligible for COBRA benefits, the Company will pay to you the amount of the COBRA premiums for health benefit coverage that otherwise would have been paid to the health insurance provider, which amount shall be paid on the same schedule as the Company would have paid such premiums to the provider for the remaining portion of such six (6) months period.

As used herein, **"Cause"** shall mean (i) commission of any immoral or illegal act or any gross or willful misconduct or material breach of any Company policy, agreement with, or duty owed to the Company, (ii) theft, fraud, embezzlement, or other intentional misappropriation of funds, (iii) destruction of Company property with intent or through gross negligence, or (iv) any material breach of any obligation or duty to the Company or any of its affiliates (whether arising by statute, common law, or agreement) relating to confidentiality, noncompetition, non-solicitation, or proprietary rights.

As a condition to the Company's obligation to make the severance payments described above, you must (i) execute a customary release of work-related claims against the Company and its affiliates that is acceptable to the Company and (ii) abide by your post-termination obligations contained in the NDA (as defined below).

Employment Eligibility: The Immigration Reform and Control Act requires employers to verify employment eligibility and identity of new employees. On your first day of employment, you must provide us with appropriate documents to establish your eligibility to work in the United States (e.g., social security card, driver's license, US passport). We will not be able to employ you if you fail to comply with this requirement.

Work Environment: The Company maintains a smoke-free, drug-free workplace policy and supports equal employment opportunities for all of its employees.

No Conflicts: By accepting this offer below, you represent (i) that you are subject to no agreements which might restrict your conduct at the Company, and (ii) that you understand that if you become aware at any time during your employment with the Company that you are subject to any agreements which might restrict your conduct at the Company, you are required to immediately inform the Company of the existence of such agreements or your employment by the Company will be subject to immediate termination.

Employee NDA: Enclosed for your review is a copy of the Company's Non-Disclosure, Non-Competition and Assignment of Intellectual Property Agreement ("**NDA**"). This offer is conditioned on your signing the NDA and your continued willingness thereafter to abide by the terms of the NDA. You are required to sign the NDA when you countersign this offer letter.

Background Check: This offer is contingent upon satisfactory completion of a background check. The enclosed Background Check Disclosure and Authorization details the scope of the background check that may be done by the Company. Please review this disclosure and promptly return your signed authorization. If you decide not to authorize a background check, your offer will be rescinded and your acceptance of our offer declined.

Miscellaneous:

This letter constitutes our entire offer regarding the terms and conditions of your employment with the Company. It supersedes any other agreements or promises made to you by anyone regarding the subject matter hereof, whether oral or written.

Please indicate your acceptance of this offer by signing below and returning a signed copy of this letter to my attention at the Company by February 16, 2016.

We are looking forward to working with you. Please contact me if you have any questions or need more information.

Sincerely,

/s/ Kush Parmar
Kush Parmar, President & CEO

Accepted and agreed:

/s/ Albert B. Seymour
Albert B. Seymour

16-Feb-2016
Date

HOMOLOGY MEDICINES, INC.

March 31, 2016

Arthur O. Tzianabos
[***]

Dear Arthur:

It is my pleasure to offer you employment with Homology Medicines, Inc. (the **"Company").** Your position Will be **President and Chief Executive Officer,** reporting to the Board of Directors. Your effective date of hire as a regular, full-time employee Will be March 31, 2016 (your "**Start Date**").

Compensation: This is an exempt position. The Company will pay you an annual salary of $410,000.00, payable in accordance with the Company's regular payroll practices and subject to all applicable tax reporting and withholding requirements.

Signing Bonus: The Company agrees to pay you a one-time cash signing bonus in an amount equal to $15,000 (the "**Signing Bonus**"), payable upon the Company's first regular payroll date following the Start Date and subject to all applicable tax reporting and withholding requirements. Notwithstanding the foregoing, you acknowledge and agree that if you voluntarily resign or the Company terminates your employment for Cause (each, a "**Termination Event**") prior to the first anniversary of your Start Date, you shall repay 50% of the Signing Bonus to the Company within 30 days of such Termination Event without reduction for any taxes withheld by the Company upon its payment to you of the Signing Bonus. By signing below, you authorize the Company to immediately offset against and reduce any amounts otherwise due to you for any amounts due to the Company in respect of your obligation to repay the Signing Bonus under this paragraph.

Performance Bonus: During employment, you will be eligible for yearly bonuses with an initial bonus target of 40% of your base salary, based on the achievement, as determined by the Company's Board of Directors (the **"Board"),** of goals and objectives established by the Board. Any bonus you receive will be paid on or before March 31 of the year following the calendar year in which it is earned, provided that you remain employed by the Company at the time of such payment (unless you have died prior to the time of such payment, in which case the amount of any bonus earned by you prior to your death will be paid to your estate). Your compensation package, including your base salary and target bonus, will be reviewed at least annually by the Company following discussion between yourself and the Board.

Equity: As soon as practicable following your Start Date, and subject to Board approval, the Company will grant you an incentive stock option (the "**Option**") to purchase 3,432,221 shares of the Company's common stock, $0.0001 par value per share (the "**Common Stock**"), at an

exercise price equal to the fair market value per share on the date of grant. The Options will vest (i.e., become exercisable) as to 25% of the underlying shares on the first anniversary of your Start Date, and as to an additional 2.0833% of the underlying shares every month thereafter, so that the Options will be fully vested on the four-year anniversary of your Start Date. In addition, if you are terminated without Cause (as defined below) within twelve (12) months of a Change in Control Transaction (as defined in the Company's 2015 Stock Incentive Plan) or during the thirty (30) day period preceding a Change in Control Transaction in anticipation of such Change in Control Transaction, 100% of the shares subject to the Options that are unvested at the time of such termination shall immediately vest. The Options will be subject to the Company's 2015 Stock Incentive Plan and to the terms of the Company's standard form of incentive stock option agreement.

Additional Benefits: As a regular, full-time employee you are eligible to participate in any employee benefit plans which the Company may offer to its senior executives. These plans may, from time to time, be amended or terminated with or without prior notice. You will also be eligible for twenty (20) days of paid time off (PTO), five (5) of which may be carried over from year to year if unused. You will also be entitled to paid legal holidays in accordance with the Company's normal policies. Additionally, you shall be entitled to indemnification to the full extent authorized under the Company's Certificate of Incorporation and By-laws as in effect from time to time.

Expense Reimbursement. You will be reimbursed for all travel, lodging, meals and other out-of-pocket expenses, including but not limited to, all costs associated with your smart phone, incurred by you in the performance of your duties, in accordance with the expense reimbursement policies of the Company for senior executives as in effect from time to time.

Term of Employment: Your employment at all times will be at will, meaning that you are not being offered employment for a definite period and that either you or the Company may terminate the employment relationship at any time for any reason. We request, however, that you provide us with at least thirty days' advance notice in the event that you intend to terminate your employment.

Termination by the Company Without Cause or Resignation by you with Good Reason: If your employment is terminated by the Company without Cause (as defined below) or if you voluntarily terminate your employment for Good Reason (as defined below), you will receive a severance of nine (9) months base salary continuation (paid on the Company's normal payroll cycle) and nine (9) months reimbursement of COBRA premiums for health and dental benefit coverage for you and your immediate family (less applicable contributions by you and paid on the Company's normal payroll cycle for benefits), as in effect immediately prior to such termination or resignation, so long as you are eligible to elect comparable COBRA benefits, provided, however that if the Company's health and dental insurance plan is terminated during such nine (9) months period such that you are no longer eligible for COBRA benefits, the Company will pay to you the amount of the COBRA premiums for health and benefit coverage that otherwise would have been paid to the health and dental insurance provider, which amount shall be paid on the same schedule as the Company would have paid such premiums to the provider for the remaining portion of such nine (9) months period.

As used herein, **"Cause"** shall mean: (i) any gross or willful misconduct or material breach of any Company policy, agreement with, or duty owed to the Company, (ii) theft, fraud, embezzlement, or other intentional misappropriation of Company funds, (iii) destruction of Company property with intent or through gross negligence, (iv) any material breach of any obligation or duty to the Company or any of its affiliates (whether arising by statute, common law, or agreement) relating to confidentiality, noncompetition, non-solicitation, or proprietary rights; or (iv) commission of, indictment or conviction of, or pleading guilty or nolo contendere to, a misdemeanor where imprisonment is imposed, other than for a traffic-related offense, a felony, or any crime involving fraud or dishonesty.

As a condition to the Company's obligation to make the severance payments described above, you must (i) timely execute a customary release of work-related claims against the Company and its affiliates that is in the form substantially similar to the one attached hereto as Exhibit A, which will be presented to you at time of termination and (ii) abide by your post-termination obligations contained in the NDA (as defined below).

As use herein, **"Good Reason"** shall mean the occurrence of any of the following events without your consent:

(i) assignment to you of any duties inconsistent in any material respect with to your position (including titles and reporting relationships), authority, duties and/or responsibilities as contemplated by this Agreement; and/or

(ii) any material failure by the Company to comply with any of the provisions regarding your Base Salary payable to you under this Agreement.

Notwithstanding the foregoing, no Good Reason will have occurred unless and until you have: (a) provided the Company, within 60 days of your knowledge of the occurrence of the facts and circumstances underlying the Good Reason event, written notice stating with specificity the applicable facts and circumstances underlying such finding of Good Reason; (b) provided the Company with an opportunity to cure the same within 30 days after the receipt of such notice; and (c) your resignation of employment must occur within 30 days after expiration of the 30 day period set forth in the foregoing clause (b).

Employment Eligibility: The Immigration Reform and Control Act requires employers to verify employment eligibility and identity of new employees. On your first day of employment, you must provide us with appropriate documents to establish your eligibility to work in the United States (e.g., social security card, driver's license, US passport). We will not be able to employ you if you fail to comply with this requirement.

Work Environment: The Company maintains a smoke-free, drug-free workplace policy and supports equal employment opportunities for all of its employees.

No Conflicts: By accepting this offer below, you represent (i) that you are subject to no agreements which might restrict your conduct at the Company, and (ii) that you understand that if you become aware at any time during your employment with the Company that you are subject to any agreements which might restrict your conduct at the Company, you are required to immediately inform the Company of the existence of such agreements or your employment by the Company will be subject to immediate termination.

Employee NDA: Enclosed for your review is a copy of the Company's Non-Disclosure, Non-Competition and Assignment of Intellectual Property Agreement **("NDA").** This offer is conditioned on your signing the NDA and your continued willingness thereafter to abide by the terms of the NDA. You are required to sign the NDA when you countersign this offer letter.

Background Check: This offer is contingent upon satisfactory completion of a background check. The enclosed Background Check Disclosure and Authorization details the scope of the background check that may be done by the Company. Please review this disclosure and promptly return your signed authorization. If you decide not to authorize a background check, your offer will be rescinded and your acceptance of our offer declined.

Miscellaneous:

This letter constitutes our entire offer regarding the terms and conditions of your employment with the Company. It supersedes any other agreements or promises made to you by anyone regarding the subject matter hereof, whether oral or written. This letter is binding on its successors and assigns.

Please indicate your acceptance of this offer by signing below and returning a signed copy of this letter to my attention at the Company by Monday April 4, 2016.

We are looking forward to working with you. Please contact me if you have any questions or need more information.

Sincerely,

/s/ Kush Parmar
Kush Parmar, President

Accepted and agreed:

/s/ Arthur Tzianabos
Arthur Tzianabos

3/31/2016
Date

Exhibit 10.14

Confidential Treatment Requested by Homology Medicines, Inc.

Execution Version

COLLABORATION AND LICENSE AGREEMENT

BY AND BETWEEN

HOMOLOGY MEDICINES, INC.

AND

NOVARTIS INSTITUTES FOR BIOMEDICAL RESEARCH, INC.

DATED NOVEMBER 6, 2017

TABLE OF CONTENTS

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

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Exhibits and Schedules

Exhibit A – Form of Invoice
Schedule 1.130 – HMI Platform Patent Rights
Schedule 1.165 – Knowledge of HMI
Schedule 3.4.1 – General Research Plan
Schedule 4.5 – Third Party License Terms
Schedule 14.2 – Exception to Representations and Warranties
Schedule 14.2.1 – HMI Patent Rights
Schedule 14.2.2 – Third Party Licenses of HMI

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

COLLABORATION AND LICENSE AGREEMENT

THIS **COLLABORATION AND LICENSE AGREEMENT** (this "**Agreement**") is entered into this 6th day of November, 2017 (the "**Effective Date**"), by and between Homology Medicines, Inc., a corporation organized under the laws of the State of Delaware, having a business address at 45 Wiggins Avenue, Bedford, MA 01730 ("**HMI**"), and Novartis Institutes for BioMedical Research, Inc., a corporation organized under the laws of the State of Delaware, having a business address at 250 Massachusetts Avenue, Cambridge, MA 02139 ("**NVS**"). HMI and NVS are sometimes referred to herein individually as a "**Party**" and collectively as the "**Parties**."

WHEREAS, HMI is a biopharmaceutical company focused on the research and development of genome editing products targeting genetically-defined diseases with unmet medical needs;

WHEREAS, NVS is a global pharmaceutical company focused on developing and commercializing pharmaceutical and biopharmaceutical products;

WHEREAS, NVS wishes to fund a research program that will include the identification and synthesis by HMI of genome editing products that Modulate certain gene targets; and

WHEREAS, NVS desires to obtain a license under the HMI Patent Rights and the HMI Know-How to Develop, Manufacture, and Commercialize Products, under the terms and conditions set forth herein, and HMI desires to grant such a license.

NOW, THEREFORE, the Parties agree as follows:

Article 1. DEFINITIONS

The following terms, whether used in the singular or plural, will have the following meanings:

1.1. "**AAA**" has the definition set forth in Section 17.1.2 (Full Arbitration).

1.2. "**AAV**" means any recombinant adeno-associated viral vector.

1.3. "**AAV Candidate Design**" means the [***]

1.4. "**AAV Gene Editing Technology**" means [***].

1.5. "**Accounting Standards**" means, with respect to HMI, GAAP and, with respect to NVS, IFRS, in each case, as generally and consistently applied throughout the Party's organization. Each Party shall promptly notify the other in the event that it changes the Accounting Standards pursuant to which its records are maintained, it being understood that each Party may only use internationally recognized accounting principles (*e.g.*, IFRS, US GAAP, etc.).

1.6. "**Acquiror**" has the definition set forth in Section 4.12.1 (Exception to Exclusivity).

1.7. "**Adverse Event**" means any untoward medical occurrence in a human clinical study subject or in a patient who is administered a Product, whether or not considered related to such Product, including any undesirable sign (including abnormal laboratory findings of clinical concern), symptom, or disease associated with the use of a Product.

1.8. "**Affiliate**" means, with respect to any Person, any Person controlling, controlled by or under common control with such Person. For purposes of this Section 1.8 (Affiliate), the term "control" (including, with correlative meaning, the terms "controlled by" and "under common control with"), means the possession, directly or indirectly, of more than 50% of the voting stock or other ownership interest of such Person, or the possession, directly or indirectly, of the power to direct or cause the direction of the affairs or management and policies of such Person or the power to elect or appoint more than 50% of the members of the governing body of such Person. The Parties acknowledge that in the case of certain entities organized under the laws of certain countries outside the United States, the maximum percentage ownership permitted by Applicable Law for a foreign investor may be less than fifty percent (50%), and that in such case such lower percentage will be substituted in the preceding sentence; *provided*, that such foreign investor has the power to direct the management and policies of such entity.

1.9. "**Agreement**" has the definition set forth in the Preamble.

1.10. "**Alliance Manager**" has the definition set forth in Section 5.3 (Alliance Managers).

1.11. "**Applicable Law**" means any applicable federal, state, local, municipal, foreign or other law, statute, legislation, principle of common law, ordinance, code, rule, regulation, or other pronouncement issued, enacted, adopted, passed, approved, promulgated, made, implemented or otherwise put into effect by or under the authority of any Governmental Authority, and will include the applicable regulations and guidance of the FDA and European Union (and national implementations thereof) that constitute cGLP practices, cGMP practices and cGCP practices (and, if and as appropriate under the circumstances, International Conference on Harmonization (ICH) guidance or other comparable regulation and guidance of any applicable Governmental Authority).

1.12. "**Arbitration**" has the definition set forth in Section 17.1.2 (Full Arbitration).

1.13. "**Assigned Know-How**" means HMI Assigned Know-How or NVS Assigned Know-How.

1.14. "**Assigned Patent Rights**" means HMI Assigned Patent Rights or NVS Assigned Patent Rights.

1.15. "**Assigned Regulatory Submissions**" has the definition set forth in Section 7.6.1 (U.S. BLA for U.S. [***] Products).

1.16. "**At-Will Opt-Out Date**" has the definition set forth in Section 4.14 (HMI Commercialization Opt-Out Rights for U.S. [***] Products).

1.17. "**Audited Party**" has the definition set forth in Section 11.10 (Records and Audits).

1.18. "**Auditing Party**" has the definition set forth in Section 11.10 (Records and Audits).

1.19. "**Auditor**" has the definition set forth in Section 11.10 (Records and Audits).

1.20. "**Bankrupt Party**" has the definition set forth in Section 16.2.3 (Termination for Bankruptcy).

1.21. "**Bankruptcy Code**" has the definition set forth in Section 17.15 (Rights in Bankruptcy).

1.22. "[***] **Out-license**" has the definition set forth in Section 4.13.1 ([***]).

1.23. "[***] **Package**" means, with respect to a [***] Product, a summary of the information or data generated by or on behalf of HMI with respect to any Research, Manufacturing, Development, or Commercialization of such [***] Product, as applicable to the stage of Development or Commercialization of such [***] Product, along with any Regulatory Submissions provided by or on behalf of HMI or its Affiliates to any Regulatory Authority for such [***] Product.

1.24. "[***] **Product**" means [***].

1.25. "[***] **Target**" means [***] A [***] Target does not include [***].

1.26. "**Biosimilar Application**" has the definition set forth in Section 12.6.5(a) (Receipt of Application; Responsibilities).

1.27. "**BLA**" means, as applicable, a Biologics License Application (as defined in 21 C.F.R. 600 et seq.), or a New Drug Application (as defined in 21 C.F.R. Parts 314 et seq.) or, in each case, its successor regulation.

1.28. "**Breach Opt-Out Date**" the date on which NVS exercises its special remedy in lieu of terminating this Agreement pursuant to Section 16.5 (Special Remedy for HMI's Uncured Material Breach) due to HMI's breach with respect to the [***] Target in the [***] Field.

1.29. "**Brief**" has the definition set forth in Section 17.1.3(a) (Expedited Arbitration).

1.30. "**Business Day**" means a day that is not a Saturday, Sunday, or a day on which banking institutions in Basel, Switzerland or Boston, Massachusetts are authorized or required by Applicable Law to remain closed.

1.31. "**C.F.R.**" means the U.S. Code of Federal Regulations.

1.32. "**Calendar Quarter**" means each period of 3 consecutive calendar months ending on March 31, June 30, September 30, or December 31, except that the first Calendar Quarter of the Term will commence on the Effective Date, and the last Calendar Quarter of the Term will end on the effective date of the termination or expiration of this Agreement.

1.33. "**Calendar Year**" means each period of 12 consecutive calendar months commencing on January 1 and ending on December 31, except that the first Calendar Year of the Term will commence on the Effective Date, and the last Calendar Year of the Term will end on the effective date of the termination or expiration of this Agreement.

1.34. "**Caltech**" means California Institute of Technology, a not-for-profit corporation duly organized and existing under the laws of the State of California with an address at 1200 East California Boulevard, MC 6-32, Pasadena, California 91125.

1.35. "**Caltech License**" means that certain License Agreement dated September 14, 2016 by and between Caltech and HMI.

1.36. "**Caltech Patent Rights**" means those Patent Rights licensed to HMI under the Caltech License.

1.37. "**Caltech Side Letter**" means that certain Amendment and Stand-By License Arrangement to be entered into by and among NVS, HMI, and Caltech in accordance with Section 14.4.3 (Caltech License).

1.38. "**Candidate**" means [***] Candidate or an Ophthalmic Candidate.

1.39. "**cGCP**" means the then-current ethical, scientific and quality standards as required by FDA for designing, conducting, recording, and reporting trials that involve the participation of human subjects, as set forth in FDA regulations in 21 C.F.R. Parts 11, 50, 54, 56, and 312 and related FDA guidance documents, and by the International Conference on Harmonization E6: Good Clinical Practices Consolidated Guideline, or as otherwise required by Applicable Law.

1.40. "**cGLP**" means the then-current good laboratory practice as required by the FDA under 21 C.F.R. Part 58 and all applicable FDA rules, regulations, orders, and guidances, and the requirements with respect to current good laboratory practices prescribed by the European Community, the OECD (Organization for Economic Cooperation and Development Council) and the ICH Guidelines, or as otherwise required by Applicable Law.

1.41. "**cGMP**" means the then-current good manufacturing practices as required by the FDA under provisions of 21 C.F.R. Parts 210 and 211 and all applicable FDA rules, regulations, orders, and guidances, and the requirements with respect to current good manufacturing practices prescribed by the European Community under provisions of "The Rules Governing Medicinal Products in the European Community, Volume 4, Good Manufacturing Practices, Annex 13, Manufacture of Investigational Medicinal Products, July 2003," or as otherwise required by Applicable Law.

1.42. "**Change of Control**" means, with respect to a Party, (a) a merger or consolidation of such Party with a Third Party that results in the voting securities of such Party outstanding immediately prior thereto, or any securities into which such voting securities have been converted or exchanged, ceasing to represent at least 50% of the combined voting power of the surviving entity or the parent of the surviving entity immediately after such merger or consolidation, (b) a transaction or series of related transactions in which a Third Party, together with its Affiliates, becomes the direct or indirect beneficial owner of more than 50% of the combined voting power of the outstanding securities of such Party, or (c) the sale or other transfer to a Third Party of all or substantially all of such Party's and its controlled Affiliates' assets.

1.43. "**Claim**" has the definition set forth in Section 17.1.1 (Escalation).

1.44. "**Clinical Development**" means all Development activities in humans for a Candidate or Product undertaken from and after Initiation of the first Phase I Clinical Trial for such Candidate or Product, including conduct of each Clinical Trial.

1.45. "**Clinical Trial**" means a Phase I Clinical Trial, Phase I/II Clinical Trial, Phase II Clinical Trial, Phase III Clinical Trial, or such other study in humans that is conducted in accordance with cGCP and is designed to generate data in support or maintenance of an IND or MAA, or other similar marketing application.

1.46. "**CMC**" means chemistry, manufacturing, and controls.

1.47. "**COC Opt-Out**" has the definition set forth in Section 4.12.2 (Change of Control).

1.48. "**COC Opt-Out Date**" has the definition set forth in Section 4.12.2 (Change of Control).

1.49. "**COH**" means City of Hope, a California nonprofit public benefit corporation located at 1500 East Duarte Road, Duarte, California, 91010.

1.50. "**COH Indemnitees**" means COH and its Affiliates, officers, directors, shareholders, employees, and agents.

1.51. "**COH License**" means that certain Exclusive License Agreement dated April 28, 2016 by and between COH and HMI.

1.52. "**COH Losses**" has the definition set forth in Schedule 4.5 (Third Party License Terms).

1.53. "**COH Patent Rights**" means those Patent Rights licensed to HMI under the COH License.

1.54. "**COH Side Letter**" means that certain Stand-by License Arrangement, dated November 6, 2017, by and among NVS, HMI, and COH.

1.55. "**Combination Product**" means any single pharmaceutical product in finished form containing as active ingredients both a Product and one or more Other Components.

1.56. "**Commercial Quality Assurance Agreement**" means the quality assurance agreement entered into by the Parties that addresses the quality related obligations of the Parties with respect to Candidates and Products supplied under the Commercial Supply Agreement.

1.57. "**Commercial Supply Agreement(s)**" has the definition set forth in Section 8.4 (Commercial Supply Agreement).

1.58. "**Commercialization**" or "**Commercialize**" any and all processes and activities conducted to establish and maintain sales for any product, including to market, advertise, promote, import, export, offer to sell (including pricing and reimbursement activities), detail, or sell any product or conduct other commercialization activities, and, where applicable, Medical Affairs. "Commercialization" shall have the correlative meaning with respect to such activities; *provided*, *however*, that Commercialize shall exclude Development and Manufacturing activities (including Manufacturing activities related to Commercialization). When used as a verb, "to Commercialize" and "Commercializing" means to engage in Commercialization and "Commercialized" has a corresponding meaning.

1.59. "**Commercialization Budget**" means the budget of Commercialization Costs established by the JSC covering all Commercialization activities in the [***] set forth in the approved [***] portion of the [***] or the approved [***], as applicable, as such budget may be updated and approved by the JSC, from year to year.

1.60. "**Commercialization Costs**" means all costs incurred by or on behalf of the [***], during the Term in connection with the Commercialization activities conducted in support of Commercialization of [***] in accordance with the approved Commercialization Budget, including (to the extent reasonably related to Commercialization of [***] costs directly allocable to costs of [***] (before and after Regulatory Approval of a [***] and other substantially similar activities reasonably related to marketing and promoting [***]. Such costs will include [***]. "Commercialization Costs" shall also include all direct costs incurred by or on behalf of the [***] in pursuing activities related to sales and marketing in support of Commercializing [***] including activities directly relating to [***] but shall specifically exclude the costs of activities that [***] except to the extent a portion of such Commercialization Costs is reasonably allocated to the Product in accordance with such Party's cost accounting policies, as consistently applied across such Party's entire portfolio and approved pursuant to this Agreement.

1.61. "**Commercializing Party**" means (a) NVS (or is Affiliates or Sublicensees) for [***]; and (b) HMI for [***]; *provided*, that upon the [***] Opt-Out Date, [***].

1.62. "**Commercially Reasonable Efforts**" means, with respect to the efforts to be expended by a Party or its Affiliates with respect to any objective or activity under this Agreement, [***] by a [***] as such [***] with respect to [***] at a [***] in its [***] taking into account all [***] and [***] and [***] and [***] the [***] including the [***] of [***] and [***]. It is [***] that the [***] in the [***] of the [***].

1.63. "**Competing Infringement**" has the definition set forth in Section 12.6.1 (Notice).

1.64. "**Competing Product**" means a product or biological agent, other than a Product, that [***] (a) [***] or (b) [***].

1.65. "**Confidential Information**" means, with respect to each Party, Know-How, inventions, Materials, and other proprietary information including data and all other scientific, pre-clinical, clinical, regulatory, Manufacturing, marketing, financial and commercial information or data that is disclosed, made available to, or provided by or on behalf of such Party to the other Party or to any of the Receiving Party's employees, consultants, Affiliates, or Sublicensees, whether or not specifically marked or designated by the disclosing Party as confidential.

1.66. "**Confidentiality Agreements**" has the definition set forth in Section 13.1.2 (Confidential Information of Each Party).

1.67. "**Control**" or "**Controlled**" means with respect to any Regulatory Submissions, Marketing Approvals, Intellectual Property Rights, or Materials, the possession by a Party (or an Affiliate of such Party, as applicable) of the right to grant a license or sublicense to such Regulatory Submissions, Marketing Approvals, Intellectual Property Rights, or Materials (as applicable) as provided herein without violating the terms of any agreement or arrangement with, or misappropriating the proprietary or trade secret information of, any Third Party and without violating any Applicable Law. Notwithstanding anything to the contrary set forth in this Agreement, a Party (or an Affiliate of a Party, as applicable) will not be deemed to Control any Regulatory Submission, Marketing Approval, Intellectual Property Right, or Materials (a) solely by virtue of the license grants set forth in this Agreement, or (b) if [***] or [***] of such [***] and such [***] were not [***] except (i) with respect to [***] from [***] by [***] or [***] with this Agreement after such Change of Control,] (ii) to the [***] any such [***] of this [***] after such [***] or (iii) for [***] to the [***] or the [***] to such [***] by any [***] of the [***].

1.68. "**Cover**," "**Covers**," or "**Covered**" means, with respect to a Product or other subject matter at issue and a relevant Patent Right, that the Manufacture, use, sale, offer for sale or importation of such Product or other subject matter by such Person would fall within the scope of a claim in such Patent Right.

1.69. "**CPI**" means the Consumer Price Index – Urban Wage Earners and Clerical Workers, U.S. City Average, All Items, 1982-84 = 100, published by the U.S. Department of Labor, Bureau of Labor Statistics (or its successor equivalent index).

1.70. "**Designated CMO**" means any Third Party contract manufacturer mutually agreed upon by the Parties, such agreement not to be unreasonably withheld, conditioned, or delayed.

1.71. "**Development**" or "**Develop**" means to develop any candidate or product, including conducting non-clinical studies or Clinical Trials prior to or after receiving Regulatory Approval and otherwise engaging in activities related to obtaining or maintaining Regulatory Approval, including, where applicable, the conduct of Medical Affairs. Developing does not include Research or Manufacturing. When used as a verb, "Developing" means to engage in Development and "Developed" has a corresponding meaning.

1.72. "**Development and Commercialization License**" has the definition set forth in Section 4.1.2 (Development and Commercialization License).

1.73. "**Development Budget**" has the definition set forth in Section 6.3 (Development Plans).

1.74. "**Development Milestone Event**" means an Ophthalmic Development Milestone Event, an In-Vivo [***] Development Milestone Event, or an Ex-Vivo [***] Development Milestone Event, as applicable.

1.75. "**Development Milestone Payment**" means an Ophthalmic Development Milestone Payment, an In-Vivo [***] Development Milestone Payment or an Ex-Vivo [***] Development Milestone Payment, as applicable.

1.76. "**Development Plan**" has the definition set forth in Section 6.3 (Development Plans).

1.77. "**Development Quality Assurance Agreement**" means the quality assurance agreement entered into by the Parties that addresses the quality related obligations of the Parties with respect to Candidates and Products supplied under the Development Supply Agreement.

1.78. "**Development Report**" has the definition set forth in Section 6.4 (Development Reporting).

1.79. "**Development Supply Agreement**" has the definition set forth in Section 8.3 (Development Supply Agreement).

1.80. "**Disclosing Party**" has the definition set forth in Section 13.1.1 (General).

1.81. "**Dose Expansion Cohort**" means in a [***], as applicable, after the initial confirmation of safety and efficacy in a small patient group, the start of recruiting additional patients with same or different eligibility criteria, to collect additional information in order to better characterize the toxicity profile or identify early signs of efficacy within a specific disease population.

1.82. "**Dose Initiation**" means, with respect to any Clinical Trial, the date on which the first volunteer or patient in such trial receives his or her initial dose in such Clinical Trial.

1.83. "**Effective Date**" has the definition set forth in the Preamble.

1.84. "**EMA**" means the European Medicines Agency or any successor agency or authority thereto.

1.85. "**Establishing Committee**" has the definition set forth in Section 5.4.2 (Operational Teams).

1.86. "**Executive Officer**" has the definition set forth in Section 17.1.1 (Escalation).

1.87. "**Expedited Arbitration**" has the definition set forth in Section 17.1.3 (Expedited Arbitration).

1.88. "**Expedited Dispute**" has the definition set forth in Section 17.1.3 (Expedited Arbitration).

1.89. "**Exploratory Reagents**" means reagents resulting from the Exploratory Research Activities, including [***] but specifically excluding [***].

1.90. "**Exploratory Research Activities**" has the definition set forth in Section 3.4.2 (Exploratory Research Plan).

1.91. "**Exploratory Research Budget**" has the definition set forth in Section 3.4.2 (Exploratory Research Plan).

1.92. "**Exploratory Research Plan**" has the definition set forth in Section 3.4.2 (Exploratory Research Plan).

1.93. "**Exploratory Research Report**" has the definition set forth in Section 3.6.4 (Exploratory Research Report).

1.94. "**External Costs**" mean expenses paid to Third Parties (or payable to Third Parties and accrued in accordance with Accounting Standards) by a Party (or its Affiliate) and incurred in the performance of activities under this Agreement; such expenses to have been recorded as income statement items in accordance with Accounting Standards, [***].

1.95. "**Ex-Vivo Field**" means [***] by cells that are [***].

1.96. "**Ex-Vivo** [***] **Development Milestone Event**" has the definition set forth in Section 11.4.2(a) (Events).

1.97. "**Ex-Vivo** [***] **Development Milestone Payment**" has the definition set forth in Section 11.4.2(a) (Events).

1.98. "**Ex-Vivo** [***] **Sales Milestone Event**" has the definition set forth in Section 11.5.2 (Ex-Vivo [***] Products).

1.99. "**Ex-Vivo** [***] **Sales Milestone Payment**" has the definition set forth in Section 11.5.2 (Ex-Vivo [***] Products).

1.100. "**FDA**" means the United States Food and Drug Administration and any successor agency or authority thereto.

1.101. "**First Commercial Sale**" means, on a [***], the date of the first sale by a Party, any Sublicensee, or any of their Affiliates, of a Product to a Third Party for end use or consumption of such Product following receipt of any required Regulatory Approval and Pricing Approval (where applicable) for such Product in the country in which such Product is sold, excluding any named patient sales or any sale or other distribution at cost or less than cost for use in any Clinical Trial, for *bona fide* charitable purposes, test marketing program, or for compassionate use.

1.102. "**Force Majeure**" means any occurrence beyond the reasonable control of a Party that prevents or substantially interferes with the performance by such Party of any of its obligations hereunder, including by reason of any act of God, flood, fire, explosion, earthquake, strike, lockout, labor dispute (except for any strike, lockout, or labor dispute involving a Party's own employees), casualty or accident, or war, revolution, civil commotion, act of terrorism, blockage or embargo, or any injunction, law, order, proclamation, regulation, ordinance, demand, or requirement of any Governmental Authority.

1.103. "**FTE**" means the equivalent of a full-time individual's work, performed by one or more individuals, at [***] hours per year for a 12 month period, performing activities pursuant to this Agreement. For clarity, indirect personnel (including support functions such as managerial, financial, legal or business development) shall not constitute FTEs. In the case that any full-time personnel of a Party works partially on work pursuant to this Agreement and partially on other work in a given time period, then the full-time equivalent to be attributed to such individual's work hereunder will be calculated based upon (a) the percentage of such individual's total work time in such time period that such individual spent working under this Agreement and (b) the percentage of a 12 month period that such time period equals. Each Party will track FTEs using its standard practice and normal systems and methodologies.

1.104. "**FTE Rate**" means the rate of $[***] per FTE per Calendar Year, which rate shall be prorated on a daily basis as necessary, and which [***] in each [***] by the [***] of the [***] of the [***] with the [***] to be [***]. For the avoidance of doubt, such FTE Rate shall be the [***] and is intended to cover the cost of [***]. Notwithstanding the foregoing, for any Calendar Year during the Term that is less than a full year, the above referenced rate will be proportionately reduced to reflect such portion of such full Calendar Year.

1.105. "**GAAP**" means accounting principles generally accepted in the United States of America, as in effect from time to time, consistently applied.

1.106. "**General Research Plan**" has the definition set forth in Section 3.4.1 (Target Research Plans).

1.107. "**Generic Product**" means, with respect to a Product in a country, a [***] product (a) [***] is sold in such country by a Third Party and (b) has achieved Regulatory Approval from a Regulatory Authority in such country jurisdiction in reliance on data supporting a prior approval of such Product by such Regulatory Authority.

1.108. "**Global Brand Plan**" has the definition set forth in Section 10.6 (Global Brand Plan and Promotional Materials for In-Vivo [***] Products).

1.109. "**Global In-Vivo** [***] **Commercialization Plan**" has the definition set forth in Section 10.3.1 (In-Vivo [***] Commercialization Plans).

1.110. "**Global In-Vivo** [***] **Development Costs**" means [***] in implementing the Development Plan for In-Vivo [***] Products for the purpose of Developing [***] Candidates and obtaining Regulatory Approval throughout the Territory for In-Vivo [***] Products, calculated in accordance with Accounting Standards consistently applied and reflected in such Party's audited financial statements.

1.111. "**Global Medical Affairs Plan**" has the definition set forth in Section 9.1 (Medical Affairs Plans).

1.112. "**Global Trade Control Laws**" means the U.S. Export Administration Regulations, the U.S. International Traffic in Arms Regulations, the economic sanctions regulations administered by the U.S. Treasury Department's Office of Foreign Assets Control, E.U. Council Regulations on export controls, including Nos. 428/2009, 267/2012, other E.U. Council sanctions regulations, as implemented in the E.U. member states, United Nations sanctions policies, and all relevant regulations made under any of the foregoing.

1.113. "**Global Trademark**" means any Trademark selected by NVS, its Affiliates, or Sublicensees under which a Party, its Affiliates, or Sublicensees markets any Product, and all trademark registrations and applications therefor, and all goodwill associated therewith. Global Trademarks exclude all Local Trademarks and all NVS Housemarks.

1.114. "**GLP Toxicology Study**" means a toxicology study (a) in species that satisfies applicable regulatory requirements and (b) that employs applicable cGLP so as to meet the standard necessary for submission as part of an IND filing with the applicable Regulatory Authority.

1.115. "**Governmental Authority**" means any arbitrator, court, judicial, legislative, administrative or regulatory authority, commission, department, board, bureau, or body or other government authority or instrumentality or any Person exercising executive, legislative, judicial, regulatory, or administrative functions of or pertaining to government, whether foreign or domestic, whether federal, state, provincial, municipal, or other.

1.116. "**HMI**" has the definition set forth in the Preamble.

1.117. "**HMI Assigned Know-How**" has the definition set forth in Section 12.1.2 (Assigned Technology).

1.118. "**HMI Assigned Patent Rights**" has the definition set forth in Section 12.1.2 (Assigned Technology).

1.119. "**HMI Assigned Technology**" means any HMI Assigned Patent Rights and HMI Assigned Know-How that are invented (a) by or on behalf of NVS jointly with HMI or its Affiliates or Third Party subcontractors; or (b) solely by or on behalf of NVS, in the case of each of (a) and (b), without the use of any non-public HMI Know-How.

1.120. "**HMI Genus Patent Rights**" means all HMI Product Patent Rights, other than HMI Product-Specific Patent Rights.

1.121. "**HMI Housemarks**" means (a) the corporate logo of HMI or any of its Affiliates, (b) the Trademarks "Homology Medicines" and "AmENDR," (c) any other Trademark containing the word "Homology," (d) any other Trademark used by HMI to identify HMI or its Affiliates, (e) all registrations, applications for registrations, and other Intellectual Property Rights associated with any and all of the foregoing clauses (a) through (d), and (f) all goodwill associated with any and all of the foregoing in clauses (a) through (e).

1.122. "**HMI Indemnitees**" has the definition set forth in Section 15.1 (Indemnification of HMI by NVS).

1.123. "**HMI Know-How**" means any Know-How that is Controlled by HMI or any of its Affiliates as of the Effective Date or during the Term (other than Joint Know-How) that is necessary or useful to Research, Develop, Manufacture, or Commercialize any Candidate or Product, but in each case, *excluding* Know-How directed to [***]. For clarity, HMI Know-How includes HMI Materials, HMI Program Know-How, HMI Platform Know-How, HMI Product Know-How, HMI Manufacturing Know-How, and HMI Assigned Know-How (in each case *excluding* Know-How directed to [***]. For clarity, HMI Know-How includes Know-How Controlled by HMI or any of its Affiliates regarding the [***] of the Candidates.

1.124. "**HMI Licensed Technology**" means the HMI Know-How, HMI Patent Rights, and HMI's rights under the Joint Know-How and Joint Patent Rights.

1.125. "**HMI Manufacturing Know-How**" has the definition set forth in Section 8.6.2 (Manufacturing Technology Transfer to NVS).

1.126. "**HMI Materials**" means any seed stocks of cell lines, cell banks, plasmids, and viruses (including AAV vectors) that are not readily available as standard commercial items, that are, in each case, (a) Controlled by HMI, and (b) necessary or useful to Manufacture any Product, and in each case, *excluding* any NVS Materials.

1.127. "**HMI Necessary Rights**" has the definition set forth in Section 11.7.2(c)(i) (Third Party Licenses).

1.128. "**HMI Patent Rights**" means any Patent Rights Controlled by HMI or any of its Affiliates as of the Effective Date or during the Term (other than Joint Patent Rights) that are necessary or useful to Research, Develop, Manufacture, or Commercialize any Candidate or Product, but in each case, *excluding* Patent Rights to the extent they Cover [***]. For clarity, HMI Patent Rights include HMI Program Patent Rights, HMI Platform Patent Rights, HMI Product Patent Rights, and HMI Assigned Patent Rights (in each case, *excluding* Patent Rights to the extent they Cover [***]. For clarity, HMI Patent Rights include Patent Rights Controlled by HMI or any of its Affiliates that Cover the [***] of the Candidates.

1.129. "**HMI Platform Know-How**" means all HMI Know-How that (a) is licensed to HMI under the COH License, or (b) relates to AAV Gene Editing Technology generally (including all HMI Assigned Know-How).

1.130. "**HMI Platform Patent Rights**" means all HMI Patent Rights that (a) as of the Effective Date are identified on Schedule 1.130 (HMI Platform Patent Rights), including the COH Patent Rights, Caltech Patent Rights, and all Patent Rights claiming priority thereto, or (b) during the Term Cover HMI Platform Know-How (including all HMI Assigned Patent Rights).

1.131. "**HMI Platform Technology**" means the HMI Platform Know-How and the HMI Platform Patent Rights.

1.132. "**HMI Product Know-How**" means HMI Product-Specific Know-How and other HMI Know-How that relates to one or more Candidates or Products (including Know-How that would be applicable to candidates or products that Modulate targets other than the Targets), but excluding HMI Platform Know-How.

1.133. "**HMI Product Patent Rights**" means HMI Product-Specific Patent Rights and other HMI Patent Rights that Cover one or more Candidates or Products (including Patent Rights that would Cover candidates or products that Modulate targets other than the Targets), but excluding HMI Platform Patent Rights.

1.134. "**HMI Product-Specific Know-How**" means HMI Know-How that relates to one or more Candidates or Products but would not be applicable to candidates or products that Modulate targets other than the Targets, but excluding any HMI Platform Know-How.

1.135. "**HMI Product-Specific Patent Rights**" means HMI Patent Rights that Cover a Candidate or Product, but would not Cover any candidate or product that Modulates targets other than the Targets, but excluding any HMI Platform Patent Rights.

1.136. "**HMI Program Know-How**" means Know-How that is invented, conceived, discovered, created, or otherwise developed solely by employees, agents, contractors, or Sublicensees of HMI in the performance of activities under this Agreement, other than NVS Assigned Know-How.

1.137. "**HMI Program Patent Rights**" means Patent Rights that Cover any invention that is conceived or otherwise invented solely by employees, agents, contractors, or Sublicensees of HMI in the performance of activities under this Agreement, other than NVS Assigned Patent Rights.

1.138. "**HMI Research Costs**" has the definition set forth in Section 3.8.1 (Support).

1.139. "**HMI Third Party Obligations**" has the definition set forth in Section 11.7.2(c)(iii) (Third Party Licenses).

1.140. "**IFRS**" means International Financial Reporting Standards, the set of accounting standards and interpretations as promulgated by the International Standards Accounting Board and as they may be updated for time to time, as consistently applied.

1.141. "**IND**" means an investigational new drug application filed with the FDA with respect to a Product, or equivalent application filed with the Regulatory Authority of a country in the Territory other than the U.S. (such as an application for a Clinical Trial Authorization in the E.U.).

1.142. "**Indemnitee**" has the definition set forth in Section 15.4 (Conditions to Indemnification).

1.143. "**Indication**" means [***] in the In-Vivo Field, [***] in the Ex-Vivo Field, and all Ophthalmic Indications.

1.144. "**Infringement Action**" has the definition set forth in Section 12.6.2 (NVS' Rights).

1.145. "**Initiation**" means, with respect to any Clinical Trial, [***].

1.146. "**Intellectual Property Rights**" means any Know-How, Patent Rights, Trademarks, copyrights, trade secrets, and any other intellectual property rights however denominated throughout the world.

1.147. "**Interest Rate**" has the definition set forth in Section 11.12 (Late Fees).

1.148. "**Interim Report**" has the definition set forth in Section 3.6.2 (Interim Reports).

1.149. "**Internal Costs**" means, for any period, the product obtained by *multiplying* (a) the actual total FTEs (or portion thereof) devoted to the performance of activity under this Agreement during such period, *by* (b) the applicable FTE Rate.

1.150. "**In-Vivo Field**" means [***] by **[***]**.

1.151. "**In-Vivo** [***] **Commercial Supply Agreement**" has the definition set forth in Section 8.5 (In-Vivo [***] Commercial Supply Agreement).

1.152. "**In-Vivo** [***] **Products**" mean [***] Products for use in the In-Vivo Field.

1.153. "**In-Vivo** [***] **Quality Assurance Agreement**" has the definition set forth in Section 8.5 (In-Vivo [***] Commercial Supply Agreement).

1.154. "**In-Vivo** [***] **Development Milestone Event**" has the definition set forth in Section 11.4.3(a) (Events).

1.155. "**In-Vivo** [***] **Development Milestone Payment**" has the definition set forth in Section 11.4.3(a) (Events).

1.156. "**In-Vivo** [***] **Sales Milestone Event**" has the definition set forth in Section 11.5.3 (In-Vivo [***] Products).

1.157. "**In-Vivo** [***] **Sales Milestone Payment**" has the definition set forth in Section 11.5.3 (In-Vivo [***] Products).

1.158. "**Joint Know-How**" has the definition set forth in Section 12.1.3 (Ownership).

1.159. "**Joint Manufacturing Committee**" or "**JMC**" has the definition set forth in Section 5.2.1 (Formation and Purpose of the JMC).

1.160. "**Joint Patent Rights**" has the definition set forth in Section 12.1.3 (Ownership).

1.161. "**Joint Steering Committee**" or "**JSC**" has the definition set forth in Section 5.1.1 (Formation and Purpose of the JSC).

1.162. "**Joint Technology**" means all Joint Know-How and Joint Patent Rights.

1.163. "**Jointly-Agreed Regulatory Submissions**" means, for each [***], (a) the IND and all material amendments thereto, (b) the pre-BLA meeting request and materials, (c) the BLA and all material amendments thereto, (d) substantive responses to questions from or negotiations with the FDA relating to the BLA or amendments or any of the meetings set forth in clause (g), (e) advisory committee materials, and material submissions related to any REMS program or Product labeling, or any post marketing requirements or commitments in each case, in the U.S, (f) the equivalent of (a) through (e) with respect to EMA, and (g) all substantive materials and filings submitted in connection with or otherwise related to any IND-related Type A meetings, Type B Pre-IND meetings, Type B End of Phase I Clinical Trial meetings, Type B End of Phase II Clinical Trial meetings, and Type C meetings.

1.164. "**Know-How**" means any proprietary records, Materials, know-how, processes, techniques, show-how, design information, information, formulations, technology, practices, trade secrets, inventions, methods, data (including animal data, clinical data, and quality control data) and results in any form whatsoever, whether or not patented or patentable.

1.165. "**Knowledge of HMI**" means the actual knowledge of the [***]; or a [***] of HMI, in each case, without any other duty of investigation or inquiry; *provided*, that in the case of the [***] such knowledge includes the information identified in the searches set forth on Schedule 1.165 (Knowledge of HMI).

1.166. "**Large Pharma Company**" means any pharmaceutical company or biotechnology company that ranks among the top [***] pharmaceutical companies or biotechnology companies in terms of annual revenue in the Calendar Year immediately prior to the Calendar Year in which a Change of Control occurs.

1.167. "**Local Trademarks**" has the definition set forth in Section 10.7.2 (Trademarks for In-Vivo **[***]** Products).

1.168. "**Loss of Market Exclusivity**" means, on a [***], (a) one or more Generic Products for which such Product is the reference product are being marketed in such country; and (b) Net Sales of such Product in such country in any Calendar Quarter following the initial sale of the first such Generic Product(s) in such country decreases to less than [***]% of the average Net Sales of such Product in such country during the [***] Calendar Quarters preceding the initial sale of such Generic Product(s).

1.169. "**Losses**" has the definition set forth in Section 15.1 (Indemnification of HMI by NVS).

1.170. "**MAA**" means (a) any BLA filed with the FDA to gain approval to market a biopharmaceutical product in the U.S., (b) a marketing authorization application filed with (i) the EMA under the centralized EMA filing procedure to gain approval to market a biopharmaceutical or diagnostic product in the E.U., or (ii) a Regulatory Authority in any E.U. country if the centralized EMA filing procedure is not used to gain approval to market a biopharmaceutical or diagnostic product in the E.U., or (c) any other equivalent or related Regulatory Submission filed in support of approval to market a biopharmaceutical or diagnostic product in any country outside the U.S. or E.U., and, in each case ((a) through (c)), including any amendments thereto, and supplemental applications, but excluding Pricing Approval applications.

1.171. "**Major European Country**" means the [***].

1.172. "**Manufacture**" or "**Manufacturing**" means all activities related to the manufacture of candidates and products, including test method development, stability testing, CMC activities, formulation, process development, manufacturing scale-up, analytical method validation, manufacturing process validation, cleaning validation, manufacturing supplies for Research, Development, Commercialization, packaging, in-process and finished product testing, release of product or any component or ingredient thereof, quality assurance and quality control activities related to manufacturing and release of product, ongoing stability tests, storage, shipment, and regulatory activities related to any of the foregoing. When used as a verb, "Manufacturing" means to engage in Manufacture and "Manufactured" has the corresponding meaning.

1.173. "**Manufacturing Costs**" means, with respect to a Candidate or Product, the [***] cost incurred by either Party or any of their respective Affiliates in Manufacturing such Candidate or Product (including all activities related to CMC, formulation and process development, and scale-up) in accordance with this Agreement and consistent with the applicable Research Plan, Development Plan, Development Supply Agreement, Commercial Supply Agreement, or In-Vivo [***] Commercial Supply Agreement [***], including: (a) to the extent that such Candidate or Product is Manufactured by a Third Party contract manufacturer: (i) the [***] External Costs paid by a Party or its Affiliates to the Third Party contract manufacturer (or to a Party, if one Party supplies to the other Party Candidate or Product Manufactured by a Third Party contract manufacturer) for the Manufacture and supply thereof (including packaging and labeling), determined in accordance with the books and records of such Party or its Affiliates maintained in accordance with Accounting Standards, *plus* (ii) a [***] amount to cover such Party's Internal Costs incurred in engaging and overseeing such Third Party contract manufacturer; and (b) to the extent that such Candidate or Product is Manufactured by a Party or its Affiliates: [***] material costs, depreciation of capital expenditures, External Costs, and Internal Costs attributable to the Manufacture of such Candidate or Product, determined in accordance with the books and records of such Party or its Affiliates maintained in accordance with Accounting Standards and as consistently applied to other products Manufactured by the Party Manufacturing; *provided*, that Manufacturing Costs calculated in accordance with clause (b) will not include any allocation of [***].

1.174. "**Marketing Approval**" means receipt of Regulatory Approval, and, in any country in the Territory where a Governmental Authority or Regulatory Authority approves or determines pricing for pharmaceutical products for reimbursement or otherwise, receipt of Pricing Approval.

1.175. "**Materials**" means any tangible compositions of matter, articles of manufacture, assays, chemical, biological or physical materials, and other similar materials.

1.176. "**Medical Affairs**" means activities conducted by a Party's medical affairs departments, including communications with key opinion leaders, medical education, symposia, advisory boards (to the extent related to medical affairs or clinical guidance), activities performed in connection with patient registries, and other medical programs and communications, including educational grants, research grants (including conducting investigator-initiated studies), and charitable donations to the extent related to medical affairs and not to other activities that do not involve the promotion, marketing, sale, or other Commercialization of Products and are not conducted by a Party's medical affairs departments.

1.177. "**Modulate**" or "**Modulation**" means to edit, engineer, modify, or modulate a gene or locus, including by means of gene knock-out, gene tagging, gene disruption, gene mutation, gene insertion, gene deletion, gene activation, gene silencing, or gene knock-in, which includes knock-in of a heterologous gene to a genomic locus, for example, a safe harbor genomic locus or a target genomic locus.

1.178. "**Net Profit"** or **"Net Loss**" means, for a given period of time, [***] during such [***] of: (a) [***] by [***] and [***] from [***] in accordance with [***] (b) [***] and its [***] for the [***] during such [***]; and (c) [***] or [***] during such [***] from [***] in accordance with [***] will be [***] of any [***]. For clarity, [***] are the [***] and shall [***] in the [***] If the [***].

1.179. "**Net Sales**" means the net sales recorded by a Party or any of its Affiliates or Sublicensees (excluding Third Party Distributors) for any Product sold to Third Parties (including Third Party Distributors) other than Sublicensees as determined in accordance with Accounting Standards as consistently applied, less a deduction of [***]% for direct expenses related to the sales of Products, distribution and warehousing expenses, and uncollectible amounts on previously sold Product. The deductions booked on an accrual basis by a Party and its Affiliates under Accounting Standards to calculate the recorded net sales from gross sales are as follows:

1.179.1. [***] and [***];

1.179.2. [***];

1.179.3. [***] and [***] and [***] (including [***] and [***]);

1.179.4. [***] through [***] and other [***];

1.179.5. [***] or [***] related to [***] and [***] or [***];

1.179.6. [***] for [***] for any [***] (including [***] and [***]); and

1.179.7. [***] or [***] for reasons [***] to [***] above to the [***] in accordance with [***].

[***] of any [***] or [***] such [***] or [***] to a [***] or is [***] shall be [***] at the [***] In the case [***] or other [***] of the [***] of such [***]. [***] the [***] (1) [***] will **[***]**; (2) [***] to the [***] of a [***]; and (3) [***] or [***] or [***] or [***] or [***] or [***] is [***] or any [***].

In the event [***] will be [***] the [***] in the [***] of the [***] in [***] is the [***] as the [***] Regarding [***] for [***] to such [***] in [***] of the [***] If the **[***]** the [***] then the [***] will be [***] on the [***] by each [***] not to be [***] or [***]).

1.180. "**Non-Bankrupt Party**" has the definition set forth in Section 16.2.3 (Termination for Bankruptcy).

1.181. "**Non-Withholding Party**" has the definition set forth in Section 11.14 (Withholding Taxes).

1.182. "**NVS**" has the definition set forth in the Preamble.

1.183. "**NVS Assigned Know-How**" has the definition set forth in Section 12.1.2 (Assigned Technology).

1.184. "**NVS Assigned Patent Rights**" has the definition set forth in Section 12.1.2 (Assigned Technology).

1.185. "**NVS Audit Team**" means a team of no more than [***] individuals who will have access to the HMI Manufacturing Know-How in connection with their audit and inspection responsibilities with respect to Candidates and Products Manufactured by or on behalf of HMI.

1.186. "**NVS CMC Sub-Team**" means a team of no more than [***] individuals with expertise in different fields who will have access to the HMI Manufacturing Know-How to ensure compliance with regulatory and quality obligations with respect to NVS' Development and Commercialization of Candidates and Products.

1.187. "**NVS Housemarks**" means (a) the corporate logo of Novartis Institutes for BioMedical Research, Inc., (b) any other Trademark containing the word "Novartis," (c) any other Trademark of NVS used by NVS to identify NVS or its Affiliates, (d) all registrations, applications for registrations, and other Intellectual Property Rights associated with any and all of the foregoing in clauses (a) through (c), and (e) all goodwill associated with any and all of the foregoing in clauses (a) through (d).

1.188. "**NVS Indemnitees**" has the definition set forth in Section 15.2 (Indemnification of NVS by HMI).

1.189. "**NVS Know-How**" means all Know-How that is Controlled by NVS or any of its Affiliates as of the Effective Date or during the Term (other than Joint Know-How) that is necessary or useful to Research, Develop, Manufacture, or Commercialize any Candidate or Product, including NVS Program Know-How, Know-How included within NVS Proprietary Technology, and NVS Assigned Know-How.

1.190. "**NVS Manufacturing Date**" means the date on which NVS is permitted to Manufacture a Candidate or Product itself or through its Affiliates or a Designated CMO in accordance with Section 8.1.2(b) (Transfer of HMI Manufacturing Responsibilities).

1.191. "**NVS Manufacturing Improvements**" means those improvements, modifications, or enhancements made by NVS or its Affiliates to the specific HMI Manufacturing Know-How in the form transferred to NVS by HMI as of the NVS Manufacturing Date for such Target, excluding NVS Materials owned or Controlled by NVS or its Affiliates.

1.192. "**NVS Materials**" means any tangible compositions of matter, articles of manufacture, assays, chemical, biological or physical materials, and other similar materials owned or Controlled by NVS, including seed stocks of cell lines, cell banks, plasmids, and viruses, *but excluding* all HMI Materials.

1.193. "**NVS Patent Rights**" means all Patent Rights that are Controlled by NVS or any of its Affiliates as of the Effective Date or during the Term (other than Joint Patent Rights) that are necessary or useful to Research, Develop, Manufacture, or Commercialize any Candidate or Product, including NVS Program Patent Rights, Patent Rights included within NVS Proprietary Technology, and NVS Assigned Patent Rights.

1.194. "**NVS Products**" means all Products for which NVS is the Commercializing Party.

1.195. "**NVS Program Know-How**" means Know-How that is invented, conceived, discovered, created, or otherwise developed solely by employees, agents, contractors, or Sublicensees of NVS in the performance of activities under this Agreement and specifically related to a Candidate or Product, other than HMI Assigned Know-How and Joint Know-How.

1.196. "**NVS Program Patent Rights**" means Patent Rights that Cover any invention that is conceived or otherwise invented solely by employees, agents, contractors, or Sublicensees of NVS in the performance of activities under this Agreement and specifically related to a Candidate or Product, other than HMI Assigned Patent Rights and Joint Patent Rights.

1.197. "**NVS Program Technology**" means NVS Program Know-How and NVS Program Patent Rights.

1.198. "**NVS Proprietary Technology**" means all Patent Rights or Know-How Controlled by NVS or any of its Affiliates as of the Effective Date or during the Term and generated independently of this Agreement that are provided to HMI for use in connection with this Agreement and include Know-How and related Patent Rights [***]*; provided* that solely with respect to any Patent Rights or Know-How Controlled by NVS or any of its Affiliates [***], NVS or its applicable Affiliate will identify such information as NVS Proprietary Technology when disclosing the same to HMI or its Affiliates.

1.199. "**NVS Quality Requirements**" has the definition set forth in Section 8.1.2 (Transfer of HMI Manufacturing Responsibilities).

1.200. "**NVS Technology**" means the NVS Know-How, the NVS Patent Rights, and NVS' rights under the Joint Know-How and Joint Patent Rights; but *excluding*, in all events, any Intellectual Property Rights in or to any Other Component.

1.201. "**Objective Criteria**" has the definition set forth in Section 8.1.3 (Objective Criteria).

1.202. "**Occupied Target**" means, with respect to NVS' selection of a potential Ophthalmic target, [***] with respect [***] to any [***] such proposed [***].

1.203. "**OFAC**" means the Office of Foreign Assets Control of the United States Department of the Treasury or any successor agency thereto.

1.204. "**Operational Team**" has the definition set forth in Section 5.4.2 (Operational Teams).

1.205. "**Ophthalmic Candidate**" means an AAV gene editing vector that Modulates an Ophthalmic Target that (a) is designed and optimized under the applicable Target Research Plan using HMI Platform Technology during the Research Term or (b) otherwise uses HMI Licensed Technology, in each case ((a) and (b)), for the [***] of Ophthalmic Indications.

1.206. "**Ophthalmic Development Milestone Event**" has the definition set forth in Section 11.4.1(a) (Events).

1.207. "**Ophthalmic Development Milestone Payment**" has the definition set forth in Section 11.4.1(a) (Events).

1.208. "**Ophthalmic Indication**" means any [***].

1.209. "**Ophthalmic Internal Program**" means, with respect to [***] with an [***] or its [***] have [***].

1.210. "**Ophthalmic Product**" means any product containing an Ophthalmic Candidate, or in the case of the [***], a cell-based product generated through genetic modification using an Ophthalmic Candidate.

1.211. "**Ophthalmic Sales Milestone Event**" has the definition set forth in Section 11.5.1 (Ophthalmic Products).

1.212. "**Ophthalmic Sales Milestone Payment**" has the definition set forth in Section 11.5.1 (Ophthalmic Products).

1.213. "**Ophthalmic Target**" means a gene, the Modulation of which would lead to treatment or prevention of an Ophthalmic Indication, which genes will be [***].

1.214. "**Other Components**" means other pharmaceutically active compounds or substances (including products that contain [***] other than those included in such Product) that [***], that are [***] within a single box or sales unit or that are sold separately but approved (or being developed for approval) for use in [***], whether sold at a single price point or under separate price points or as part of a course [***], in each case, which compounds or substances are not a Product, are not Covered by an HMI Patent Right, and do not embody HMI Know-How.

1.215. "**Party**" means either HMI or NVS; "**Parties**" means both HMI and NVS.

1.216. "**Party Vote**" has the definition set forth in Section 5.6.1 (Committee Decisions).

1.217. "**Patent Challenge**" means any challenge to the validity or enforceability of a Patent Right by commencing any opposition proceeding, post-grant review, *inter partes* review, or declaratory action, or any foreign equivalent thereof, in any court, arbitration proceeding, or other tribunal, including the United States Patent and Trademark Office and any foreign counterpart thereof.

1.218. "**Patent Rights**" means all rights, title and interests in and to (a) all national, regional and international patents and patent applications filed in any country of the world including provisional patent applications and all supplementary protection certificates, (b) all patent applications filed either from such patents, patent applications or provisional applications or from an application claiming priority to any of the foregoing, including any continuation, continuation-in part, divisional, provisional, converted provisionals and continued prosecution applications, or any substitute applications, (c) any patent issued with respect to or in the future issued from any such patent applications, including utility models, petty patents, design patents and certificates of invention, and (d) any and all extensions or restorations by existing or future extension or restoration mechanisms, including revalidations, reissues, reexaminations and extensions (including any supplementary protection certificates and the like) of the foregoing patents or patent applications.

1.219. "**Person**" means an individual, sole proprietorship, partnership, limited partnership, limited liability partnership, corporation, limited liability company, business trust, joint stock company, trust, incorporated association, joint venture or similar entity or organization, including any Governmental Authority (or any department, agency, or political subdivision thereof).

1.220. "**Pharmacovigilance Agreement**" has the definition set forth in Section 7.7 (Pharmacovigilance Agreement).

1.221. "**Phase I Clinical Trial**" means a clinical trial of an investigational product in patients with the primary objective of characterizing its safety, tolerability, and pharmacokinetics and identifying a recommended dose and regimen for future studies as described in 21 C.F.R. 312.21(a), or a comparable Clinical Trial prescribed by the relevant Regulatory Authority in a country other than the United States. The investigational product can be administered to patients as a single agent or in combination with other investigational or marketed agents.

1.222. "**Phase I/II Clinical Trial**" means a combined Phase I Clinical Trial and Phase II Clinical Trial.

1.223. "**Phase II Clinical Trial**" means a clinical trial of an investigational product in patients with the primary objective of characterizing its activity in a specific disease state as well as generating more detailed safety, tolerability, pharmacokinetics, and dosing information as described in 21 C.F.R. 312.21(b), or a comparable Clinical Trial prescribed by the relevant Regulatory Authority in a country other than the United States including a human clinical trial that is also designed to satisfy the requirements of 21 C.F.R. 312.21(a) or corresponding foreign regulations and is subsequently optimized or expanded to satisfy the requirements of 21 C.F.R. 312.21(b) (or corresponding foreign regulations) or otherwise to enable a Phase III Clinical Trial (*e.g.*, a Phase I/II Clinical Trial). The investigational product can be administered to patients as a single agent or in combination with other investigational or marketed agents.

1.224. "**Phase III Clinical Trial**" means any clinical trial of an investigational product in patients that incorporates accepted endpoints for confirmation of statistical significance of efficacy and safety with the aim to obtain Regulatory Approval in any country as described in 21 C.F.R. 312.21(c), or a comparable Clinical Trial prescribed by the relevant Regulatory Authority in a country other than the United States. The investigational product can be administered to patients as a single agent or in combination with other investigational or marketed agents.

1.225. "**Pivotal Clinical Trial**" means a human clinical trial in any country that is prospectively designed to generate data intended to satisfy the requirements of 21 C.F.R. § 312.21(c) (as amended) in the U.S. or a similar clinical study prescribed by a Regulatory Authority from another country, from time to time, pursuant to Applicable Law.

1.226. "**Pivotal Clinical Trial Trigger Point**" means, with respect to a U.S. [***] Product, the date that is [***] months prior to the anticipated Initiation of a Pivotal Clinical Trial for such U.S. [***] Product as provided in the Development Plan for such U.S. [***] Product.

1.227. "**Preclinical Development**" means all pre-clinical and non-clinical Development activities for a Candidate or Product undertaken prior to the commencement of the first Clinical Trial for such Candidate or Product, including non-clinical studies and other material Development activities to be undertaken to generate data sufficient to enable the filing of an IND.

1.228. "**Pricing Approval**" means any approval, agreement, determination, or decision establishing prices that can be charged to consumers for a pharmaceutical product or that will be reimbursed by Governmental Authorities for a pharmaceutical product, in each case, in a country in the Territory where Governmental Authorities or Regulatory Authorities approve or determine pricing for pharmaceutical products for reimbursement or otherwise.

1.229. "**Product**" means any [***] Product or Ophthalmic Product.

1.230. "**Product Trademarks**" means the Global Trademarks and Local Trademarks (excluding the HMI Housemarks and NVS Housemarks).

1.231. "**Professional Requirements**" includes (a) FDA's regulations, guidance, and enforcement letters concerning the advertising of prescription drug products, (b) the American Medical Association's Guidelines on Gifts to Physicians from Industry, (c) the Accreditation Council for Continuing Medical Education (ACCME) Standards for Commercial Support of Continuing Medical Education, (d) the Pharmaceutical Supply Chain Initiative (PSCI) and Pharmaceutical Industry Principles for Responsible Supply Chain Management, (e) the Code on Interactions with Healthcare Professionals promulgated by the Pharmaceutical Research and Manufacturers of America, (f) the Department of Health and Human Services Office of Inspector General Compliance Program Guidance for Pharmaceutical Manufacturers, and (g) all other accepted national and international pharmaceutical industry codes of practice in and for the relevant countries in the Territory, as any of the foregoing may be amended from time-to-time.

1.232. "**Profit Share Payments**" has the definition set forth in Section 11.6.3 (Net Profits).

1.233. "**Profit Share Report**" has the definition set forth in Section 11.6.5 (Profit Share Reports; Payments).

1.234. "**Program Technology**" means HMI Program Patent Rights, HMI Program Know-How, NVS Program Patent Rights, and NVS Program Know-How.

1.235. "**Quality Agreements**" mean the Development Quality Assurance Agreement(s), the Commercial Quality Assurance Agreement(s), and the In-Vivo [***] Quality Assurance Agreement.

1.236. "**Receiving Party**" has the definition set forth in Section 13.1.1 (General).

1.237. "**Regulatory Approval**" means, with respect to a Product in any country or jurisdiction, any approval (excluding any Pricing Approval), registration, license, or authorization from a Regulatory Authority in a country or other jurisdiction that is necessary to market and sell such Product in such country or jurisdiction.

1.238. "**Regulatory Authority**" means any Governmental Authority or authority responsible for granting Regulatory Approvals, including the FDA, EMA, and any corresponding national or regional regulatory authorities, or Pricing Approvals for Products.

1.239. "**Regulatory Exclusivity**" means, with respect to a Product, the ability to exclude Third Parties from Commercializing a product in a country, either through data exclusivity rights, orphan drug designation, or such other rights conferred by a Regulatory Authority in such country, other than through Patent Rights.

1.240. "**Regulatory Executive**" has the definition set forth in Section 7.2.2 (Responsibility).

1.241. "**Regulatory Responsible Party**" means [***].

1.242. "**Regulatory Submissions**" means any regulatory application, submission, notification, communication, correspondence, registration, Regulatory Approvals, and other filings, made to, received from or otherwise conducted with a Regulatory Authority related to Developing, Manufacturing, obtaining marketing authorization, or otherwise Commercializing a product in a particular country or jurisdiction, including all INDs, CTAs, BLAs, MAAs, and all applications for Regulatory Approval together with all supplements or amendments to any of the foregoing.

1.243. "**Reimbursement Cap**" has the definition set forth in Section 3.8.1 (Support).

1.244. "**Research**" means computational biology, bioinformatics, and basic research and discovery activities, including molecular biology, biochemistry, and pre-clinical pharmacology, *in vitro* assays, and *in vivo* assays that Modulate the identification of new biological agents including activities related to the synthesis, discovery, identification, screening, optimization or design of recombinant adeno-associated virus-based vectors. "Research" excludes Development, Manufacture, and Commercialization. When used as a verb, "Researching" means to engage in Research.

1.245. "**Research Activities**" means the Exploratory Research Activities and the Target Research Activities.

1.246. "**Research Budget**" means the Exploratory Research Budget and any Target Research Budget.

1.247. "**Research License**" has the definition set forth in Section 4.1.1 (Research License).

1.248. "**Research Plans**" means the Exploratory Research Plan and the Target Research Plans.

1.249. "**Research Term**" means [***] (a) with respect to [***] on the [***] and (b) with respect to [***] on the [***] of (a) and (b), [***].

1.250. "**ROFN Exercise Notice**" has the definition set forth in [***]).

1.251. "**Royalties**" has the definition set forth in Section 11.7.1 (Royalty Rates).

1.252. "**Royalty Floor**" has the definition set forth in Section 11.7.3 (Cumulative Effect of Royalty Reductions).

1.253. "**Royalty Patent Rights**" means [***].

1.254. "**Royalty Rates**" has the definition set forth in Section 11.7.1 (Royalty Rates).

1.255. "**Royalty Report**" has the definition set forth in Section 11.8 (Royalty Reports; Payments).

1.256. "**Royalty Term**" means, on a Product-by-Product and country-by-country basis, the period commencing on the date of First Commercial Sale of a Product in a country and ending on the latest of (a) [***] years following the First Commercial Sale of such Product in such country, (b) the expiration of the last Valid Claim of the Royalty Patent Rights Covering such Product in such country, or (c) the expiration of the first Regulatory Exclusivity obtained for such Product in such country.

1.257. "**Sales Milestone Events**" means any of the Ophthalmic Sales Milestone Events, Ex-Vivo [***] Sales Milestone Events, or In-Vivo [***] Sales Milestone Events.

1.258. "**Sales Milestone Payments**" means any of the Ophthalmic Sales Milestone Payments, Ex-Vivo [***] Sales Milestone Payments, or In-Vivo [***] Sales Milestone Payments.

1.259. "[***]" means [***].

1.260. "[***]" has the definition set forth in Section [*******].

1.261. "[***]" has the definition set forth in Section [*******].

1.262. "[***] **Opt-Out Date**" means, with respect to a U.S. [***] Product, as applicable, (a) the COC Opt-Out Date, (b) the Breach Opt-Out Date, or (c) the At-Will Opt-Out Date.

1.263. "**Selected Third Party Agreements**" means, with respect to any Terminated Candidate or Terminated Product, any agreement entered into by and between NVS or any of its Affiliates or its Sublicensees, on the one hand, and one or more Third Parties, on the other hand, that is necessary to Develop, Manufacture, or Commercialize such Terminated Candidate or Terminated Product in the Territory and that does not relate to any compound or product other than any Terminated Candidates or Terminated Products.

1.264. "[***] **Candidate**" means an AAV gene editing vector that Modulates the [***] Target that (a) is designed and optimized under the applicable Target Research Plan using HMI Platform Technology during the Research Term or (b) otherwise uses the HMI Licensed Technology, in each case ((a) and (b)), for the treatment of [***].

1.265. "[***] **Product**" means a product containing a [***] Candidate, or in the case of the Ex-Vivo Field, a cell-based product generated through genetic modification using [***] Candidate.

1.266. "[***] **Target**" means any gene, the Modulation of which would lead to [***] of [***].

1.267. "**Subcommittee**" has the definition set forth in Section 5.1.5(q) (Specific Responsibilities of the JSC).

1.268. "**Sublicensee**" means any Person, other than a Party or an Affiliate or Third Party Distributor of a Party, to which a Party grants a sublicense of the licenses granted to such Party by the other Party under this Agreement.

1.269. "**Success Criteria**" means, with respect to a Candidate that Modulates a given Target, [***] in order to [***] the [***] from the [***] or a [***].

1.270. "**Success Criteria Report**" has the definition set forth in Section 3.6.3 (Success Criteria Reports).

1.271. "**Target**" means the [***] Target for the In-Vivo Field, the [***] Target for the Ex-Vivo Field, and each Ophthalmic Target.

1.272. "**Target Fee**" has the definition set forth in Section 11.3 (Target Fee).

1.273. "**Target Fee Trigger**" has the definition set forth in Section 3.7 (Candidates).

1.274. "**Target Fee Trigger Date**" has the definition set forth in Section 11.3 (Target Fee).

1.275. "**Target Reagents**" means reagents resulting from the Target Research Activities, including cell lines and animal models, but specifically excluding AAV vectors, plasmids, working cell banks, master cell banks and manufacturing raw materials, components, or helpers.

1.276. "**Target Research Activities**" has the definition set forth in Section 3.4.1 (Target Research Plans).

1.277. "**Target Research Budget**" has the definition set forth in Section 3.4.1 (Target Research Plans).

1.278. "**Target Research Plan**" has the definition set forth in Section 3.4.1 (Target Research Plans).

1.279. "**Term**" has the definition set forth in Section 16.1 (Term).

1.280. "**Terminated Candidates**" has the definition set forth in Section 16.3 (Effects of Termination for NVS Breach, Patent Challenge, or for Convenience by NVS).

1.281. "**Terminated Products**" has the definition set forth in Section 16.3 (Effects of Termination for NVS Breach, Patent Challenge, or for Convenience by NVS).

1.282. "**Terminated Target**" means any Target that is terminated pursuant to Section 16.2 (Termination).

1.283. "**Territory**" means all countries of the world and all territories and possessions thereof.

1.284. "**Third Party**" means any Person other than a Party or an Affiliate of a Party.

1.285. "**Third Party Distributor**" means any Third Party, other than a Sublicensee, that distributes (but does not Develop or Manufacture) a Product directly to customers.

1.286. "**Third Party Infringement**" has the definition set forth in Section 12.7.1 (Notice).

1.287. "**Third Party Infringement Losses**" has the definition set forth in Section 15.3.2 (Third Party Infringement).

1.288. "**Third Party License**" means a written agreement between a Party or its Affiliates and a Third Party to license or acquire Third Party Intellectual Property Rights for use in connection with the Research, Development, Manufacture, or Commercialization of a Candidate or Product, including for clarity, any such agreement entered into as a result of settlement of any claims for infringement of Third Party Intellectual Property Rights. For clarity, the COH License and the Caltech License constitute Third Party Licenses of HMI.

1.289. "**Trademarks**" means all registered and unregistered trademarks, service marks, trade dress, trade names, logos, insignias, symbols, designs, and all other indicia of ownership, and combinations thereof.

1.290. "**U.S. BLA Transfer Date**" has the definition set forth in Section 7.6.1 (U.S. BLA for In-Vivo [***] Products).

1.291. "**U.S. In-Vivo** [***] **Commercialization Plan**" has the definition set forth in Section 10.3.1 (In-Vivo [***] Commercialization Plans).

1.292. "**U.S. Medical Affairs Plan**" has the definition set forth in Section 9.1 (Medical Affairs Plans).

1.293. "**U.S.** [***] **HMI Assumed IP Costs**" mean [***] to a U.S. [***] pursuant to [***] to a [***] pursuant to the [***] with respect to [***].

1.294. "**U.S.** [***] **Product**" means any In-Vivo [***] Product Commercialized in the U.S.

1.295. "**U.S.** [***] **Shared IP Costs**" mean [***] into to [***] to [***] or its [***] any [***] of such [***] including [***] (a) and (b), [***]

1.296. "**Valid Claim**" means a claim of (a) an issued patent within the Royalty Patent Rights in the U.S. or in a jurisdiction outside the U.S., as applicable, that has not expired, lapsed, or been cancelled, or been dedicated to the public, or held unenforceable, invalid, revoked or cancelled by a court or Governmental Authority of competent jurisdiction in an order or decision from which no appeal has can be taken, including through opposition, reexamination, reissue, disclaimer, *inter partes* review, post grant procedures, or similar proceedings; or (b) a pending patent application for a patent included in the Royalty Patent Rights that has not been finally abandoned or finally rejected by a Governmental Authority action from which no appeal can be taken and that has been pending for no more than [***] from the date of filing of the earliest patent application to which such pending patent application is entitled to claim priority.

1.297. "**Withholding Party**" has the definition set forth in Section 11.14 (Withholding Taxes).

Article 2. Overview of Collaboration

2.1. **Overview of Research Activities**. During the Research Term for the Target Research Activities and in accordance with the terms and conditions of this Agreement, the Parties will collaborate to identify and synthesize Candidates that Modulate each Target according to the applicable Target Research Plan for such Target, with the aim of identifying IND-ready Candidates for treatment of the corresponding Indication for such Target. As of the Effective Date, the Parties anticipate that the Target Research Activities will result in the identification, synthesis, and further advancement of at least [***] IND-ready Candidate that Modulates each Target, which Candidate(s) NVS may elect to take forward into Clinical Development. In addition, during the Research Term for the Exploratory Research Activities, the Parties will collaborate and HMI will perform research

activities in accordance with the terms of this Agreement and the Exploratory Research Plan to determine the feasibility of applying the HMI Licensed Technology to identify any applications with respect to available targets other than the Targets (but not to provide to NVS any candidates that manipulate, or AAV gene editing vectors that Modulate, in each case, any such other targets, unless otherwise agreed to in writing by the Parties). [***].

2.2. **Overview of Development and Commercialization**. If NVS elects to Develop any Candidate(s) for a particular Target in accordance with the terms of this Agreement, then, subject to HMI's performance of any Research Activities (which may include performing IND-enabling toxicology studies requested by NVS) with respect to such Target and HMI's Manufacturing obligations under Article 8 (Manufacturing and Technology Transfer), NVS will thereafter have the sole right to conduct and be responsible for, at its cost and expense (other than HMI's share of the Global In-Vivo [***] Development Costs), all Development and Commercialization of such Candidates and any associated Products (other than HMI's Commercialization of In-Vivo [***] Products in the U.S.) for the remainder of the Term in accordance with the terms of this Agreement.

Article 3. Research Term

3.1. **Targets**.

3.1.1 [***] **Target**. During the Research Term, NVS will have the right to identify one or more genes, the Modulation of which would lead to [***] of [***], as a [***] Target. Any such identified genes shall be reflected in an update to the Research Plan.

3.1.2 **Ophthalmic Target Selection and Substitution**. As of the Effective Date, NVS has selected [***] as its first Ophthalmic Target under this Agreement. NVS will have the right to (a) select the [***] no later than the [***] of the Effective Date; and (b) make up to [***] substitutions of an Ophthalmic Target (in aggregate) during the first [***] of the Research Term by providing written notice to HMI; *provided*, *however*, that in the case of each of (a) and (b), NVS may not select any target except as expressly permitted under this Section 3.1.2 (Ophthalmic Target Selection and Substitution). If, at the time of HMI's receipt of such notice, the proposed ophthalmic target is an Occupied Target, then NVS may select another proposed target (and another if such other proposed target is an Occupied Target and so on) until such time that NVS selects an ophthalmic target that is not an Occupied Target, at which point such proposed ophthalmic target will be added as an Ophthalmic Target under this Agreement. If NVS in good faith questions why a proposed ophthalmic target is an Occupied Target, then upon request HMI shall promptly provide reasonable evidence as to why such target is an Occupied Target, which evidence may be provided by HMI to NVS' outside counsel or another outside consultant engaged by NVS to confirm such status. Such outside counsel or consultant engaged by NVS will be permitted to disclose to NVS only whether or not it agrees with HMI's determination that the proposed ophthalmic target is an Occupied Target. In the event of a dispute with regard to any proposed ophthalmic target, such dispute shall be resolved by Expedited Arbitration. Upon substitution of an Ophthalmic Target, the original target will no longer be an Ophthalmic Target for purposes of this Agreement. NVS will have no further right to substitute any Ophthalmic Target once it has made [***] substitutions under this Section 3.1.2 (Ophthalmic Target Selection and Substitution). If HMI has granted any Third Party any non-exclusive rights with respect to any non-Occupied Target that NVS selects as an Ophthalmic Target, then HMI will disclose to NVS the nature of such granted non-

exclusive rights at the time of NVS' proposal of such target, and if (i) NVS does not withdraw its proposal of such target, then when such target becomes an Ophthalmic Target, the rights granted by HMI to NVS under this Agreement with respect to such Ophthalmic Target will be subject to such non-exclusive rights; and (ii) NVS does withdraw its proposal of such target, then such proposal shall not qualify as one of the [***] permitted substitutions under this Agreement.

3.2. **Success Criteria**. NVS will propose to the JSC for review, discussion, and approval (a) a draft of the Success Criteria for [***] Candidates and the Success Criteria for Ophthalmic Candidates that Modulate the initial Ophthalmic Target, and the JSC may modify and will approve the final Success Criteria within [***] month after the Effective Date; and (b) the draft Success Criteria for Ophthalmic Candidates that Modulate [***], any other additional substituted Ophthalmic Target, or any new [***] Target, and the JSC may modify and will approve the final Success Criteria no later than [***] month after NVS' selection of [***], such substitution Ophthalmic Target, or such new [***] Target, as applicable.

3.3. **Conduct of Research Activities**.

3.3.1 **Research Diligence Obligations**. Subject to the JSC's review and approval of each Research Plan, the Parties will [***] perform (themselves or through their Affiliates or any subcontractor) the Target Research Activities in accordance with the applicable Target Research Plan and the Exploratory Research Activities in accordance with the Exploratory Research Plan.

3.3.2 **Additional Development Support**. HMI's obligations to perform any Research Activities will conclude at the end of the Research Term. If NVS wishes HMI to conduct any additional activities with respect to any Candidate or Product at any time during the Term after the conclusion of the Research Term, then the Parties will negotiate in good faith to agree upon the scope of any such additional activities and other [***] terms with respect to such activities, including compensation. Notwithstanding the foregoing, subject to reasonable availability, HMI will cooperate with NVS by answering NVS' questions and sharing HMI Product Know-How relating to the Candidates [***]; *provided, however*, [***].

3.4. **Research Plans and Budgets**.

3.4.1 **Target Research Plans**. The principal objectives of the activities to be undertaken by both Parties during the Research Term with respect to each Target will be based substantially on the research plan attached hereto as Schedule 3.4.1 (the "**General Research Plan**"). The Parties will jointly create a research plan for each such Target based on the General Research Plan (each, a "**Target Research Plan**"). Each Target Research Plan will set forth for such Target: (a) the specific activities to be performed by each Party during the Research Term to Research and conduct Preclinical Development on Candidates that Modulates such Target, including the Manufacture of research grade vectors (the "**Target Research Activities**"); (b) the anticipated number of HMI FTEs to be dedicated to performing the Target Research Activities for such Target; and (c) a budget setting out by Calendar Year the estimated Internal Costs and External Costs (including Manufacturing Costs) to be incurred by HMI and its Affiliates in the conduct of the Target Research Activities for such Target during the upcoming Calendar Year (each, a "**Target Research Budget**"). The Parties shall develop and submit the initial Target Research Plan to the JSC for its review and approval (i) for the first [***]

Target and the first Ophthalmic Target, no later than [***] month after the Effective Date, and (ii) for the [***], any substitution Ophthalmic Target, or any new [***] Target, as applicable, no later than [***] month after NVS' selection of such Target.

3.4.2 **Exploratory Research Plan**. The principal objectives of the activities to be undertaken by HMI during the Research Term to determine the feasibility of applying the HMI Licensed Technology to identify novel applications with respect to available targets other than the Targets will be defined in a research plan based substantially on the General Research Plan (the "**Exploratory Research Plan**"). The Exploratory Research Plan will set forth: (a) the specific activities to be performed by HMI during the Research Term using the HMI Platform Technology to conduct vector design or vector assessment activities to determine the feasibility of applying the HMI Licensed Technology to identify novel applications with respect to available targets other than the Targets, including the Manufacture of research grade vectors (the "**Exploratory Research Activities**"); (b) the anticipated number of HMI FTEs to be dedicated to performing the Exploratory Research Activities; and (c) a budget setting out by Calendar Year the estimated Internal Costs and External Costs (including Manufacturing Costs) to be incurred by HMI and its Affiliates in the conduct of the Exploratory Research Activities in the upcoming Calendar Year (the "**Exploratory Research Budget**"). NVS will develop and submit the initial Exploratory Research Plan to the JSC for its review and approval no later than [***] month after the Effective Date and in any event in advance of HMI being responsible for the performance of any such Exploratory Research Activities.

3.4.3 **Amendments to the Research Plans and Research Budgets**. During the Research Term, the Parties will jointly develop and submit an update to each applicable Research Plan (including each applicable Research Budget) no later than [***] of each Calendar Year (or more frequently as may be determined by the JSC) and the JSC may modify and will approve each updated Research Plan no later than [***]. HMI will not be required to perform any work that would impose any additional financial obligations beyond those that would not be fully reimbursed by NVS pursuant to Section 3.8 (Research Funding), unless NVS agrees to provide funding for such additional work in writing, and such additional work is included in an amendment approved by the JSC. Following such review and approval by the JSC, each amended Research Plan and Research Budget will become effective immediately and will supersede the applicable previous Research Plan and Research Budget.

3.5. Results of Exploratory and Target Activities. Upon NVS' reasonable request, HMI will transfer to NVS all Exploratory Reagents and Target Reagents. For clarity, HMI Materials shall be transferred to NVS in accordance with Section 4.6 (Knowledge and Technology Transfer) and Section 8.6 (Manufacturing Know-How Transfer and Technology Transfer), as applicable.

3.6. Research Records and Reports.

3.6.1 **Records**. HMI will maintain, or cause to be maintained, records of its Research Activities in sufficient detail and in a good scientific manner appropriate for scientific, patent, and regulatory purposes, which records will reasonably reflect work performed by HMI under each Research Plan. NVS will have the right to audit and request a copy of such records from time to time during the Term.

3.6.2 **Interim Reports**. During the Research Term, in advance of each meeting of the JSC (unless otherwise agreed by the JSC), the Parties will jointly create and submit to the JSC for its review and discussion a written report that includes: (a) a summary of the Research Activities completed during the most recently completed Calendar Quarter; (b) a copy of all material results generated during such period related to each Target; and (c) both Parties' progress against the timeline and budget set forth in each Research Plan, with appropriate documentation to substantiate all such activities and results (each, an "**Interim Report**").

3.6.3 **Success Criteria Reports**. During the Research Term, if HMI reasonably believes that any Candidate has achieved the Success Criteria for Candidates that Modulate such Target, HMI will submit to the JSC for its review and approval a report that: (a) identifies all such Candidate(s); and (b) provides all data and documentation that supports HMI's determination of achievement of the Success Criteria for Candidates that Modulate such Target (each, a "**Success Criteria Report**").

3.6.4 **Exploratory Research Report**. No later than [***] after the end of the Research Term, HMI will prepare and submit to the JSC for its review and discussion a final written report that provides information summarizing the Exploratory Research Activities undertaken and all accomplishments achieved during the Research Term (the "**Exploratory Research Report**"). The Exploratory Research Report will contain a copy of all results generated during the Research Term in the performance of the Exploratory Research Activities, including a description of all Exploratory Reagents, in hard copy or electronic format with appropriate documentation to substantiate such results.

3.7. **Candidates**. During the Research Term, (a) NVS and the JSC will assess the results provided in each Interim Report; (b) the JSC will review and determine whether each Candidate identified in the Success Criteria Report has achieved the Success Criteria for the Target that such Candidate Modulates; and (c) NVS will determine whether it wishes to Develop any Candidate, regardless of whether such Candidate has achieved the applicable Success Criteria. NVS will have the right to Develop and Commercialize [***] arising from the Target Research Activities. On a Target-by-Target basis, upon the earlier of (i) the JSC's approval of the first Candidate that meets the applicable Success Criteria for the Target that such Candidate Modulates, or (ii) [***] with respect to such Candidate ((i) or (ii), the "**Target Fee Trigger**"), NVS will pay the Target Fee to HMI in accordance with Section 11.3 (Target Fee); [***].

3.8. **Research Funding**.

3.8.1 **Support**. During the Research Term, as support for work performed by or on behalf of HMI in accordance with this Agreement and each Research Plan, NVS will be responsible for all Internal Costs and External Costs, in each case, incurred by HMI in accordance with the JSC-approved Research Plans (collectively, the "**HMI Research Costs**"), to the extent such amounts are within [***]% of each applicable Research Budget for such Calendar Year or otherwise approved in advance in writing by NVS. Notwithstanding the foregoing, NVS will not be responsible for any Internal Costs or External Costs incurred by HMI in performance of any Research Activities, including any Manufacturing Costs with respect to Candidates or Products Manufactured for use in connection with such Research Activities, in excess of $[***] in the aggregate (the "**Reimbursement Cap**") or that exceed [***]% of the approved Research Budget for such Calendar Year, in each case, unless otherwise approved by

NVS in writing. HMI will not be required to perform any Research Activities under any Research Plan, including incurring any Manufacturing Costs with respect to Candidates or Products Manufactured for use in connection with such Research Activities to the extent that HMI's performance of such activities would exceed the Reimbursement Cap, unless NVS agrees in writing to provide additional funding over the Reimbursement Cap to reimburse HMI for the Internal Costs and External Costs (including Manufacturing Costs, as applicable) incurred by HMI in connection with performing such Research Activities.

3.8.2 **Research Payments**. No later than [***] after the conclusion of each Calendar Quarter, HMI will provide to NVS a report of the HMI Research Costs actually incurred in performing its activities under each Research Plan during the most recently completed Calendar Quarter, which will include a breakdown of Internal Costs and External Costs actually incurred by HMI during such Calendar Quarter, including the applicable Manufacturing Costs along with a written invoice for the amount due in accordance with this Section 3.8 (Research Funding) for such Calendar Quarter. NVS will pay to HMI the undisputed amounts set forth in any such invoice within [***] of NVS' receipt of such invoice.

Article 4. Licenses; Exclusivity

4.1. License Grants to NVS.

4.1.1 **Research License**. Subject to the terms of this Agreement, HMI hereby grants to NVS and its Affiliates, (a) during the Research Term, a worldwide, non-exclusive research license, with the right to grant sublicenses through multiple tiers in accordance with Section 4.3 (Sublicensing Rights), under the HMI Licensed Technology solely to perform its responsibilities under any Research Plan; (b) a worldwide license, with the right to grant sublicenses through multiple tiers in accordance with Section 4.3 (Sublicensing Rights), under the HMI Licensed Technology to conduct Preclinical Development activities with respect to Candidates and Products (including the use of Target Reagents), which license will be (i) co-exclusive (with HMI) during the Research Term; and (ii) exclusive during the remainder of the Term; and (c) a worldwide, non-exclusive, perpetual, irrevocable license, without the right to grant sublicenses, to use Exploratory Reagents and Target Reagents, and any improvements, modifications, or derivatives resulting from the use thereof, solely for its internal research purposes ((a) – (c) together the "**Research License**").

4.1.2 **Development and Commercialization License**. Subject to the terms of this Agreement, HMI hereby grants to NVS and its Affiliates an exclusive, royalty-bearing license (with the right to grant sublicenses through multiple tiers in accordance with Section 4.3 (Sublicensing Rights)) under the HMI Licensed Technology to Develop and Commercialize (a) Ophthalmic Candidates and Ophthalmic Products worldwide, (b) [***] Candidates and [***] Products worldwide in the Ex-Vivo Field, and (c) [***] Candidates and In-Vivo [***] Products worldwide, excluding the Commercialization thereof in the United States (the "**Development and Commercialization License**"). Subject to the terms of this Agreement, effective as of the [***] Opt-Out Date, HMI hereby grants to NVS and its Affiliates an exclusive license (with the right to grant sublicenses through multiple tiers in accordance with Section 4.3 (Sublicensing Rights)) under the HMI Licensed Technology to Commercialize U.S. [***] Products.

4.1.3 **Manufacturing License**. Subject to the terms of this Agreement, HMI hereby grants to NVS and its Affiliates a royalty-bearing license (with the right to grant sublicenses to Designated CMOs in accordance with Section 4.3 (Sublicensing Rights)) under the HMI Licensed Technology to Manufacture or have Manufactured (a) Ophthalmic Candidates and Ophthalmic Products worldwide and (b) [***] Candidates and [***] Products in the In-Vivo Field and in the Ex-Vivo Field worldwide, in each case, in accordance with Article 8 (Manufacturing and Technology Transfer). The foregoing license will be (i) co-exclusive (with HMI) as of the Effective Date with respect to Candidates and Products, (ii) exclusive as of the NVS Manufacturing Date for the applicable Candidate and Product (other than any U.S. [***] Product), and (iii) co-exclusive (with HMI) as of the NVS Manufacturing Date for any U.S. [***] Product. [***]

4.1.4 **Assigned Technology License**. HMI hereby grants to NVS and its Affiliates, a worldwide, non-exclusive, perpetual, irrevocable, royalty-free, and fully-paid up license with the right to grant sublicenses under the HMI Assigned Technology in connection with the research, development, manufacturing, commercialization, or other exploitation of products or services by or on behalf of NVS or its Affiliates. Notwithstanding anything to the contrary set forth in this Agreement, the license granted under this Section 4.1.4 (Assigned Technology License) do not grant NVS or its Affiliates any rights or licenses under HMI Licensed Technology (other than the HMI Assigned Technology) beyond those granted as part of the Research License, the Development and Commercialization License, or under Section 4.1.3 (Manufacturing License).

4.2. License Grant to HMI.

4.2.1 **Non-Exclusive Research License**. Subject to the terms of this Agreement, NVS hereby grants to HMI during the Research Term, a worldwide, non-exclusive license, with the right to grant sublicenses through multiple tiers in accordance with Section 4.3 (Sublicensing Rights) under the NVS Technology solely to perform its Research Activities under the applicable Research Plan.

4.2.2 **Exclusive Commercial License**. Subject to the terms of this Agreement, NVS hereby grants to HMI during the Term of this Agreement, a worldwide exclusive license without the right to sublicense under the NVS Program Patent Rights, the NVS Program Know-How, and NVS' interest in the Joint Know-How and Joint Patent Rights, in each case, to Commercialize In-Vivo [***] Products in the U.S.

4.2.3 **Non-Exclusive NVS Manufacturing Improvements License**. NVS will and hereby does, grant to HMI a non-exclusive, royalty-bearing, perpetual, irrevocable, worldwide, sublicensable license under all NVS Manufacturing Improvements (if any) to Manufacture and have Manufactured candidates and products that are created using HMI Platform Technology; *provided*, that the Parties agree to negotiate [***] financial terms for such license, subject to Expedited Arbitration if the Parties are unable to agree on such financial terms within [***] following NVS' receipt of written notice from HMI requesting such license.

4.3. Sublicensing and Licensing Rights.

4.3.1 **Research License**. Subject to Section 4.3.4 (Sublicense and License Requirements), (a) NVS may sublicense the rights granted to it under clauses (a) and (b) of Section 4.1.1 (Research License); and (b) HMI may (i) license or sublicense its rights under clause (b)(i) of Section 4.1.1 (Research License) and (ii) sublicense the rights granted to it under Section 4.2.1 (Non-Exclusive Research License), in each of (a) or (b), to any Third Party service provider performing services for the benefit of such sublicensing Party without the other Party's prior written consent. NVS may not sublicense the rights granted to it under clause (c) of Section 4.1.1 (Research License) without HMI's prior written consent.

4.3.2 **Development and Commercialization Licenses**. Subject to Section 4.3.4 (Sublicense and License Requirements), NVS may sublicense its rights under Section 4.1.2 (Development and Commercialization License) without HMI's prior written consent (a) to any Third Party service provider performing services for the benefit of NVS in connection with the Development or Commercialization of any Candidate or Product, or (b) to any Third Party to whom NVS desires to sublicense Development or Commercialization rights in any and all jurisdictions; *provided*, [***].

4.3.3 **Manufacturing License**. Subject to Section 4.3.4 (Sublicense and License Requirements), (a) NVS may sublicense its rights under Section 4.1.3 (Manufacturing License); and (b) HMI may license or sublicense its rights under clauses (i) and (iii) under Section 4.1.3 (Manufacturing License), in each of (a) and (b), to any Designated CMO. For clarity, the use of Third Party service providers engaged to perform services in connection with Manufacturing, including analytics service providers, will be deemed subcontractors and not Sublicensees.

4.3.4 **Sublicense and License Requirements**. Each Party will ensure that all permitted sublicenses granted under this Agreement: (a) are consistent with the terms of this Agreement, (b) include an obligation of the Sublicensee to assign to such Party all Know-How and Patent Rights invented, discovered, created, or otherwise developed by the Sublicensee that would fall within the definition of Assigned Know-How or Assigned Patent Rights if they were invented, discovered, created, or otherwise developed by such Party or its Affiliates, (c) include an obligation of the Sublicensee to assign or grant a sublicensable license to such Party of all Know-How and Patent Rights invented, discovered, created, or otherwise developed by the Sublicensee that would fall within the definition of Program Technology if they were invented, discovered, created, or otherwise developed solely by such Party or its Affiliates, (d) to the extent a Party engages a Sublicensee to Commercialize a Product, include an obligation of such Sublicensee to account for and report its Net Sales of each such Product, and (e) require the Sublicensee to comply with the obligations of the sublicensing Party contained in this Agreement, including the confidentiality and non-use obligations set forth in Article 13 (Confidentiality). Each Party will remain responsible and liable for the performance of all Affiliates and Sublicensees under their respective sublicensed rights to the same extent as if such activities were conducted by the sublicensing Party. In no event will any sublicense relieve the sublicensing Party of any of its obligations under this Agreement. The sublicensing Party will deliver to the other Party a copy of any executed sublicense agreement (redacted as necessary to protect confidential information that is not necessary to confirm compliance with this Agreement) no later than [***] following the execution thereof. Any termination of the licenses granted to a Party hereunder will cause all of the applicable Sublicensees of such Party to automatically lose the same rights under any sublicense. For clarity, any licenses or sublicenses by HMI or its Affiliates (other than to NVS and its Affiliates under this Agreement) of HMI Licensed Technology [***] licensed to NVS hereunder shall be treated as a sublicense and subject to the terms of this 4.3.4 (Sublicense and License Requirements).

4.4. **Subcontractors**. Each Party may perform any of its obligations under this Agreement through one or more subcontractors; *provided*, that (a) the subcontracting Party remains fully responsible for the work allocated to, and payment to, such subcontractors to the same extent it would if it had done such work itself; (b) the subcontractor undertakes in writing obligations of confidentiality and non-use applicable to the Confidential Information that are at least as stringent as those set forth in Article 13 (Confidentiality); and (c) the subcontractor agrees in writing to assign all inventions and other Intellectual Property Rights developed in the course of performing any such work under this Agreement that are specifically related to Candidates or Products to the Party retaining such subcontractor and a sublicensable license under and to all other inventions and other Intellectual Property Rights that are developed by the subcontractor in the course of performing such work under this Agreement, and to cooperate and sign any documents to confirm or perfect such assignment.

4.5. **Third Party Licenses**. All rights licensed to a Party from a Third Party and sublicensed to the other Party under this Agreement will be subject to and subordinate to the terms of the applicable Third Party License. Each Party will comply with the terms of any such Third Party License, [***]. Schedule 4.5 (Third Party License Terms) sets forth certain obligations under (a) the COH License that apply to certain COH Patent Rights and (b) the Caltech License that apply to certain Caltech Patent Rights, and NVS will comply with those terms applicable to sublicensees under such licenses that have been [***] disclosed to NVS by HMI.

4.6. **Knowledge and Technology Transfer**. Within [***] of NVS' request, HMI will deliver to NVS copies of (a) the written HMI Product Know-How related to each Candidate or Product, (b) documents and files related to the HMI Product Patent Rights, and (c) any other HMI Know-How that is necessary or useful for the Development or Commercialization of Candidates and Products in accordance with this Agreement; *provided*, that any HMI Know-How relating to Manufacturing shall only be provided to NVS in accordance with Article 8 (Manufacturing and Technology Transfer). In addition, as part of such Know-How transfer, HMI will transfer to NVS HMI Materials related to a Candidate or Product to the extent necessary for NVS to exercise the rights granted to it under this Agreement with respect to the HMI Product Know-How related to such Candidate or Product. Any HMI Materials provided by HMI in connection with the transfer of the HMI Product Know-How will remain the sole property of HMI. Thereafter, on a continuing basis during the Term, HMI shall [***], and at a minimum no less frequently than on a [***] basis through the JSC, as applicable, disclose to NVS all additional HMI Product Know-How (including providing any such HMI Materials) related to a Candidate or Product that comes into existence since the prior disclosure. HMI will provide [***] assistance to NVS in connection with understanding and using all such HMI Product Know-How for purposes consistent with the licenses and rights granted to NVS hereunder. NVS will use and transfer all documents and files related to the HMI Product Know-How related to each Candidate or Product including HMI Materials and HMI Product Patent Rights only for purposes of exercising its rights and licenses with respect to applicable Candidates and Products in accordance with this Agreement, and for no other purpose. NVS will be responsible for all reasonable documented costs and expenses associated with the transfer to NVS of such documentation and any HMI Product Know-How.

4.7. **Covenant Not to Sue NVS**. During the Term, HMI hereby covenants not to assert or cause to be asserted, and will cause its Affiliates, licensees, and sublicensees not to assert or cause to be asserted, against NVS or any of NVS' Affiliates or Sublicensees, any claim of infringement,

misappropriation, or other violation of Intellectual Property Rights Controlled by HMI or its Affiliates, including any Intellectual Property Rights relating to [***], with respect to the Research, Development, Manufacturing, or Commercialization of any Candidate or Product in accordance with this Agreement.

4.8. **No Implied Licenses**. Each Party acknowledges that the rights and licenses granted under this Agreement are limited to the scope expressly granted herein. Except for the rights expressly granted under this Agreement, no rights, title, licenses, or other interests of any nature whatsoever are granted whether by implication, estoppel, reliance, or otherwise, by either Party to the other Party. Accordingly, NVS will not practice or exploit the HMI Know-How and HMI Patent Rights other than as expressly licensed in this Agreement, and likewise HMI will not practice or exploit the NVS Know-How and NVS Patent Rights other than as expressly licensed in this Agreement. Each Party specifically reserves all rights not expressly granted to the other Party hereunder.

4.9. **Retained Rights**. Notwithstanding the licenses granted to NVS in Section 4.1 (License Grants to NVS), but subject to Section 4.13 (ROFNs [***]), HMI (a) retains the exclusive right to practice the HMI Licensed Technology to Develop and Commercialize [***], and (b) NVS will not Research, Develop, Manufacture, Commercialize, or otherwise exploit any [***] Candidate or [***] Product for the treatment of [***].

4.10. **U.S. Government Rights**. The Parties acknowledge that the Patent Rights and Know-How licensed to HMI under the COH License and Caltech License are each subject to retained rights of the U.S. Government in such HMI Licensed Technology pursuant to 35 U.S.C. §§ 200-212 and applicable U.S. government regulations and the right of such Third Party licensors and other non-profit academic or research institutions to practice such HMI Licensed Technology for non-profit educational and research uses; *provided*, that HMI covenants that such uses will not include research sponsored by any for-profit Third Parties.

4.11. **Exclusivity**. During the Term, HMI and its Affiliates will not itself or with or through any Third Party, directly or indirectly, Research, Manufacture, Develop, or Commercialize (a) Candidates or Products except in the performance of activities under this Agreement; or (b) [***].

4.12. **Change of Control**.

4.12.1 **Exception to Exclusivity**. Notwithstanding the exclusivity granted under Section 4.11 (Exclusivity), if HMI, as a result of a Change of Control, is acquired by an entity that, as of the time of such transaction, directly or through an Affiliate, is Researching, Developing, Manufacturing, Commercializing, or otherwise exploiting a [***], [***] of such Change of Control, [***] such [***] may continue to [***] and otherwise [***] (without such [***]) so long as: (a) [***]; and (b) [***] (i) does [***] (including any [***]) or [***] involved in the [***] (*provided*, that the foregoing [***] but do not [***] or are not otherwise [***] involved in the [***] and (ii) [***] to ensure that such [***]. In addition, [***] (other than [***]) with respect to [***] with respect to [***].

4.12.2 **Change of Control**4.12.3 . Without limiting Section 4.12.1 (Exception to Exclusivity): (a) where the Acquiror is [***] any [***] then [***] with respect to [***] shall [***] of such Change of Control; (b) where [***] notwithstanding any other provision of this Agreement, [***] with respect to [***] and (c) at [***] will no longer [***] it is then [***] of such [***]. Upon the [***] (i) the [***] pursuant to **[***]**

with respect to such [***] and [***], (ii) [***] shall be [***] for such [***], (iii) **[***]** with respect to such [***] or any [***] in the [***] the same [***] as such [***] with respect to [***] shall [***] including [***] or any [***] with respect to [***] including [***] with respect to [***] shall instead [***] including [***], in each case, as with respect to [***]; and (iv) [***] and [***] with respect to [***] and [***], and all [***] in such [***].

4.13. ROFNs For [***].

4.13.1 **HMI** [***] **Products**. HMI will ensure that any [***] Product Researched, Developed, or Commercialized by or on behalf of HMI or its Affiliates is done so in a manner distinct from any [***] Product.

(a) If at any point HMI or its Affiliates receives or intends to make a *bona fide* offer from or to a Third Party with respect to the transfer, assignment, grant of a license, or other disposition of rights to Develop or Commercialize any [***] ("[***] **Out-license**"), then HMI will notify NVS in writing of such offer, and simultaneously provide NVS with the [***]. NVS will have an [***] exercisable no later than [***] days after receipt of any such written notice from HMI to notify HMI in writing as to whether NVS desires to negotiate for a license to Develop and Commercialize [***] owned by HMI or its Affiliates (the "**ROFN Exercise Notice**"). If NVS provides such ROFN Exercise Notice to HMI within such [***] period indicating its desire to negotiate for such rights, then (i) upon NVS' request, HMI will (A) within [***] of NVS' request, provide NVS with other information and documentation reasonably requested by NVS in HMI's or its Affiliate's Control relating to such [***]; and (B) afford NVS and its representatives reasonable access during normal business hours to HMI's personnel; and (ii) NVS will have the [***] from the date of HMI's receipt of the ROFN Exercise Notice to negotiate with HMI a definitive license agreement setting forth the terms of a license to Develop and Commercialize such [***].

(b) If either (i) NVS does not provide such written notice to HMI within such [***] period, or (ii) NVS and HMI do not enter into a definitive license agreement within the [***] negotiation period after having conducted such negotiations in good faith, then, in each case ((i) and (ii)), for a period of [***] following such [***] or [***] period, as applicable, and subject to the terms of this Agreement, HMI will be free to enter into negotiations and an agreement with one or more Third Parties relating to any license, grant, or other transfer of rights with respect to such [***] (or to further develop and commercialize any such product itself), without further obligation to NVS; *provided*, that (A) [***]; and (B) [***] in accordance with the provisions of this Section 4.13.1 (HMI [***]).

4.13.2 **NVS Development and Commercialization of** [***]. If NVS wishes to Research, Develop, and Commercialize a [***] Product for the treatment of [***], then NVS will notify HMI in writing of such desire. Upon HMI's receipt of such notice from NVS, the Parties will negotiate [***] terms of an amendment to this Agreement or another separate agreement to grant NVS the rights to Research, Develop, and Commercialize the applicable [***] Product for the treatment of [***], including additional financial consideration to be paid to HMI with respect to a grant of such rights. If HMI and NVS do not agree on commercially reasonable terms within [***] of the commencement of such negotiation, then NVS will not Research, Develop or Commercialize such [***] Product for the treatment of [***]; [***].

4.14. **HMI Commercialization Opt-Out Rights for U.S.** [***] **Products**. HMI shall have the right to elect not to Commercialize an In-Vivo [***] Product in the U.S. by written notice to NVS given any time. Such election shall become effective as of [***] after the date of NVS' receipt of such notice (such date, the "**At-Will Opt-Out Date**"). As of the At-Will Opt-Out Date with respect to a U.S. [***] Product: (a) the licenses granted to HMI pursuant to Section 4.2.2 (Exclusive Commercial License) and Section 10.7.3 (Trademark License) with respect to such U.S. [***] Product shall terminate and revert to NVS, (b) NVS shall be the Commercializing Party for such U.S. [***] Product, (c) all rights granted to HMI under this Agreement with respect to such U.S. [***] Product or any [***] Products in the Ex-Vivo Field incorporating the same Candidate as such U.S. [***] Product that differ from the rights granted to HMI under this Agreement with respect to the Ophthalmic Products shall terminate, including rights at the JSC or any Subcommittee and rights with respect to regulatory matters, including any rights with respect to Jointly-Agreed Regulatory Submissions, and HMI shall instead receive the same rights, including review and discussion rights and access to reports provided to HMI under this Agreement, in each case, as with respect to the Ophthalmic Products; and (d) HMI hereby assigns to NVS all of its right, title, and interest in and to any Local Trademarks used by HMI with respect to such In-Vivo [***] Product, including the right to sue and recover for past, present, or future infringement, dilution, or other violation thereof, and all goodwill contained in such Local Trademarks. For clarity, notwithstanding HMI's election not to Commercialize an In-Vivo [***] Product in the U.S., [***].

Article 5. Governance

5.1. **Joint Steering Committee**.

5.1.1 **Formation and Purpose of the JSC**. Promptly, but no later than [***] days after the Effective Date, the Parties will establish a Joint Steering Committee ("**JSC**"), which JSC will coordinate and oversee or monitor the Parties' activities hereunder in accordance with this Section 5.1 (Joint Steering Committee). The JSC will have the responsibilities set forth herein and will dissolve upon the expiration of the Term.

5.1.2 **Membership**. Each Party will designate up to [***] representatives with appropriate expertise and seniority to serve as members of the JSC, and who have the authority to bind such Party with respect to matters within the purview of the JSC. Each Party may replace its JSC representatives at any time upon written notice to the other Party. HMI will designate one of its JSC members as one of the co-chairpersons of the JSC and NVS will designate one of its members as the other co-chairperson of the JSC. Every [***] months the co-chairpersons will alternate serving in the role of "lead co-chairperson." The lead co-chairperson or his or her designee, in collaboration with the Alliance Managers, will be responsible for calling meetings, preparing and circulating an agenda in advance of each meeting, and preparing and issuing minutes of each meeting within [***] thereafter. Such minutes will be deemed finalized unless any JSC member objects to the accuracy of such minutes within [***] of receipt of such minutes.

5.1.3 **Meetings**. The JSC will hold meetings at such times as it elects to do so, but in no event will such meetings be held less frequently than [***], unless otherwise agreed by the Parties. The JSC will meet alternatively at NVS' facilities in Cambridge, Massachusetts and HMI's facilities in Bedford, Massachusetts, or at such locations as the Parties may otherwise agree. Meetings of the JSC may be held by audio or video teleconference with the consent of each Party; *provided*, *however*, that at least [***] JSC meeting per year will be held in person. The Alliance Manager of each Party will attend each meeting of the JSC as a non-voting participant. Each Party will be responsible for all of its own expenses of participating in any JSC meeting.

5.1.4 **Meeting Agendas**. Each Party will disclose to the other Party the proposed agenda items along with appropriate information at least [***] in advance of each meeting of the JSC. Notwithstanding the foregoing, under exigent circumstances requiring JSC input, a Party may provide its agenda items to the other Party within a lesser period of time in advance of the meeting, or may propose that there not be a specific agenda for a particular meeting, so long as such other Party consents to such later addition of such agenda items or the absence of a specific agenda for such JSC meeting.

5.1.5 **Specific Responsibilities of the JSC**. The responsibilities of the JSC will be to:

(a) oversee the overall strategic relationship between the Parties;

(b) review, discuss, and approve each Research Plan (including the applicable Research Budget set forth therein), and each amendment or update thereto;

(c) review, discuss, develop, and approve the Success Criteria (or any modification thereto) for Candidates that Modulate each Target;

(d) review and discuss each Interim Report, each Success Criteria Report, and the Exploratory Research Report;

(e) review, discuss, and determine whether any Candidate identified in the Success Criteria Report has achieved the Success Criteria for Candidates that Modulate such Target;

(f) facilitate the flow of information (including Development Reports) between the Parties with respect to the Development and Commercialization of Ophthalmic Candidates, Ophthalmic Products, [***] Candidates in the Ex-Vivo Field, and [***] Products in the Ex-Vivo Field;

(g) review and discuss any proposed sublicenses to whom NVS proposes to grant rights to Develop or Commercialize In-Vivo [***] Products;

(h) review and discuss the Development Plan for In-Vivo [***] Products and all material amendments or updates thereto;

(i) develop, discuss, and approve the initial high-level summary (including the associated budget) of marketing strategy and Commercialization activities for In-Vivo [***] Products, and each material amendment or update to such plans and budgets;

(j) review, discuss, and approve the Global In-Vivo [***] Commercialization Plan and the U.S. In-Vivo [***] Commercialization Plan (including the applicable Commercialization Budgets set forth therein), and all material amendments or updates to such plans and budgets;

(k) review and discuss the status and progress of regulatory activities for In-Vivo [***] Products and provide any comments to NVS with respect to any Jointly-Agreed Regulatory Submissions for In-Vivo [***] Products;

(l) review, discuss, and approve each Global Medical Affairs Plan and U.S. Medical Affairs Plan, progress under such plans, and all material amendments or updates thereto;

(m) review, discuss, and approve the initial Global Brand Plan for In-Vivo [***] Products, and each material amendment and update thereto;

(n) upon request of a Party, develop and discuss whether to approve a Territory-specific brand plan for U.S. [***] Products;

(o) review, discuss and coordinate the Parties' scientific presentation and publication strategy relating to In-Vivo [***] Products in the Territory;

(p) review and discuss reports from the JMC and provide guidance to any Subcommittee to resolve any other disputes or disagreements arising from any such Subcommittee;

(q) establish additional subcommittees, and other operational committees or *ad hoc* subcommittees, on an "as needed" basis to oversee particular projects or activities (the JMC, and such other operational committees and subcommittees, each a "**Subcommittee**"); and

(r) perform such other functions as appropriate to further the purposes of this Agreement as determined by the Parties.

5.2. Joint Manufacturing Committee

5.2.1 **Formation and Purpose of the JMC**. Promptly, but not more than [***] after the Parties establish the JSC, the JSC will establish a Joint Manufacturing Committee ("**JMC**"), which JMC will be a Subcommittee of the JSC and will have the responsibilities provided for herein. The JMC will dissolve upon the earlier of (a) expiration of the Term, or (b) such time as otherwise determined by the JSC.

5.2.2 **Membership and Meetings of the JMC**. Each Party will designate up to [***] representatives with appropriate expertise and seniority to serve as members of the JMC, and who have the authority to bind such Party with respect to matters within the purview of the JMC. HMI will designate a co-chairperson of the JMC and NVS will designate a co-chairperson of the JMC. Each Party may replace its JMC representatives and co-chairpersons at any time upon written notice to the other Party. The JMC will hold meetings at such times as it elects to do so (but in any event at least on a Calendar [***] basis, unless the Parties agree otherwise), and at such locations as the Parties may agree upon or, if agreed by the Parties, by audio or video teleconference. Each Party will be responsible for all of its own expenses of participating in any JMC meeting.

5.2.3 **Specific Responsibilities of the JMC**. The responsibilities of the JMC will be to:

(a) generally facilitate flow of information between the Parties with respect to technical development and Manufacturing clinical supply of Candidates and Products to NVS, and, if applicable, commercial supply;

(b) coordinate and oversee the complete Manufacturing Know-How transfer related to each Candidate and Product to the NVS CMC Sub-Team, including with respect to host cell line history, raw materials used for cultivation, available licenses for commercial use, details about vectors, and process and analytical methods applied to Candidates and Products;

(c) coordinate, oversee, and approve the type and amount of assistance to be provided by or on behalf of HMI to NVS for any HMI Manufacturing Know-How transfer support requested by NVS pursuant to Section 8.6.2 (Manufacturing Technology Transfer to NVS) to permit NVS to Manufacture such Candidate(s) and Product(s);

(d) update NVS about the progress of the HMI facility build-up, or the need to engage Designated CMOs, as appropriate;

(e) provide transparency on planning and budget requirements with respect to preclinical and clinical supplies of Candidates and Products to permit each Party to meet its internal budget and planning processes;

(f) facilitate and align the Parties' activities related to any NVS quality assurance audits of HMI's and Designated CMOs' facilities, including following up on critical audit findings and supporting the identification and implementations of potential solutions;

(g) select and approve the list of Designated CMOs;

(h) advise on the material terms of agreements entered into between HMI and Designated CMOs;

(i) oversee negotiation of the Development Supply Agreement, Commercial Supply Agreement, In-Vivo [***] Commercial Supply Agreement, and Quality Agreements, as appropriate; and

(j) perform such other functions as appropriate to further the purposes of this Agreement as determined by the Parties.

5.3. **Alliance Managers**. Each of the Parties will appoint a single individual to coordinate communications regarding Research, Development, Manufacturing, and Commercialization obligations between the Parties (each, an "**Alliance Manager**"). The role of the Alliance Manager is to act as a single point of contact between the Parties to ensure a successful relationship under this Agreement. The Alliance Managers will attend any JSC meetings and may

attend any Subcommittee meetings. Alliance Managers will be non-voting participants in all JSC and Subcommittee meetings that they attend; *provided*, *however*, that an Alliance Manager may bring any matter to the attention of the JSC or any Subcommittee if such Alliance Manager reasonably believes that such matter warrants such attention. Each Party will designate its initial Alliance Manager promptly after the Effective Date and each Party may change its designated Alliance Manager at any time upon written notice to the other Party. Any Alliance Manager may designate a substitute to temporarily perform the functions of that Alliance Manager by written notice to the other Party. Each Alliance Manager will also: (a) be the point of first referral in all matters of conflict resolution; (b) provide a single point of communication for seeking consensus between the Parties regarding key strategy and plan issues; (c) identify and bring disputes to the attention of the JSC in a timely manner; and (d) plan and coordinate cooperative efforts.

5.4. Additional Committees.

5.4.1 **JSC Subcommittees**. Each such Subcommittee, other than the JMC, which will be established and will operate as provided for above, will be constituted and will operate as the JSC determines. HMI will designate a co-chairperson of each Subcommittee and NVS will designate a co-chairperson of each Subcommittee, each of whom will be a Party's representative who is a member of such Subcommittee. Every [***] the co-chairpersons of each Subcommittee will alternate serving in the role of "lead co-chairperson." The lead co-chairperson or his or her designee will be responsible for calling meetings, preparing and circulating an agenda in advance of each meeting, and preparing and issuing minutes of each meeting within [***] thereafter. Such minutes shall be deemed finalized unless any applicable Subcommittee member objects to the accuracy of such minutes within [***] of receipt of such minutes. Each Party may replace its representatives and co-chairpersons on each such Subcommittee at any time upon written notice to the other Party. Each Party will be responsible for all of its own expenses of participating in any Subcommittee meeting. Each Subcommittee and its activities will be subject to the oversight of the JSC. No Subcommittee's authority may exceed that specified for such Subcommittee in this Article 5 (Governance). Any disagreement between the representatives of the Parties on a Subcommittee will be resolved in accordance with Section 5.6 (Decision-Making).

5.4.2 **Operational Teams**. From time-to-time, the JSC or any Subcommittee may establish and delegate specific matters or duties within its responsibilities to directed teams (each, an "**Operational Team**"), the composition, operation, and responsibilities of which will be determined by the JSC or the applicable establishing Subcommittee (the "**Establishing Committee**"). Operational Teams may be established on an *ad hoc* basis for purposes of a specific activity or on such other basis as the applicable Establishing Committee may determine. Each Operational Team will report to, and its activities will be subject to the oversight of, the applicable Establishing Committee. No Operational Team's authority may exceed that specified for the applicable Establishing Committee. Any disagreement between the representatives of the Parties on any Operational Teams will be referred to the applicable Establishing Committee for resolution in accordance with Section 5.6 (Decision-Making).

5.5. Additional Participants. With the consent of the other Party, not to be unreasonably withheld, conditioned, or delayed, other employees of either Party or any of its Affiliates involved in the Research, Development, Manufacturing, or Commercialization of any Candidates or Products may attend meetings of the JSC or any Subcommittee as non-voting participants. In addition, with the consent of each Party, consultants, representatives, or advisors involved in the Research,

Development, Manufacturing, or Commercialization of any Candidates or Products may attend meetings of the JSC or any Subcommittee as non-voting observers; *provided*, *however*, that such Third Party participants and observers are under written obligations of confidentiality and non-use applicable to the Confidential Information of each Party that are at least as stringent as those set forth in Article 13 (Confidentiality).

5.6. Decision-Making.

5.6.1 **Committee Decisions**. Each Party's representatives on the JSC and each Subcommittee will, collectively, have one vote (the "**Party Vote**") on all matters brought before such committee for a decision by consensus. The JSC and each Subcommittee will make decisions as to matters within its jurisdiction by unanimous Party Vote, which Party Vote may either be reflected in the minutes of the committee meeting or by an action by written consent signed by the co-chairperson appointed by each Party or his or her designee identified in writing. No vote will be binding on either Party unless each Party has at least one representative in attendance.

5.6.2 **Scope of Committee Authority**. For the avoidance of doubt, matters that are specified in this Article 5 (Governance) only to be reviewed and discussed (as opposed to reviewed, discussed, and approved) do not require any agreement or decision by either Party and are not subject to the voting and decision-making procedures set forth in this Section 5.6 (Decision-Making).

5.6.3 **Escalation**. If the representatives of HMI and NVS are unable to agree on or resolve any matter requiring the approval of the JSC, the JMC or any other Subcommittee after the use of good faith efforts, then, at the election of either Party, such Party may refer such matter to the Party's respective Executive Officer. The Executive Officers will use good faith efforts to resolve any such disagreement so referred to them as soon as practicable, and any final decision that the Executive Officers agree to in writing will be conclusive and binding on the Parties. If the Executive Officers are unable to resolve any disagreement so referred within a period of [***] after such matter is referred to them (or such longer period as the Executive Officers may agree upon), then:

(a) If such disagreement refers to any amendment to any Research Plan (including any Research Budget) that would (a) materially change the objectives of the activities to be conducted during the Research Term from those set forth in Section 2.1 (Overview of Research Activities), or (b) otherwise conflict with the terms and conditions of the Agreement, then [***];

(b) If such disagreement refers to any additional payments in excess of the Reimbursement Cap to compensate HMI for the additional Internal Costs and External Costs (including Manufacturing Costs), as applicable, to be incurred by HMI as required to complete any Research Activities in accordance with any JSC approved Research Plan, then [***];

(c) If such disagreement refers to the initial U.S. In-Vivo [***] Commercialization Plan (or the Commercialization Budget set forth therein), or any amendment or update thereto, then [***] with respect to the aspects of such U.S. In-Vivo [***] Commercialization Plan upon which the Parties are unable to agree, *provided*, that such decision is not reasonably likely to have a material adverse effect on (i) [***] or (ii) [***];

(d) If such disagreement refers to a Territory-specific brand strategy for U.S. [***] Products, then [***] with respect to the aspects of such Territory-specific brand strategy upon which the Parties are unable to agree that solely relates to the U.S., *provided*, that such decision is not reasonably likely to have a material adverse effect on (i) [***] or (ii) [***]; and

(e) [***].

5.7. **General Authority**. The JSC and each Subcommittee and Alliance Manager will have solely the powers expressly assigned to them in this Article 5 (Governance) and elsewhere in this Agreement. In conducting themselves on the JSC and any other Subcommittee, and as Alliance Managers, and in exercising their rights under this Article 5 (Governance), all representatives of each Party will consider diligently, reasonably, and in good faith all input received from the other Party, and will use good faith efforts to reach unanimity, where required, on all matters before them. Notwithstanding anything to the contrary set forth in this Agreement, neither the JSC nor any Subcommittee will have the right to make any decisions:

5.7.1 to amend or modify this Agreement, or waive compliance with this Agreement;

5.7.2 in a manner that excuses such Party from any obligation specifically enumerated under this Agreement;

5.7.3 in a manner that negates any consent right or other right specifically allocated to the other Party under this Agreement;

5.7.4 to resolve any dispute involving the breach or alleged breach of this Agreement;

5.7.5 to resolve a matter if the provisions of this Agreement specify that agreement of the Parties, including consent of each Party, is required for such matter;

5.7.6 in a manner that would require the other Party to perform any act that would cause such Party to violate any Applicable Law or the requirements of any Regulatory Authority, or otherwise breach any of its obligations hereunder;

5.7.7 impose any obligation on either Party that would be in violation of such Party's written standard operating procedures, written business policies, or written compliance policies or procedures; or

5.7.8 otherwise expand the rights or reduce the obligations of either Party under this Agreement.

Article 6. Development

6.1. **Development Diligence**. Subject to Article 8 (Manufacturing and Technology Transfer), NVS will use Commercially Reasonable Efforts to Develop and obtain Marketing Approval for at least [***] Product in each of the In-Vivo Field and Ex-Vivo Field and for at least [***] Ophthalmic Product that Modulates each Ophthalmic Target.

6.2. **Candidate and Product Development Responsibilities**. Subject to HMI's performance of its Research Activities and HMI's Manufacturing obligations under Article 8 (Manufacturing and Technology Transfer), NVS will [***] at its sole cost and expense (other than HMI's share of the Global In-Vivo [***] Development Costs), the Development of each Candidate and Product.

6.3. **Development Plans**. Within [***] In-Vivo [***] Product, NVS will develop a written development plan setting forth the Development activities for such In-Vivo [***] Product (as such plan may be amended from time-to-time, the "**Development Plan**"). Such Development Plan will include in reasonable detail: (a) the anticipated overall program of Development for the In-Vivo [***] Product, including pre-clinical studies, Clinical Trials, and other material Development activities to be undertaken to achieve Regulatory Approval for such In-Vivo [***] Product, along with any anticipated dates for filing for Regulatory Approvals thereof; and (b) the anticipated costs and expenses associated with those Development activities (the "**Development Budget**"). NVS will submit the initial Development Plan for Development of the In-Vivo [***] Product to the JSC for its review and approval, and NVS will use [***] to consider and implement any reasonable comments received from the JSC on any such initial Development Plan. NVS will update the Development Plan (including the Development Budget therein) on an annual basis (or more frequently as may be determined by NVS or the JSC, as applicable), and submit all material amendments to the Development Plan for review and approval by the JSC. NVS will provide the JSC with a copy of each finalized Development Plan, as amended.

6.4. **Development Reporting**. With respect to each Calendar Year in which NVS conducts any Development activities (a) for any Candidates or any Products other than an In-Vivo [***] Product, NVS will, on or before December 30th of such Calendar Year, provide to HMI (through the JSC) for its review and discussion, [***] report summarizing (i) NVS' and its Affiliates' and Sublicensees' material Development and regulatory activities with respect to each such Product over the prior Calendar Year, and (ii) any planned future Development and regulatory activities, including those activities it anticipates to initiate or have initiated for the following Calendar Year; and (b) for any In-Vivo [***] Products, NVS will, on or before May 31st and December 30th of such Calendar Year, provide to HMI (through the JSC) for its review and discussion, [***] report summarizing (i) NVS' and its Affiliates' and Sublicensees' material Development and regulatory activities with respect to each In-Vivo [***] Product during the prior 6 month period; and (ii) any planned future Development and regulatory activities, including those activities it anticipates to initiate or have initiated during the following 6 month period (each of (a) and (b), a "**Development Report**").

Article 7. Regulatory Affairs.

7.1. **Regulatory Submissions**. From and after the Effective Date, NVS will[***] be responsible for (a) preparing, filing, and submitting, directly or through its Affiliates and permitted Sublicensees, all Regulatory Submissions for all Products in the Territory, and each material amendment or update thereto, in its name other than Jointly-Agreed Regulatory Submissions; and (b) interfacing, corresponding and meeting with Regulatory Authorities relating to Regulatory Submissions in the Territory for such Products; *provided*, that Regulatory Submissions and correspondence made to, and meetings held with, the FDA and EMA with respect to (i) [***] or (ii) [***] in each of (i) and (ii), will be prepared or conducted, as applicable, in collaboration with a representative from HMI's regulatory team in accordance with this Article 7 (Regulatory Affairs); *provided further* that in all cases, such rights shall expressly exclude and not apply with

respect to any data in Regulatory Submissions, correspondence, or meetings relating to any Other Components. Subject to Section 7.6 (Transfer of U.S. BLA for In-Vivo [***] Products), all Regulatory Approvals and Pricing Approvals for Products will be [***] owned by [***]. For all Products, NVS will timely inform HMI regarding the submission, receipt or denial of Regulatory Approval for such Product obtained or denied; *provided*, *however*, that NVS will inform HMI of such event prior to public disclosure of such event by NVS.

7.2. Collaboration With Respect to Regulatory Interactions.

7.2.1 **Correspondence**. The Parties' regulatory teams will collaborate with respect to substantive correspondence in support of (a) that portion of Jointly-Agreed Regulatory Submissions related to any In-Vivo [***] Product; and (b) that portion of Regulatory Submissions related to Manufacturing by HMI or its Designated CMO of Candidates and Products, in the case of each of ((a) and (b)), excluding any portion of such correspondence that contains any data or information relating to any Other Components. In addition, NVS will, in a timely manner, provide HMI with (i) copies of any material written correspondence submitted to or received from Regulatory Authorities with the FDA or EMA, and (ii) summaries of any material oral communications with the FDA or EMA, in each case of (i) and (ii), relating to Regulatory Submissions or Development of any In-Vivo [***] Product with the FDA or EMA, or Regulatory Submissions to the extent relating to the Manufacture of Products by or on behalf of HMI (including its Designated CMO), but excluding in all cases, any portion of such copies or summaries that contain any data or information relating to any Other Components.

7.2.2 **Responsibility**. Notwithstanding Section 7.1 (Regulatory Submissions) or Section 7.2.1 (Correspondence Related to In-Vivo [***] Products), NVS will be responsible for, and will have final decision-making authority on the content of, all Regulatory Submissions, communications, and other dealings with the Regulatory Authorities in the applicable countries in the Territory relating to Development of Candidates and Products other than Jointly-Agreed Regulatory Submissions; *provided* that NVS will consider [***] comments from HMI with respect to any Regulatory Submissions with the Regulatory Authorities to the extent related to the Manufacture of any Product by or on behalf of HMI (including its Designated CMO). The Parties will [***] agree on the content of each Jointly-Agreed Regulatory Submissions for In-Vivo [***] Products excluding any portion of any such submission that relates solely to any data or information relating to any Other Components. Any disagreement between the Parties' regulatory teams with respect to the contents of any such Jointly-Agreed Regulatory Submission that cannot be resolved after good faith efforts will, at the election of either Party, be submitted for resolution to each Party's head of regulatory affairs (each, a "**Regulatory Executive**"). If, after good faith efforts, the Regulatory Executives are unable to resolve any such disagreement within a period of [***], then, at the election of either Party, a Party may refer such matter to the Parties' respective Executive Officers for resolution in accordance with Section 17.1.1 (Escalation). If the Parties' Executive Officers are unable to reach agreement on the content of such Jointly-Agreed Regulatory Submission within a period of [***], then the Regulatory Responsible Party will have final decision-making authority with respect to the content of such Jointly-Agreed Regulatory Submission. At least [***] In-Vivo [***] Product, the Parties' regulatory teams will meet and agree on the strategy and procedures for reviewing, approving, and submitting Jointly-Agreed Regulatory Submissions for In-Vivo [***] Products. For clarity, any review, discussion, and approval rights with respect to Jointly-Agreed Regulatory Submissions shall exclude in all cases, such portions relating to any Other Components.

7.3. **Regulatory Meetings**. NVS will use good faith efforts to invite up to [***] representatives of HMI's regulatory team to attend and act as non-participating observers at any substantive meetings relating to (a) Regulatory Submissions for Development of In-Vivo [***] Products with the FDA or EMA (including the following meetings, to the extent held by NVS: [***], and (b) Regulatory Submissions with respect to Manufacturing by HMI or its Designated CMO of Candidates and Products, in the case of each of (a) and (b), to the extent (i) such meetings are scheduled in advance, (ii) HMI's attendance is not prohibited by Applicable Law or the FDA or EMA; and (iii) such meetings do not involve Other Components. In addition, (A) attendance by HMI representatives will not prevent participation of a NVS representative due to restrictions imposed by the FDA or EMA on the number of attendees; and (B) NVS will not be obligated to change the schedule of such meetings in order to accommodate the schedule of HMI's representatives. HMI will follow NVS' reasonable instructions with respect to any such meeting that it attends, and will not discuss the contents of any such meeting with any Third Party or Regulatory Authority except as required by Applicable Law or authorized by NVS in writing.

7.4. **Rights of Reference; Further Assurances**. NVS hereby grants to HMI a "Right of Reference," as that term is defined in 21 C.F.R. § 314.3(b) and any analogous law, rule, or regulation outside of the U.S., to the data included in any Regulatory Submissions for an In-Vivo [***] Product or a [***] Product in the Ex-Vivo Field that incorporates the same Candidate as the In-Vivo [***] Product to the extent necessary for HMI's Commercialization of such In-Vivo [***] Product in the U.S. HMI hereby grants to NVS a "Right of Reference," as that term is defined in 21 C.F.R. § 314.3(b) and any analogous law, rule, or regulation outside of the U.S., to any data included in any Regulatory Submission for an In-Vivo [***] Product in the U.S. to the extent necessary for NVS' Development, Manufacturing, or Commercialization of In-Vivo [***] Products outside of the U.S. or [***] Products in the Ex-Vivo Field incorporating the same Candidate as the In-Vivo [***] Product. The Party granting the right of reference under this Section 7.4 (Rights of Reference; Further Assurances) will execute and deliver, or will cause to be executed and delivered, to the non-granting Party such endorsements, assignments, and other documents as may be reasonably necessary to effect the foregoing right to reference. Such actions may include providing a signed statement that the non-granting Party may rely on, and that the Regulatory Authority may access, in support of the non-granting Party's application for Regulatory Approval or providing any underlying raw data or information submitted by the granting Party to the Regulatory Authority with respect to any Regulatory Submissions or Regulatory Approval Controlled by the granting Party or its Affiliates that relate to In-Vivo [***] Products, in each case, to the extent provided under this Section 7.4 (Rights of Reference; Further Assurances); *provided*, *further*, that in all cases, such right shall expressly exclude any data in Regulatory Submissions or Regulatory Approvals relating to any Other Components.

7.5. **Cooperation**. The Parties will cooperate with each other to achieve the regulatory objectives contemplated herein in a timely, accurate, and responsive manner, including using reasonable efforts to coordinate the regulatory strategy for In-Vivo [***] Products such that it is consistent with the overall objective of facilitating Regulatory Approvals of one or more In-Vivo [***] Products in the U.S. HMI will assist NVS as is reasonably necessary, in order for NVS to obtain and maintain each applicable Marketing Approval for each Product in the Territory, including in connection with the preparation, filing, and submission of all Regulatory Submissions by NVS and as reasonably requested in connection with (a) CMC data and the preparation and filing of Regulatory Submissions related to the Manufacture of the Candidates and Products in the Territory, or (b) any other activities conducted by or on behalf of HMI or its Affiliates under this

Agreement with respect to the Research and Preclinical Development of such Candidates and Products (including with respect to any AAV Candidate Design for a Candidate or Product), including in the case of each of (a) and (b), providing any expert testimony in support thereof with Regulatory Authorities to the extent required in connection with such Regulatory Submissions. Without limiting the generality of the foregoing, if requested by a Regulatory Authority in the Territory in connection with the receipt of any Regulatory Approval for a Product, or if reasonably requested by NVS in connection with any Regulatory Submission for a Product, HMI will communicate with, and provide any available information in HMI's Control regarding the HMI Platform Know-How and HMI Platform Patent Rights to the applicable Regulatory Authority as necessary to obtain Regulatory Approval for such Product from the applicable Regulatory Authority.

7.6. Transfer of U.S. BLA for In-Vivo [***] **Products**.

7.6.1 **U.S. BLA for In-Vivo** [***] **Products**. In advance of the anticipated date of receipt of Regulatory Approval for an In-Vivo [***] Product from the FDA in the U.S., the Parties' regulatory teams will meet and agree on process for timely transferring over the BLA for the U.S. [***] Product following receipt of such BLA from FDA along with the necessary dossier for such Product to allow for the prompt Commercialization of such U.S. [***] Product. As soon as reasonably practicable following the date of receipt of Regulatory Approval for an In-Vivo [***] Product from the FDA in the U.S. and in accordance with the mutually agreed timetable for such transfer, which, in any event will be no later than [***] days following the date of receipt of Regulatory Approval for such In-Vivo [***] Product from the FDA in the U.S., NVS will submit a letter or other document informing the FDA that all rights to the BLA filed for such In-Vivo [***] Product have been transferred to HMI (the date of such transfer of the BLA, the "**U.S. BLA Transfer Date**"). NVS will transfer to HMI copies (in electronic or other format) of such BLA and any other Regulatory Submissions owned or Controlled by NVS or its Affiliates as of the U.S. BLA Transfer Date to the extent not already in HMI's or its Affiliates possession that are exclusively related to In-Vivo [***] Products in the U.S., excluding any such data relating to any Other Components (the "**Assigned Regulatory Submissions**") in accordance with the timeline mutually agreed upon by the Parties.

7.6.2 **Ex-Vivo Related Regulatory Submissions**. To the extent that any portion of any Regulatory Submissions Controlled by NVS as of the U.S. BLA Transfer Date relating to the Development, Manufacture, or Commercialization of [***] Products in the Ex-Vivo Field that incorporate the same Candidate as that in the U.S. [***] Product are necessary for the Commercialization of such U.S. [***] Product, then, after the U.S. BLA Transfer Date, upon HMI's reasonable request and at HMI's expense, but subject to Applicable Law, NVS will provide copies of such portions of such material to HMI (excluding any data in such Regulatory Submissions relating to any Other Components).

7.6.3 **Further Assurances**. HMI will bear all Third Party expenses in connection with the transfer and assignment of all Assigned Regulatory Submissions, and any other copies of Regulatory Submissions provided to HMI pursuant to this Article 7 (Regulatory Affairs). Subject to the terms and conditions of this Agreement, upon HMI's written reasonable request, NVS will execute and deliver, or will cause to be executed and delivered, to HMI such endorsements, assignments and other documents as may be reasonably necessary to assign, convey, transfer, and deliver

to HMI all of NVS' rights, title, and interests in and to the Assigned Regulatory Submissions, including submitting to the FDA a letter or other necessary documentation (with copy to HMI) notifying the FDA of the transfer of ownership of each Assigned Regulatory Submission assigned to HMI pursuant to Section 7.6.1 (U.S. BLA for In-Vivo [***] Products).

7.7. **Pharmacovigilance Agreement**. The Parties will cooperate with regard to the reporting and handling of safety information, including Adverse Events, involving In-Vivo [***] Products in accordance with Applicable Law on pharmacovigilance and clinical safety. Following the Effective Date but prior to the U.S. BLA Transfer Date and within such time to ensure that all regulatory requirements are met, the Parties will negotiate in good faith and execute a pharmacovigilance agreement on reasonable terms that will define the pharmacovigilance responsibilities of the Parties and safety data exchange procedures between the Parties to enable each Party to comply with all of its respective legal and regulatory obligations relating to In-Vivo [***] Products, including safety data exchange procedures for information relating to (a) [***] Products in the Ex-Vivo Field that incorporate the same Candidate as the In-Vivo [***] Product and (b) other Products manufactured using the HMI Platform Technology, to the extent reasonably likely to impact the safety of any Product (the "**Pharmacovigilance Agreement**"); it being understood that NVS will take the lead for safety and hold the global safety database on behalf of both Parties for each In-Vivo [***] Product while such Product is being Developed.

7.8. **Clinical Trial Holds; Recalls**.

7.8.1 **Clinical Trial Holds**. NVS will timely inform HMI in the event that any Clinical Trial for an In-Vivo [***] Product is suspended, put on hold, or terminated in its respective Territory prior to completion as a result of any action by a Regulatory Authority or by NVS voluntarily.

7.8.2 **Recalls**. Each Party will timely notify the other Party upon its determination that any event, incident, or circumstance has occurred that may result in the need for a recall, market withdrawal, or stock recovery of any In-Vivo [***] Product in accordance with the timelines agreed to in the applicable supply agreement or Quality Agreement. For all recalls of In-Vivo [***] Products, the Parties will reasonably consult with each other with respect to the actions to be taken to address such recall, market withdrawal, or stock recovery, [***], and [***]. Subject to the foregoing, and the terms set forth in any manufacturing, supply, quality, or pharmacovigilance agreement (including the Pharmacovigilance Agreement) between the Parties, (a) for all recalls, market withdrawals, and stock recoveries that are taken in the U.S. with respect to any In-Vivo [***] Product, so long as HMI is the Commercializing Party for such In-Vivo [***] Product in the U.S., HMI will be responsible for execution at its cost and expense, and NVS will take such actions as reasonably requested by HMI at HMI's cost in connection therewith and otherwise reasonably cooperate in all such efforts, and (b) for all other recalls, market withdrawals, and stock recoveries with respect to any In-Vivo [***] Product, NVS will be responsible for execution at its cost and expense, and HMI will take such actions as reasonably requested by NVS in connection therewith and otherwise reasonably cooperate in all such efforts at NVS' cost. All [***] incurred by the Commercializing Party in connection with any recall, market withdrawal, or stock recovery for any In-Vivo [***] Product in the U.S. (including expenses for notification, destruction, and return of the affected In-Vivo [***] Product and any refund to customers of amounts paid for such In-Vivo [***] Product) will be a [***].

Article 8. Manufacturing and Technology Transfer

8.1. Manufacturing Responsibilities.

8.1.1 **HMI Responsibilities**. Subject to the oversight of the JSC or JMC, as applicable, HMI will be responsible for Manufacturing: (a) Candidates for each Target for Research Activities in accordance with the applicable Target Research Plan; and (b) subject to Sections 8.1.3 (Objective Criteria) and 8.6.1 (Manufacturing Related Rights), Candidates and Products in accordance with the Development Supply Agreement(s), Commercial Supply Agreement(s), and applicable Quality Agreements, as applicable. For clarity, with respect to any Products in the Ex-Vivo Field, HMI's responsibility for Manufacturing such Products will be limited to Manufacturing of the applicable Candidate for such Product.

8.1.2 **Transfer of HMI Manufacturing Responsibilities**.

(a) As part of the Parties' negotiations of each of the Development Supply Agreement(s), Development Quality Assurance Agreement(s), Commercial Supply Agreement(s), or Commercial Quality Assurance Agreement(s), as applicable to a Candidate or Product, if [***] determines, based on those criteria set out in Section 8.1.3 below (Objective Criteria), that [***] (i) [***] or (ii) [***], then (A) subject to Section 8.1.3 (Objective Criteria) and the JMC's approval or the Executive Officer's agreement (or, in the event of any disagreement by the JMC and the Executive Officers as to whether the Objective Criteria have been met, the determination by the arbitrators that such Objective Criteria have not been met in accordance with Section 8.1.4 (Dispute Resolution)), HMI will contract with and transfer Manufacturing for such Candidate or Product to that Designated CMO agreed upon by the Parties; and (B) [***]. In HMI's agreement with each applicable Designated CMO, HMI shall ensure that (1) NVS has the same rights in respect of the Designated CMO that NVS has under Section 8.6.1 (Manufacturing Related Rights), (2) NVS is a Third Party beneficiary to all such agreements with the right to enforce provisions contained therein, and (3) NVS is permitted to order such Candidate or Product directly from the Designated CMO pursuant to the terms of such HMI-Designated CMO agreement.

(b) In the event that NVS reasonably determines, based on those criteria set out in Section 8.1.3 (Objective Criteria) below, that the available Designated CMOs are unable to Manufacture or supply such Candidate or Product (i) [***] or (ii) [***], then (A) the NVS Manufacturing Date shall be deemed to occur with respect to such Candidate or Product; and (B) NVS shall be entitled to Manufacture such Candidate or Product, as applicable, itself. Notwithstanding NVS' right to Manufacture Candidates and Products itself commencing on the NVS Manufacturing Date, NVS shall also be entitled, where the Parties have agreed that a Designated CMO is capable of Manufacturing or supplying such Candidate or Product and such Designated CMO becomes able to Manufacture or supply such Candidate or Product (1) [***] or (2) [***] to have such Candidate and Product Manufactured by such alternative Designated CMO.

8.1.3 **Objective Criteria**. As part of the Parties' negotiations of the Development Supply Agreement, Development Quality Assurance Agreement, Commercial Supply Agreement, or Commercial Quality Assurance Agreement, as applicable to such Candidate or Product, the Parties will jointly define a set of criteria that will be used to determine whether HMI or the applicable Designated CMO is able to Manufacture or supply such Candidate or Product (i) [***] or (ii) [***] (the "**Objective Criteria**"), which Objective Criteria will include the following listed criteria (as applicable, based on the phase of Development or Commercialization of such Candidate or Product):

(a) whether HMI or the Designated CMO has [***] to Manufacture such Candidate or Product so as to meet: (i) [***]; (ii) [***]; and (iii) [***];

(b) whether HMI or the Designated CMO has [***] to Manufacture such Candidate or Product so that they will be [***] in materials, ingredients, workmanship, appearance and finish;

(c) whether HMI or the Designated CMO has [***] to Manufacture such Candidate or Product in accordance with all applicable authorizations;

(d) whether the Manufacturing site (i) has (or is capable of obtaining [***]) all permits, licenses, equipment, approvals, and other authorizations that are required under Applicable Law relating to the performance of Manufacturing and the provision of such Candidate and Product; (ii) has received (or is capable of obtaining [***]) approval to Manufacture Candidates and Products by the applicable Regulatory Authorities; and (iii) has been subject to any warning letters or other regulatory actions; and

(e) whether HMI or the Designated CMOs have [***] to supply, and the quantities to be Manufactured and supplied are likely to be capable of meeting [***] requirements.

8.1.4 **Dispute Resolution**.

(a) If the Parties are unable to agree upon the terms of any Development Supply Agreement, Development Quality Assurance Agreement, Commercial Supply Agreement, or Commercial Quality Assurance Agreement, as applicable, then neither Party will be obligated to enter into any such agreement with respect to which the Parties fail to reach agreement and HMI will not be obligated to Manufacture Candidates and Products under the Development Supply Agreement (if the Parties fail to reach agreement on the terms of the Development Supply Agreement or the Development Quality Assurance Agreement) or the Commercial Supply Agreement (if the Parties fail to reach agreement on the terms of the Commercial Supply Agreement or the Commercial Quality Assurance Agreement), as applicable, until the Parties reach agreement on the terms of the applicable agreements.

(b) Any dispute between the Parties as to whether the Objective Criteria have been met shall first be discussed by the representatives of HMI and NVS at the JMC, and if the JMC, after the use of good faith efforts, is unable to agree on or resolve such disputed terms within a period of [***] after discussing such issue (or such longer period as the JMC may agree), then the Parties shall submit the issue(s) in dispute to each Party's respective Executive Officer. If the Executive

Officers are unable to agree on or resolve such issue within a period of [***] after discussing such issue, then the Parties shall submit the issues for Arbitration in accordance with Section 17.1.2 (Full Arbitration); *provided*, that the arbitrators selected will have the technical expertise, experience, and capability to impartially resolve disputes with respect to AAV manufacturing and supply and quality matters, including whether the Manufacture or supply of such Candidates and Products provided hereunder meet the Objective Criteria.

8.2. **Manufacturing Costs**. During the period that HMI is responsible for Manufacturing any Candidate or Product, NVS will be responsible for the documented Manufacturing Costs actually incurred by HMI directly in connection with the Manufacture and supply of such Candidate and Product in accordance with the Research Plans, Development Supply Agreement(s), and Commercial Supply Agreement(s), as applicable; *provided*, *further*, that: (a) Manufacturing Costs for Candidates shall (i) continue until the end of [***], (ii) be set forth in the applicable JSC approved Research Budget, and (iii) be subject to the [***]; (b) Candidates and Products Manufactured and supplied pursuant to the applicable Development Supply Agreement shall be supplied to NVS at a transfer price equal to [***]; and (c) Candidates and Products Manufactured for Pivotal Clinical Trials and Commercialization activities and supplied pursuant to the Commercial Supply Agreement shall be supplied to NVS at a transfer price equal to [***].

8.3. **Development Supply Agreement**. At such time as directed by the JMC following identification of any Candidates and Products and subject to the oversight of the JMC, the Parties will negotiate in good faith a definitive supply agreement for HMI to Manufacture and supply Candidates and Products to NVS for use in conducting Preclinical Development and Clinical Development of such Candidates and Products until the completion of the Phase I/II Clinical Trial for Candidates and Products that Modulate such Target in accordance with this Agreement ("**Development Supply Agreement(s)**") along with the associated Development Quality Assurance Agreement (which Development Quality Assurance Agreement will contain terms related to HMI's rights and obligations as the Manufacturer of such Product(s) as well as terms related to NVS' rights and obligations as the Regulatory Responsible Party for such Product(s), including each Party's respective review, comment, and approval rights thereunder). The Development Supply Agreement and the Development Quality Assurance Agreement will provide for customary terms and conditions, including quality requirements, those provisions required under Sections 8.1.3 (Objective Criteria) and 8.6.1 (Manufacturing Related Rights), forecasting, ordering, delivery, technical criteria to be met, payment, and supply, in accordance with the terms of this Agreement.

8.4. **Commercial Supply Agreement**. Provided that HMI is still Manufacturing Candidates and Products under the applicable Development Supply Agreement and Development Quality Assurance Agreement, at such time as directed by the JMC prior to the Initiation of the first Pivotal Clinical Trial for such Target, the Parties will negotiate in good faith the terms of a new supply agreement for Candidates and Products ("**Commercial Supply Agreement(s)**"), along with the associated Commercial Quality Assurance Agreement(s) to cover supply of Candidates and Products for the Pivotal Clinical Trial, Product launch, and NVS' Commercialization requirements (which Commercial Quality Assurance Agreement will contain terms related to HMI's rights and obligations as the Manufacturer of such Product(s) as well as terms related to NVS' rights and obligations as the Regulatory Responsible Party for such Product(s), including each Party's respective review, comment, and approval rights thereunder). The Commercial Supply Agreement and Commercial Quality Assurance Agreement will provide for customary terms and conditions, including quality requirements, those provisions required under Sections 8.1.3 (Objective Criteria) and 8.6.1 (Manufacturing Related Rights), forecasting, ordering, delivery, technical requirements and criteria to be met, payment, and supply and will be consistent with the terms of this Agreement, [***].

8.5. **In-Vivo** [***] **Commercial Supply Agreement**. If (a) NVS is Manufacturing such In-Vivo [***] Product for use outside the U.S. and (b) no Designated CMO is, at such time, able to (or within a timely manner would be capable of) Manufacture and supply such In-Vivo [***] Products, then at HMI's request and at the appropriate time directed by the JMC, the Parties will negotiate in good faith a definitive supply agreement for NVS to supply to HMI In-Vivo [***] Products for Commercialization in the U.S. in accordance with this Agreement ("**In-Vivo** [***] **Commercial Supply Agreement**") along with a quality assurance agreement covering quality related obligations of such supply ("**In-Vivo** [***] **Quality Assurance Agreement**") (which In-Vivo [***] Quality Assurance Agreement will contain terms related to NVS' rights and obligations as the Manufacturer of such In-Vivo [***] Product as well as terms related to each Party's rights and obligations as the Regulatory Responsible Party for such In-Vivo [***] Product, including each Party's respective review, comment, and approval rights thereunder). The In-Vivo [***] Commercial Supply Agreement and In-Vivo [***] Quality Assurance Agreement will provide for customary terms and conditions, including forecasting, ordering, delivery, manufacturing costs, termination at will rights for both Parties with reasonable advance notice periods, reasonable volume caps with a mechanism to address adjustments to such cap over time, technical criteria to be met, payment, and supply, and will be consistent with the terms of this Agreement. The transfer price paid by HMI for In-Vivo [***] Products under the In-Vivo [***] Commercial Supply Agreement shall be equal to [***]. If the Parties are unable to agree upon the terms of the In-Vivo [***] Commercial Supply Agreement, then neither Party will be obligated to enter into such agreement, and NVS will not be obligated to Manufacture In-Vivo [***] Products under the In-Vivo [***] Commercial Supply Agreement until the Parties reach agreement on the terms of such agreement.

8.6. **Manufacturing Know-How Transfer and Technology Transfer**.

8.6.1 **Manufacturing Related Rights**. Commencing upon NVS' commencement of Preclinical Development of a Candidate or Product, HMI will grant, or in the case of any Designated CMO, shall procure the granting, to the NVS CMC Sub-Team or NVS Audit Team, as applicable, the rights below for the purposes of enabling NVS to comply fully with its regulatory and quality obligations in relation to such Candidate or Product Manufactured by HMI or a Designated CMO, including the release of such Candidate and Product:

(a) access to all information relating to HMI Manufacturing Know-How with respect to such Candidate and Product, including the Manufacturing process for such Candidate or Product and access to CMC data for such Candidates and Products (*i.e.*, cell line history, vector sequences, media composition, summary of animal derived material used during the course of technical Research and Development, details about Manufacturing process and analytical methods applied or under Development, etc.);

(b) a right (either itself or through an authorized representative), pursuant to the audit right provided under Section 8.7 below (Audit and Inspection), to inspect and audit any facility in which such Candidate or Product is Manufactured with advance reasonable notice, which inspection or audit shall not occur more than once per Calendar Year per Manufacturing facility, subject to any for-cause audits or any follow-up audit required to ensure compliance with prior audit findings;

(c) a right to approve any Designated CMO used by HMI for the Manufacture of such Candidate or Product;

(d) a right to access records regarding the selection and engagement of any Third Party supplier of any materials, components, excipients, or processing aids necessary for the Manufacture of such Candidate or Product, including traceability requirements to ensure compliance under pedigree requirements; and

(e) access to any other relevant information or materials [***] to satisfy its regulatory or other quality related obligations with respect to such Candidate or Product, including access to and inspection and audit rights for any Third Party subcontractors or suppliers, each as mutually agreed upon in the applicable Development Supply Agreement, Commercial Supply Agreement, or Quality Agreement.

Thereafter, on a continuing basis during the Term, HMI shall [***], and at a minimum no less frequently than on a [***] basis, disclose to the NVS CMC Sub-Team all additional HMI Product Know-How relating to such Candidate or Product that comes into existence from time to time. Subject to Section 13.1.3 (Exceptions to Confidentiality), the NVS CMC Sub-Team and NVS Audit Team will not disclose any HMI Manufacturing Know-How to other personnel of NVS or its Affiliates; *provided*, that the foregoing shall not apply to any [***] of NVS or its Affiliates where the information received is of a general nature regarding the progress of the Development, Manufacturing, or Commercialization activities of any Candidate or Product and does not disclose specific technical information contained within such HMI Manufacturing Know-How. HMI will provide reasonable assistance to NVS, at NVS' expense, in connection with understanding and using all such HMI Product Know-How to Manufacture Candidates and Products in accordance with the licenses and rights granted to NVS pursuant to this Agreement.

8.6.2 **Manufacturing Technology Transfer to NVS**. On or after the NVS Manufacturing Date, HMI will make available to NVS all additional HMI Know-How [***] to enable NVS or its Affiliates to Manufacture the applicable Candidate and Product that NVS has the right to Manufacture pursuant to this Agreement (the "**HMI Manufacturing Know-How**"), including by providing copies or samples of relevant documentation, HMI Materials, and other embodiments of such HMI Manufacturing Know-How. Without limiting the foregoing, the transfer shall include (a) transferring copies of technical documentation, specifications, patents and procedures, and tangible embodiments of the HMI Manufacturing Know-How; (b) providing access to a sufficient number of qualified scientists, production and quality assurance personnel and engineers, as well as quality control personnel; (c) allowing reasonable access to the Manufacturing sites, Designated CMO's and Affiliates involved in the Manufacture and Development of the applicable Candidates and Products; and (d) any other support or training reasonably requested by NVS to facilitate such transfer. Any HMI Materials provided by HMI in connection with the transfer of the HMI Manufacturing Know-How will remain the sole property of HMI. NVS will (i) use such HMI Materials only in the fulfillment of obligations or exercise of rights under this Agreement, and (ii) not use such HMI Manufacturing Know-How or HMI Materials or deliver the same to any Third Party, other than Designated CMOs or Third Party sub-contractors or permitted

Sublicensees used in connection with Manufacturing, without HMI's prior written consent, not to be unreasonably withheld, conditioned, or delayed. Each Party will bear its own Internal Costs in connection with such transfer support, *provided* that NVS will reimburse HMI those actual documented and agreed upon Internal Costs incurred by HMI in connection with any HMI Manufacturing Know-How transfer support requested by NVS that exceed the number of hours of transfer support approved by the JMC. NVS will be responsible for any reasonable documented Third Party expenses incurred by either Party in connection with the requested HMI Manufacturing Know-How transfer. HMI will invoice NVS for its Internal Costs incurred under this Section 8.6.2 (Manufacturing Technology Transfer to NVS), which Internal Costs NVS is responsible for paying no later than [***] after the conclusion of each Calendar Quarter, and NVS will pay to HMI the undisputed amount set forth in such invoice within [***] of NVS' receipt of such invoice.

8.7. **Audit and Inspection**. Where HMI is Manufacturing, HMI grants NVS, and where a Designated CMO is Manufacturing, HMI will secure for NVS the right, upon execution of the Designated CMO's standard site visit confidentiality agreement and other customary protections to protect the confidentiality of any visible Third Party confidential information, in each case, at reasonable times (but not to exceed [***] audit per site per Calendar Year except with respect to any for-cause audits or any follow-up audit required to ensure compliance with prior audit findings), with reasonable prior written notice, and for a reasonable period of time, to inspect HMI's or such Designated CMO's production facilities to (a) perform a pre-qualification audit, (b) confirm HMI's or such Designated CMO's or such Third Party's compliance with cGMP, NVS Quality Requirements, the applicable specifications, and Applicable Law, and (c) review relevant Manufacturing records with respect to Candidates and Products, in each case, in accordance with the Development Quality Assurance Agreement or Commercial Quality Assurance Agreement, as applicable. Unless otherwise agreed by the Parties, NVS will have the right to have up to [***] NVS representatives of the NVS Audit Team at any such audit or inspection and any such audit must take place in the presence of HMI personnel. If NVS observes a condition [***] that any Candidates or Products are not being Manufactured in accordance with cGMP, NVS Quality Requirements, or the applicable specifications or Applicable Law, then the Parties will discuss and agree on any appropriate corrective actions to address such non-compliance, and HMI will and will cause the Designated CMO to implement any such corrective action, in each case, in accordance with the Development Quality Assurance Agreement or Commercial Quality Assurance Agreement, as applicable. If any Regulatory Authority or any other Governmental Authority conducts or gives notice of its intent to conduct any audit or inspection at any offices or facilities (including Manufacturing facilities) of HMI or any Designated CMO where such audit or inspection relates to any Candidates or Products, then HMI will [***] give notice thereof to NVS and, to the extent such audit or inspection relates to a Candidate or Product and to the extent practicable and not prohibited by Applicable Law, secure for NVS through the NVS CMC Sub-Team or the NVS Audit Team, in NVS' discretion, the right to participate in any such audit or inspection. HMI shall ensure that all such rights set forth in this Section 8.7 (Audit and Inspection) apply to those Third Party subcontractors and suppliers as agreed upon by the Parties in the applicable Development Quality Assurance Agreement or Commercial Quality Assurance Agreement.

8.8. **Additional Obligations**. Product sold in the United States will be manufactured substantially in the United States to the extent required by 35 U.S.C. §§ 200-212 with respect to HMI Patent Rights licensed to HMI by any Third Party licensors.

Article 9. Medical Affairs

9.1. **Medical Affairs Plans**. NVS will prepare a reasonably detailed, annual plan for global Medical Affairs with respect to In-Vivo [***] Products (the "**Global Medical Affairs Plan**"), and HMI will prepare a reasonably detailed, annual plan for Medical Affairs with respect to In-Vivo [***] Products in the U.S. (the "**U.S. Medical Affairs Plan**"), in each case, no later than [***] for an In-Vivo [***] Product. The strategic objectives in the U.S. Medical Affairs Plan will be consistent with the strategic objectives in the Global Medical Affairs Plan, unless otherwise agreed by the Parties. In order to ensure consistency between the Global Medical Affairs Plan and the U.S. Medical Affairs Plan and coordination and alignment between the Parties with respect to the Medical Affairs to be conducted by NVS with respect to In-Vivo [***] Products pursuant to the Global Medical Affairs Plan and by HMI with respect to U.S. [***] Products pursuant to the U.S. Medical Affairs Plan (including with respect to each Party's communications with key opinion leaders in the Territory), the Global Medical Affairs Plan and the U.S. Medical Affairs Plan, and any material amendments or updates thereto will be reviewed and discussed by the JSC, with the first such review and discussion occurring no later than [***] for an In-Vivo [***] Product. Any subsequent review and discussion, to the extent required, will occur annually thereafter at an appropriate time as agreed by the JSC, or more frequently as may be required during the Term.

9.2. **Medical Affairs Activities**. HMI will be responsible for Medical Affairs with respect to In-Vivo [***] Products in the U.S., and will conduct such activities in accordance with the U.S. Medical Affairs Plan; and NVS will be responsible for Medical Affairs with respect to In-Vivo [***] Products outside of the U.S., and will conduct such activities in accordance with the Global Medical Affairs Plan. NVS will also be responsible for Medical Affairs with respect to all NVS Products throughout the Territory. Each Party will (a) conduct all Medical Affairs in a professional and ethical business manner and in compliance with Applicable Law and applicable Professional Requirements; (b) provide the other Party with reasonable cooperation, support, and assistance with respect to preparing such Party's Medical Affairs plan, and conducting activities under each such plan, in order to coordinate Medical Affairs with respect to In-Vivo [***] Products throughout the Territory, at the requesting Party's cost and expense; and (c) provide updates (through the JSC) summarizing its Medical Affairs with respect to In-Vivo [***] Products and progress under the Global Medical Affairs Plan (with respect to NVS) and the U.S. Medical Affairs Plan (with respect to HMI) during the period since the last JSC meeting.

Article 10. Commercialization

10.1. **Commercialization Responsibilities**.

10.1.1 **Of NVS**. During the Term, subject to Article 8 (Manufacturing and Technology Transfer), NVS will be solely responsible, at its cost and expense, for Commercializing all NVS Products in the Territory (including booking all sales for such products).

10.1.2 **Of HMI**. During the Term, so long as HMI is the Commercializing Party for the U.S. [***] Products and subject to Article 8 (Manufacturing and Technology Transfer), HMI will be solely responsible, at its cost and expense, for Commercializing all In-Vivo [***] Products in the U.S. (including booking all sales for such In-Vivo [***] Products in the U.S.).

10.2. Commercialization Diligence Obligations.

10.2.1 **Of NVS**. During the Term, subject to Article 8 (Manufacturing and Technology Transfer), NVS will [***] Commercialize each NVS Product in the Territory for which Marketing Approval has been obtained.

10.2.2 **Of HMI**. During the Term, so long as HMI is the Commercializing Party for the U.S. [***] Product and subject to Article 8 (Manufacturing and Technology Transfer), HMI will [***] Commercialize each In-Vivo [***] Product in the U.S. following the receipt of Marketing Approval from the FDA in the U.S. for such In-Vivo [***] Product.

10.3. Commercialization Plans.

10.3.1 **In-Vivo** [***] **Commercialization Plans**. Subject to Applicable Law, NVS will prepare and provide to HMI (through the JSC): (a) an initial high-level summary of the anticipated Commercialization strategy and activities to be conducted for an In-Vivo [***] Product; and (b) an associated budget, no later than [***] for such In-Vivo [***] Product. In addition, NVS will prepare and provide to the JSC a Commercialization plan for each In-Vivo [***] Product that contemplates the commercial launch of, and the Commercialization activities to be taken in the first [***] after the First Commercial Sale of, such In-Vivo [***] Product in the Territory excluding the U.S. if HMI is the Commercializing Party and including the U.S. if NVS is the Commercializing Party (the "**Global In-Vivo** [***] **Commercialization Plan**"). If HMI is the Commercializing Party, then HMI will prepare and provide to the JSC a Commercialization plan for each In-Vivo [***] Product that contemplates the commercial launch of, and the Commercialization activities to be taken in the first [***] after the First Commercial Sale of, such In-Vivo [***] Product in the U.S. (the "**U.S. In-Vivo** [***] **Commercialization Plan**"). If HMI is the Commercializing Party, then each Party will provide the applicable Commercialization plan to the other Party no later than [***] such In-Vivo [***] Product in such Party's territory. Subject to Applicable Law, (i) the strategic objectives and activities in the U.S. In-Vivo [***] Commercialization Plan will be consistent with the strategic objectives and activities in the Global In-Vivo [***] Commercialization Plan, unless otherwise agreed by the Parties; and (ii) the Global In-Vivo [***] Commercialization Plan and the U.S. In-Vivo [***] Commercialization Plan will each be reviewed, discussed, and approved by the JSC. Thereafter, at least once each [***], NVS will submit an updated Global In-Vivo [***] Commercialization Plan for each In-Vivo [***] Product, and HMI will submit an updated U.S. In-Vivo [***] Commercialization Plan, in each case, to the JSC for review, discussion, and approval.

10.3.2 **In-Vivo** [***] **Commercialization Activities**. Each Party will provide the other Party with reasonable cooperation, support, and assistance requested by the other Party, at the requesting Party's expense, with respect to preparing such Party's Commercialization plan for In-Vivo [***] Products in order to coordinate Commercialization with respect to such In-Vivo [***] Products throughout the Territory; *provided*, that any such cooperation, support, and assistance shall be limited to that permitted under Applicable Law.

10.4. Reimbursement. The Commercializing Party will be responsible for, and will have sole authority and the final decision-making right with respect to, any payor and pricing studies related to obtaining and maintaining Pricing Approval in each country in its respective Territory (where required), and all submissions, communications, meetings, and other dealings with

Governmental Authorities, payors, and other Third Parties relating to pricing and reimbursement of In-Vivo [***] Products in such Commercializing Party's territory. Notwithstanding the foregoing, in the U.S., upon the non-Commercializing Party's reasonable request, the Commercializing Party will allow a representative from the non-Commercializing Party to attend meetings with such Governmental Authorities, payors, and other Third Parties relating to pricing and reimbursement of In-Vivo [***] Products in the U.S. (unless prohibited by Applicable Law, or the applicable Governmental Authorities, payors, or other Third Party and excluding in all cases, that portion involving communications involving Other Components). In addition, so long as HMI is the Commercializing Party for In-Vivo [***] Products in the U.S. and there has not been an HMI Change of Control, upon HMI's request, NVS will consent to allow a representative from HMI to attend meetings with Governmental Authorities, payors, and other Third Parties relating to pricing and reimbursement for In-Vivo [***] Products in Canada and the EU, such NVS consent not to be unreasonably withheld, conditioned, or delayed (unless prohibited by Applicable Law, or the applicable Governmental Authorities, payors, or other Third Party and excluding in all cases, that portion involving communications involving Other Components). If a non-Commercializing Party is not allowed to attend any such meeting in the U.S., then the Commercializing Party will provide the other Party with an update summarizing such meeting reasonably promptly after such meeting. Upon either Party's reasonable request, but subject to local anti-competition laws and any obligations of confidentiality between a Party and any Third Party, the Parties will share key market research and relevant sections of national reimbursement dossiers (or their equivalent) for In-Vivo [***] Products, as well as other relevant Commercialization information as may be agreed by the Parties.

10.5. Commercialization Reporting.

10.5.1 **NVS Obligations**. On or before May 31st and December 30th of each Calendar Year in which NVS conducts any Commercialization activities for any NVS Product, NVS will provide to the JSC for its review and discussion a summary of the material Commercialization activities it has, or its Affiliates or Sublicensees have, performed, or caused to be performed, since the preceding report, and the future activities it expects to initiate with respect to any NVS Product for the following [***].

10.5.2 **HMI Obligations**. On or before May 31st and December 30th of each Calendar Year in which HMI conducts any Commercialization activities for any In-Vivo [***] Product in the U.S., HMI will provide to the JSC for its review and discussion a summary of the material Commercialization activities it has, or its Affiliates have, performed since the preceding report, and the future activities it expects to initiate with respect to any In-Vivo [***] Product in the U.S. for the following [***].

10.6. Global Brand Plan and Promotional Materials for In-Vivo[***]**Products**. No later than [***] months [***] the first In-Vivo [***] Product, NVS will submit to the JSC for review and discussion a global brand plan, which plan will include the global key positioning and global messaging strategy for such In-Vivo [***] Product (the "**Global Brand Plan**"). NVS may amend or update the Global Brand Plan from time-to-time and will submit material amendments and updates to the JSC for review and discussion. All promotional materials for any In-Vivo [***] Product used by HMI or its Affiliates in the U.S. must be consistent with the Global Brand Plan, unless the JSC develops and approves a Territory-specific brand strategy for such In-Vivo [***] Product in the U.S., including any positioning or key messaging for such In-Vivo [***] Product in the U.S. that is inconsistent with the Global Brand Plan. With respect to any such Territory-specific brand strategy that is either approved by the JSC or HMI or NVS, as applicable, pursuant to Section 5.6.3 (Escalation), in each case, HMI will implement such Territory-specific brand

strategy in lieu of the applicable strategy under the Global Brand Plan for In-Vivo [***] Products in the U.S. If HMI seeks to use any promotional materials for any In-Vivo [***] Product that have content or messaging that is inconsistent with the Global Brand Plan or any Territory-specific brand strategy, then, in each case, HMI will obtain NVS' prior written approval with respect to such materials prior to HMI's use thereof. Upon NVS' reasonable request, HMI will provide samples of HMI's promotional materials for the U.S. for NVS' review to determine consistency with the Global Brand Plan or any Territory-specific brand strategy, and other content or format approved by NVS. Upon HMI's reasonable request, NVS will provide to HMI samples of NVS' core promotional materials for In-Vivo [***] Products outside the U.S.

10.7. Trademarks and International Nonproprietary Name.

10.7.1 **NVS Product Trademarks**. NVS will have the right, in its sole discretion, to select all Trademarks to be used in connection with each NVS Product to be sold by NVS, and to design and produce any and all promotional materials for each such NVS Product, including package inserts, data sheets, leaflets, advertisements, and labeling. HMI will have the right to use any Product Trademarks selected by NVS on HMI's websites and corporate communications for the purpose of promoting HMI's association with NVS under this Agreement with NVS' prior written consent, not to be unreasonably withheld, conditioned, or delayed and in accordance with any Trademark usage guidelines provided by NVS.

10.7.2 **Trademarks for In-Vivo** [***] **Products**. NVS, in collaboration with HMI, will select, and submit to the JSC for its review and discussion, the global brand name for each In-Vivo [***] Product and the applicable Trademarks for use in the Territory. HMI will Commercialize each In-Vivo [***] Product in the U.S. under the Global Trademarks using the global brand name for such In-Vivo [***] Product selected by NVS in the Global Brand Plan and under the trade dress set forth in the Global Brand Plan, unless HMI reasonably believes that the use or registration of any Global Trademark in the U.S. (a) would be inappropriate due to the linguistic or cultural particularities in the U.S. or would violate Applicable Law in the U.S., (b) is reasonably likely to be rejected by the FDA, or (c) is in conflict with any Third Party's Intellectual Property Rights in the U.S. If HMI is unable to use any Global Trademark for any of the foregoing reasons ((a) through (c)), then HMI will use one of the alternative Trademarks (which Trademarks will include trademarks and trade dress) for In-Vivo [***] Products in the U.S. selected by NVS in the Global Brand Plan, or if such alternative Trademarks are unacceptable for the reasons set forth in the preceding sentence, then HMI will use other Trademarks (including trademarks and trade dress) to be agreed upon by HMI and NVS (the "**Local Trademarks**"). HMI will own all such Local Trademarks, including all trademark registrations and applications therefor and all goodwill associated therewith. Once the brand name for an In-Vivo [***] Product has been selected for a country in the Territory pursuant to this Section 10.7.2 (Trademarks for In-Vivo [***] Products), NVS will be responsible for obtaining Regulatory Approval of such brand name for use in the Commercialization of such In-Vivo [***] Product in the U.S. HMI will Commercialize In-Vivo [***] Products in the U.S. only under the applicable Product Trademarks for such In-Vivo [***] Product and HMI's Housemarks, and no other Trademarks (*provided*, that NVS Housemarks may be included with NVS' prior written consent).

10.7.3 **Trademark License**. Subject to the terms and conditions of this Agreement, NVS hereby grants and agrees to grant to HMI (a) an exclusive, royalty-free limited license with the right to sublicense to Sublicensees (in accordance with Section 4.3.2 (Development and Commercialization Licenses)) to use the Global Trademark for each In-Vivo [***] Product in the U.S. in accordance with this Agreement, and (b) subject to NVS' prior written consent, not to be unreasonably withheld, conditioned, or delayed, a non-exclusive, royalty-free limited license to use NVS Housemarks, with the right to sublicense to Sublicensees (in accordance with Section 4.3.2 (Development and Commercialization Licenses)), in the case of each of (a) and (b), solely in connection with the Commercialization of the applicable In-Vivo [***] Product in the U.S. in accordance with this Agreement.

10.7.4 **International Non-Proprietary Name**. NVS will, [***], be responsible for the selection and filing of the international nonproprietary name for any [***] Candidate and In-Vivo [***] Product with the World Health Organization and any Regulatory Authorities in the Territory, to which names HMI will have the right to reference in the U.S. in connection with its Commercialization activities for such In-Vivo [***] Product. NVS will, using Commercially Reasonable Efforts, be responsible for the selection and filing of the international nonproprietary name for each other Candidate and Product with the World Health Organization and any Regulatory Authorities in the Territory.

Article 11. Consideration; Financial Terms

11.1. **Equity Investment**. On the Effective Date, NVS will enter into a separate stock purchase agreement with HMI pursuant to which NVS will make [***] equity investment through the sale and issuance to NVS of Series B Preferred Stock of HMI on the same terms as set forth in the Series B Preferred Stock Purchase Agreement dated as of [***] by and between the Parties. NVS also made [***] equity investment pursuant to the terms set forth in such Series B Preferred Stock Purchase Agreement dated as of [***].

11.2. **Upfront Payment**. In partial consideration for the performance by HMI of the Research Activities during the Research Term and in partial consideration for the exclusivity granted in favor of NVS under Section 4.11 (Exclusivity) and the Research License granted to NVS under Section 4.1.1 (Research License), no later than [***] after receipt of an invoice from HMI, which invoice shall be substantially in the form of Exhibit A, NVS will pay to HMI a one-time payment of $[***] in immediately available funds by wire transfer, in accordance with wire instructions to be given by HMI to NVS.

11.3. **Target Fee**. NVS will provide HMI with written notice within [***] of the date of the occurrence of the Target Fee Trigger for a Target (the "**Target Fee Trigger Date**"). Following occurrence of the Target Fee Trigger, HMI will submit an invoice to NVS for the Target Fee. No later than [***] after NVS' receipt of an invoice from HMI for the Target Fee, NVS will pay to HMI a one-time payment of $[***] with respect to the applicable Target (for each Target, a "**Target Fee**") in immediately available funds by wire transfer, in accordance with wire instructions to be given by HMI to NVS. For the avoidance of doubt, the Target Fee shall be payable (a) only once for each Target, regardless of the number of Candidates that meet the applicable Success Criteria for the Target that such Candidate Modulates, and (b) only if the Target Fee Trigger conditions are met.

11.4. **Development Milestones Payments**.

11.4.1 **Ophthalmic Products**.

(a) **Events**. Subject to Section 11.4.4 (Development Milestone Payment Terms), NVS will pay to HMI the corresponding milestone payment set forth in Table 11.4.1 (each an "**Ophthalmic Development Milestone Payment**") upon achievement of each applicable milestone event listed in Table 11.4.1 below (each, an "**Ophthalmic Development Milestone Event**") [***].

Table 11.4.1 – Ophthalmic Development Milestones

	***Ophthalmic Development Milestone Event* [***]**	***Ophthalmic Development Milestone Payment***
1.	[***]	$ [***]
2.	[***] [***]	$ [***]
3.	[***]	$ [***]
4.	[***]	$ [***]
5.	[***]	$ [***]
6.	[***]	$ [***]
7.	[***]	$ [***]
8.	[***]	$ [***]
9.	[***]	$ [***]

(b) **Other Payment Conditions**. Each Ophthalmic Development Milestone Payment shall be payable only on the first occurrence of the applicable Ophthalmic Development Milestone Event for each of the [***] Ophthalmic Targets, and none of the Ophthalmic Development Milestone Payments shall be payable more than once with respect to an Ophthalmic Target, regardless of the number of Ophthalmic Products Developed or Commercialized.

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

11.4.2 [***] **Products in the Ex-Vivo Field**.

(a) **Events**. Subject to Section 11.4.4 (Development Milestone Payment Terms), NVS will pay to HMI the corresponding milestone payment set forth in Table 11.4.2 (each an "**Ex-Vivo** [***] **Development Milestone Payment**") upon achievement of each applicable milestone event listed in Table 11.4.2 below (each, an "**Ex-Vivo** [***] **Development Milestone Event**") for solely the first [***] Product in the Ex-Vivo Field that Modulates the [***] Target.

Table 11.4.2 – Ex-Vivo [***] **Development Milestones**

	Ex-Vivo* [***] *Development Milestone Event	***Ex-Vivo* [***] *Development Milestone Payment***
1.	[***]	$ [***]
2.	[***]	$ [***]
3.	[***]	$ [***]
4.	[***]	$ [***]
5.	[***]	$ [***]
6.	[***]	$ [***]
7.	[***]	$ [***]
8.	[***]	$ [***]
9.	[***]	$ [***]

(b) **Other Payment Conditions**. Each Ex-Vivo [***] Development Milestone Payment shall be payable only once upon the first occurrence of the applicable Ex-Vivo [***] Development Milestone Event, and none of the Ex-Vivo [***] Development Milestone Payments shall be payable more than once, regardless of the number of [***] Products for the Ex-Vivo Field Developed or Commercialized.

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

11.4.3 **In-Vivo** [***] **Products**.

(a) **Events**. Subject to Section 11.4.4 (Development Milestone Payment Terms), NVS will pay to HMI the corresponding milestone payment set forth in Table 11.4.3 (each an "**In-Vivo** [***] **Development Milestone Payment**") upon achievement of each applicable milestone event listed in Table 11.4.3 below (each, an "**In-Vivo** [***] **Development Milestone Event**") for solely the first In-Vivo [***] Product that Modulates the [***] Target.

Table 11.4.3 – In-Vivo [***] Development Milestones

	In-Vivo* [***] *Development Milestone Event	***In-Vivo* [***] *Development Milestone Payment***
1.	[***]	$ [***]
2.	[***] [***]	$ [***]
3.	[***]	$ [***]
4.	[***]	$ [***]
5.	[***]	$ [***]
6.	[***]	$ [***]
7.	[***]	$ [***]
8.	[***]	$ [***]
9.	[***]	$ [***]

(b) **Other Payment Conditions**. Each In-Vivo [***] Development Milestone Payment shall be payable only once upon the first occurrence of the applicable In-Vivo [***] Development Milestone Event, and none of the In-Vivo [***] Development Milestone Payments shall be payable more than once, regardless of the number of In-Vivo [***] Products Developed or Commercialized.

11.4.4 **Development Milestone Payment Terms**.

(a) **Payment Terms.** NVS will notify HMI within [***] after achievement of each Development Milestone Event. After receipt of notice of achievement of such Development Milestone Event, HMI shall submit an invoice to NVS substantially in the form of Exhibit A for the corresponding Development Milestone Payment. NVS will pay to HMI the corresponding milestone payment set forth in the applicable table within [***] of receipt of such invoice.

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

(b) **Once Per Target**. If Development of a Product for which a Development Milestone Payment is due is terminated after it achieves a Development Milestone Event, then the Development Milestone Payment will remain due and payable with respect to such terminated Product, but the corresponding Development Milestone Payment will not be due on any subsequent achievement of the same Development Milestone Event by a subsequent Product for such Target.

11.4.5 **Skipped Milestones**. If a Development Milestone Event for a Target is skipped (*i.e.*, a later Development Milestone Event for a Target is payable before the achievement of an earlier Development Milestone Event for such Target), then the Development Milestone Payments for such earlier-listed and skipped Development Milestone Events for such Target will be deemed to have been achieved upon the achievement of the subsequent Development Milestone Event; [***].

11.5. Sales Milestone Payments.

11.5.1 **Ophthalmic Products**. In conjunction with the Royalty Reports, NVS will notify HMI [***] after the end of each Calendar Quarter in which the date on which NVS', its Affiliates', and its Sublicensees' cumulative Net Sales of all Ophthalmic Products for a Target in a given Calendar Year first reach the respective thresholds indicated below in Table 11.5.1 below (each, an "**Ophthalmic Sales Milestone Event**"). Upon receipt of such notice, HMI shall submit an invoice to NVS substantially in the form of Exhibit A for the corresponding one-time milestone payments set forth below in Table 11.5.1 (each, an "**Ophthalmic Sales Milestone Payment**"). NVS will pay to HMI the corresponding Ophthalmic Sales Milestone Payment no later than [***] after receipt of such invoice.

Table 11.5.1 – Ophthalmic Sales Milestones

Ophthalmic Sales Milestone Event	***Ophthalmic Sales Milestone Payment***
1. [***]	$ [***]
2. [***]	$ [***]
3. [***]	$ [***]

For clarity, only Net Sales of Ophthalmic Products that Modulate the applicable Ophthalmic Target shall count towards achievement of the applicable Ophthalmic Sales Milestone Event for such Ophthalmic Target.

11.5.2 **Ex-Vivo** [***] **Products**. In conjunction with the Royalty Reports, NVS will notify HMI [***] after the end of each Calendar Quarter in which the date on which NVS', its Affiliates', and its Sublicensees' cumulative Net Sales of all [***] Products in the Ex-Vivo Field in a given Calendar Year first reach the respective thresholds indicated below in Table 11.5.2 below (each, an "**Ex-Vivo** [***]

Sales Milestone Event"). Upon receipt of such notice, HMI shall submit an invoice to NVS substantially in the form of Exhibit A for the corresponding one-time milestone payments set forth below in Table 11.5.2 (each, an "**Ex-Vivo** [***] **Sales Milestone Payment**"). NVS will pay to HMI the corresponding Ex-Vivo [***] Sales Milestone Payment no later than [***] after receipt of such invoice.

Table 11.5.2 – Ex-Vivo [***] Sales Milestones

Ex-Vivo [***] Sales Milestone Event	***Ex-Vivo [***] Sales Milestone Payment***
1. [***]	$ [***]
2. [***]	$ [***]
3. [***]	$ [***]

11.5.3 **In-Vivo** [***] **Products**. In conjunction with the Royalty Reports, NVS will notify HMI [***] after the end of each Calendar Quarter in which the date on which NVS', its Affiliates', and its Sublicensees' cumulative Net Sales of all In-Vivo [***] Products in all countries in the Territory other than the U.S. in a given Calendar Year first reach the respective thresholds indicated below in Table 11.5.3 below (each, an "**In-Vivo** [***] **Sales Milestone Event**"). Upon receipt of such notice, HMI shall submit an invoice to NVS substantially in the form of Exhibit A for the corresponding one-time milestone payments set forth below in Table 11.5.3 (each, an "**In-Vivo** [***] **Sales Milestone Payment**"). NVS will pay to HMI the corresponding In-Vivo [***] Sales Milestone Payment no later than [***] after receipt of such invoice.

Table 11.5.3 – In-Vivo [***] Sales Milestones

In-Vivo [***] Sales Milestone Event	***In-Vivo [***] Sales Milestone Payment***
1. [***]	$ [***]
2. [***]	$ [***]
3. [***]	$ [***]

11.5.4 **Achievement of Multiple Sales Milestones**. If 2 or more of Sales Milestone Events are achieved in the same Calendar Quarter or the same Calendar Year, then NVS will pay each corresponding Sales Milestone Payments during the Calendar Quarter in which it is achieved, in conjunction with royalty payments due for such Calendar Quarter.

11.6. Payments for U.S. [***] **Products**.

11.6.1 **Development Cost Reimbursement to NVS**. Within [***] after each Calendar Quarter during which NVS incurred Global In-Vivo [***] Development Costs, NVS shall provide HMI with a report setting forth the amount of Global In-Vivo [***] Development Costs incurred by or on behalf of NVS in such Calendar Quarter. Subject to Section 11.6.2 ([***]), HMI shall be obligated to reimburse NVS for [***]% of such Global In-Vivo [***] Development Costs by payment of such amount to NVS within [***] after receipt of such report.

11.6.2 [***]. With respect to [***] of its [***] related to [***] and, in such case, [***] that would have [***] pursuant to [***] in the absence [***] of such [***] at any [***] and become [***] (a) [***], (b) [***] in the [***], and (c) in accordance with [***], in the event of [***]. In order to [***] with respect to [***] prior to [***] for such [***]. [***] shall be [***] following [***]. In the event [***] with respect to [***], subject to [***] and [*******upon the [***] (i) [***] of such [***] or (ii) [***] with respect to [***] shall be [***] for (A) [***] in the case [***] of such [***] shall be [***]:

(a) in the case of [***] provided above [***] of the [***]; it being [***] for such [***] with respect [***], which shall [***] in accordance with [***] or

(b) in the case of [***] with respect to [***] or any [***] of any [***] in respect of [***]; it being understood that [***] with respect to [***].

11.6.3 **Net Profits**. Subject to Section 16.4 (Effects of Termination for Bankruptcy or HMI's Uncured Material Breach), with respect to each U.S. [***] Product, commencing with the Calendar Quarter in which the First Commercial Sale of such U.S. [***] Product occurs, the Commercializing Party will pay to the non-Commercializing Party an amount equal to [***]% of the Net Profit for such U.S. [***] Product for each Calendar Quarter (the "**Profit Share Payments**").

11.6.4 **Net Losses**. The non-Commercializing Party will not be responsible for any Net Losses in a given Calendar Quarter during the Term, and the Commercializing Party may carry forward Net Losses in any Calendar Quarter for deduction from Net Sales in the calculation of Net Profits earned in a subsequent Calendar Quarter.

11.6.5 **Profit Share Reports; Payments**. Within [***] after the end of each Calendar Quarter commencing with the first Calendar Quarter in which any of the amounts set forth in Section 11.6.3 (Net Profits) and Section 11.6.4 (Net Losses) are received or incurred, the Commercializing Party will provide to the other Party a [***] report of (a) the total monthly sales calculation of Net Sales of the U.S. [***] Product, and (b) Commercialization Costs and Manufacturing Costs incurred by the Commercializing Party or its Affiliates and in the case of NVS, Sublicensees, and (c) U.S. [***] Shared IP Costs, in accordance with this Agreement in such Calendar Quarter, which report will be in such form as the Parties may agree from time-to-time (the "**Profit Share Report**"). Without limiting the generality of the foregoing, the Commercializing Party will require its Affiliates and in the case of NVS, Sublicensees, to account for Net Sales and will include their Net Sales in the Profit Share Report as if such sales were made by the Commercializing Party. If no Net Profit is due to the other Party for a given Calendar Quarter, then the applicable Profit Share Report will so state. Concurrently with

the Profit Share Report, the Commercializing Party will make a payment to the other Party of the applicable Profit Share Payment due pursuant to Section 11.6.3 (Net Profits), in each case for such Calendar Quarter. For the avoidance of doubt, no cost or expense will be counted more than once in calculating Manufacturing Costs, Commercialization Costs, or U.S. [***] Shared IP Costs, even if such cost or expense falls into more than one of the cost categories that comprise such costs.

11.7. Royalty Payments.

11.7.1 **Royalty Rates**. In further consideration of the licenses and other rights granted to NVS under this Agreement, during the Royalty Term for a Product in a country (other than for U.S. [***] Products), NVS will pay HMI royalties based on the aggregate Net Sales by NVS, its Affiliates, and its Sublicensees in a Calendar Year of (a) all Ophthalmic Products during the Royalty Term for each such Product in such country at the rates set forth in Table 11.7.1(a) below, (b) all [***] Products in the Ex-Vivo Field during the Royalty Term for each such Product in such country at the rates set forth in Table 11.7.1(b) below, and (c) all In-Vivo [***] Products outside of the U.S. during the Royalty Term for each such Product in such country at the rates set forth in Table 11.7.1(c) below. The royalty payments made pursuant to this Section 11.7.1 (Royalty Rates), the "**Royalties**" and the rates set forth in Table 11.7.1(a), Table 11.7.1(b), and Table 11.7.1(c), the "**Royalty Rates**."

Table 11.7.1(a) – Royalty Rates for Ophthalmic Products

Net Sales of all Ophthalmic Products	***Royalty Rate***	***Royalty Floor***
[***]	[***]%	[***]%
[***]	[***]%	[***]%
[***]	[***]%	[***]%

Table 11.7.1(b) – Royalty Rates for [***] Products in the Ex-Vivo Field

Net Sales of all [***] Products in the Ex-Vivo Field	***Royalty Rate***	***Royalty Floor***
[***]	[***]%	[***]%
[***]	[***]%	[***]%
[***]	[***]%	[***]%

Table 11.7.1(c) – Royalty Rates for In-Vivo [***] Products

Net Sales of all In-Vivo [***] Products outside of the U.S.	***Royalty Rate***	***Royalty Floor***
[***]	[***]%	[***]%
[***]	[***]%	[***]%
[***]	[***]%	[***]%

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

By way of example only, if NVS receives $[***] in Net Sales of all Ophthalmic Products during a given Calendar Year, then the Royalties payable by NVS under this Section 11.7.1 (Royalty Rates) with respect to such Ophthalmic Products during such Calendar Year would be calculated as follows:

Royalty = [***] = $[***]

+ [***] = $[***]

+ [***] = $[***]

= $[***]

11.7.2 **Adjustments to Royalties**.

(a) **Lack of Valid Claims**. Subject to Section 11.7.3 (Cumulative Effect of Royalty Reductions), on a Product-by-Product and country-by-country basis in the Territory, during any period of the Royalty Term for a Product in such country (other than any U.S. [***] Product) in which such Product is not Covered by a Valid Claim in such country, then Royalties due to HMI under Section 11.7.1 (Royalty Rates) for such Product in such country will be reduced by [***]% during any such period until the expiration of the Royalty Term for such Product in such country.

(b) **Loss of Market Exclusivity**. Subject to 11.7.3 (Cumulative Effect of Royalty Reductions), on a Product-by-Product and country-by-country basis, if an event of a Loss of Market Exclusivity for a Product in any country has occurred, then the Royalties due to HMI pursuant to Section 11.7.1 (Royalty Rates) with respect to such Product in such country will be reduced by [***]%.

(c) **Third Party Licenses**.

(i) If NVS reasonably determines that rights to a Third Party's Intellectual Property Rights are [***] in connection with the Development, Manufacture or Commercialization of a Candidate or Product, then NVS will have the right to enter into a Third Party License in order to permit such Development, Manufacture or Commercialization. Notwithstanding the foregoing, where NVS reasonably determines that rights to a Third Party's Patent Rights or Third Party Know-How are [***] for NVS to practice the HMI Platform Technology in accordance with the licenses granted to NVS pursuant to Section 4.1 (License Grants to NVS) (such Third Party Patent Rights "**HMI Necessary Rights**"), NVS will first provide HMI with written notice of any such Third Party License that it intends to enter, and HMI will have the right to enter into such Third Party License itself within [***] of HMI's receipt of such notice on terms and conditions determined by HMI with HMI responsible for all costs and expenses incurred in connection with securing any such license. If HMI fails to enter into any such Third Party License within such [***] period, then will NVS have the right to enter into any such Third Party License itself. If NVS does enter into such Third Party License in accordance with this paragraph, then NVS may determine the terms and conditions of any such Third Party License and subject to this remainder of this Section 11.7.2(c) (Third Party Licenses), will be responsible for all costs and expenses incurred in connection with securing any such license.

(ii) Subject to Section 11.7.3 (Cumulative Effect of Royalty Reductions), the amount of any Royalties due to HMI pursuant to Section 11.7.1 (Royalty Rates) with respect to the applicable Product in such country during such Calendar Quarter will be reduced, on a Product-by-Product and country-by-country basis, by an amount equal to:

(A) [***]% of any royalty or other payments paid by NVS or its Affiliates pursuant to any (1) Third Party License entered into by NVS or its Affiliates for; or (2) Third Party Infringement Losses incurred by or on behalf of NVS and its Affiliates with respect to any Product (excluding In-Vivo [***] Products in the U.S.) for in each of (1) and (2), HMI Necessary Rights with respect to a Product in the applicable country; and

(B) [***]% of any royalty or other payments paid by NVS or its Affiliates pursuant to any (1) other Third Party License entered into by NVS or its Affiliates with respect to such Product in such country or (2) Third Party Infringement Losses incurred by or on behalf of NVS or its Affiliates with respect to any Product (excluding In-Vivo [***] Products in the U.S.), in each of (1) and (2), other than with respect to the HMI Necessary Rights.

(iii) Notwithstanding anything to the contrary in this Agreement, HMI shall remain solely responsible for the payment of any royalty, milestone, and other payment obligations, if any, due to Third Parties in connection with any HMI Licensed Technology or Third Party Licenses that (A) has been licensed to HMI or its Affiliates and is sublicensed to NVS under this Agreement, or (B) relates to covenants or other obligations agreed by HMI or its Affiliates prior to the Effective Date with any Third Party relating to any HMI Licensed Technology or any Candidate or Product, (collectively, the "**HMI Third Party Obligations**"), including pursuant to the COH License and the Caltech License. All such payments in respect of the HMI Third Party Obligations shall be made promptly by HMI in accordance with the terms of the applicable Third Party License.

11.7.3 **Cumulative Effect of Royalty Reductions**. On a country-by-country basis, in no event will the royalty reductions for Products that Modulate a given Target permitted under Section 11.7.2(a) (Lack of Valid Claims), Section 11.7.2(b) (Loss of Market Exclusivity), or Section 11.7.2(c)(i) (Third Party Licenses), alone or together, reduce the Royalties due to HMI for Products that Modulate such Target pursuant to Section 11.7.1 (Royalty Rates) in a country in a given Calendar Quarter to less than the applicable royalty floor set forth in Table 11.7.1 in such country in such

Calendar Quarter (the "**Royalty Floor**"). [***] Notwithstanding the Royalty Floor or any other limitations set forth in this Section 11.7.3 (Cumulative Effect of Royalty Reductions) and without limiting HMI's obligations hereunder, if a Third Party threatens to either terminate or diminish the scope or exclusivity of the licenses granted to NVS under any HMI Licensed Technology under a Third Party License to which HMI or its Affiliates is a party, then [***]

11.8. **Royalty Reports; Payments**. Commencing on the First Commercial Sale of a Product (other than a U.S. [***] Product) and for so long as Royalties are due under this Agreement, no later than [***] after the end of each Calendar Quarter, NVS will provide to HMI a written report (each, a "**Royalty Report**"), which Royalty Report will set forth: (a) the Net Sales (in local currency and United States Dollars) for such Calendar Quarter on a country-by-country and Product-by-Product basis; (b) the amount of any adjustments to such Royalties in accordance with Section 11.7.2 (Adjustments to Royalties); (c) the resulting total Royalties for the relevant Calendar Quarter in United States Dollars; and (d) if, applicable, Sales Milestone Payments owed to HMI listed by category. All Royalty Reports will be the Confidential Information of NVS. Upon receipt of such Royalty Report, HMI shall issue an invoice to [***]. Royalty payments for each Calendar Quarter will be due within [***] of receipt of such written invoice by HMI for the Calendar Quarter.

11.9. **Other Payments**. Subject to the terms and conditions of this Agreement, each Party will pay to the other Party any other undisputed amounts due under this Agreement no later than [***] after receipt of such invoice.

11.10. **Records and Audits**.

11.10.1 **Books and Records**. Each Party shall (a) keep complete, true, and accurate books and records in accordance with its Accounting Standards in relation to this Agreement, including in relation to HMI Research Costs, Global In-Vivo [***] Development Costs, Commercialization Costs, Manufacturing Costs, the number of units of Product sold or otherwise disposed of, the gross amount billed or invoiced for Products sold or otherwise disposed of, Net Sales of Products and the deductions taken in the calculation of Net Sales in sufficient detail to enable amounts owed or payable to the other Party hereunder to be determined; and (b) maintain such books and records for at least [***] following the Calendar Year to which they pertain. Each Party (the "**Auditing Party**") may, upon written request, cause an internationally-recognized independent accounting firm (the "**Auditor**"), that is reasonably acceptable to the other Party (the "**Audited Party**") to inspect the relevant records of such Audited Party and its Affiliates to verify the payments made and amounts reported by the Audited Party and the related reports, statements, and books of accounts, as applicable.

11.10.2 **Audit Procedure**. Before beginning its audit, the Auditor shall execute a written agreement acceptable to the Audited Party by which the Auditor agrees to keep confidential all information reviewed during the audit, which agreement shall contain terms of non-disclosure and non-use no less stringent than those set forth in this Agreement. The Auditor shall have the right to disclose to the Auditing Party only its conclusions regarding any payments owed under this Agreement. Each Party and its Affiliates shall make their records available for inspection by the Auditor during regular business hours at such place or places where such records are customarily kept, upon receipt of reasonable advance notice from the Auditing Party. The records shall

be reviewed solely to verify the accuracy of the Audited Party's Royalties and other payment obligations and compliance with the financial terms of this Agreement, including (a) with respect to HMI's right to audit, Royalty Reports and the reports provided for in Section 11.6.1 (Development Cost Reimbursement to NVS), and (b) with respect to NVS' right to audit, the reports of HMI Research Costs provided for in Section 3.8.2 (Research Payments), and information set forth in the Profit Share Reports provided for in Section 11.6.5 (Profit Share Reports; Payments) including Net Sales for U.S. [***] Products, Commercialization Costs, and Manufacturing Costs.

11.10.3 **Frequency; Overpayments and Underpayments**. Such inspection right shall not be exercised more than [***] without cause in any Calendar Year and not more frequently than [***] without cause with respect to records covering any specific period of time. In addition, the Auditing Party shall only be entitled to audit the books and records of the Audited Party for the [***] prior to the Calendar Year in which the audit request is made. The Auditing Party agrees to hold in strict confidence all information received and all information learned in the course of any audit or inspection, except to the extent necessary to enforce its rights under this Agreement or to the extent required to comply with any Applicable Law or judicial order. The Auditor shall provide its audit report and basis for any determination to the Audited Party at the time such report is provided to the Auditing Party before it is considered final. In the event that the final result of the inspection reveals an underpayment or overpayment by either Party, the underpaid or overpaid amount shall be settled promptly plus interest due on any underpayments at the Interest Rate. The Auditing Party shall pay for such inspections, as well as its expenses associated with enforcing its rights with respect to any payments hereunder; *provided*, that if an underpayment of more than [***]% of the total payments due hereunder for the applicable year is discovered, then the fees and expenses charged by the Auditor shall be paid by Audited Party.

11.11. **Currency of Payment**. All amounts to be paid by NVS pursuant to this Agreement will be made in United States Dollars. When conversion of payments from any foreign currency is required to be undertaken by NVS, the United States Dollar equivalent shall be calculated using NVS' then-current standard exchange rate methodology as applied in its external reporting for the conversion of foreign currency sales into United States Dollars.

11.12. **Late Fees**. Each paying Party will pay the other Party interest on any undisputed payments that are not paid on or before the date such payments are due under this Agreement at [***] or the maximum applicable legal rate, if less (the "**Interest Rate**"), calculated on the total number of days that the payment is delinquent.

11.13. **Currency Restrictions**. In the event that, by reason of Applicable Law in any country, it becomes impossible or illegal for a Party to transfer, or have transferred on its behalf, payments owed the other Party hereunder, such Party will promptly notify the other Party of the conditions preventing such transfer and such payments will be deposited in local currency in the relevant country to the credit of the other Party in a recognized banking institution designated by the other Party or, if none is designated by the other Party within a period of [***], in a recognized banking institution selected by the transferring Party, as the case may be, and identified in a written notice given to the other Party.

11.14. **Withholding Taxes**. Either Party (a "**Withholding Party**") may withhold from payments due to the other Party (a "**Non-Withholding Party**") amounts for payment of any withholding tax that is required by Applicable Law to be paid to any taxing authority with respect to such payments, which shall be remitted in accordance with Applicable Law. The Withholding Party will provide to the Non-Withholding Party all relevant documents and correspondence, and will also provide to the Non-Withholding Party any other cooperation or assistance on a reasonable basis as may be necessary to enable the Non-Withholding Party to claim exemption from such withholding taxes and to receive a refund of such withholding tax or claim a foreign tax credit. The Withholding Party will give proper evidence from time to time as to the payment of any such tax. The Parties will cooperate with each other in seeking deductions under any double taxation or other similar treaty or agreement from time to time in force. Such cooperation may include the Withholding Party making payments from a single source in the U.S., where possible.

Article 12. Intellectual Property

12.1. **Ownership of Inventions**.

12.1.1 **Background Intellectual Property**. As between the Parties, and subject to the licenses granted under this Agreement, each Party retains all rights, title, and interests in and to all Intellectual Property Rights that such Party owns or Controls as of the Effective Date or that it develops or otherwise acquires after the Effective Date outside the performance of the activities under this Agreement. Without limiting the generality of the foregoing, as between the Parties, HMI owns all rights, title, and interests in and to the HMI Platform Technology, and NVS owns all rights, title, and interest in and to the NVS Proprietary Technology.

12.1.2 **Assigned Technology**. Notwithstanding anything to the contrary set forth in this Agreement, (a) HMI will own (i) all inventions and other Know-How invented, discovered, created, or otherwise developed by or on behalf of a Party (or jointly by the Parties or their Affiliates) in the performance of activities under this Agreement that constitutes an improvement, modification, or enhancement of HMI Platform Technology, which invention or other Know-How arises from the use of such [***].

12.1.3 **Ownership**. Subject to Section 12.1.2 (Assigned Technology) with respect to Assigned Know-How and Assigned Patent Rights, (a) each Party, as between such Party and the other Party, will own (i) [***] that is invented, discovered, created, or otherwise developed solely by employees, agents, or contractors of such Party in the performance of the activities under this Agreement, and (ii) [***], and (b) both Parties will jointly own (i) all [***] that is invented, discovered, created, or otherwise developed jointly by or on behalf of the Parties in the performance of the activities under this Agreement ("Joint Know-How"), and (ii) [***] ("Joint Patent Rights"). Each Party will own a joint undivided interest in the Joint Technology, and, subject to any licenses granted by one Party to the other Party under this Agreement, and Section 4.11 (Exclusivity), each Party will have [***]. To the extent any further consent by either Party is required in connection with any permitted exploitation or licensing of the Joint Technology by the other Party, then such Party will promptly provide such consent on request. To the extent necessary in any jurisdiction to give effect to the intent of this Section 12.1.3 (Ownership), but subject to the licenses granted under this Agreement, each Party hereby grants and agrees to grant to the other Party a nonexclusive, royalty-free, fully-paid, worldwide, irrevocable, perpetual license, with the right to grant sublicenses through multiple tiers, to practice the Joint Technology for any and all purposes, subject to any licenses granted by one Party to the other under this Agreement and Section 4.11 (Exclusivity). [***].

12.1.4 **Covenants and Licenses in Support of Ownership**. NVS (on behalf of itself and its Affiliates) will and hereby does assign to HMI all rights, title, and interests in and to the HMI Assigned Know-How and HMI Assigned Patent Rights in order to give effect to the ownership of such HMI Assigned Patent Rights and HMI Assigned Know-How set forth in Section 12.1.2 (Assigned Technology), together with the right to file or own applications for any HMI Assigned Patent Rights. HMI (on behalf of itself and its Affiliates) will and hereby does assign to NVS all rights, title, and interests in and to the NVS Assigned Know-How and NVS Assigned Patent Rights in order to give effect to the ownership of such NVS Assigned Patent Rights and NVS Assigned Know-How set forth in Section 12.1.2 (Assigned Technology), together with the right to file or own applications for any NVS Assigned Patent Rights. Upon a Party's request, the other Party will provide all further cooperation that the requesting Party reasonably determines is necessary to give effect to the ownership of the Assigned Know-How and Assigned Patent Rights set forth in Section 12.1.2 (Assigned Technology) and to ensure the requesting Party the full and quiet enjoyment of the applicable Assigned Know-How and Assigned Patent Rights, including executing and delivering further assignments, consents, releases, and other commercially reasonable documentation, and providing good faith testimony by affidavit, declaration, deposition, in person, or other proper means, and otherwise assisting the requesting Party in support of any effort by the requesting Party to establish, perfect, defend, or enforce its rights in the Assigned Know-How and Assigned Patent Rights, in accordance with this Agreement. Upon a Party's request, the other Party will require the cooperation of the individual inventors of any inventions disclosed in the Assigned Know-How and Assigned Patent Rights, including (a) obtaining signatures of such inventors on any patent applications or other documentation reasonably necessary to obtain patent protection for such inventions, and (b) procuring (at the requesting Party's cost and expense) such inventors' good faith testimony by affidavit, declaration, deposition in person, or other proper means in support of the requesting Party's efforts in establishing, perfecting, defending, or enforcing Patent Rights to such inventions.

12.2. **Notice of Inventions**. Each Party will notify the other of the invention, creation, development, or reduction to practice of any Joint Technology, and NVS will promptly notify HMI of the invention, creation, development, or reduction to practice of any HMI Assigned Know-How and HMI Assigned Patent Rights, NVS Program Know-How, and NVS Program Patent Rights, and HMI will promptly notify NVS of the invention, creation, development, or reduction to practice of any HMI Program Know-How, HMI Program Patent Rights, NVS Assigned Know-How, and NVS Assigned Patent Rights. Each Party will ensure that its Affiliates, Sublicensees, and subcontractors enable such disclosure.

12.3. **Invention Protection**. Each Party will ensure that employees and independent contractors (excluding Sublicensees, who are subject to Section 4.3.4 (Sublicense and License Requirements) and subcontractors, who are subject to Section 4.4 (Subcontractors)) of such Party or its respective Affiliates performing work under this Agreement will, prior to commencing such work, be bound by written invention assignment obligations, requiring: (a) prompt reporting of any Intellectual Property Rights arising from such work; (b) assignment to the applicable Party or Affiliate all of his or her rights, title, and interests in and to any Intellectual Property Rights arising from such work; (c) cooperation in the preparation, filing, prosecution, maintenance, and enforcement of any Patent Right that is required to be assigned under this Agreement; and (d) performance of all acts and signing, executing, acknowledging, and delivering any and all documents required for effecting the obligations and purposes of this Agreement.

12.4. Prosecution and Maintenance of Patent Rights.

12.4.1 **HMI Patent Rights**. HMI will be responsible for the preparation, filing, prosecution, and maintenance of all [***]; *provided*, that the overall strategy for such preparation, filing, prosecution, and maintenance of the [***] will be consistent with the strategy determined for such Patent Rights by the Parties either directly or through the JSC (or corresponding Subcommittee). The HMI External Costs incurred to obtain, prosecute, and maintain (a) [***] will be borne [***]% by HMI and [***]% by NVS; [***]. HMI will invoice NVS for those agreed upon External Costs incurred to obtain, prosecute and maintain [***] on a Calendar Quarterly basis, and NVS will pay all such undisputed invoices no later than [***] after receipt thereof. HMI will provide copies of draft filings and material communications with any patent authority related to all pending [***] in advance of submission for review and comment by the NVS. HMI, its agents and attorneys will consider in good faith all comments timely provided to HMI by NVS on such filings and communications related to Candidates and Products (*provided*, that NVS does so promptly and consistent with any applicable filing deadlines) and, in all events, HMI will provide NVS with copies of all such filings and material communications submitted to or received from any patent authority. If HMI elects to abandon any HMI Patent Right, then NVS will have the option to continue to prosecute and maintain such Patent Right in HMI's name and at NVS' expense; *provided*, *however*, that if HMI does so and NVS exercises its option to continue to prosecute any such [***], then (i) NVS will [***] and (ii) [***].

12.4.2 [***]. NVS will be responsible for the preparation, filing, prosecution, and maintenance of the [***]; *provided*, that the overall strategy for such preparation, filing prosecution and maintenance of [***] will be consistent with the strategy determined for such Patent Rights by the Parties either directly or through the JSC (or corresponding Subcommittee). The External Costs incurred to obtain, prosecute, and maintain the [***] will be borne [***]% by NVS. The External Costs incurred to obtain, prosecute, and maintain [***] will be borne [***]% by HMI and [***]% by NVS. NVS will invoice HMI for those agreed upon External Costs incurred to obtain, prosecute and maintain [***] on a Calendar Quarterly basis, and HMS will pay all such undisputed invoices no later than [***] after receipt thereof. NVS will provide copies of draft filings and material communications with any patent authority related to all pending [***] in advance of submission for review and comment by HMI. NVS, its agents and attorneys will consider in good faith all comments timely provided to NVS by HMI on such filings and communications (*provided*, that HMI does so promptly and consistent with any applicable filing deadlines), and in all events, NVS will provide HMS with copies of all such filings and material communications submitted to or received from any patent authority. If NVS decides to abandon any [***], then HMI will have the option to continue to prosecute and maintain such [***] in HMI's name at HMI's expense. If NVS decides to abandon any [***], then HMI will have the option to continue to prosecute and maintain such [***] in both Parties' names, with such External Costs incurred to obtain, prosecute, and maintain such [***] still borne [***]% by HMI and [***]% by NVS; *provided*, that if NVS opts to no longer pay for such External Costs, then HMI will have the option to continue to prosecute and maintain such [***] in HMI's name and at HMI's sole cost, in which case NVS will assign its joint interest in the [***] to HMI and HMI grants NVS a non-exclusive, worldwide, transferable, perpetual, and irrevocable license and right under such former [***].

12.4.3 **Cooperation and Discussion**. On a [***] basis, each Party's internal or external patent counsel(s) will provide an update and discuss (a) the status of all pending [***], (b) any material updates regarding the prosecution and maintenance of the [***], including the strategy for the preparation, filing, prosecution, and maintenance of such Patent Rights (in each case (a) and (b), with HMI's representative providing an update on all [***] and NVS' representative providing an update on all [***]), (c) any inventions disclosed by either Party to the other pursuant to Section 12.2 (Notice of Inventions) since the prior meeting, and (d) any Third Party Licenses that each Party is considering entering into, including any such Third Party License to any HMI Necessary Rights. In addition, the Parties shall, and shall cause their Affiliates to, cooperate and implement reasonable Patent Right filing and prosecution strategies (including filing divisionals, continuations, or otherwise) so that, to the extent reasonably feasible, [***] are pursued in mutually exclusive patent applications.

12.4.4 **Patent Term Extension**. NVS will have the right to elect and file for patent term restorations or extensions, supplemental protection certificates, or any of their equivalents with respect to [***], and HMI will have the right to elect and file for patent term restorations or extensions, supplemental protection certificates, or any of their equivalents with respect to all [***] other than [***]; *provided*, that each Party shall take into account reasonable and timely requests by the other Party to make any such elections or filings with respect to any such Patent Right if a Party's failure to so act in such country would impair the other Party's ability to obtain any such restoration, extension, supplemental protection certificate, or any of their equivalents for the same relating to any Patent Right for which such Party controls the prosecution and maintenance thereof. The Parties will cooperate and shall take the other Party's reasonable input into account in determining whether to obtain such patent term restoration or extension, supplemental protection certificate, or equivalent thereof. Upon the request by a Party, such other Party will reasonably cooperate in the implementation of such requesting Party's decisions made in a manner with this Section 12.4.4 (Patent Term Extension).

12.5. Interference, Opposition, Reexamination, and Reissue.

12.5.1 **Notice**. During the Term, each Party will promptly notify the other Party but in any case not more than [***] following the discovery by the discovering Party of any request for, or the filing or declaration of, any Patent Challenge, with respect to any [***], along with the determination by the Parties either directly or through the JSC (or corresponding Subcommittee) that any such Patent Right should be reissued, reexamined, or reviewed via supplemental examination to avert invalidity or unenforceability thereof or reissued to permissibly broaden such [***].

12.5.2 **HMI's and NVS' Role**. During the Term, HMI will have the right (but not the obligation) to undertake any course of action to defend or prosecute any such Patent Challenge with respect to any [***] unless HMI determines in its sole discretion not to undertake any such course of action to defend or prosecute any such Patent Challenge, in which case NVS will have the right (but not the obligation) to undertake any course of action to defend or prosecute any such Patent Challenge with respect to any [***]. During the Term, NVS will have the right (but not the obligation) to

undertake any course of action to defend or prosecute any such Patent Challenge with respect to any [***], unless NVS determines in its sole discretion not to undertake any such course of action to defend or prosecute any such Patent Challenge, in which case HMI shall have the right (but not the obligation) to undertake any course of action to defend or prosecute any such Patent Challenge with respect to any such [***]. NVS will be responsible for (a) [***]% of the External Costs incurred by NVS in connection with any course of action taken to defend or prosecute any such Patent Challenge with respect to [***] and (b) [***]% of the External Costs incurred in connection with any course of action taken to defend or prosecute any Patent Challenge with respect to [***]. NVS will invoice HMI for all such External Costs to be borne by HMI on a Calendar Quarterly basis, and HMI will pay all such undisputed invoices no later than [***] after receipt thereof. During and after the Term, NVS will have the sole right (but not the obligation) to undertake any course of action to defend or prosecute any such Patent Challenge with respect to any [***] at its own expense.

12.5.3 **Cooperation; Coordination**. The Parties will cooperate fully with each other and each will provide to the other any information or assistance that the other may reasonably request with respect to any course of action taken under this Section 12.5 (Interference, Opposition, Reexamination, and Reissue) with respect to [***]. The applicable Party will (a) keep the other Party reasonably informed of all developments in such proceeding, including to the extent permissible, the status of any settlement negotiations and the terms of any offer related thereto, (b) provide to the other Party for its review and discussion, copies of all material submissions or agreements arising in connection with such proceeding sufficiently in advance of their filing, due date, or execution date so as to give the other Party sufficient time to comment thereon, and (c) give good faith consideration to the other Party's comments. Each Party and its respective Affiliates will promptly supply or execute all papers and instruments, or require their respective employees to supply or execute such papers and instruments, as may be necessary and appropriate for purposes of assisting the applicable Party in any course of action taken with respect to [***] under this Section and will promptly inform the other Party of matters that may, in such Party's reasonable judgment, affect any course of action taken with respect thereto.

12.6. Enforcement Against Third Party Infringement.

12.6.1 **Notice**. If either Party (a) becomes aware of any actual or threatened infringement, misappropriation, or other violation by a Third Party of any [***] as a result of the manufacture, use, sale, or import of any compound or product that is or is reasonably expected to be competitive with any Product (including alleged or threatened infringement based on the Development, Manufacturing, Commercialization or an application to market a product that is competitive with any Product in the Territory) (each, a "**Competing Infringement**"), then such Party will promptly notify the other Party (in all instances, such timeframe to be sufficiently prompt to provide the other Party the opportunity to respond to such proceedings) and provide it with all details of such Competing Infringement of which it is aware. The Parties will promptly meet to review and discuss the Competing Infringement and the strategy for patent enforcement with respect to such Competing Infringement.

12.6.2 **NVS' Rights**. NVS will have the right (but not the obligation) to initiate an infringement, misappropriation, or other appropriate suit (an "**Infringement Action**") anywhere in the world against any Third Party as to [***] at its cost and expense; *provided*, that (a) NVS will keep HMI reasonably informed about any such Infringement Action, (b) HMI will provide reasonable cooperation to NVS in connection with such Infringement Action, including, to the extent the Infringement Action relates to any [***], by promptly supplying or executing all papers and instruments, or requiring its employees to supply or execute such papers and instruments, as may be necessary for purposes of initiating and pursuing such Infringement Action, at NVS' cost and expense, (c) NVS will not take any position with respect to, or settle, such Infringement Action in any way that would adversely affect the scope, validity, or enforceability of any [***] without the prior written consent of HMI, such consent not to be unreasonably withheld, conditioned, or delayed, and (d) if NVS determines not to institute an Infringement Action with respect to a Competing Infringement, or determines to cease to pursue any such Infringement Action, then, in each case, it will promptly inform HMI of the same and pursuant to Section 12.6.3 (HMI's Rights), HMI may have the right to pursue such Infringement Action.

12.6.3 **HMI's Rights**.

(a) HMI will have the right (but not the obligation) to initiate an Infringement Action anywhere in the world against any Third Party as to any Competing Infringement of any [***] at its cost and expense; *provided*, that (i) HMI will keep NVS reasonably informed about any such Infringement Action, (ii) NVS will provide reasonable cooperation to HMI in connection with such Infringement Action, including by promptly supplying or executing all papers and instruments, or requiring its employees to supply or execute such papers and instruments, as may be necessary for purposes of initiating and pursuing such Infringement Action, at HMI's cost and expense, (iii) HMI will not take any position with respect to, or settle, such Infringement Action in any way that would adversely affect the scope, validity, or enforceability of any [***] without the prior written consent of NVS, such consent not to be unreasonably withheld, conditioned, or delayed, and (iv) if HMI determines not to institute an Infringement Action with respect to a Competing Infringement, or determines to cease to pursue any such Infringement Action, then, in each case, it will promptly inform NVS of the same and NVS may have the right to pursue such Infringement Action.

(b) If NVS informs HMI that it does not intend to prosecute an Infringement Action in respect of any [***] as to a Competing Infringement anywhere in the Territory pursuant to Section 12.6.2 (NVS' Rights), or NVS determines to cease to pursue any such Infringement Action in respect of any [***] with respect to such Competing Infringement, and, in each case, if NVS' use of [***] would lead to prosecuting or continuing to pursue such Infringement Action, then HMI will have the right (but not the obligation), upon notice to NVS, to take appropriate action to address such Competing Infringement in respect of any [***], including by initiating its own Infringement Action or taking over prosecution of any Infringement Action initiated by NVS. In such event, (i) HMI will keep NVS reasonably informed about such Infringement Action and will consult with NVS before taking any major steps during the conduct of such Infringement Action, (ii) NVS will provide reasonable cooperation to HMI in connection with such Infringement Action, at HMI's cost and expense, and (iii) HMI will not take any position with respect to, or settle, such Infringement Action in any way that would adversely affect the scope, validity, or enforceability of the [***] without NVS' prior written consent, which consent will not be unreasonably withheld, conditioned, or delayed.

(c) HMI will have the sole right (but not the obligation) to initiate an Infringement Action anywhere in the world against any Third Party as to any Competing Infringement of any [***] at its cost and expense; *provided*, that (i) HMI will keep NVS reasonably informed about any such Infringement Action, and (ii) NVS will provide reasonable cooperation to HMI, at HMI's cost and expense, in connection with such Infringement Action, including by promptly supplying or executing all papers and instruments, or requiring its employees to supply or execute such papers and instruments, as may be necessary for purposes of initiating and pursuing such Infringement Action.

12.6.4 **Procedures; Assistance; Expenses**. The Party having the right to initiate any Infringement Action under this Section 12.6 (Enforcement Against Third Party Infringement) will pay all expenses of such Infringement Action, including attorneys' fees and court costs and reimbursement of the other Party's reasonable external costs in rendering assistance requested by the initiating Party. If required under any Applicable Law in order for the initiating Party to initiate or maintain such Infringement Action, or if either Party is unable to initiate or prosecute such Infringement Action solely in its own name or it is otherwise advisable to obtain an effective legal remedy, then, in each case, the other Party will join as a party to such Infringement Action and will execute, and cause its Affiliates to execute, all documents necessary for the initiating Party to initiate litigation to prosecute and maintain such Infringement Action, at the initiating Party's expense. In addition, at the initiating Party's request, the other Party will provide reasonable assistance to the initiating Party in connection with an Infringement Action. The non-initiating Party will have the right to participate and be represented in any such Infringement Action by its own counsel at its own expense.

12.6.5 **Biosimilar Litigation.**

(a) **Receipt of Application; Responsibilities**. If either Party receives a copy of an application submitted to the FDA under subsection (k) of Section 351 of the PHSA (a "**Biosimilar Application**") naming a Product as a reference product or otherwise becomes aware that such a Biosimilar Application has been filed (such as in an instance described in Section 351(l)(9)(C) of the PHSA), then either Party will, within [***] after receipt thereof, similarly notify the other Party so NVS may seek permission to view the application and related confidential information from the filer of the Biosimilar Application under Section 351(l)(1)(B)(iii) of the PHSA. If either Party receives any equivalent or similar certification or notice in any other country in the Territory, either Party will, within [***] of receipt thereof, notify and provide the other Party with copies of such communication. Regardless of the Party that is the "reference product sponsor" for purposes of such Biosimilar Application, NVS will have the sole right to manage and prosecute biosimilar litigation, including: (i) NVS will have the sole right to designate pursuant to Section 351(l)(1)(B)(ii) of the PHSA in-house counsel who will receive confidential access to the Biosimilar Application, with the understanding that a representative of HMI, as patent owner of [***] will have the right to view confidential information related to the [***] disclosed under Section 351(l)(1)(B)(iii); (ii) NVS will have the sole right to list any Patent Rights, including [***] insofar as they Cover the applicable

Product as required or desired pursuant to Applicable Law, to respond to any communications with respect to such lists from the filer of the Biosimilar Application, and to negotiate with the filer of the Biosimilar Application as to whether to utilize a different mechanism for Information exchange than that specified in Section 351(l) of the PHSA; and (iii) NVS will have the sole right to identify Patent Rights or respond to communications under any equivalent or similar listing in any other country in the Territory. However, NVS will reasonably consult with HMI with respect to asserting and enforcing any [***] and will use reasonable efforts to accommodate HMI's timely comments with respect to activities in connection with the assertion and enforcement of such [***]. If required pursuant to Applicable Law, HMI will prepare such lists and make such responses at NVS' direction. HMI will: (A) provide to NVS, within [***] days of NVS' request, all information, including a correct and complete list of [***] Covering any Product, that is [***] to enable NVS to make such lists and communications with respect to the [***]; and (B) cooperate with NVS' reasonable requests in connection therewith, including meeting any submission deadlines, in each case, to the extent required or permitted by Applicable Law. NVS will: (1) reasonably consult with HMI prior to identifying any [***] to a Third Party as contemplated by this Section 12.6.5 (Biosimilar Litigation) and will consider in good faith HMI's timely advice and suggestions with respect thereto; and (2) notify HMI of any such lists or communications promptly after they are made.

(b) **Actions for Infringement; Injunction**. Notwithstanding anything to the contrary in this Section 12.6 (Enforcement Against Third Party Infringement), NVS will have the right to bring an action for infringement of the [***] as required under Section 351(l)(6) of the PHSA following the agreement on a list of patents for litigation under Section 351(l)(4) or exchange of patent lists pursuant to Section 351(l)(5)(B) of such act, or as required following any equivalent or similar certification or notice in any other country. The Parties' rights and obligations with respect to the foregoing legal actions will be as set forth in Section 12.6.2 (NVS' Rights) through Section 12.6.4 (Procedures; Assistance; Expenses); *provided*, that within [***] of reaching agreement on a list of Patent Rights for litigation under Section 351(l)(4) or exchange of patent lists pursuant to Section 351(l)(5)(B), NVS will notify HMI as to whether or not it elects to prosecute such infringement. Either Party will, within [***], notify and provide the other Party with copies of any notice of commercial marketing provided by the filer of a Biosimilar Application pursuant to Section 351(l)(8)(A) of the PHSA, or any equivalent or similar certification or notice in any other country. Thereafter, NVS will have the right to seek an injunction against such commercial marketing as permitted pursuant to Section 351(l)(8)(B) of the PHSA.

12.6.6 **Recoveries**. If either Party obtains any damages, license fees, royalties, or other compensation (including any amount received in settlement of such litigation) from any Third Party in connection with any Competing Infringement, then the amounts will be allocated in all cases as follows:

(a) first, to reimburse each Party for all expenses of such Infringement Action incurred by each Party, including attorneys' fees and disbursements, court costs and other litigation expenses; and

(b) any remaining amounts will be split as follows: (i) [***]% will be paid to the Party initiating or defending such suit or action, and (ii) [***]% will be paid to the non-initiating or non-defending Party.

12.7. Defense of Claims.

12.7.1 **Notice**. If a Party becomes aware of any actual or potential claim alleging that the Research, Development, Manufacture, or Commercialization of any Candidate or Product infringes, misappropriates, or otherwise violates any Intellectual Property Rights of a Third Party (or would if carried out) ("**Third Party Infringement**"), then such Party will notify the other Party as promptly as possible following the receipt of service of process in such action, suit, or proceeding, or the date on which such Party becomes aware that such action, suit, or proceeding has been instituted, and the JSC (or corresponding Subcommittee) (or the Parties directly if the JSC is dissolved during the Term) will meet as soon as possible to discuss the overall strategy for defense of such matter.

12.7.2 **Defense**. Subject to Article 15 (Indemnification; Limitation Of Liability; Insurance): (a) HMI shall have the first right (but not the obligation) to defend any claims of Third Party Infringement alleging that [***] infringes, misappropriates, or otherwise violates the Intellectual Property Rights of any Third Party; and (b) NVS shall have the first right (but not the obligation) to defend any other claims of Third Party Infringement alleging that [***] infringes, misappropriates, or otherwise violates the Intellectual Property Rights of any Third Party.

Article 13. Confidentiality

13.1. Confidential Information.

13.1.1 **General**. Each Party (the "**Receiving Party**") will maintain all Confidential Information disclosed to it or its representatives by or on behalf the other Party (the "**Disclosing Party**") in strict confidence during the Term of this Agreement and for a period of [***] after the expiration or termination of this Agreement; *provided*, that any Confidential Information of either Party that constitutes a trade secret will continue to be subject to the terms of this Article 13 (Confidentiality) in perpetuity, so long as such information remains a trade secret. Each Party will use all such disclosed Confidential Information only to the extent necessary for purposes of this Agreement, including exercising the licenses and rights hereunder and will not disclose such Confidential Information to any Third Party without the prior written consent of the Disclosing Party, except as permitted under this Agreement. Each Party will notify the other Party promptly on discovery of any unauthorized use or disclosure by a Party of the other Party's Confidential Information, including the other Party's trade secrets.

13.1.2 **Confidential Information of Each Party**. All information disclosed prior to the Effective Date pursuant to (a) the Confidentiality Agreement between the Parties dated as of [***], as amended on [***] and (b) the Confidentiality Agreement between the Parties dated as of [***] ((a) and (b), collectively, the "**Confidentiality Agreements**"), by HMI to NVS will be Confidential Information of HMI and by NVS to HMI will be Confidential Information of NVS. The contents of each Interim Report, Success Criteria Report, or Exploratory Research Report that relate solely to HMI Platform Technology will be considered Confidential Information of [***], with

the remainder of the content of all such reports along with all Royalty Reports or reports identifying Development Milestones and Sales Milestones will be considered Confidential Information of [***]. The [***], the non-disclosed terms of this Agreement, and [***] will be the Confidential Information of each Party. The Targets, Candidates, and Products will be Confidential Information of [***]. The [***] (including [***]) will be the Confidential Information of [***] and the [***] (including [***]) will be the Confidential Information of [***].

13.1.3 **Exceptions to Confidentiality**. The obligations of each Receiving Party imposed by Section 13.1.1 (General) will not apply to any Confidential Information disclosed to the Receiving Party by the Disclosing Party that: (a) was known to the Receiving Party without an obligation to keep such information confidential prior to the Effective Date other than as a result of disclosure under any other agreement between the Parties, including the Confidentiality Agreements (as demonstrated by documentary evidence); (b) is or becomes generally available to the public through means other than an unauthorized disclosure by the Receiving Party, its Affiliates, or any agents to whom it or they disclosed such information; (c) was or subsequently is disclosed to the Receiving Party without restriction by a Third Party having a *bona fide* right to disclose such Confidential Information without breaching any obligation to the Disclosing Party; (d) is developed independently by the Receiving Party without benefit of or recourse to any of the Disclosing Party's Confidential Information (as demonstrated by documentary evidence); or (e) is published pursuant to Section 13.1.5 (Publicity). For clarity, (i) specific aspects or details of Confidential Information will not be deemed to be within the public domain or in the possession of the Receiving Party merely because the Confidential Information is embraced by more general information in the public domain or in the possession of the Receiving Party; and (ii) any combination of Confidential Information will not be considered in the public domain or in the possession of the Receiving Party merely because individual elements of such Confidential Information are in the public domain or in the possession of the Receiving Party unless the combination and its principles are in the public domain or in the possession of the Receiving Party.

13.1.4 **Permitted Disclosures**.

(a) **Compliance with Law**. Notwithstanding anything to the contrary set forth in this Article 13 (Confidentiality), each Receiving Party may use and make disclosures of Confidential Information of the Disclosing Party: (i) to its Affiliates, and the Receiving Party's employees, directors, agents, consultants, or advisors to the extent necessary for the potential or actual performance of its obligations or exercise of its licenses and other rights under this Agreement, in each case, who are under an obligation of confidentiality and non-use with respect to such information that is no less stringent than the terms of this Agreement; (ii) to patent offices in any country in which Patent Rights are sought for purposes of prosecuting any applications for any Patent Rights or defending any Patent Rights in interference or opposition actions as contemplated by this Agreement; (iii) to Regulatory Authorities as necessary to pursue Development, Commercialization, Manufacturing, or Marketing Approval of Products; *provided*, that such Confidential Information will be disclosed only to the extent reasonably necessary to do so, and where permitted, subject to confidential treatment; (iv) to Third Parties to the extent a Party is required to do so pursuant to the terms of a Third Party License; *provided*, that such Confidential Information will be disclosed only to the extent reasonably necessary to do so; or

(v) to the extent required to comply with Applicable Law or a court or administrative order, including of the United States Securities and Exchange Commission or similar regulatory agency in other countries, in each case, to the extent applicable to such Party at such time; *provided*, *however*, that the Party who is required to make such disclosure (A) provides the other Party with reasonable prior written notice, (B) coordinates with the other Party with respect to the wording and timing of any such disclosure and affords the other Party an opportunity to oppose or limit, or secure confidential treatment for such required disclosure, (C) if unsuccessful in its efforts pursuant to clause (B), takes all reasonable and lawful actions to obtain confidential treatment for such disclosure, and (D) discloses the minimum amount and scope of the Confidential Information necessary to comply with Applicable Law. Notwithstanding the foregoing, any Confidential Information so disclosed will remain subject to the terms of this Agreement.

(b) **SEC Filings and Other Disclosures**. If either Party concludes that a copy of this Agreement must be filed with the United States Securities and Exchange Commission or a similar regulatory agency in a country other than the United States, such Party will (i) a reasonable time prior to any such filing, provide the other Party with a copy of the Agreement showing any provisions hereof as to which the Party proposes to request confidential treatment, (ii) provide the other Party with an opportunity to comment on any such proposed redactions and to suggest additional redactions, and (iii) take such Party's reasonable comments into consideration before filing such Agreement and use Commercially Reasonable Efforts to have terms identified by such other Party afforded confidential treatment by the applicable regulatory agency.

(c) **Agreement**. Solely with respect to the terms of this Agreement, either Party may disclose the terms of this Agreement, to any *bona fide* actual or prospective acquirers, underwriters, investors, lenders or other financing sources and any *bona fide* actual or prospective licensors, Sublicensees, licensees or strategic partners and to employees, directors, agents, consultants and advisers of such Third Party, who are under an obligation of confidentiality with respect to such information that is no less stringent than the terms of this Agreement, and provided that such Confidential Information will be disclosed only to the extent reasonably necessary to evaluate the proposed transaction or perform its obligations or exercise its rights granted under the applicable agreement.

13.1.5 **Publicity**. Except as otherwise contemplated by this Section 13.1.5 (Publicity), Section 13.3 (Publications and Presentations), and Applicable Law, legal process, or stock exchange rules, neither Party will issue a press or news release or make any similar public announcement related to the execution or terms of this Agreement, the conduct of Research Activities, other Development activities or the Commercialization of Products without the prior written consent of the other Party (solely for the purpose of this Section 13.1.5 (Publicity), consent via e-mail with return receipt will be allowed); [***]. Upon the execution of this Agreement, each Party may issue a press release with respect to this Agreement in a form agreed by the Parties. Thereafter, where a request for a public disclosure is made by a Party with respect to this Agreement, the Parties will agree upon the form of a press release or other public statement, and either Party may make subsequent public disclosure of the contents of press release or other public statement; *provided*, that the disclosing Party will not depart from the agreed-upon form, if any, without the prior written consent of the other Party.

13.2. **No Use of Name**. Subject to the terms of this Agreement, neither Party will use the name or Trademarks of the other Party in any promotional materials or advertising without the prior written consent of the other Party, except as provided under this Agreement or required by Applicable Law, in which case the Party disclosing such name or Trademarks will give advance notice of such use and otherwise comply with Section 13.1.4(a) (Compliance with Law).

13.3. **Publications and Presentations**.

13.3.1 **NVS' Rights to Publish and HMI's Rights to Review**. The Parties recognize the desirability of publishing and publicly disclosing the results of, and scientific information regarding, the activities under this Agreement. NVS will be free to publish and present the results of and information regarding the activities under this Agreement as provided in this Section 13.3.1 (NVS' Rights to Publish and HMI's Rights to Review) in a manner consistent with Applicable Law and industry practices, subject to prior review by HMI for issues of patentability and protection of HMI Confidential Information. Accordingly, prior to publishing or disclosing the results of, or scientific information regarding, any activities under this Agreement. NVS will provide HMI with drafts of proposed abstracts, manuscripts, or summaries of presentations that include such results or information. HMI will respond promptly through its designated representative and in any event no later than [***] after receipt of such proposed publication or presentation or such shorter period as may be agreed to by the Parties. NVS will delay any such proposed publication or presentation for a reasonable period (not to exceed [***] after HMI receives such proposed publication or presentation) to permit HMI to make filings for patent protection and will otherwise remove Confidential Information of HMI identified by HMI in such publication or presentation. [***].

13.3.2 **HMI's Rights to Publish and NVS' Rights to Review**. HMI will be free to publish and present the results of and information regarding any Research during the Research Term as provided in this Section 13.3.2 (HMI's Rights to Publish and NVS' Rights to Review) in a manner consistent with Applicable Law and industry practices, subject to prior review by NVS for issues of patentability and protection of NVS Confidential Information. Accordingly, prior to publishing or disclosing the results of, or scientific information regarding, any such Research, HMI will provide NVS with drafts of proposed abstracts, manuscripts, or summaries of presentations that include such results or information. NVS will respond promptly through its designated representative and in any event no later than [***] after receipt of such proposed publication or presentation or such shorter period as may be agreed to by the Parties. HMI will delay any such proposed publication or presentation for a reasonable period (not to exceed [***] after NVS receives such proposed publication or presentation) to permit NVS to make filings for patent protection and will otherwise remove Confidential Information of NVS identified by NVS in such publication or presentation. [***].

Article 14. Representations, Warranties, and Covenants

14.1. **Mutual Representations and Warranties**. As of the Effective Date, HMI and NVS each hereby represents and warrants to the other as follows:

14.1.1 **Organization**. It is a corporation duly organized, validly existing and in good standing under the laws of the jurisdiction of its organization, and has all requisite power and authority, corporate or otherwise, to execute, deliver and perform this Agreement.

14.1.2 **Authorization**. The execution and delivery of this Agreement and the performance by it of the transactions contemplated hereby have been duly authorized by all necessary corporate action and will not violate (a) such Party's certificate of incorporation or bylaws (or equivalent charter or organizational documents), (b) any agreement, instrument or contractual obligation to which such Party is bound, (c) any requirement of any Applicable Law or regulations or court or administrative under, or (d) any order, writ, judgment, injunction, decree, determination, or award of any court or Governmental Authority presently in effect applicable to such Party.

14.1.3 **No Inconsistent Obligation**. It is not under any obligation, contractual, or otherwise, to any Person that conflicts with or is inconsistent in any respect with the terms of this Agreement or that will impede the diligent and complete fulfillment of its obligations hereunder.

14.1.4 **No Conflicts**. The execution, delivery and performance of this Agreement by such Party does not conflict with such Party's charter documents, bylaws or other organizational documents, any agreement, instrument or understanding, oral or written, to which it is a party or by which it is bound, nor violate Applicable Law or any order, writ, decree, judgment, injunction, determination or award of any Governmental Authority having jurisdiction over it.

14.1.5 **No Litigation**. There is no action or proceeding pending or, to the knowledge of such Party, threatened that could reasonably be expected to impair or delay the ability of such Party to perform its obligations under this Agreement.

14.1.6 **Government Authorizations**. All consents, approvals, and authorizations from all Governmental Authorities or other Third Parties required to be obtained by such Party in connection with this Agreement, including the grant of any licenses, have been obtained.

14.1.7 **Debarment**. Neither such Party, nor any Affiliate of such Party, has been debarred by any Regulatory Authority, including under the Generic Drug Enforcement Act of 1992 (21 U.S.C. §301 et seq.), is under investigation for debarment action by any Regulatory Authority, has been disqualified as an investigator pursuant to 21 C.F.R. §312.70, has a disqualification hearing pending or is currently employing or using any Person that has been so debarred or disqualified by any Regulatory Authority to perform any of such Party's obligations under this Agreement.

14.2. **Additional Representations of HMI as of the Effective Date**. As of the Effective Date, HMI further represents and warrants to NVS, that, except as set forth on Schedule 14.2 (Exceptions to Representations and Warranties):

14.2.1 **HMI Patent Rights**. Schedule 14.2.1 sets forth a complete and accurate list of all HMI Patent Rights in existence, all of which are owned or Controlled by HMI. To the Knowledge of HMI, (a) the issued patents in the HMI Patent Rights are valid and enforceable without any claims, challenges, oppositions,

nullity actions, interferences, inter-partes reexaminations, inter-partes reviews, post-grant reviews, derivation proceedings, or other proceedings pending or threatened and HMI has filed and prosecuted patent applications within the HMI Patent Rights owned by HMI in good faith and complied with all duties of disclosure with respect thereto, (b) HMI has not committed any act, or omitted to commit any act, that may cause the HMI Patent Rights to expire prematurely or be declared invalid or unenforceable, and (c) all application, registration, maintenance and renewal fees in respect of the HMI Patent Rights have been paid and all necessary documents and certificates have been filed with the relevant agencies for the purpose of maintaining the HMI Patent Rights set forth on Schedule 14.2.1.

14.2.2 **HMI Technology Agreements**. Schedule 14.2.2 sets forth a complete and accurate list of all Third Party Licenses pursuant to which HMI Controls any Know-How or Patent Rights that are included within the HMI Licensed Technology.

14.2.3 **HMI Inventions and Assignments**. With respect to any HMI Licensed Technology owned by HMI, (a) HMI and its Affiliates have obtained from all individuals who contributed to the conception or reduction to practice thereof, effective assignments of all ownership rights of such individuals in such HMI Licensed Technology, either pursuant to written agreement or by operation of law, and (b) all of its employees, officers, and consultants have executed agreements or have existing obligations under Applicable Law requiring assignment to HMI or its Affiliates, as applicable, of all inventions made during the course of performance under this Agreement, and no officer or employee of HMI or its Affiliates is subject to any agreement with any other Third Party that requires such officer or employee to assign any interest in any HMI Licensed Technology to any Third Party.

14.2.4 **License to NVS**. HMI has the right and authority to: (a) grant to NVS and its Affiliates the licenses under the HMI Licensed Technology that HMI grants to NVS in accordance with the terms and conditions of this Agreement; and (b) use, disclose, and commercially exploit, and to enable NVS and its Affiliates to use, disclose, and commercially exploit the HMI Licensed Technology in accordance with the terms and conditions of this Agreement.

14.2.5 **Third Party Licenses**. HMI has fully and accurately disclosed to NVS the relevant terms of the COH License and the Caltech License.

14.2.6 **No Third Party Limitations**. HMI has not granted its Affiliates or any Third Party, including any academic organization or agency, rights that would interfere with NVS' rights hereunder, and there are no Third Party Licenses or arrangements other than as set forth in Schedule 14.2.2 to which HMI or any of its Affiliates is a party relating to HMI Licensed Technology that would (a) limit the rights granted to NVS under this Agreement or (b) restrict or result in a restriction on NVS' ability to Research, Develop, Manufacture, use, or Commercialize the Candidates or Products, in accordance with this Agreement.

14.2.7 **Confidentiality**. All employees, officers, and consultants of HMI and its Affiliates have executed agreements or have existing obligations under Applicable Law obligating the individual to maintain as confidential HMI's Confidential Information as well as confidential information of other parties (including of NVS and its

Affiliates) that such individual may receive in its performance under this Agreement, to the extent required to support HMI's obligations under this Agreement, and HMI and its Affiliates have taken commercially reasonable precautions to preserve the confidentiality of HMI Know-How that is not claimed in a published HMI Patent Right or that has not been publicly disclosed.

14.2.8 **No Interference**. Neither HMI nor any Affiliate has been involved in any proceedings or other claims in which such Person alleges any Third Party interference, infringement, misappropriation, or other violation of the HMI Licensed Technology, nor have any such proceedings been threatened in writing by HMI or its Affiliates.

14.2.9 **No HMI Infringement**. There is no pending action or proceeding alleging that the use of the HMI Licensed Technology with respect to the [***] Target or first Ophthalmic Target infringes, misappropriates, or otherwise violates any Intellectual Property Rights of any Third Party, and, to the Knowledge of HMI, there is no pending action or proceeding alleging that the use of the HMI Licensed Technology as otherwise contemplated under this Agreement infringes, misappropriates, or otherwise violates any Intellectual Property Rights of any Third Party.

14.2.10 **No Third Party Infringement**. To the Knowledge of HMI, no Patent Right or trade secret right owned or controlled by a Third Party will be infringed or misappropriated by: the Development, Manufacture, or Commercialization of any Candidates or Products by either Party or its Affiliates or Sublicensees in accordance with this Agreement, nor has HMI or its Affiliates received in writing any notice alleging such infringement or misappropriation.

14.2.11 **No Claims**. There are no claims, judgments, or settlements against or amounts with respect thereto owed by HMI or any of its Affiliates relating to the HMI Licensed Technology.

14.2.12 **No U.S. Government Funding.** Except for the Patent Rights and Know-How licensed to HMI under the COH License or Caltech License, neither HMI nor its Affiliates have entered into a government funding relationship that would result in rights to any Candidate or Product residing in the U.S. Government, National Institutes of Health, National Institute for Drug Abuse or other agency, and the licenses granted hereunder are not subject to overriding obligations to the U.S. Government as set forth in Public Law 96 517 (35 U.S.C. 200 204), as amended, or any similar obligations under the laws of any other country.

14.2.13 **Notices and Consents.** HMI has delivered any and all required notice letters and received any and all necessary consents from any Third Party necessary to effectuate any sublicenses granted to NVS and its Affiliates under HMI Licensed Technology. Upon NVS' request, HMI will provide NVS with written evidence of such notices and consents, including COH's receipt of such notice of the sublicense grant.

14.3. Compliance Covenants. Each of NVS and HMI covenant to the other as follows:

14.3.1 **Compliance with Law**. It will, and will ensure that its Affiliates, comply with all Applicable Law in connection with the performance of its and its Affiliates' activities under this Agreement, including, to the extent applicable, the European Data Protection Directive 95/46/EC, the European General Data Protection Regulation (Regulation (EU) 2016/679), and any other applicable national data protection legislation.

14.3.2 **No Inconsistent Obligations**. It will not, and will ensure that its Affiliates will not, take any action or enter into any agreement with any Third Party that diminishes the rights granted to the other Party under this Agreement.

14.3.3 **Foreign Corrupt Practices Act of 1977**. In performing under this Agreement, it and its Affiliates agree to comply with all applicable anti-corruption laws, including the Foreign Corrupt Practices Act of 1977, as amended from time-to-time; the anti-corruption laws of the Territory; and all laws enacted to implement the Organization for Economic Cooperation and Development Convention on Combating Bribery of Foreign Officials in International Business Transactions.

14.3.4 **No Bribery**. It will not directly or indirectly offer or pay, or authorize such offer or payment of, any money, or transfer anything of value, to improperly seek to influence any: (a) any elected or appointed government official (*e.g.*, a member of a ministry of health); (b) any employee or person acting for or on behalf of a Governmental Authority; (c) any political party officer, employee, or person acting for or on behalf of a political party or candidate for public office; (d) an employee or person acting for or on behalf of a public international organization; or (e) any person otherwise categorized as a government official under local law.

14.3.5 **Export Control**. Neither it nor its Affiliates will export, transfer, or sell any Product to any country or territory except in compliance with Applicable Law.

14.3.6 **Debarment**. It will not engage, in any capacity in connection with this Agreement or any ancillary agreements, any officer, employee, contractor, consultant, agent, representative, or other person who has been debarred by any Regulatory Authority, including under the Generic Drug Enforcement Act of 1992 (21 U.S.C. §301 et seq.), is under investigation for debarment action by any Regulatory Authority, has been disqualified as an investigator pursuant to 21 C.F.R. §312.70, has a disqualification hearing pending or is currently employing or using any Person that has been so debarred or disqualified by any Regulatory Authority to perform any of such Party's obligations under this Agreement. Each Party will inform the other Party in writing promptly if it or any person engaged by it or any of its Affiliates who is performing any obligations under this Agreement or any ancillary agreements is debarred or excluded, or if any action, suit, claim, investigation or legal or administrative proceeding is pending or, to each Party's knowledge, is threatened, pursuant to which a Party, any of its Affiliates or any such person performing obligations hereunder or thereunder may become debarred or excluded.

14.4. Additional Covenants of HMI.

14.4.1 **Conflicting Transactions**. During the Term, HMI will not, and will cause its Affiliates not to, enter into any agreement granting a license or other right under the HMI Licensed Technology that is inconsistent with this Agreement.

14.4.2 **HMI Third-Party License**. HMI will (a) maintain Control of all Patent Rights and Know-How licensed to NVS under each Third Party License to which HMI or its Affiliates is a party; (b) not materially breach or be in material default under any Third Party License to which HMI or its Affiliates is a party under which HMI Controls HMI Licensed Technology [***] for NVS to Research, Develop, Manufacture or Commercialize any Candidates or Products pursuant to this Agreement in a manner that would permit the counterparty thereto to terminate such Third Party License or otherwise diminish the scope or exclusivity of the licenses granted to NVS under the HMI Licensed Technology; and (c) not terminate or breach any Third Party License to which HMI or its Affiliates is a party in a manner that would terminate rights that are sublicensed to NVS or otherwise diminish the scope or exclusivity of the licenses granted to NVS under the HMI Licensed Technology. In the event that HMI receives notice of an alleged material breach by HMI or its Affiliates under any such Third Party License, where termination of such Third Party License or any diminishment of the scope or exclusivity of the licenses granted to NVS under the HMI Licensed Technology is being or could be sought by the counterparty, then HMI will promptly, but in no event less than [***] thereafter, provide written notice thereof to NVS and grant NVS the right (but not the obligation) to cure such alleged breach. HMI will not amend any Third Party License to which HMI or its Affiliates is a party in any manner that [***] affects NVS' exclusive rights to Research, Develop, Manufacture or Commercialize any Candidates or Products pursuant to this Agreement without NVS' prior written consent.

14.4.3 **Caltech License**. HMI will [***] execute the Caltech Side Letter, in a form reasonably acceptable to NVS, within [***] after the Effective Date.

14.5. **Warranty Disclaimer**. EXCEPT AS EXPRESSLY SET FORTH HEREIN, THE INTELLECTUAL PROPERTY RIGHTS, CANDIDATES, AND MATERIALS PROVIDED BY HMI ARE PROVIDED "AS IS" AND WITHOUT WARRANTY. EXCEPT AS EXPRESSLY SET FORTH HEREIN, EACH OF THE PARTIES EXPRESSLY DISCLAIMS ANY AND ALL WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF DESIGN, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, VALIDITY, OR ENFORCEABILITY OF THEIR RESPECTIVE INTELLECTUAL PROPERTY RIGHTS, AND NONINFRINGEMENT OF THE INTELLECTUAL PROPERTY RIGHTS OF THIRD PARTIES, IN EACH CASE, ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICES, IN ALL CASES WITH RESPECT THERETO.

Article 15. Indemnification; Limitation Of Liability; Insurance

15.1. **Indemnification of HMI by NVS**. Subject to Section 15.4 (Conditions to Indemnification), NVS will defend, indemnify, and hold harmless HMI and its Affiliates, and their respective employees, officers and directors ("**HMI Indemnitees**") from and against any and all liability, damage, loss, cost or expense of any nature (including reasonable attorney's fees and litigation expenses) ("**Losses**") incurred or imposed upon the HMI Indemnitees or any one of them in connection with any claims, suits, actions, demands, proceedings, causes of action or judgments resulting from a Third Party claim arising out of or relating to: (a) subject to Section 15.3 (U.S. [***] Product Liability and U.S. [***] Third Party Infringement), the Development or Commercialization of any Candidate or Product by or on behalf of any NVS Indemnitee; (b) subject to Section 15.3 (U.S. [***] Product Liability and U.S. [***] Third Party Infringement) and any supply agreement entered into between the Parties, the Manufacturing of any Candidates

or Products by or on behalf of any NVS Indemnitee; (c) the breach by any NVS Indemnitee of any term of this Agreement; or (d) the negligence or willful misconduct of any NVS Indemnitee, except in each case of ((a) through (d)), to the extent that any such claim results or arises from a matter for which HMI is obligated to indemnify NVS under Section 15.2 (Indemnification of NVS by HMI).

15.2. **Indemnification of NVS by HMI**. Subject to Section 15.4 (Conditions to Indemnification), HMI will defend, indemnify, and hold harmless NVS and its Affiliates, Sublicensees, and their respective employees, officers and directors ("**NVS Indemnitees**") from and against any and all Losses incurred or imposed upon the NVS Indemnitees or any one of them in connection with any claims, suits, actions, demands, proceedings, causes of action or judgments resulting from a Third Party claim arising out of or relating to (a) the conduct of the Research Activities; (b) subject to Section 15.3 (U.S. [***] Product Liability and U.S. [***] Third Party Infringement) and any supply agreement entered into between the Parties, the Manufacture of any Candidates or Products by or on behalf of any HMI Indemnitee; (c) subject to Section 15.3 (U.S. [***] Product Liability and U.S. [***] Third Party Infringement), the Commercialization of U.S. [***] Products by or on behalf of any HMI Indemnitees; (d) the breach by any HMI Indemnitee of any term of this Agreement; or (e) the negligence or willful misconduct of any HMI Indemnitee except, in each case ((a) through (e)), to the extent that any such claim results or arises from a matter for which NVS is obligated to indemnify HMI under Section 15.1 (Indemnification of HMI by NVS).

15.3. **U.S.** [***] **Product Liability and U.S.** [***] **Product Third Party Infringement**.

15.3.1 **Product Liability**. Subject to any supply agreements or quality agreements entered into between the Parties, (a) any Losses arising out of Third Party product liability claims arising from [***] will be treated as [***]; (b) any Losses arising out of Third Party product liability claims arising from [***]; and (c) any Losses arising out of Third Party product liability claims arising from [***], regardless of which Party incurs such Losses.

15.3.2 **Third Party Infringement**. Any Losses arising out of or relating to infringement, misappropriation, or other violation of the Intellectual Property Rights of any Third Party ("**Third Party Infringement Losses**") arising from (a) **[***]**; and (b) [***].

15.4. **Conditions to Indemnification**. Any Person seeking indemnification (the "**Indemnitee**") under this Article 15 (Indemnification; Limitation Of Liability; Insurance) will give prompt written notice of the indemnity claim to the indemnifying Party and promptly provide a copy to the indemnifying Party of any complaint, summons, or other written or verbal notice that the Indemnitee receives in connection with any such claim. An Indemnitee's failure to deliver written notice will relieve the indemnifying Party of liability to the Indemnitee under this Article 15 (Indemnification; Limitation Of Liability; Insurance) only to the extent such delay is prejudicial to the indemnifying Party's ability to defend or settle such claim. The indemnifying Party will have the right to assume and control the defense of the indemnification claim at its own expense with counsel selected by the indemnifying Party and reasonably acceptable to the Indemnitee; *provided*, *however*, that an Indemnitee will have the right to retain its own counsel, with the fees and expenses to be paid by the indemnifying Party, if representation of such Indemnitee by the counsel retained by the indemnifying Party would be inappropriate due to actual or potential differing interests between the Indemnitee and any other party represented by such counsel in such proceedings. The indemnifying Party will act reasonably and in good faith with respect to all matters relating to such claim. If the indemnifying Party does not assume the defense of the

indemnification claim as described in this Section 15.4 (Conditions to Indemnification), then the Indemnitee may defend the indemnification claim but will have no obligation to do so. The Indemnitee will not settle or compromise the indemnification claim without the prior written consent of the indemnifying Party, and the indemnifying Party will not settle or compromise the indemnification claim in any manner which would have an adverse effect on the Indemnitee's interests (including any rights under this Agreement or the scope, validity, or enforceability of any Patent Rights, Confidential Information, or other rights licensed to NVS by HMI hereunder), without the prior written consent of the Indemnitee, which consent, in each case (by the indemnifying Party or the Indemnitee, as the case may be), will not be unreasonably withheld, conditioned, or delayed. The Indemnitee will reasonably cooperate with the indemnifying Party at the indemnifying Party's expense and will make available to the indemnifying Party all pertinent information under the control of the Indemnitee, which information will be subject to Article 13 (Confidentiality). The indemnifying Party will not be liable for any settlement or other disposition of the claims by the Indemnitee if such settlement is reached without the written consent of the indemnifying Party pursuant to this Section 15.4 (Conditions to Indemnification).

15.5. **Limited Liability**. NEITHER OF THE PARTIES WILL BE ENTITLED TO RECOVER FROM THE OTHER PARTY ANY SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL, OR PUNITIVE DAMAGES OR DAMAGES FOR LOSS OF PROFIT OR LOST OPPORTUNITY IN CONNECTION WITH THIS AGREEMENT, ITS PERFORMANCE OR LACK OF PERFORMANCE HEREUNDER, OR ANY LICENSE GRANTED HEREUNDER, EXCEPT TO THE EXTENT THE DAMAGES RESULT FROM (A) A PARTY'S WILLFUL MISCONDUCT OR NEGLIGENCE UNDER THIS AGREEMENT, (B) A BREACH OF THE OBLIGATIONS OF A PARTY UNDER ARTICLE 13 (CONFIDENTIALITY), (C) INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OWNED OR CONTROLLED BY THE OTHER PARTY, OR (D) AMOUNTS REQUIRED TO BE PAID AS PART OF A CLAIM FOR WHICH A PARTY PROVIDES INDEMNIFICATION UNDER Article 15 (INDEMNIFICATION; LIMITED LIABILITY; INSURANCE).

15.6. **Insurance Obligations**. Each Party will maintain during the Term and for a period of at least [***] after the last commercial sale of any Product for which it is responsible hereunder, and at its cost, reasonable insurance with a reputable solvent insurer against liability and other risks associated with its activities contemplated by this Agreement in an amount appropriate for its business and products of the type that are the subject of this Agreement, and for its obligations under this Agreement; *provided*, *however*, that at a minimum, each Party will maintain, in force beginning at least [***] prior to enrollment of the first subject in a Clinical Trial, product liability insurance policy providing coverage of at least [***]. Each Party will furnish to the other Party evidence of such insurance upon request. [***].

15.7. **Acknowledgement**. The Parties each acknowledge and agree that (a) [***], (b) [***], and (c) [***] will not in and of itself constitute a breach or default of any obligation in this Agreement.

Article 16. Term and Termination

16.1. **Term**. This Agreement will commence on the Effective Date and, unless otherwise terminated pursuant to Section 16.2 (Termination), will continue on a Target-by-Target basis until the expiration of all applicable Royalty Terms with respect to all Products that Modulate such Target on a country-by-country-basis in the Territory (the "**Term**"). On a Product-by-Product and country-by-country basis, effective upon the expiration of the Royalty Term for such Product in such country (but not upon any earlier termination of this Agreement for any reason), the licenses granted to NVS will each become non-exclusive, fully paid-up, royalty-free, irrevocable, and perpetual in such country with respect to such Product.

16.2. **Termination**. This Agreement may be terminated as follows:

16.2.1 **Termination for Convenience by NVS**. NVS may terminate this Agreement on a Target-by-Target basis at will, in its sole discretion, on not less than (a) [***] prior written notice to HMI, following the First Commercial Sale of a Product that Modulates such Target, and (b) [***] prior written notice to HMI, if prior to the First Commercial Sale of a Product that Modulates such Target.

16.2.2 **Termination for Breach**. If a Party commits a material breach of any obligation set forth under this Agreement, then the other Party may terminate this Agreement with respect to the applicable Target that is the subject of such breach, unless such breach is cured within (a) the [***] period after receipt of written notice from the non-breaching Party with respect to any breach of any payment obligation under this Agreement, or (b) the [***] period after receipt of written notice from the non-breaching Party with respect to any other material breach of an obligation set forth under this Agreement; *provided*, that (i) if such breach, by its nature, is curable, but not within the foregoing cure period, then such cure period will be extended for a period of up to [***] (for a total cure period of [***]) if the breaching Party provides a written plan for curing such breach to the non-breaching Party and is using Commercially Reasonable Efforts to cure such breach in accordance with such written plan; and (ii) if the alleged breaching Party disputes in good faith the existence or materiality of any such breach specified in the notice provided by the other Party, and the alleged breaching Party provides notice of such dispute within such [***] period, as applicable, then the Party alleging such breach shall not have the right to terminate this Agreement unless and until the dispute resolution process provided for in Section 17.1 (Dispute Resolution) has been completed (including the tolling and curing period set forth therein).

16.2.3 **Termination for Bankruptcy**. This Agreement may be terminated in its entirety by a Party (the "**Non-Bankrupt Party**") by providing written notice of termination to the other Party upon the filing or institution of bankruptcy, reorganization, liquidation or receivership proceedings, or upon an assignment of a substantial portion of the assets for the benefit of creditors by the other Party (the "**Bankrupt Party**"); *provided*, *however*, that in the event of any involuntary bankruptcy or receivership proceeding such right to terminate will only become effective if the Bankrupt Party consents to the involuntary bankruptcy or receivership or such proceeding is not dismissed within [***] after the filing of such bankruptcy or receivership.

16.2.4 **Termination for Patent Challenge**. If NVS or any of its Affiliates files, assists a Third Party in filing, or joins a Third Party in filing or maintaining, a Patent Challenge of any Patent Right Controlled by HMI that Covers any Candidate or Product, HMI may, in its sole discretion, either (a) terminate this Agreement in its entirety by providing written notice of such termination to NVS or (b) leave the Agreement in effect, but increase each of the Royalty Rates, payable under Section 11.7 (Royalty Payments) by [***] percentage points by providing written notice of such increase to NVS; *provided*, *however*, that no such termination right or Royalty Rate increase right shall apply where (i) such Patent Challenge is brought as a defense in any lawsuit or administrative proceeding first brought by HMI, its Affiliates, or any licensees

for the Patent Rights forming the basis for such claim; or (ii) any Patent Challenge brought by NVS or any of its Affiliates challenging the validity or enforceability of any Patent Rights Controlled by HMI that is not included in the HMI Licensed Technology.

16.3. **Effects of Termination for NVS Breach, Patent Challenge, or for Convenience by NVS**. In the event that (a) HMI terminates this Agreement with respect to a Target for NVS' material breach pursuant to Section 16.2.2 (Termination for Breach), (b) HMI terminates this Agreement for Patent Challenge by NVS or any of its Affiliates pursuant to Section 16.2.4 (Termination for Patent Challenge); or (c) NVS terminates this Agreement with respect to a Target for convenience, then in each case, effective solely as of the effective date of termination, the following provisions will apply with respect to the Terminated Targets and all Candidates and Products that Modulate such Terminated Targets, but excluding, in all cases, any Other Components contained in such Products (the "**Terminated Candidates**" and "**Terminated Products**"), as applicable:

16.3.1 **Termination of Rights and Licenses**. Subject to Section 16.7 (Surviving Provisions), except as expressly set forth in this Agreement, all rights and licenses granted from one Party to the other hereunder will immediately terminate with respect to the Terminated Targets, Terminated Candidates, and Terminated Products, including any sublicenses granted by NVS pursuant to Section 4.3 (Sublicensing Rights); *provided*, *however*, if such termination relates to the [***] Target and was effected by NVS pursuant to Section 16.2.1 (Termination for Convenience by NVS), HMI's obligation to pay [***] with respect to any In-Vivo [***] Product shall remain payable as provided in Section 11.6.2 ([***]).

16.3.2 **Assignment of Regulatory Submissions**. NVS will (a) [***] assign to HMI all of its rights, title, and interests in and to all Clinical Trial data, Regulatory Submissions, and Regulatory Approvals and Pricing Approvals (where applicable) solely related to any Terminated Targets, Terminated Candidates, and Terminated Products owned or Controlled by NVS or any of its Affiliates or its Sublicensees as of the effective date of termination, and (b) [***] transfer ownership of all such assigned Regulatory Submissions and Regulatory Approvals and Pricing Approvals (where applicable) to HMI, including submitting to each applicable Regulatory Authority a letter or other [***] documentation notifying such Regulatory Authority of the transfer of such ownership of such Regulatory Approval and Pricing Approval (where applicable).

16.3.3 **License Grant to HMI For Termination for NVS Breach or NVS Patent Challenge**. If HMI terminates this Agreement with respect to a Target for NVS' material breach or for a Patent Challenge by NVS or any of its Affiliates, NVS will and hereby does, grant to HMI [***] with the [***] (subject to [***]), to (a) such [***] and [***] and [***] to any [***] or [***] then [***] that are not [***] or that are [***] but the [***] which has [***], in each case, pursuant to [***], (b) [***] respect to those [***] at the time [***] of the [***] such [***], in all cases, [***], in each case ((a) and (b)), to the extent [***], and (c) if, [***] has [***] for the purpose of [***]; *provided*, that with respect to **[***]** clauses (b) and (c), [***] subject to [***] if the [***] following the [***]. [***] pursuant to [***] without the [***] and, as far as [***] and be [***] set forth in [***].

16.3.4 **License Grant to HMI For Termination for Convenience by NVS**. If NVS terminates this Agreement with respect to a Target for convenience, NVS will and hereby does, grant to HMI [***], with the [***] (subject to [***]), to (a) such [***] to any [***] that are [***] or [***] but the [***], in each case, pursuant to [***], (b) [***] with respect to [***] or [***] for which [***] has been [***], such [***] as of [***] and [***], in all cases, [***] in or to [***], in each case ((a) and (b)), to the [***], subject to [***], and [***], and (c) if, as of [***] in the [***] for the purpose of [***] such [***]; *provided*, that with respect to [***] clauses (b) and (c), [***] for such [***], subject to [***] following the [***] on such [***]. If [***] or [***] by **[***]** pursuant to **[***]** of the [***], then [***] and as far as [***] such [***] the terms set forth in [***].

16.3.5 **Ongoing Clinical Trials**.

(a) **Transfer to HMI**. Unless prohibited by any Regulatory Authority or Applicable Law, at HMI's written request, NVS will [***] transfer control of all Clinical Trials involving any Terminated Products being conducted by or on behalf of NVS, an Affiliate, or a Sublicensee as of the effective date of termination to HMI or its Affiliates or a Third Party that is designated in writing by HMI. NVS will [***] continue to conduct such Clinical Trials, [***] to minimize interruption of any such Clinical Trials (including the assignment of all related investigator and other agreements relating to such Clinical Trials); *provided*, that HMI will not have any obligation to continue any Clinical Trial unless required by Applicable Law, accepted pharmaceutical industry norms, or ethical practices. [***]

(b) **NVS Wind-Down**. If HMI does not elect to assume control of any such Clinical Trials, then NVS will, in accordance with accepted pharmaceutical industry norms and ethical practices, wind-down any on-going Clinical Trials of Terminated Products for which it has responsibility hereunder in which Dose Initiation has commenced. [***]

16.3.6 **NVS Knowledge and Inventory Transfer**. NVS will provide to HMI or its designated Affiliate or Third Party copies of all material data, reports, records, and other material sales and marketing related information in NVS' possession and Control to the extent that such data, reports, records, materials or other information relate solely to the Development and Commercialization of such Terminated Candidates and Terminated Products. In connection with such transfer, NVS will, at HMI's option transfer to HMI or its designated Affiliate or Third Party all inventory of Terminated Candidates and Terminated Products and components and works in process held by NVS with respect to the Manufacture of Terminated Candidates and Terminated Products as of the effective date of termination of this Agreement at the cost paid by or on behalf of NVS for such inventory.

16.3.7 **Selected Third Party Agreements**. At HMI's written request, NVS will [***] HMI any Selected Third Party Agreement related solely to any Terminated Candidates or Terminated Products requested by HMI, unless assignment of any such Selected Third Party Agreement is not permitted, in which case NVS (or such Affiliate or Sublicensee, as applicable) will [***] secure the consent of the applicable Third Party to such assignment. If any assignment or such consent cannot be obtained with respect to a Selected Third Party Agreement, then, for a period of up to [***] from the effective date of termination, NVS will, or will cause such Affiliates or Sublicensees, as applicable, to, [***] obtain for HMI [***] practical benefit and burden under such Selected Third Party Agreement by entering into [***] alternative arrangements on terms agreeable to [***].

16.3.8 **Appointment as Exclusive Distributor**. If any Terminated Products are being Commercialized by NVS in any country in the Territory as of the effective date of termination, then, at HMI's election, until the earlier of (a) such time as all Regulatory Approvals and Pricing Approvals (where applicable) with respect to such Terminated Products in such country have been assigned and transferred to HMI, or (b) [***] from the effective date of termination, either (i) NVS will appoint HMI or its designee as its exclusive distributor of such Terminated Products in such country and grant HMI or its designee the right to appoint sub-distributors, to the extent not prohibited by Applicable Law or any written agreement between NVS or any of its Affiliates and a Third Party, or (ii) NVS will have the continued right to sell the Terminated Products in such country from its inventory, and the obligation to continue to Commercialize the Terminated Products in such country in accordance with the terms of this Agreement, and NVS' obligations under this Agreement with respect to all such Terminated Products that NVS sells, including the obligation to remit Royalties to HMI hereunder, will continue in full force and effect during such period.

16.3.9 **Supply of Product**. If NVS is Manufacturing such Terminated Products on the effective date of termination, at HMI's written request, which shall be exercised no later than [***] after the effective date of termination, the Parties will negotiate in good faith a supply agreement under which NVS will supply to HMI such quantities of Terminated Candidates and Terminated Products until the earlier of (a) such time as HMI has established an alternate, validated source of supply for such Terminated Candidates and Terminated Products, and (b) [***] from the anniversary of the effective date of termination of this Agreement. In addition, upon any such termination, any Development Supply Agreements or Commercial Supply Agreements for such Terminated Candidate or Terminated Product shall terminate.

16.3.10 **Responsibility for Costs**. Except as expressly set forth in this Section 16.3 (Effects of Termination for NVS Breach, Patent Challenge, or for Convenience by NVS), if this Agreement is terminated with respect to a Target by NVS for convenience, then within [***] after receipt of an invoice therefor along with reasonable documentation and substantiation of such costs, HMI will reimburse NVS the reasonable costs incurred by NVS in connection with NVS' performance of activities under Section 16.3 (Effects of Termination for NVS Breach, Patent Challenge, or for Convenience by NVS), and if this Agreement is terminated with respect to a Target by HMI for NVS' material breach or by HMI for Patent Challenge, then NVS will bear the costs incurred by NVS in connection with NVS' performance of activities under Section 16.3 (Effects of Termination for NVS Breach, Patent Challenge, or for Convenience by NVS).

16.4. Effects of Termination for Bankruptcy or HMI's Uncured Material Breach. In the event that a Party terminates this agreement pursuant to Section 16.2.3 (Termination for Bankruptcy) or NVS terminates this Agreement with respect to a Target for HMI's material breach then, subject to Section 16.7 (Surviving Provisions), except as expressly set forth in this Agreement, this Agreement and all rights and licenses granted from one Party to the other hereunder will immediately terminate.

16.5. **Special Remedy for HMI's Uncured Material Breach**. In the event that NVS would have the right to terminate this Agreement with respect to a Target for material breach by HMI then, in lieu of exercising such termination right, effective as of the date on which such termination would have taken place: (a) all rights and licenses granted from NVS to HMI with respect to such Target, Product, and Candidate will immediately terminate, including any sublicense granted thereunder; (b) any future milestone payments and future Royalties applicable to Net Sales of such Product will remain applicable in accordance with the terms of this Agreement; and (c) if such Target is the [***] Target for the In-Vivo Field, then: (i) the licenses granted to HMI pursuant to Section 4.2.2 (Exclusive Commercial License) and Section 10.7.3 (Trademark License) with respect to all U.S. [***] Products shall terminate and revert to NVS, (ii) NVS shall be the Commercializing Party for all U.S. [***] Products; (iii) any [***] with respect to any In-Vivo [***] Product shall be accelerated such that any amounts owed to NVS under [***] shall be paid to NVS within [***] days of the effective date of termination; (iv) all review, comment, discussion, or approval rights granted to HMI under this Agreement with respect to such U.S. [***] Products shall terminate, including rights at the JSC or any Subcommittee and rights with respect to regulatory matters, including Jointly-Agreed Regulatory Submissions; (v) NVS' Development, Manufacturing, and Commercialization reporting obligations (other than Royalty Reports) with respect to such Products shall be reduced to [***] NVS' Development, Manufacturing, and Commercialization activities with respect to such Target provided to HMI through the JSC; and (vi) HMI hereby assigns to NVS all of its right, title, and interest in and to Local Trademarks used by HMI with respect to such In-Vivo [***] Product, including the right to sue and recover for past, present, or future infringement, dilution, or other violation thereof, and all goodwill contained in such Local Trademarks. In addition, NVS shall have the right to [***].

16.6. **Confidential Information**. Upon termination of this Agreement for any reason, the Receiving Party will destroy all written, electronic, or other materials containing Confidential Information of the Disclosing Party provided to it by the Disclosing Party in connection with this Agreement, including all copies thereof, within [***] of such termination and provide certification of such destruction to the Disclosing Party; *provided*, that (a) the Receiving Party may retain one copy in its archives solely for the purpose of monitoring its ongoing confidentiality obligations hereunder, and (b) the Receiving Party will not be obligated to destroy such materials containing Confidential Information of the Disclosing Party that are necessary for the Receiving Party to exercise any other license or right of the Receiving Party that survives such termination of this Agreement; *provided*, that the Receiving Party's use of such Confidential Information of the Disclosing Party will continue to be subject to the requirements and restrictions set forth in Article 13 (Confidentiality).

16.7. **Surviving Provisions**. Subject to the other terms and conditions regarding the termination and survival of obligations under this Agreement in the event of expiration or termination of this Agreement, upon expiration or termination of this Agreement, all provisions of this Agreement will cease to have any effect, except that the following provisions will survive any such expiration or termination for any reason for the period of time specified therein, or if not specified, then they will survive indefinitely: Section 4.1.1(c) (Research License), Section 4.1.4 (Assigned Technology License), Section 4.2.3 (Non-Exclusive NVS Manufacturing Improvements License), Section 7.7 (Pharmacovigilance Agreement) and Section 7.8.2 (Recalls), in each case, where the Commercializing Party for the U.S. [***] Product is not the Manufacturing Party, and until such time that such Manufactured U.S. [***] Product is no longer in the market in the U.S., Section 11.8 (Royalty Reports; Payments), Section 11.9 (Other Payments) and Section 11.11 (Currency of Payment) through Section 11.14 (Withholding Taxes)), in each case, until such time as all payments accruing prior to the effective date of termination of the Agreement have been made, Section 11.10 (Records and Audits) for a period of [***] following the effective date of termination of the Agreement, Section 12.1 (Ownership of Inventions), Article 13 (Confidentiality), Article 15 (Indemnification; Limitation of Liability;

Insurance), Section 16.1 (Term), the last sentence, only upon expiration, Section 16.3 (Effects of Termination for NVS Breach, Patent Challenge, or for Convenience by NVS), Section 16.4 (Effects of Termination for Bankruptcy or HMI's Uncured Material Breach), Section 16.6 (Confidential Information), Section 16.7 (Surviving Provisions), and Article 17 (Miscellaneous). Termination of this Agreement will not relieve either Party of any liability that accrued hereunder prior to the effective date of such termination nor preclude either Party from pursuing all rights and remedies it may have hereunder or at law or in equity with respect to any breach of this Agreement. The remedies provided in this Article 16 (Term and Termination) are not exclusive of any other remedies a Party may have in law or equity.

Article 17. Miscellaneous

17.1. Dispute Resolution.

17.1.1 **Escalation**. In the event of any dispute, claim, controversy or cause of action asserted by a Party against the other Party or by the HMI Indemnitees against NVS or by the NVS Indemnitees against HMI arising out of or related to this Agreement or performance of this Agreement (a "**Claim**"), including any alleged breach of this Agreement or claim for indemnification pursuant to Article 15 (Indemnification; Limitation Of Liability; Insurance), such Party may, by written notice to the other Party, refer such matter to the Parties' respective officers designated below for attempted resolution (each, an "**Executive Officer**"):

For NVS: [***]

For HMI: [***]

17.1.2 **Full Arbitration**. Except as otherwise expressly set forth in this Agreement, if such Executive Officers do not resolve the dispute within [***] after receipt of such request, then, either Party may at any time after such [***] period submit such Claim to be finally settled by arbitration administered in accordance with the procedural rules of the American Arbitration Association (the "**AAA**") in effect at the time of submission, as modified by this Section 17.1.2 (Full Arbitration) (the "**Arbitration**"). The Arbitration will be governed by the Applicable Law of the State of New York. The Arbitration will be heard and determined by 3 arbitrators who are retired judges or attorneys with at least [***] of relevant experience in the pharmaceutical and biotechnology industry, each of whom will be impartial and independent and will not have worked for or on behalf of either Party for at least [***]. Each Party will appoint one arbitrator and the third arbitrator will be selected by the 2 Party-appointed arbitrators, or, failing agreement within [***] following appointment of the second arbitrator, by the AAA. Such Arbitration will take place in New York, New York. The Arbitration award so given will, absent manifest error, be a final and binding determination of the Claim, will be fully enforceable in any court of competent jurisdiction, and will not include any damages expressly prohibited by Section 15.5 (Limited Liability). NVS will pay the fees, costs and expenses for the arbitrator it chooses, HMI will pay the fees, costs and expenses for the arbitrator it chooses, and the Parties will share payment for the third arbitrator. Except in a proceeding to enforce the results of the Arbitration or as otherwise required by Applicable Law or securities exchange, neither Party nor any arbitrator may disclose the existence, content or results of any Arbitration hereunder without the prior written consent of both Parties.

17.1.3 **Expedited Arbitration**. If a Party exercises its rights under this Agreement to refer a dispute to expedited arbitration (an "**Expedited Dispute**"), then the Parties will follow the expedited dispute resolution process in this Section 17.1.3 (Expedited Arbitration) (and not the dispute resolution process in Section 17.1.2 (Full Arbitration)) ("**Expedited Arbitration**"). The Parties agree and acknowledge that any good faith dispute under Expedited Arbitration will not be deemed to be a material breach of this Agreement. The Expedited Dispute will be submitted to fast-track, binding arbitration in accordance with the following:

(a) Prior to referring an Expedited Dispute to arbitration, each Party will provide the other Party with a proposal and written memorandum in support of its position regarding the Expedited Dispute, as well as any documentary evidence it wishes to provide in support thereof (each a "**Brief**"). If the Parties cannot resolve the Expedited Dispute within [***] of exchanging Briefs, the Parties will refer the Expedited Dispute to arbitration.

(b) Arbitration will be conducted in New York, New York under the rules of the AAA for the resolution of commercial disputes in the most expedited manner permitted by such rules. The Parties will appoint a single arbitrator to be selected by mutual agreement. If the Parties are unable to agree on an arbitrator, the Parties will request that the AAA select the arbitrator. The arbitrator will be a professional in business or licensing experienced in the valuation of biopharmaceutical products with at least [***] of experience in the pharmaceutical and life sciences industries, including the conduct of research, development and commercialization collaborations. The cost of the arbitration will be borne equally by the Parties. Except in a proceeding to enforce the results of the arbitration or as otherwise required by Applicable Law, neither NVS nor HMI nor any arbitrator may disclose the existence, content or results of any arbitration hereunder without the prior written agreement of NVS and HMI.

(c) Within [***] after such matter is referred to arbitration, each Party will provide the arbitrator with its Brief, which may be revised from the form provided to the other Party pursuant to paragraph (a) above, and the arbitrator will provide each Party's Brief to the other Party after it receives it from both Parties.

(d) Within [***] after a Party submits its Brief, the other Party will have the right to respond thereto. The response and any material in support thereof will be provided to the arbitrator and the other Party.

(e) The arbitrator will have the right to meet with the Parties as necessary to inform the arbitrator's determination and to perform independent research and analysis. Within [***] of the receipt by the arbitrator of both Parties' responses (or expiration of the [***] period if any Party fails to submit a response), the arbitrator will deliver his/her decision regarding the Expedited Dispute in writing; *provided*, that the arbitrator will select one of the resolutions proposed by the Parties.

17.1.4 [***]. The Parties agree that [***] as well as [***] in which [***], will be [***] set forth in [***] for so long as [***], and the [***] such [***]. In addition, [***] of any [***], including under [***], (a) this [***], (b) the [***], (c) the [***] as to any [***], (d) any [***], and (e) [***] will [***], until the [***] and the [***] of the [***] to be the [***] for the [***]; *provided*, that if such [***] by (i) the [***] will have [***] of the [***] or (ii) the [***], the [***] will [***] and complete such [***] within such [***] or any [***] by such [***] before any such [***]. Further, with respect to [***] of the [***] will have [***] or any [***] by such [***] or [***] by the [***] of such [***].

17.2. **Designation of Affiliates**. Each Party may discharge any obligations and exercise any rights under this Agreement through delegation of its obligations or rights to any of its Affiliates. Each Party hereby guarantees the performance by its Affiliates of such Party's obligations under this Agreement, and will cause its Affiliates to comply with the provisions of this Agreement in connection with such performance. Any breach by a Party's Affiliate of any of such Party's obligations under this Agreement will be a breach by such Party, and the other Party may proceed directly against such Party without any obligation to first proceed against such Party's Affiliate.

17.3. **Injunctive Relief**. Notwithstanding anything to the contrary set forth in this Agreement, the Parties each stipulate and agree that (a) the other Party's Confidential Information includes highly sensitive trade secret information, (b) a breach of Article 13 (Confidentiality) by a Party with respect to such information may cause irrevocable harm for which monetary damages would not provide a sufficient remedy, and (c) in such case of a breach of Article 13 (Confidentiality), the non-breaching Party will be entitled to seek equitable relief (including temporary or permanent restraining orders, specific performance or other injunctive relief) from any court of competent jurisdiction. In addition, and notwithstanding anything to the contrary set forth in this Agreement, in the event of any other actual or threatened breach hereunder, the aggrieved Party may seek equitable relief (including temporary or permanent restraining orders, specific performance or other injunctive relief) from any court of competent jurisdiction without first submitting to the dispute resolution procedures set forth in Section 17.1 (Dispute Resolution).

17.4. **Governing Law**. This Agreement will be governed by and construed in accordance with the laws of the State of New York without taking into consideration any choice of law principles that would lead to the application of the laws of another jurisdiction.

17.5. **Waiver of Jury Trial**. TO THE EXTENT NOT PROHIBITED BY APPLICABLE LAW THAT CANNOT BE WAIVED, THE PARTIES HEREBY WAIVE, AND COVENANT THAT THEY WILL NOT ASSERT (WHETHER AS PLAINTIFF, DEFENDANT OR OTHERWISE), ANY RIGHT TO TRIAL BY JURY IN ANY ACTION ARISING IN WHOLE OR IN PART UNDER OR IN CONNECTION WITH THIS AGREEMENT, WHETHER NOW EXISTING OR HEREAFTER ARISING, AND WHETHER SOUNDING IN CONTRACT, TORT, OR OTHERWISE. THE PARTIES AGREE THAT ANY OF THEM MAY FILE A COPY OF THIS PARAGRAPH WITH ANY COURT AS WRITTEN EVIDENCE OF THE KNOWING, VOLUNTARY AND BARGAINED-FOR AGREEMENT AMONG THE PARTIES IRREVOCABLY TO WAIVE ITS RIGHT TO TRIAL BY JURY IN ANY PROCEEDING WHATSOEVER BETWEEN THEM RELATING TO THIS AGREEMENT WILL INSTEAD BE TRIED IN A COURT OF COMPETENT JURISDICTION BY A JUDGE SITTING WITHOUT A JURY.

17.6. **Cumulative Remedies**. The rights and remedies of the Parties under this Agreement are cumulative and not exclusive and, accordingly, are in addition to and not in lieu of any other rights and remedies of the Parties at law or in equity.

17.7. **Notices**. Any notice or report required or permitted to be given or made under this Agreement by either Party to the other will be in writing and delivered to the other Party at its address indicated below or to such other address as the addressee will have theretofore furnished in writing to the addressor by hand, courier or by registered or certified airmail (postage prepaid), in writing, by registered or certified airmail (postage prepaid):

If to NVS: Novartis Institutes for BioMedical Research, Inc.
250 Massachusetts Avenue
Cambridge, MA 02139
Attention: General Counsel

If to HMI: Homology Medicines, Inc.
45 Wiggins Avenue
Bedford, MA 01730
Attention: Chief Operating Officer

Copy to (which copy will not constitute notice):

Homology Medicines, Inc.
45 Wiggins Avenue
Bedford, MA 01730
Attention: Vice President, Intellectual Property

Copy to (which copy will not constitute notice):

Ropes & Gray LLP
800 Boylston Street, Prudential Tower
Boston, MA 02199
Attention: David M. McIntosh

All notices will be deemed effective: (a) if by courier, on the Business Day of delivery as evidenced by the courier's receipt (or if delivered or sent on a non-Business Day, then on the next Business Day); or (b) if sent by registered or certified airmail, on the Business Day of receipt as evidenced on the return receipt.

17.8. **Amendment; Waiver**. This Agreement may be amended, modified, superseded or cancelled only by a written agreement between the Parties, and any of the terms of this Agreement may be waived only by a written instrument executed by each Party or, in the case of waiver, by the Party or Parties waiving compliance. The delay or failure of either Party at any time or times to require performance of any provisions will in no manner affect the rights at a later time to enforce the same. No waiver by either Party of any condition or of the breach of any term contained in this Agreement, whether by conduct, or otherwise, in any one or more instances, will be deemed to be, or considered as, a further or continuing waiver of any such condition or of the breach of such term or any other term of this Agreement.

17.9. **Assignment and Successors**. Neither Party may assign or transfer this Agreement and the licenses granted under this Agreement without the other Party's prior written consent *unless* such assignment is to (a) a Third Party successor or purchaser of all or substantially all of the assets or businesses to which this Agreement relates whether pursuant to a sale of assets, merger, or other transaction, in which case the assigning Party will provide prior written notice to the other Party and need not obtain the other Party's consent, or (b) an Affiliate of such Party, in which case the

assigning Party will provide prior written notice to the other Party and need not obtain the other Party's consent; *provided*, that the assigning Party remains fully liable for the performance of its obligations hereunder by such assignee. [***] Any other assignment of this Agreement by a Party requires the prior written consent of the other Party. An assignment to an Affiliate will terminate, and all rights so assigned will revert to the assigning Party, if and when such Affiliate ceases to be an Affiliate of the assigning Party. For clarity, any assignment in violation of this Section 17.9 (Assignment and Successors) will be null, void, and of no legal effect. This Agreement will be binding upon and inure to the benefit of the Parties and their respective legal representatives, successors and permitted assigns.

17.10. **Force Majeure**. Neither NVS nor HMI will be liable for failure of or delay in performing obligations set forth in this Agreement, and neither will be in breach of its obligations, to the extent such failure or delay is due to a Force Majeure; *provided*, *however*, that a Force Majeure will not excuse any Party from any undisputed payment obligations to the other Party under this Agreement. In event of such Force Majeure, the Party affected will use reasonable efforts to avoid or remove such causes of nonperformance, and will continue to perform hereunder with reasonable dispatch whenever such causes are removed. The Party invoking such Force Majeure rights of this Section 17.10 (Force Majeure) must promptly notify the other Party by courier or overnight dispatch (*e.g.*, Federal Express) within a period of [***] of both the first and last day of the Force Majeure.

17.11. **Interpretation**. The Parties acknowledge and agree that: (a) each Party and its counsel reviewed and negotiated the terms and provisions of this Agreement and have contributed to its revision; (b) the rule of construction to the effect that any ambiguities are resolved against the drafting Party will not be employed in the interpretation of this Agreement; and (c) the terms and provisions of this Agreement will be construed fairly as to each Party and not in a favor of or against either Party, regardless of which Party was generally responsible for the preparation of this Agreement. In addition, except as otherwise explicitly specified to the contrary, (i) references to a section, schedule or exhibit means a section of, or schedule or exhibit to this Agreement, unless another agreement is specified, (ii) the word "including" (in its various forms) means "including without limitation," (iii) the words "shall" and "will" have the same meaning, (iv) references to a particular statute or regulation include all rules and regulations thereunder and any predecessor or successor statute, rules or regulations, in each case as amended or otherwise modified from time-to-time, (v) words in the singular will be held to include the plural and vice versa, and words of one gender will be held to include the other gender as the context requires, (vi) references to a particular Person include such Person's successors and assigns to the extent not prohibited by this Agreement, (vii) references to "days" will mean calendar days, unless otherwise specified, (viii) the word "or" will not be exclusive, unless the context otherwise requires, (ix) references to "written" or "in writing" include in electronic form, (x) the titles and headings contained in this Agreement are for reference purposes only and will not affect in any way the meaning or interpretation of this Agreement, (xi) the terms "hereof," "hereby," "hereto," and derivative or similar words refer to this entire Agreement, including any schedules or exhibits hereto, and (xii) unless otherwise specified, "$" is in reference to United States Dollars.

17.12. **Integration**. This Agreement and the COH Side Letter, together with all exhibits and schedules attached hereto, sets forth the entire agreement with respect to the subject matter hereof and thereof and supersedes all other agreements and understandings between the Parties with respect to such subject matter, including the Confidentiality Agreements.

17.13. **Severability**. Each Party hereby agrees that it does not intend to violate any public policy, statutory or common laws, rules, regulations, treaty, or decision of any government agency or executive body thereof of any country or community or association of countries. Should one or more provisions of this Agreement be or become invalid, the Parties will substitute, by mutual consent, valid provisions for such invalid provisions which valid provisions in their economic effect are sufficiently similar to the invalid provisions such that it can be reasonably assumed that the Parties would have entered into this Agreement with such valid provisions. In case such valid provisions cannot be agreed upon, the invalidity of one or several provisions of this Agreement will not affect the validity of this Agreement as a whole, unless the invalid provisions are of such essential importance to this Agreement such that it is to be reasonably assumed that the Parties would not have entered into this Agreement without the invalid provisions.

17.14. **Further Assurances**. Each of HMI and NVS agrees to duly execute and deliver, or cause to be duly executed and delivered, such further instruments and do and cause to be done such further acts and things, including, the filing of such additional assignments, agreements, documents and instruments, as the other Party may at any time and from time-to-time reasonably request in connection with this Agreement or to carry out more effectively the provisions and purposes of, or to better assure and confirm unto such other Party its rights and remedies under, this Agreement.

17.15. **Rights in Bankruptcy**. All licenses and rights to licenses granted under or pursuant to this Agreement by the Bankrupt Party to the Non-Bankrupt Party are, and will otherwise be deemed to be, for purposes of Section 365(n) of the United States Bankruptcy Code (the "**Bankruptcy Code**"), licenses of rights to "intellectual property" as defined under Section 101(35A) of the Bankruptcy Code. The Parties agree that the Non-Bankrupt Party, as a licensee of such rights under this Agreement, will retain and may fully exercise all of its rights and elections under the Bankruptcy Code. The Parties further agree that upon commencement of a bankruptcy proceeding by or against the Bankrupt Party under the Bankruptcy Code, the Non-Bankrupt Party will be entitled to a complete duplicate of, or complete access to (as the Non-Bankrupt Party deems appropriate), all such intellectual property and all embodiments of such intellectual property. Such intellectual property and all embodiments of such intellectual property will be promptly delivered to the Non-Bankrupt Party (a) upon any such commencement of a bankruptcy proceeding and upon written request by the Non-Bankrupt Party, unless the Bankrupt Party elects to continue to perform all of its obligations under this Agreement, or (b) if not delivered under (a) above, upon the rejection of this Agreement by or on behalf of the Bankrupt Party and upon written request by the Non-Bankrupt Party. The Bankrupt Party (in any capacity, including debtor-in-possession) and its successors and assigns (including any trustee) agrees not to interfere with the exercise by the Non-Bankrupt Party or its Affiliates of its rights and licenses to such intellectual property and such embodiments of intellectual property in accordance with this Agreement, and agrees to assist the Non-Bankrupt Party and its Affiliates in obtaining such intellectual property and such embodiments of intellectual property in the possession or control of Third Parties as reasonably necessary or desirable for the Non-Bankrupt Party to exercise such rights and licenses in accordance with this Agreement. The foregoing provisions are without prejudice to any rights the Non-Bankrupt Party may have arising under the Bankruptcy Code or other Applicable Law.

17.16. **Counterparts**. This Agreement may be executed simultaneously in any number of counterparts by digital or telephonic facsimile transmission, each of which will be an original and both of which, together, will constitute a single agreement.

[Remainder of page intentionally left blank.]

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their duly authorized representatives.

HOMOLOGY MEDICINES, INC.

By: /s/ Arthur Tzianabos
Name: Arthur Tzianabos
Title: President & Chief Executive Officer

NOVARTIS INSTITUTES FOR BIOMEDICAL RESEARCH, INC.

By: /s/ Scott A. Brown
Name: Scott A. Brown
Title: VP, General Counsel

[Signature Page to Collaboration and License Agreement]

Exhibit A

Form of Invoice

[***]

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

Schedule 1.130

HMI Platform Patent Rights

[***]

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

Schedule 1.165

Knowledge of HMI

[***]

Schedule 3.4.1

General Research Plan

1. [***]

Schedule 4.5

Third Party License Terms

[***]

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Schedule 14.2

Exceptions to Representations and Warranties

[***]

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Schedule 14.2.1

HMI Patent Rights

[***]

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

Schedule 14.2.2

Third Party Licenses of HMI

The COH License

The CalTech License

Exhibit 10.15

Confidential Treatment Requested by Homology Medicines, Inc.

EXCLUSIVE LICENSE AGREEMENT

THIS EXCLUSIVE LICENSE AGREEMENT (the "**Agreement**") is made and entered into as of the 28th day of April, 2016 (the "**Effective Date**") by and between Homology Medicines, Inc., a Delaware corporation with a principal place of business at 44 Hartwell Avenue, Suite 102, Lexington, Massachusetts 02421 ("**Licensee**") and City of Hope, a California nonprofit public benefit corporation located at 1500 East Duarte Road, Duarte, California 91010 ("**City of Hope**" or "**COH**"). Licensee and COH are each sometimes referred to herein individually as a "**Party**" and collectively as the "**Parties**."

WHEREAS:

A. COH operates an academic research and medical center that encourages the use of its inventions, discoveries and intellectual property for the benefit of the public and COH Controls (as defined below) certain Patent Rights (as defined below) useful in the Field (as defined below);

B. Research relating to the Patent Rights was sponsored in part by the National Institute of Health, and as a consequence this license is subject to obligations to the United States Federal Government under 35 U.S.C. §§ 200-212 and applicable U.S. government regulations;

C. Licensee is a company dedicated to the commercial development and exploitation in the Field (as defined below) of products and services that incorporate one or more of the technologies described in the Patent Rights and therefore Licensee desires to obtain from COH a worldwide, exclusive license under the Patent Rights, on the terms and subject to the conditions set forth herein;

D. The Parties have entered into a Sponsored Research Agreement, dated [***] (the "**SRA**");

E. The Parties have entered into an Option To Acquire An Exclusive License (the "**Option**") dated [***] (the "**Option Effective Date**")

F. Pursuant to the Option, Licensee has exercised its option to acquire an exclusive license as set forth in the Option; and

G. The Certificate of Incorporation of Licensee is in the form attached hereto as Exhibit 1 (the "**Charter**").

NOW, THEREFORE, in consideration of the mutual covenants contained herein, and for other good and valuable consideration, the amount and sufficiency of which are hereby acknowledged, the Parties hereby agree as follows:

ARTICLE 1
DEFINITIONS

1.1 "**Act**" means the Securities Act of 1933, as amended.

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Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

1.2 "**Affiliate**" of a Party means a Person that, directly or indirectly (through one or more intermediaries) controls, is controlled by, or is under common control with such Party. For purposes of this ***Section 1.2***, "control" means (i) the direct or indirect ownership of 50 percent or more of the voting stock or other voting interests or interests in profits, or (ii) the ability to otherwise control or direct the decisions of board of directors or equivalent governing body thereof by contract or otherwise.

1.3 "**Background Patents**" means (i) the patents set forth in Exhibit 2; (ii) foreign equivalents that claim the same invention(s) and priority date as the foregoing, and (iii) renewals, reissues, and re-examinations of any of the foregoing.

1.4 "**Business Day**" means any day, other than a Saturday, Sunday or day on which commercial banks located in Los Angeles, California, are authorized or required by law or regulation to close.

1.5 "**Commercially Reasonable Efforts**" means the exercise of such efforts and commitment of such resources by Licensee, directly or through one or more Sublicensees, in a diligent manner consistent with [***]. In the event that Licensee or a Sublicensee with respect to a given Licensed Product or Licensed Service, has a program or product that competes with the programs contemplated by this Agreement with respect to such Licensed Product or Licensed Service, then "Commercially Reasonable Efforts" shall also mean [***].

1.6 "**COH Shares**" means the shares of Common Stock to be issued to COH or its designees in accordance with ***Section 4.3***.

1.7 "**COH Confidential Information**" means Confidential Information owned or controlled by COH, and disclosed or provided by or on behalf of COH to Licensee or its designees.

1.8 "**Common Stock**" means Common Stock, par value $0.0001 per share, of Licensee.

1.9 "**Confidential Information**" means: (i) all information and materials (of whatever kind and in whatever form or medium) owned or controlled by, and disclosed by or on behalf of, one Party to the other Party (or its designee) in connection with this Agreement, whether prior to or during the term of this Agreement and whether provided orally, electronically, visually, or in writing; provided that all such information and materials initially disclosed in writing or electronically shall be clearly marked as "CONFIDENTIAL" and all such materials and information initially disclosed orally shall be reduced to writing and marked as "CONFIDENTIAL" within 10 days following the date of initial oral disclosure; (ii) all copies of the information and materials described in (i) above; and (iii) each of the terms and conditions of this Agreement; provided further that Confidential Information shall not include information to the extent a Party can demonstrate through its contemporaneous written records that such information has been:

(a) known to the receiving Party, or in the public domain, at the time of its receipt by a Party, or which thereafter becomes part of the public domain other than by virtue of a breach of this Agreement or the obligations of confidentiality under this Agreement;

(b) received without an obligation of confidentiality from a Third Party having the right to disclose without restrictions such information;

(c) independently developed by the receiving Party without use of or reference to Confidential Information disclosed by the other Party; or

(d) released from the restrictions set forth in this Agreement by the express prior written consent of the disclosing Party.

1.10 "**Control(s)**" or "**Controlled**" means the possession by a Party, as of the Effective Date, of rights sufficient to effect the grant of rights set forth in this Agreement without violating the terms of any agreement with any Third Party.

1.11 "**Core Know-How**" means the know-how directly related to the Core Patents, and related tangible materials, in each case, (a) solely as owned or Controlled by COH as of the Option Effective Date, and (b) as identified on Exhibit 3, as the same may be amended from time to time by mutual written consent of the Parties.

1.12 "**Core Patents**" means the Group Patents and SRA Patents.

1.13 "**Covers**" or "**Covered by**," with reference to a particular Licensed Product or Licensed Service, means that the manufacture, use, sale, offering for sale, or importation of such Licensed Product or performance of such Licensed Service would, but for ownership of, or a license granted under this Agreement to, the relevant Patent Right, infringe a Valid Claim in the country in which the activity occurs.

1.14 "**Developed AAVFs**" means any [***] other than those identified in Exhibit 5.

1.15 "**Dispute**" means any controversy, claim or legal proceeding arising out of or relating to this Agreement, or the interpretation, breach, termination, or invalidity of this Agreement.

1.16 "**Equity Financing**" means the issuance of capital stock of Licensee, in one or more bona fide equity financing transactions, including any such capital stock issued upon the exercise, conversion or exchange of all evidences of indebtedness, shares or other securities directly or indirectly convertible into or exchangeable for Common Stock.

1.17 "**First Commercial Sale**" means, with respect to a particular Licensed Product or Licensed Service in a given country, the first arm's-length commercial sale of such Licensed Product or the first performance of such Licensed Service following Marketing Approval in such country by or under authority of Licensee or any Sublicensee to a Third Party who is not a Sublicensee.

1.18 "**GAAP**" means generally accepted accounting principles, consistently applied, as promulgated from time to time by the Financial Accounting Standards Board.

1.19 "**Group Patents**" means (i) the patents and patent applications set forth on Exhibit 4; (ii) patents, patent applications, continuation and divisional applications and foreign equivalents that claim priority to and the same priority date as the foregoing patents or patent applications, (iii) continuation-in-part applications that claim priority to and the same priority date as any of the foregoing patents or patent applications, (iv) letters patent or the equivalent issued on any of the foregoing applications throughout the world, and (v) amendments, extensions, renewals, reissues, and re-examinations of any of the foregoing. Notwithstanding the foregoing, "Group Patents" shall only include any continuation-in-part application to the extent that claims in such continuation-in-part application are supported in the specification of the parent application, unless otherwise mutually agreed to in writing by the parties to this Agreement.

1.20 "**License Year**" means each calendar year during the term of this Agreement; except that the first License Year shall commence on the Effective Date and end on December 31 of the calendar year in which the Effective Date occurs.

1.21 "**Licensed Product**" means a product (including kits, component sets or components thereof, regardless of concentration or formulation) that: (i) is Covered by a Valid Claim, (ii) is manufactured by a process or used in a method Covered by a Valid Claim, or (iii) contains, as an active ingredient, any substance the manufacture, use, offer for sale or sale of which is Covered by a Valid Claim. By way of clarification, "Licensed Product" shall include a product manufactured in a country in which such manufacture is Covered by a Valid Claim and thereafter exported to and sold in a country in which no Valid Claim exists.

1.22 "**Licensed Service**" means any service the performance of which would, but for the license granted herein, be Covered by a Valid Claim.

1.23 "**Licensee Confidential Information**" means Confidential Information owned or controlled by, and disclosed or provided by or on behalf of, Licensee to COH or its designees.

1.24 "**Mammalian Therapeutics Field**" means the field of mammalian therapeutics, associated diagnostics, and target validation; provided, that, the Mammalian Therapeutics Field specifically excludes the Research Reagent Field.

1.25 "**Marketing Approval**" means all approvals, licenses, registrations or authorizations of any federal, state or local regulatory agency, department, bureau or other governmental entity, necessary for the manufacturing, use, storage, import, transport, marketing and sale of Licensed Products or performance of Licensed Services in a country or regulatory jurisdiction.

1.26 "**Net Proceeds**" means the net proceeds actually received by Licensee from all sales of shares of capital stock after deduction of all transaction expenses, finder's fees, advisory fees, legal fees, sales commissions or similar amounts paid to brokers or dealers and other costs and expenses incurred by Licensee or its subsidiaries in connection therewith. In the event such net proceeds are not paid to Licensee in cash, the value of such net proceeds will be the fair market value of the assets constituting such net proceeds.

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1.27 "**Net Sales**" means the total gross amount invoiced by Licensee and its Affiliates and (regardless of whether and when such invoices are actually paid) on the sale of Licensed Products and Licensed Services to Third Parties (including, without limitation, the provision of any product by Licensee and its Affiliates that incorporates a Licensed Product or Licensed Service but for clarity excluding documented sponsored research and/or development activities, valued at the actual direct cost of such activities on a fully burdened basis (including reasonable margin for overhead)), less the following items, [***]:

(a) insurance, handling and transportation charges actually invoiced;

(b) amounts repaid, credited or allowed for rejection, return or recall;

(c) sales or other excise taxes or other governmental charges levied on or measured by the invoiced amount (including, without limitation, value added taxes);

(d) brokerage, customs and import duties or charges; and

(e) normal and customary trade and quantity discounts (including chargebacks and allowances) and rebates which relate to the Licensed Products or Licensed Services.

Sales of Licensed Products between or among Licensee, its Affiliates or its Sublicensees shall be excluded from the computation of Net Sales, except in those instances in which the purchaser is also the end-user of the Licensed Product sold. [***].

If more than one product or service sold separately by Licensee are combined for sale at a single offering price, the total gross amount invoiced for purposes of determining Net Sales shall be calculated by multiplying the revenue for said combined sale by the fraction A/(A+B), where A is the sum of the offering prices of each product and service that independently constitutes a Licensed Product or Licensed Service when sold separately, and B is the sum of the offering prices of each other product or service combined therewith at said single offering price.

1.28 "**Option Effective Date"** has the meaning set forth in the Recitals.

1.29 "**Patent Rights**" means the Background Patents and Core Patents.

1.30 "**Person**" means any person or entity, including any individual, trustee, corporation, partnership, trust, unincorporated organization, limited liability company, business association, firm, joint venture or governmental agency or authority.

1.31 "**Phase 1 Clinical Trial**" means, as to a specific Licensed Product or Licensed Service, a study as described in 21 C.F.R. §312.21(a) or a comparable clinical study in a country other than the United States.

1.32 "**Phase 2 Clinical Trial**" means, as to a specific Licensed Product or Licensed Service, a study in humans designed with the principal purpose of determining initial efficacy and dosing of such Licensed Product in patients for the indication(s) being studied as described in 21 C.F.R. §312.21(b); or a similar clinical study in a country other than the United States.

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1.33 "**Phase 3 Clinical Trial**" means, as to a specific Licensed Product or Licensed Service, a lawful study in humans of the efficacy and safety of such Licensed Product or Licensed Service, which is prospectively designed to demonstrate statistically whether such Licensed Product is effective and safe for use in a particular indication in a manner sufficient to file an application to obtain Marketing Approval to market and sell that Licensed Product or Licensed Service in the United States or another country for the indication being investigated by the study, as described in 21 C.F.R. § 312.21(c); or similar clinical study in a country other than the United States.

1.34 "**Pre-Existing AAVFs**" means the adeno-associated virus vectors identified in Exhibit 5.

1.35 "**Qualified Financing**" means the sale of capital stock of Licensee, in one or more transactions, including capital stock issuable (assuming the satisfaction of any conditions to exercisability, convertibility or exchangeability) upon the exercise, conversion or exchange of all evidences of indebtedness, shares or other securities directly or indirectly convertible into or exchangeable for Common Stock, including all rights, options or warrants to subscribe for, purchase or otherwise acquire shares of Common Stock, that constitute a bona fide Equity Financing at such time as the gross proceeds to Licensee from third party investors in such Equity Financing(s) ([***]) are less than or equal to the Qualified Financing Protection Ceiling; provided that if capital stock of Licensee is sold in a single transaction or series of related transactions for different purchase prices and any of such shares of capital stock are included for purposes of determining the number of shares of Qualifying Stock to be issued to COH or its designees pursuant to ***Section 4.3***, each share of capital stock that is sold for the lowest purchase price shall be deemed to be have sold first (regardless of the date on which such shares are actually sold) and the next number of shares of capital stock that are sold for the next highest purchase price shall be deemed to have sold next, et cetera, until the gross proceeds from all such sales are equal to the Qualified Financing Protection Ceiling.

1.36 "**Qualified Financing Protection Ceiling**" means $[***].

1.37 "**Qualifying Stock**" means the sum of: (i) the shares of Common Stock issued and to be issued to COH in accordance with ***Section 4.3***, (ii) the number of shares of Common Stock ([***]) of Licensee outstanding, and (iii) the maximum number of shares of Common Stock of Licensee issuable (assuming the satisfaction of any conditions to exercisability, convertibility or exchangeability) upon the exercise, conversion or exchange of all evidences of indebtedness, shares or other securities directly or indirectly convertible into or exchangeable for Common Stock of the Licensee, including all rights, options or warrants to subscribe for, purchase or otherwise acquire shares of Common Stock of the Licensee [***].

1.38 "**Research Reagent**" means a chemical or biologic reagent for use solely for non-clinical laboratory purposes and that is Covered by a Valid Claim.

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1.39 "**Research Reagent Field"** means the field of the manufacture, use, distribution, and sale of Research Reagents for pre-clinical research. For clarity, the "Research Reagent Field" excludes therapeutic or prophylactic administration and commercial diagnostics.

1.40 "**SRA Effective Date**" means [***].

1.41 "**SRA Patents**" means additional patents and patent applications that arise out of (i) the Parties' activities under the SRA; (ii) the efforts of COH and Licensee on or after January 6, 2015 through the SRA Effective Date to apply subject matter of the Background Patents or Group Patents to applications involving hematological disorders or hepatic disorders; (iii) patents, patent applications, continuation and divisional applications and foreign equivalents that claim the same invention(s) and priority date as the foregoing, (iv) continuation-in-part applications that claim the same priority date as any of the foregoing applications, (v) letters patent or the equivalent issued on any of the foregoing applications throughout the world, and (vi) amendments, extensions, renewals, reissues, and re-examinations of any of the foregoing. Notwithstanding the foregoing, "SRA Patents" shall only include any continuation-in-part application to the extent that claims in such continuation-in-part application are supported in the specification of the parent application or are supported by the research conducted prior to the termination of the SRA, unless otherwise mutually agreed to in writing by the parties to this Agreement.

1.42 "**Sublicensee**" means any Third Party which enters into an express agreement with Licensee or an Affiliate involving the grant to such Third Party of a sublicense under the license granted to Licensee pursuant to this Agreement. For avoidance of doubt, Sublicensee excludes (i) vendors and contract research or manufacturing organizations conducting research or manufacturing on behalf of Licensee or an Affiliate solely in connection with activities undertaken on behalf of Licensee and its Affiliates related to the Licensed Products and Licensed Services and that are not otherwise licensed to develop or sell Licensed Products or Licensed Services, and (ii) end users of Licensed Products or Licensed Services.

1.43 "**Sublicense Revenues**" means all consideration, in whatever form, due from a Sublicensee in return for the grant of a sublicense of Licensee's rights hereunder, excluding consideration in the form of: (i) payments or reimbursement for documented sponsored research and/or development activities, valued at the actual direct cost of such activities on a fully burdened basis (including reasonable margin for overhead), (ii) payment or reimbursement of reasonable patent expenses actually incurred or paid by Licensee and not otherwise reimbursed, or payment of patent expenses required to by paid by Licensee hereunder, (iii) payments for the purchase of equity in Licensee at the fair market value of such equity, and (iv) payments received by Licensee from Sublicensees in support of full time equivalent employees, or other in-kind benefit, to run a partnered program. By way of clarification, the principal amount of any loan or other extension of credit provided to Licensee or an Affiliate of Licensee in connection with the grant of a sublicense by Licensee that is other than an arm's-length credit relationship between an established financial institution and Licensee, shall be deemed to constitute "Sublicense Revenues," provided that repayment of said loan or credit shall be set off against Sublicense Revenues. In addition, for clarity, the basis for Sublicense Revenues shall include royalties and milestones received by Licensee from Sublicensee in connection with a sublicense of Licensee's rights hereunder. Sublicense Revenues, however, shall not, in any case, be considered to also constitute Net Sales under this Agreement.

1.44 "**Territory**" means the entire world.

1.45 "**Third Party**" means a Person that is neither a Party to this Agreement nor an Affiliate of a Party.

1.46 "**Unrestricted Field**" means any and all fields.

1.47 "**Valid Claim**" means a claim of a pending patent application or an issued and unexpired patent included in the Patent Rights in a particular jurisdiction, which claim has not, in such jurisdiction, been finally rejected or been declared invalid or cancelled by the patent office or a court of competent jurisdiction in a decision that is no longer subject to appeal as a matter of right, nor been pending for more than [***] ([***]) [***] from the earliest claimed priority date; provided also that Valid Claim shall exclude any pending claim in an application from which no claims have issued for [***] ([***]) [***] from the earliest claimed priority date.

ARTICLE 2
DEVELOPMENT AND COMMERCIALIZATION EFFORTS

2.1 **Development and Commercialization Responsibilities**. Licensee shall have the sole right and responsibility for, and control over, all development, manufacturing and commercialization activities (including all regulatory activities) with respect to Licensed Products and Licensed Services in the Field.

2.2 **Licensee Diligence**.

2.2.1 **Therapeutic Diligence Milestones**. Licensee shall use Commercially Reasonable Efforts to develop and commercialize Licensed Products and Licensed Services in the Mammalian Therapeutic Field, directly or through one or more Sublicensees or Affiliates. Without limiting the foregoing, if Licensee, directly or through one or Sublicensees or Affiliates, fails to accomplish any one of the "Therapeutic Diligence Milestones" set forth in this Section 2.2.1 by the date specified (each a "Deadline Date") corresponding to such Diligence Milestone, COH shall have the right, [***] ([***]) days after written notice to Licensee, to terminate this Agreement or to convert the grant of exclusive rights pursuant to Section 3.2 from exclusive to non-exclusive, without any change in the other terms and conditions of this Agreement. Conversion of the license to non-exclusive pursuant to this Section 2.2.1 shall not constitute a waiver of COH's right to terminate the license thereafter if Licensee's obligations under this Section 2.2.1 continue to be unmet.

"Deadline Date"	**"Therapeutic Diligence Milestone"**
1. [***] Year Anniversary of Effective Date	[***].
2. [***] Year Anniversary of Effective Date	[***].
3. [***] Year Anniversary of Effective Date	[***].
4. [***] Year Anniversary of Effective Date	[***].

Licensee shall provide COH with prompt notice of meeting each of the foregoing Therapeutic Diligence Milestone which notice shall be accompanied by reasonable documentary evidence of the satisfaction of the applicable Therapeutic Diligence Milestone. For avoidance of doubt, [***]; and [***].

2.2.2 **Partnering Milestones**.

(a) Licensee shall use Commercially Reasonable Efforts to (i) [***], or (ii) [***] (each, a "**Partnering Milestone**") in each case, within [***] ([***]) years of the Effective Date (the "**Partnering Milestone Deadline Date**"). If Licensee fails to accomplish at least one of the Partnering Milestones prior to the Partnering Milestone Deadline Date, then [***] ([***]) days after receipt by Licensee of written notice from COH, the exclusive license granted pursuant to ***Section 3.2*** shall convert to the following ("**License Conversion**"):

(i) an exclusive royalty-bearing right and license under the Core Patents and Core Know-How to make, have made, use, sell, offer for sale, have sold, import, export and otherwise exploit Licensed Products and to perform Licensed Services, in the Mammalian Therapeutic Field, in the Territory;

(ii) a non-exclusive royalty-bearing right and license under the Core Patents and Core Know-How to make, have made, use, sell, offer for sale, have sold, import, export and otherwise exploit Licensed Products and to perform Licensed Services, in the Research Reagent Field, in the Territory, provided that any royalty obligations under ***Section 4.5*** hereof and any sublicensee fees under ***Section 4.7*** hereof shall each be reduced to values which are [***] percent ([***]%) of the values set forth therein, respectively; and

(iii) a non-exclusive royalty-bearing right and license under the Core Patents and Core Know-How to make, have made, use, sell, offer for sale, have sold, import, export and otherwise exploit Licensed Products and to perform Licensed Services, in all fields outside of the Mammalian Therapeutic Field and Research Reagent Field, in the Territory, provided that any royalty obligations under ***Section 4.5*** hereof and any sublicensee fees under ***Section 4.7*** hereof shall each be reduced to values which are [***] percent ([***]%) of the values set forth therein, respectively,

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in each case (i), (ii) and (iii), except as set forth above, without any change in the other terms and conditions of this Agreement. For avoidance of doubt, there shall be no License Conversion so long as Licensee accomplishes one of the Partnering Milestones by the Partnering Milestone Deadline Date.

(b) In the event of the a License Conversion pursuant to ***Subsection 2.2.2(a)*** hereof, COH grants to Licensee a right of first negotiation to negotiate an exclusive or non-exclusive, worldwide, royalty bearing, sublicensable license under the Core Patents and Core Know-How in any field outside of the Mammalian Therapeutic Field and Research Reagent Field, in the Territory. Within [***] ([***]) days of failing to meet the Partnering Milestone by the Partnering Milestone Deadline Date, Licensee may notify COH in writing that Licensee has an interest in securing an exclusive license under the Core Patents and Core Know-How in any field outside of the Mammalian Therapeutic Field and Research Reagent Field. If Licensee so advises COH in writing (the "**Election Notice**"), COH and Licensee shall enter into good faith exclusive negotiations for a period of up to [***] ([***]) days after the date of the Election Notice for the grant of an exclusive license from COH to Licensee. If, at the end of such [***] ([***])-day period, COH and Licensee have not entered into such an exclusive license, COH shall be free to exploit its interest in such Core Patents and Core Know-How in all fields outside of the Mammalian Therapeutic Field and Research Reagent Field [***]. If Licensee fails to advise COH of its interest in securing an exclusive license within such [***] ([***])-day period, COH shall be free to exploit its interest in the Core Patents and Core Know-How in all fields outside of the Mammalian Therapeutic Field and Research Reagent Field [***].

(c) Licensee shall provide COH with prompt notice of meeting each of the Partnering Milestones which such notice shall be accompanied by reasonable documentary evidence of the satisfaction of the applicable Partnering Milestone.

2.3 **Governance**. COH and Licensee shall each designate one individual to serve as the main point of contact for communications related to development and commercialization of Licensed Products and Licensed Services under this Agreement (each a "**Designated Representative**"). The initial Designated Representative of COH shall be [***] and the initial Designated Representative of Licensee shall be [***]. Each Party may replace its Designated Representative at any time upon prior notice to the other Party. Licensee shall keep COH reasonably informed as to progress in the development and commercialization of Licensed Products and Licensed Services. Without limiting the foregoing, on or before January 15 and July 15 of each year during the term of this Agreement, Licensee shall provide to COH a written report setting forth, in reasonable detail, its activities and achievements with respect to the development and commercialization of Licensed Products and Licensed Services during the preceding six months, including activities relating to the achievement of Therapeutic Diligence Milestones and Partnering Milestones (the "**Semi-Annual Report**"). The Designated Representatives shall meet in person [***] each calendar year to present and discuss the current Semi-Annual Report at such location and date as mutually agreed. Each Party shall be responsible for all expenses incurred by its Designated Representative in the participation in such annual meetings.

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2.4 **Clinical Trial Center**. Upon request of COH, Licensee agrees to reasonably consider including COH as a site of clinical trials related to oncology and infectious diseases, to the extent appropriate for a particular clinical trial.

ARTICLE 3
LICENSE GRANTS

3.1 **Background Patents License**. COH hereby grants, and to the extent a present grant cannot be made, agrees to grant, to Licensee and its Affiliates a non-exclusive royalty-bearing right and license under the Background Patents to make, have made, use, sell, offer for sale, have sold, import, export and otherwise exploit Licensed Products and to perform, use, offer for sale, sell, have sold, provide and otherwise exploit Licensed Services, in the Unrestricted Field, in the Territory.

3.2 **Core Patents and Know-How License**. Subject to the conversion rights set forth in ***Section 2.2***, COH hereby grants, and to the extent a present grant cannot be made, agrees to grant, to Licensee and its Affiliates an exclusive royalty-bearing right and license under the Core Patents and Core Know-How to make, have made, use, sell, offer for sale, have sold, import, export and otherwise exploit Licensed Products and to perform use, offer for sale, sell, have sold, provide and otherwise exploit Licensed Services, in the Unrestricted Field, in the Territory.

3.3 **Retained Rights**. The grant of rights to Licensee pursuant to ***Sections 3.1*** and ***3.2*** shall be subject to: (i) the retained rights of the U.S. Government in the Patent Rights pursuant to 35 U.S.C. §§ 200-212 and applicable U.S. government regulations, (ii) the non-transferable, royalty-free right of COH and its Affiliates to practice the Patent Rights and Core Know-How for non-profit educational and research uses, provided that such uses shall not include research sponsored by any for-profit Third Parties, (iii) the non-transferable right of COH and its Affiliates to publicly disclose their own research results, to the extent they have such a right under the Parties' agreements and subject to ***Section 11.4***, and (iv) the non-transferable right of COH and its Affiliates to allow other non-profit academic or research institutions to use the Patent Rights and Core Know-How for the same purposes and on the same conditions as (ii) and (iii).

3.4 **No Implied Licenses**. Licensee acknowledges that the licenses granted in this Agreement are limited to the scope expressly granted and that, subject to the terms and conditions of this Agreement, all other rights under all Patent Rights, Core Know-How and other intellectual property rights Controlled by COH are expressly reserved to COH.

3.5 **Sublicensing**. Licensee and Affiliates shall have the right to sublicense its rights hereunder without the consent of COH, effective on notice to COH. The terms and conditions of each sublicense of Licensee's rights hereunder shall be consistent with this Agreement. A true and complete copy of each sublicense of Licensee's rights hereunder, as well as any amendment thereto, shall be delivered to COH promptly following the effective date of each such sublicense or amendment.

3.6 **Documentation of Licensed Services**. Licensee and its Sublicensees and Affiliates shall provide Licensed Services only pursuant to one or more written agreements which set forth, in reasonable detail, all consideration due to Licensee for the provision of such services. Licensee shall provide a true and complete copy of each such agreement to COH promptly following the effective date of such agreement, provided that such copy may be redacted to protect Sublicensee's or Affiliate's confidential information not relevant to compliance with this Agreement, for example, information regarding intellectual property unrelated to the Licensed Patents. For avoidance of doubt, each such agreement shall constitute Licensee Confidential Information.

ARTICLE 4
PAYMENTS

4.1 **Up-Front Payment**. Licensee shall pay to COH non-refundable license fees of seventy-five thousand ($75,000) within [***] ([***]) days after the Effective Date.

4.2 **License Maintenance Fee**. On or before the tenth Business Day after the end of each License Year (excluding the first License Year ending December 31, 2016), Licensee shall pay to COH a non-refundable license maintenance fee of $[***]. The license maintenance fee paid in a given License Year shall be applied as credit against royalties otherwise due to COH pursuant to ***Section 4.5***, below, during the License Year in which payment was made but may not be carried over and applied as credit against royalties due in subsequent years.

4.3 **Stock Grant**.

(a) Subject to the terms and conditions of this Agreement, within [***] ([***]) days of the execution of this Agreement, Licensee will issue to COH and/or such reasonable number of designees as COH may specify (provided that each such designee has: (i) demonstrated to the reasonable satisfaction of Licensee that it is an "accredited investor" as such term is defined in Regulation D promulgated under the Securities Act of 1933 (the "**Act**"), (ii) represented to Licensee that it is acquiring the shares for investment purposes only, and (iii) acknowledged that the shares to be received are restricted securities under the Act (each such designee, an "**Accredited Designee,**" and together with COH, the "**COH Stockholders**")), 814,905 validly issued, fully-paid, non-assessable shares of Common Stock and shall deliver to the applicable COH Stockholders stock certificates evidencing such shares. At the closing of each Qualified Financing that occurs prior to, or that causes, the achievement of the Qualified Financing Protection Ceiling, Licensee will issue to COH and/or such reasonable number of Accredited Designees as COH may specify, a number of shares of validly issued, fully-paid, non-assessable shares of Common Stock that is determined such that upon the completion of such issuance, COH and its designees will hold [***] of the total number of shares of Qualifying Stock, calculated as of immediately after the closing of such Qualified Financing (the "**Measurement Date**"); *provided*, *that*, if a financing causes the achievement of the Qualified Financing Protection Ceiling, only the portion of such financing as would cause the achievement of the Qualified Financing Protection Ceiling shall be deemed a "Qualified Financing" for

purposes of calculating the number of additional shares of Common Stock issuable to COH pursuant to this sentence, and COH shall not be entitled to any additional shares of Common Stock as a result of any proceeds to the Company in a Qualified Financing exceeding the Qualified Financing Protection Ceiling. Promptly after the applicable Measurement Date, Licensee will deliver to the applicable COH Stockholders (i) certificates representing the shares of Common Stock to be issued in accordance with the foregoing, and (ii) a certificate, executed on behalf of Licensee by an executive officer of Licensee, showing Licensee's calculation of the number of shares of Qualifying Stock as of the Measurement Date, the sales price of each share of capital stock issued in the Qualified Financings, and the gross proceeds of the Qualified Financings and Licensee's calculation of the shares of Common Stock to be issued to the COH Stockholders. Such shares of Common Stock will be issued in consideration for the benefits provided to Licensee under the Agreement and no additional consideration shall be payable for such shares of Common Stock.

(b) COH, on behalf of itself and all of the COH Stockholders, represents and warrants to Licensee as follows:

(i) The COH Stockholders acknowledge and agree that the COH Shares will be restricted securities and will not be registered with the Securities and Exchange Commission or qualified with any state securities authority and that, accordingly, the COH Shares may not be distributed, sold or otherwise transferred except pursuant to an effective registration statement under the Act or pursuant to an available exemption from the registration requirements of the Act. COH acknowledges that Licensee has no obligation to register or qualify the COH Shares for resale.

(ii) Each of the COH Stockholders is an "accredited investor" as defined in Rule 501(a) of Regulation D promulgated under the Act. Each of the COH Stockholders is an investor in securities of companies in the development stage and acknowledges that each such COH Stockholder is able to fend for itself, can bear the economic risk of its investment, and has such knowledge and experience in financial or business matters that it is capable of evaluating the merits and risks of the investment in the COH Shares.

(iii) COH hereby confirms that unless the COH Shares are registered under the Securities Exchange Act of 1934, as amended, the COH Shares will be acquired for investment for the applicable COH Stockholder's own account, not as a nominee or agent, and not with a view to the resale or distribution of any part thereof, and that such COH Stockholder has no present intention of selling, granting any participation in, or otherwise distributing the same. COH further represents that the COH Stockholders do not presently have any contract, undertaking, agreement or arrangement with any person to sell, transfer or grant participation rights to such person or to any third person, with respect to any of the COH Shares unless the COH Shares are registered under the Securities Exchange Act of 1934, as amended. No COH Stockholder has been formed for the specific purpose of acquiring the COH Shares.

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(iv) COH understands that the COH Shares and any securities issued in respect of or exchange for the COH Shares, may bear any one or more of the following legends: (a) any legend required by the securities laws of any state to the extent such laws are applicable to the COH Shares represented by the certificate so legended; and (b) the following legend:

> "THE SECURITIES REPRESENTED BY THIS STATEMENT HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED, AND MAY NOT BE TRANSFERRED WITHOUT AN EFFECTIVE REGISTRATION STATEMENT FOR SUCH SECURITIES UNDER SUCH ACT OR PURSUANT TO RULE 144 PROMULGATED UNDER SUCH ACT OR AN OPINION OF COUNSEL SATISFACTORY TO THE CORPORATION THAT REGISTRATION IS NOT REQUIRED UNDER SUCH ACT."

4.4 **Milestone Payments**. Within [***] days after the occurrence of ***each*** "**Milestone Event**" set forth below, whether achieved by Licensee, its Affiliate or a Sublicensee, Licensee shall pay COH or its designee the amount indicated below for [***] Licensed Products or Licensed Services for which [***] is initiated ("**Milestone Products**"):

Milestone Event	Amount Due
#1. [***]	$ [***]
#2. [***]	$ [***]
#3. [***]	$ [***]
#4. [***]	$ [***]
#5. [***]	$ [***]

In the event that any Milestone Event is met with respect to a specific Licensed Product or Licensed Service prior to the satisfaction of any prior Milestone Event with respect to such Licensed Product or Licensed Service, then Licensee shall also pay the amount due for occurrence of all prior Milestone Events not previously paid upon meeting the development milestone for such Licensed Product or Licensed Service ([***]).

4.5 **Royalties**.

(a) Subject to ***Subsection (c)*** below, with respect to Licensed Products that comprise [***], Licensee shall pay to COH or its designee royalties on Net Sales at a rate of (i) [***] percent if annual Net Sales are up to and including $[***]; (ii) [***] percent if annual Net Sales are greater than $[***] up to and including $[***]; and (iii) [***] percent if annual Net Sales exceed $[***]. Royalties shall be paid on [***] basis until the expiration in [***] of the last to expire of the Valid Claims in [***] Covering Licensed Product or Licensed Service.

(b) Subject to ***Subsection (c)*** below, with respect to Licensed Products that comprise [***], or [***], Licensee shall pay to COH or its designee royalties on Net Sales at a rate of (i) [***] percent if annual Net Sales are up to and including $[***]; (ii) [***] percent if annual Net Sales are greater than $[***] up to and including $[***]; and (iii) [***] percent if annual Net Sales exceed $[***]. Royalties shall be paid on [***] basis until the expiration in [***] of the last to expire of the Valid Claims in [***] Covering Licensed Product or Licensed Service.

(c) Beginning the earlier of (i) [***]; or (ii) [***], if the total earned royalties paid by Licensee under ***Sections 4.5(a) and (b)*** in any calendar year cumulatively amounts to less than $[***] for that calendar year ("**Minimum Annual Royalty**"), Licensee shall pay to COH on or before February 28 following the last quarter of such calendar year the difference between Minimum Annual Royalty and the total earned royalty paid by Licensee for such year under ***Sections 4.5(a) and (b)***, provided, however, that for the first such calendar year, the amount of Minimum Annual Royalty payable shall be pro-rated for the number of days remaining in that calendar year.

4.6 **Royalty Offsets**. If, in Licensee's reasonable business judgment it is necessary to pay to a Third Party other than a Sublicensee consideration (whether in the form of a royalty or otherwise) for the right to make, have made, use, sell, offer for sale, have sold, import, export or otherwise exploit a Licensed Product or Licensed Service in a given jurisdiction, and if the aggregate royalty rates of any and all royalties payable to such Third Party licensors when combined with the royalty rate payable to COH exceeds [***] percent in the case of Net Sales of Licensed Products or Licensed Services, then Licensee shall have the right with respect to any period for which royalties are due (i.e. a calendar quarter or calendar year) to set off [***] percent of the aggregate royalties otherwise payable with respect to such period and such jurisdiction to such Third Party licensors against royalties that would otherwise be due to COH hereunder with respect to such period and jurisdiction; provided, however, that under no circumstances shall the royalty offsets permitted in this ***Section 4.6*** result in the reduction of the effective adjusted royalty rate and the royalty amount otherwise due to COH in any period for which payment is due and in any jurisdiction pursuant to ***Section 4.5***, above, by more than [***] percent (e.g., with respect to Pre-Existing AAVFs, the minimum effective adjusted royalty rate on Licensed Products and Licensed Services for annual sales up to $[***] shall be [***] percent). Licensee shall [***] obtain a royalty offset provision in any Third Party license.

4.7 **Sublicense Revenues**.

4.7.1 With respect to Sublicense Revenues associated with a Sublicensee's Licensed Products comprising [***], Licensee shall pay to COH a percentage of all such Sublicense Revenues within [***] days after payment is received from the relevant Sublicensee, determined as follows:

(a) if the sublicense is granted [***], [***] percent ([***]%) of Sublicense Revenues received up to and including the date on which cumulative Sublicense Revenues reach at least $[***], [***] percent ([***]%) of Sublicense Revenues received when cumulative Sublicense Revenues are greater than $[***] and up to and including $[***], and twenty percent ([***]%) of Sublicense Revenues received on and after the date that cumulative Sublicense Revenues exceed $[***],

(b) if the sublicense is granted [***], [***] percent ([***]%) of Sublicense Revenues; and

(c) if the sublicense is granted [***], [***] percent ([***]%) of Sublicense Revenues.

4.7.2 With respect to Sublicense Revenues associated with a Sublicensee's Licensed Products comprising [***], or [***], Licensee shall pay to COH a percentage of all such Sublicense Revenues within [***] ([***]) days after payment is received from the relevant Sublicensee, determined as follows:

(a) if the sublicense is granted [***], [***] percent ([***]%) of Sublicense Revenues received up to and including the date on which cumulative Sublicense Revenues reach at least $[***], [***] percent ([***]%) of Sublicense Revenues received when cumulative Sublicense Revenues are greater than $[***] and up to and including $[***], and [***] percent ([***]%) of Sublicense Revenues received on and after the date that cumulative Sublicense Revenues exceed $[***],

(b) if the sublicense is granted [***], [***] percent ([***]%) of Sublicense Revenues; and

(c) if the sublicense is granted [***], [***] percent ([***]%).

4.7.3 In the event that Sublicensee Revenue is received by Licensee and [***] ([***]), Licensee shall pay to COH the percentage of all Sublicense Revenues in accordance with ***Section 4.7.2***, provided, however, that beginning at such time that [***], Licensee shall pay to COH the additional percentage of the related Sublicense Revenues required by ***Section 4.7.1***.

4.7.4 In the event that a Sublicensee [***], and [***], Licensee shall pay to COH [***] sold by Sublicensee.

If any Sublicense Revenues are received by Licensee as Publicly Traded Sublicensee's stock, the percentage share payable to COH pursuant to this ***Section 4.7*** shall be due in such Publicly Traded Sublicensee's stock. If any Sublicense Revenues are received by Licensee as stock in a Sublicensee that is not Publicly Traded, the percentage share payable to COH pursuant to this ***Section 4.7*** shall be due, in COH's sole discretion, either in kind or in its cash equivalent, provided however, that if COH elects to receive the cash equivalent, the cash equivalent value shall be equal to [***]% of the fair market value of such stock as determined by an independent valuation firm. For all other Sublicense Revenues received by Licensee that are not in cash or cash equivalents (and not in the form of stock), the percentage share payable to COH pursuant to this ***Section 4.7*** shall be due, in COH's sole discretion, either in kind or in its cash equivalent. For the purposes of this ***Section 4.7***, "**Publicly Traded Sublicensee**" means a Sublicensee that is a publicly-traded company with market capitalization of at least [***].

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4.8 **Timing of Royalty Payments**. Royalty payments due under ***Section 4.5***, above, shall be paid annually within [***] days following the end of each calendar year until the first License Year in which aggregate Net Sales across all Licensed Product and License Services reach $[***]. Thereafter, all royalty payments due under ***Section 4.5*** shall be paid in quarterly installments, within [***] days following the end of each calendar quarter. During such time as royalty payments are made in quarterly installments, the applicable royalty rate for each quarter pursuant to ***Section 4.5(a)*** and ***(b)*** shall be determined based upon annual Net Sales for the preceding calendar year, and the royalty payment for the fourth calendar quarter of each calendar year shall be adjusted as necessary to resolve any over- or underpayment in each of the first three calendar quarters, based on the actual annual Net Sales.

4.9 **No Deductions from Payments**. Licensee is solely responsible for payment of any fee, royalty or other payment due to any Third Party not a Sublicensee in connection with the research, development, manufacture, distribution, use, sale, import or export of a Licensed Product or Licensed Service and except as set forth in ***Section 4.6*** above, Licensee shall not have the right to set off any amounts paid to such a Third Party, including fee, royalty or other payment, against any amount payable to COH hereunder.

4.10 **Single Royalty**. Only a single royalty payment shall be due and payable on Net Sales of a Licensed Product or performance of a Licensed Service, regardless if such Licensed Product or Licensed Service is Covered by more than one Valid Claim.

4.11 **No Overlap**. With respect to any consideration received by Licensee from its Sublicensees, if such consideration qualifies as Net Sales of Licensed Products and Licensed Services, then Licensee shall only be obligated to make a royalty payment to COH pursuant to ***Section 4.5***, and if such consideration does not qualify as Net Sales of Licensed Products and Licensed Services but qualifies as Sublicense Revenues, then Licensee shall only be obligated to make a payment to COH pursuant to ***Section 4.7***.

ARTICLE 5
REPORTS, AUDITS AND FINANCIAL TERMS

5.1 **Royalty Reports**. Within [***] days after the end of each calendar quarter in which a royalty payment under ***Article 4*** is required to be made, Licensee shall send to COH a report of Net Sales of the Licensed Products and Licensed Services for which a royalty is due, which report sets forth for such calendar quarter the following information, on [***]: (i) total Net Sales, (ii) total gross sales of Licensed Products and Licensed Services, (iii) the quantity of each Licensed Product sold and Licensed Service performed, (iv) the exchange rate used to convert Net Sales from the currency in which they are earned to United States dollars; and (v) the total royalty payments due.

5.2 **Additional Financial Terms**.

5.2.1 **Currency**. All payments to be made under this Agreement shall be made in United States dollars, unless expressly specified to the contrary herein. Net Sales outside of the United States shall be first determined in the currency in which they are earned and shall then be converted into an amount in United States dollars. All currency conversions shall use the conversion rate reported by Reuters, Ltd. on the last Business Day of the calendar quarter for which such payment is being determined.

5.2.2 **Payment Method**. Amounts due under this Agreement shall be paid in immediately available funds, by means of wire transfer to an account identified by COH.

5.2.3 **Withholding of Taxes**. Licensee may withhold from payments due to COH amounts for payment of any withholding tax that is required by law to be paid to any taxing authority with respect to such payments. Licensee shall provide to COH all relevant documents and correspondence, and shall also provide to COH any other cooperation or assistance on a reasonable basis as may be necessary to enable COH to claim exemption from such withholding taxes and to receive a full refund of such withholding tax or claim a foreign tax credit. Licensee shall give COH proper evidence from time to time as to the payment of such tax. The Parties shall cooperate with each other in seeking deductions under federal and state tax laws and any double taxation or other similar treaty or agreement from time to time in force.

5.2.4 **Late Payments**. Any amounts not paid on or before the date due under this Agreement are subject to interest from the date due through and including the date upon which payment is received. Interest is calculated, over the period between the date due and the date paid, at a rate equal to [***] percentage point ([***]%) over the "bank prime loan" rate, as such rate is published in the U.S. Federal Reserve Bulletin H.15 or successor thereto on the last Business Day of the applicable calendar quarter prior to the date on which such payment is due, provided that in no event shall the applicable interest rate exceed a rate of [***] percent ([***]%).

5.2.5 **Blocked Currency**. If, at any time, legal restrictions prevent the prompt remittance of part or all royalties with respect to any country where a Licensed Product is sold or Licensed Service provided, payment shall be made through such lawful means or methods as Licensee may determine. When in any country, the law or regulations prohibit both the transmittal and deposit of royalties or other payments, Licensee shall continue to report all such amounts, but may suspend payment for as long as such prohibition is in effect. As soon as such prohibition ceases to be in effect, all amounts that would have been obligated to be transmitted or deposited but for the prohibition, together with accrued interested thereon, shall promptly be transmitted to COH.

5.3 **Accounts and Audit**.

5.3.1 **Records**. Licensee shall keep, and shall require that each Sublicensee keep, full, true and accurate books of account containing the particulars of its Net Sales and the calculation of royalties. Licensee and its Sublicensees shall each keep such books of account and the supporting data and other records at its principal place of business. Such books and records must be maintained available for examination upon reasonable notice in accordance with this ***Section 5.3.1*** for [***] calendar years after the end of the calendar year to which they pertain, and otherwise as reasonably required to comply with GAAP.

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5.3.2 **Appointment of Auditor**. COH may appoint an internationally- recognized independent accounting firm reasonably acceptable to Licensee to inspect the relevant books of account of Licensee and its Sublicensees to verify any reports or statements provided, or amounts paid or invoiced (as appropriate), by Licensee or its Sublicensees.

5.3.3 **Procedures for Audit**. COH may exercise its right to have Licensee's and its Sublicensees' relevant records examined only during the [***] year period during which Licensee is required to maintain records, no more than [***] in any consecutive four calendar quarters. Licensee and its Sublicensees are required to make records available for inspection only during regular business hours, only at such place or places where such records are customarily kept, and only upon receipt of at least [***] days advance notice from COH.

5.3.4 **Audit Report**. The independent accountant will be instructed to provide to COH an audit report containing only its conclusions and methodology regarding the audit, and specifying whether the amounts paid were correct and, if incorrect, the amount of any underpayment or overpayment.

5.3.5 **Underpayment and Overpayment**. After review of the auditor's report: (i) if there is an uncontested underpayment by Licensee for all of the periods covered by such auditor's report, then Licensee shall pay to COH the full amount of that uncontested underpayment, and (ii) if there is an uncontested overpayment for such periods, then COH shall provide to Licensee a credit against future payments (such credit equal to the full amount of that overpayment), or, if Licensee is not obligated to make any future payments, then COH shall pay to Licensee the full amount of that overpayment. Contested amounts are subject to dispute resolution under ***Article 12***. If the total amount of any such underpayment (as agreed to by Licensee or as determined under ***Article 12***) exceeds [***] of the amount previously paid by Licensee for the period subject to audit, then Licensee shall pay the reasonable costs for the audit. Otherwise, all costs of the audit shall be paid by COH.

ARTICLE 6
LICENSEE COVENANTS

6.1 Licensee covenants and agrees that:

(a) in conducting activities contemplated under this Agreement, it shall comply in all material respects with all applicable laws and regulations including, without limitation, those related to the manufacture, use, labeling, importation and marketing of Licensed Products and Licensed Services;

(b) Licensee will at all times have a sufficient number of shares of Common Stock authorized and reserved for issuance to the COH Stockholders in accordance with the terms of this Agreement; and

(c) Licensee will obtain all authorizations necessary for the issuance of the Common Stock issuable to the COH Stockholders pursuant to this Agreement after the date hereof prior to the issuance of such Common Stock.

ARTICLE 7
INTELLECTUAL PROPERTY; PATENT PROSECUTION, MAINTENANCE AND ENFORCEMENT.

7.1 **Patent Prosecution, Maintenance and Enforcement**.

(a) COH shall be responsible for the preparation, filing, prosecution, and maintenance of all Background Patents, using counsel of its choice. COH will timely provide Licensee with copies of all relevant documentation relating to such prosecution and periodically update Exhibit 2 to include current information regarding the Background Patents, and Licensee shall keep such information confidential. COH's counsel shall take instructions only from COH. All patents and patent applications in Background Patents and Core Patents, to the extent one or more inventors have the obligation to assign to COH, shall be assigned by such inventors to COH.

(b) COH will not unreasonably refuse to amend any patent application in the Background Patents to include claims reasonably requested by Licensee to protect the products contemplated to be sold by Licensee under this Agreement.

(c) As of the Option Effective Date, Licensee shall have the right to assume preparation, filing, prosecution, and maintenance of all Core Patents in the name of COH at Licensee's own expense, using Licensee counsel reasonably acceptable to COH, solely for as long as Licensee maintains exclusivity with respect to the Core Patents in the Unrestricted Field. In the event of a License Conversion pursuant to ***Section 2.2.2(a)*** hereof where Licensee does not maintain exclusivity with respect to the Core Patents in the Unrestricted Field, Licensee shall take all actions reasonably requested by COH to enable COH to prepare, file, prosecute, and maintain all Core Patents, on its own behalf using counsel of COH's choice; provided, that the **Cooperation Provisions** of ***Section 7.1(d)*** shall apply to COH cooperating with Licensee, *mutatis mutandis*, including without limitation that COH will timely provide Licensee with copies of all relevant documentation relating to such prosecution and Licensee shall keep such information confidential, and that COH's counsel shall reasonably consider comments from Licensee, but take ultimate instructions only from COH.

(d) Promptly following the end of each calendar quarter or upon request of COH, Licensee will provide COH with an update and details regarding the filing, prosecution and maintenance status of each Core Patent. Licensee shall provide COH with drafts of all proposed filings (including, without limitation, the initial application as well as any material correspondence related to any filings) in a manner that allows COH a reasonable opportunity to review and comment before any such filing is made or due but in no event, except when impossible, less than [***] ([***]) business days prior to any filing deadline. Licensee will consider all of, and incorporate to the extent commercially reasonable for Licensee's conduct of its business, COH's suggestions, recommendations and instructions concerning the preparation,

filing, prosecution, defense and maintenance of Core Patents (including without limitation any suggestion or recommendation to alter or expand or limit the scope, content and/or claims of any such application), and, to the extent otherwise possible, will undertake the preparation, filing, prosecution and defense of Core Patents in a way that is intended to reasonably optimize the scope and enforceability of the Core Patents. COH shall cooperate with Licensee in the preparation, filing, prosecution, and maintenance of Core Patents by disclosing such information as may be necessary and by promptly executing such documents as Licensee may request to effect such efforts. COH shall secure, and upon request provide to Licensee, assignments from all employees and other individuals necessary to grant the rights, licenses and privileges granted in this Agreement. The aforementioned provisions of this subparagraph are collectively the "**Cooperation Provisions**". For clarity, (i) Licensee may not use cost or expense as a basis to deem any proposed COH claim or application commercially unreasonable, provided COH is willing to bear any increased cost or expense, in which case Licensee shall not be entitled to the benefits of any such claim or application unless COH's costs are reimbursed and (ii) if Licensee deems any COH claim or application commercially unreasonable due to cost or expense, COH shall be entitled to require Licensee to file continuation, divisional or other independent applications to be prosecuted and maintained by COH at its cost and expense independent of Licensee and which shall be outside the scope of the rights licensed.

(e) Each Party shall promptly provide written notice to the other in the event it becomes aware of any actual or probable infringement of any of the Patent Rights or of any Third Party claim regarding the enforceability or validity of any Patent Rights ("**Infringement Notice**").

(f) Licensee shall, in cooperation with COH, use reasonable efforts to terminate infringement of the Core Patents without litigation. If such infringing activity has not been abated within [***] ([***]) days following the date the Infringement Notice is provided, then Licensee may, following consultation with COH, in its sole discretion and at its sole expense, take action against any alleged infringer or in defense of such any claim, provided, that Licensee has exclusive rights under this Agreement in the applicable field within which the alleged infringer is operating.

(g) If required for Licensee to maintain standing to enforce the Core Patents against a Third Party, COH agrees to be named a party to a legal proceeding at Licensee's request, provided that Licensee will pay any costs incurred by COH arising out of such suit, including but not limited to, any legal fees of counsel that COH selects and retains to represent it in the suit.

(h) In the event that Licensee declines to cause such infringement to cease (e.g. by settlement or injunction) and thereafter declines to initiate and thereafter diligently maintain legal proceedings against the infringer other than as part of a mutually agreed upon bona fide strategy, developed with the guidance of outside patent counsel, to preserve the Core Patents, COH may, in its sole discretion and at its sole expense, take action against such alleged infringer or in defense of any such Third Party claim.

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(i) Any recovery obtained by Licensee or COH, after [***] recovery, shall be [***].

7.2 **Trademarks**. Licensee shall be responsible for the selection, registration, maintenance, and defense of all trademarks for use in connection with the sale or marketing of Licensed Products and Licensed Services in the Field in the Territory (the "**Marks**"), as well as all expenses associated therewith. Licensee shall not, without COH's prior written consent, use any trademarks or house marks of COH (including the COH corporate name), or marks confusingly similar thereto, in connection with Licensee commercialization of Licensed Products or Licensed Services under this Agreement in any promotional materials or applications or in any manner implying an endorsement by COH of Licensee or the Licensed Products or Licensed Services. Licensee shall own all Marks.

7.3 **Challenge to the Patent Rights by Licensee**.

(a) COH may terminate this Agreement and, notwithstanding ***Section 3.5***, above, all Sublicenses issued hereunder, upon [***] ([***]) days' written notice to Licensee in the event that Licensee or any of its Affiliates or Sublicensees directly or indirectly asserts a Patent Challenge. "Patent Challenge" means any challenge in a legal or administrative proceeding to the patentability, validity or enforceability of any of the Patent Rights (or any claim thereof), including by: (a) filing or pursuing a declaratory judgment action in which any of the Patent Rights is alleged to be invalid or unenforceable; (b) citing prior art against any of the Patent Rights other than in connection with patent prosecution, filing a request for or pursuing a re-examination of any of the Patent Rights (other than with COH's written agreement), or becoming a party to or pursuing an interference against any of the Patent Rights; or (c) filing or pursuing any re-examination, opposition, cancellation, nullity or other like proceedings against any of the Patent Rights; but excluding in each case (i) any challenge raised as a defense against a claim, action or proceeding asserted by COH against Licensee, its Affiliates or Sublicensees, (ii) actions taken during prosecution of the Patent Rights, and (iii) a third party naming of Licensee in any legal proceeding against its will, provided that Licensee has taken commercially reasonable steps to avoid such participation. In lieu of exercising its rights to terminate under this ***Section 7.3(a)*** COH may elect upon written notice to increase the payments due under all of Section 4 by [***] percent ([***]%), which election will be effective retroactively to the date of the commencement of the Patent Challenge. Licensee acknowledges and agrees that this ***Section 7.3(a)*** is reasonable, valid and necessary for the adequate protection of COH's interest in and to the Patent Rights, and that would not have granted to Licensee the licenses under those Patent Rights, without this ***Section 7.3(a)***. COH will have the right at any time in its sole discretion to strike this ***Section 7.3(a)*** (or any portion thereof) from this Agreement, and COH will have no liability whatsoever as a result of the presence or absence of this ***Section 7.3(a)*** (or any struck portion thereof).

7.4 **Payment of COH Patent Expenses**. The Parties acknowledge that, prior to the Option Effective Date, COH provided to Licensee documentation of historic expenses incurred by COH with respect to the drafting, prosecution and maintenance of the Patent Rights. In consideration of such historic expenditures by COH, Licensee shall reimburse COH for [***] percent of such expenses within [***] days of the Effective Date; subject to a maximum of $[***].

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COH shall provide to Licensee an annual invoice and reasonably detailed documentation with respect to COH's reasonable out-of-pocket expenses incurred with respect to prosecution and maintenance of Core Patents. Licensee shall reimburse COH for [***] percent of such expenses within [***] days after receipt of such invoice and documentation.

7.5 **Marking**. Licensee and its Sublicensees shall mark all Licensed Products and all materials related to Licensed Services in such a matter as to conform with the patent laws of the country to which such Licensed Products are shipped or in which such products are sold and such Licensed Services performed.

ARTICLE 8
TERM AND TERMINATION

8.1 **Term and Expiration of Term**. The term of this Agreement (the "**Term**") shall commence on the Effective Date and, notwithstanding any other provision of this Agreement, unless sooner terminated by mutual agreement or pursuant to any other provision of this Agreement, this Agreement shall expire on a country-by-country basis and on a Patent Right-by- Patent Right basis upon both (a) expiration of the last to expire of any issued Valid Claim of the Patent Rights in such country and (b) no patent application in Patent Rights remains pending (such expiry of the Term hereinafter referred to as "**Expiration**"). Upon Expiration in a country, COH hereby grants and agrees to grant Licensee a perpetual, irrevocable, royalty-free, fully paid-up, non-exclusive right and license, with the ability to sublicense, under the Core Know-How, to make, have made, use, sell, offer to sell, have sold, import, export, and otherwise exploit Licensed Products and Licensed Services in such country.

8.2 **Termination**.

8.2.1 **Material Breach**. Either Party may terminate this Agreement prior to its Expiration for any material breach by the other Party, provided that the Party seeking to terminate shall have first given the breaching Party notice of such material breach with reasonable particulars of the material breach, and the Party receiving the notice of the material breach shall have failed to cure that material breach within forty-five (45) days after the date of receipt of such notice.

8.2.2 **Bankruptcy**. Either Party shall have the right to terminate this Agreement prior to its Expiration upon notice to the other Party, in the event that: (i) the Party receiving said notice seeks protection of any bankruptcy or insolvency law other than with the prior consent of the noticing Party, or (ii) a proceeding in bankruptcy or insolvency is filed by or against the Party receiving notice and not withdrawn, removed or vacated within sixty days of such filing, or there is adjudication by a court of competent jurisdiction that said Party is bankrupt or insolvent. All rights and licenses granted under or pursuant to this Agreement by either Party are, and shall otherwise be deemed to be, for purposes of Section 365(n) of the United States Bankruptcy Code (the "Bankruptcy Code"), licenses of rights to "intellectual

property" as defined under Section 101 of the Bankruptcy Code. The Parties agree that the Parties, as licensees of such rights under this Agreement, shall retain and may fully exercise all of their rights and elections under the Bankruptcy Code. The Parties further agree that, in the event of the commencement of a bankruptcy proceeding by or against either Party under the Bankruptcy Code, the Party hereto that is not subject to such proceeding shall be entitled to a complete duplicate of (or complete access to, as appropriate) any such intellectual property and all embodiments of such intellectual property, which, if not already in the non-subject Party's possession, shall be promptly delivered to it (A) following any such commencement of a bankruptcy proceeding upon the non-subject Party's written request therefor, unless the Party subject to such proceeding elects to continue to perform all of its obligations under this Agreement, or (B) if not delivered under the immediately preceding clause (A), upon written request therefor by the non-subject Party following the rejection of this Agreement by or on behalf of the Party subject to such proceeding.

8.2.3 **Termination at Will by Licensee**. Licensee shall have the right to terminate this Agreement prior to its Expiration upon notice to COH without cause, effective no fewer than 90 days following the date of such notice.

8.3 **Effect of Termination**.

8.3.1 Upon any termination of this Agreement pursuant to ***Section 8.2*** (but excluding COH's bankruptcy under ***Section 8.2.3***, and for clarity, not in the case of Expiration), all rights and licenses granted to Licensee under ***Article 4***, if any, shall immediately terminate on and as of the effective date of termination as provided in ***Section 8.2***, except that Licensee shall have the right to continue to sell Licensed Products manufactured prior to the effective date of such termination until the sooner of: (i) [***] days after the effective date of termination, or (ii) the exhaustion of Licensee's inventory of Licensed Products.

8.3.2 Upon termination of this Agreement pursuant to ***Section 8.2*** (but excluding COH's bankruptcy under ***Section 8.2.3***, and for clarity, not in the case of Expiration):

(1) Each Party shall promptly return to the other Party all relevant records and materials in its possession or control containing or comprising the other Party's Confidential Information and to which the Party does not retain rights hereunder.

(2) Licensee shall discontinue making any representation regarding its status as a licensee of COH for Licensed Products and Licensed Services. Subject to ***Section 8.3.1***, above, Licensee shall cease conducting any activities with respect to the marketing, promotion, sale or distribution of Licensed Products and Licensed Services.

8.3.3 Termination of this Agreement through any means and for any reason pursuant to ***Section 8.2*** (but excluding COH's bankruptcy under ***Section 8.2.3***, and for clarity, not in the case of Expiration), shall not relieve the Parties of any obligation accruing prior thereto, including the payment of all sums due and payable, and shall be without prejudice to the rights and remedies of either Party with respect to any antecedent breach of any of the provisions of this Agreement.

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8.4 **Survival**. Sections 4.3 (Stock Grant), 5.1 (Royalty Reports), 5.2 (Additional Financial Terms), 5.3 (Accounts and Audit), 7.5 (Marking), 8.3 (Effect of Termination), 8.4 (Survival), Article 10 (Indemnification), Article 11 (Confidentiality), Article 12 (Dispute Resolution), Sections 14.1 (Assignment and Delegation), 14.4 (Applicable Law), 14.7 (Notices), and 14.10 (Interpretation) shall survive termination of this Agreement for any reason pursuant to Section 8.2 and Expiration pursuant to Section 8.1, provided that ***Section 4.3*** shall not survive termination of this Agreement pursuant to ***Section 8.2.1*** due to a breach of ***Article 9*** by COH.

ARTICLE 9
REPRESENTATIONS AND WARRANTIES

9.1 **Mutual Representations and Warranties**. COH and Licensee each represents and warrants as follows:

9.1.1 It has the right and authority to enter into this Agreement and all action required to be taken on its behalf, its officers, directors, partners and stockholders necessary for the authorization, execution, and delivery of this Agreement and, the performance of all of its obligations hereunder, and this Agreement, when executed and delivered, will constitute valid and legally binding obligations of such Party, enforceable in accordance with its terms, subject to applicable law including: (i) laws limiting the availability of specific performance, injunctive relief, and other equitable remedies; and (ii) bankruptcy, insolvency, reorganization, moratorium, fraudulent conveyance or other similar laws now or hereafter in effect generally relating to or affecting creditors' rights generally.

9.1.2 Entry into this Agreement will not constitute a breach of any other agreement to which it is party.

9.1.3 It has read this Agreement, with assistance from its counsel of choice. It understands all of this Agreement's terms. It has been given a reasonable amount of time to consider the contents of this Agreement before each Party executed it. It agrees that it is executing this Agreement voluntarily with full knowledge of this Agreement's legal significance.

9.1.4 It agrees that it is not relying in any manner on any statement, promise, representation or understanding, whether oral, written or implied, made by any Party, not specifically set forth in this Agreement. It acknowledges that, after execution of this Agreement, it may discover facts different from or in addition to those which it now knows or believes to be true. Nevertheless, it agrees that this Agreement shall be and remain in full force and effect in all respects, notwithstanding such different or additional facts.

9.2 **Representations and Warranties of COH**. COH represents and warrants that, as of the Effective Date, to the actual knowledge of the Director of the Office of Technology Transfer, his direct reports, [***], without independent inquiry, COH owns the Patent Rights and the Core Know How, free of any liens, encumbrances, security interests, legal actions or restrictions on transfer not expressly set forth herein, COH has the full power and authority to grant the rights, licenses and privileges granted herein, and that COH has not granted any license or other rights to the Patent Rights or Core Know How inconsistent with the rights granted herein.

9.3 **Representations and Warranties of Licensee**. Except as set forth on Schedule 9.3 to this Agreement (which may be updated with respect to Section 9.3.5 prior to each Measurement Date), Licensee represents and warrants as follows, as of the date hereof and as of each Measurement Date:

9.3.1 all authorizations necessary for the issuance of the COH Shares on the date hereof have been obtained;

9.3.2 no consent, approval, order, or authorization of, or registration, qualification, designation, declaration, or filing with, any federal, state, or local governmental authority on the part of Licensee is required in connection with the offer, sale, or issuance of the COH Shares or the consummation of any other transaction contemplated hereby, except for the following: (i) the filing of a notice of exemption pursuant to Section 25102(f) of the California Corporate Securities Law of 1968, as amended, which shall be filed by Licensee promptly following the date hereof; and (ii) the compliance with other applicable state securities laws, which compliance will have occurred within the appropriate time periods therefor. Assuming the accuracy of the COH Stockholder representations contained in this Agreement and subject to the filings described above, the offer, sale, and issuance of the COH Shares in conformity with the terms of this Agreement are exempt from the registration requirements of Section 5 of the Act, and from the qualification requirements of Section 25110 of the California Securities Law and neither Licensee, nor any authorized agent acting on its behalf will take any action hereafter that would cause the loss of such exemptions;

9.3.3 The sale of the COH Shares is not subject to any preemptive rights or rights of first refusal that have not been properly waived or complied with;

9.3.4 The COH Shares, when issued, sold and delivered in accordance with the terms of this Agreement for the consideration expressed herein, will be duly and validly issued, fully paid and nonassessable and free of encumbrances, other than restrictions on transfer under applicable state and federal securities laws or encumbrances created or imposed by COH;

9.3.5 The authorized capital stock of Licensee consists of 86,000,000 shares of Common Stock, 10,600,451 of which are issued and outstanding (taking into account the issuance of the COH Shares) and 62,269,145 shares of preferred stock, par value $0.0001 per share, 33,395,907 of which are issued and outstanding. Licensee has also reserved an aggregate of 8,875,000 shares of Common Stock for issuance to officers, directors, employees and consultants pursuant to the Stock Plan. All issued and outstanding shares have been duly authorized and validly issued and are fully paid and nonassessable. Other than COH's right to the COH Shares hereunder and options to purchase Common Stock granted pursuant to the Stock Plan, there are no other outstanding rights, options, warrants, preemptive rights, rights of first refusal, or similar rights for the purchase or acquisition from Licensee of any securities of Licensee nor any commitments to issue or execute any such rights, options, warrants, preemptive rights or rights of first refusal.

9.3.6 Licensee is not in violation or default of any provision of the Charter or its bylaws and will not on any Measurement Date be in such violation or default.

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9.4 **Exclusions**. Nothing in this Agreement is or shall be construed as:

9.4.1 A warranty or representation by COH as to the validity or scope of any claim or patent or patent application within the Patent Rights;

9.4.2 A warranty or representation by COH that anything made, used, sold, or otherwise disposed of under any license granted in this Agreement is or will be free from infringement of any patent rights or other intellectual property right of any Third Party;

9.4.3 A grant by COH, whether by implication, estoppel, or otherwise, of any licenses or rights under any patents other than Patent Rights and Core Know-How as defined herein, regardless of whether such patents are dominant or subordinate to Patent Rights;

9.4.4 Subject to ***Section 7.1(g),*** an obligation on COH to bring or prosecute any suit or action against a third party for infringement of any of the Patent Rights or Core Know-How***)***;

9.4.5 An obligation to furnish any know-how outside of the Core Know-How; or

9.4.6 A representation or warranty of the ownership of the Patent Rights and Core Know-How other than as set forth in ***Section 9.2***, above.

9.5 **DISCLAIMER**. **EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, NO WARRANTY IS GIVEN WITH RESPECT TO THE PATENT RIGHTS OR CORE KNOW-HOW, EITHER IN FACT OR BY OPERATION OF LAW, BY STATUTE OR OTHERWISE, AND THE PARTIES SPECIFICALLY DISCLAIM ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, VALIDITY OF THE PATENT RIGHTS OR NON-INFRINGEMENT OF THE INTELLECTUAL PROPERTY OR OTHER RIGHTS OF ANY THIRD PARTY. THE WARRANTIES SET FORTH IN *SECTIONS 9.1 AND 9.2*, ABOVE, ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, VALIDITY, NON-INFRINGEMENT AND ALL SUCH OTHER WARRANTIES ARE HEREBY EXPRESSLY DISCLAIMED.**

ARTICLE 10
INDEMNIFICATION

10.1 **Indemnification by Licensee**. Licensee shall defend, indemnify and hold harmless COH, its Affiliates, officers, directors, shareholders, employees and agents ("**COH Indemnitees**") from and against any and all Third Party liabilities, claims, suits, and expenses, including reasonable attorneys' fees (collectively, "**Losses**"), arising out of or in any way attributable to: (i) the material breach of any representation or warranty made by Licensee under this Agreement, (ii) the research, development, marketing, approval, manufacture, packaging, labeling, handling, storage, transportation, use, distribution, promotion, marketing or sale of Licensed Products or

Licensed Services by or on behalf of Licensee, any of its Affiliates or a Sublicensee or any other exercise of rights under this Agreement or pursuant to any sublicense, or (iii) the negligence, willful misconduct or failure to comply with applicable law by a Licensee Indemnitee or Sublicensee; in each case except to the extent that such Losses are caused directly by: (a) COH's material breach of any representation or warranty made by COH under this Agreement, (b) COH's material breach of its obligations under this Agreement, and/or (c) the gross negligence or willful misconduct of a COH Indemnitee.

10.2 **Indemnification by COH**. COH shall defend, indemnify and hold harmless Licensee, its Affiliates, and their respective officers, directors, shareholders, employees and agents ("**Licensee Indemnitees**") from and against any and all Losses caused directly by: (i) the material breach of any representation or warranty made by COH under this Agreement, and/or (ii) the gross negligence or willful misconduct of a COH Indemnitee, in each case, except to the extent that such Losses arise out of or are in any way attributable to: (a) the material breach of any representation or warranty made by Licensee under this Agreement, (b) the research, development, marketing, approval, manufacture, packaging, labeling, handling, storage, transportation, use, distribution, promotion, marketing or sale of Licensed Products or Licensed Services by or on behalf of Licensee or a Sublicensee, or (c) the negligence, willful misconduct or failure to comply with applicable law by a Licensee Indemnitee or a Sublicensee.

10.3 **Procedure**. The indemnities set forth in this ***Article 10*** are subject to the condition that the Party seeking the indemnity shall forthwith notify the indemnifying Party on being notified or otherwise made aware of a liability, claim, suit, action or expense and that the indemnifying Party defend and control any proceedings with the other Party being permitted to participate at its own expense (unless there shall be a conflict of interest which would prevent representation by joint counsel, in which event the indemnifying Party shall pay for the other Party's counsel); provided, that, the indemnifying Party may not settle the liability, claim, suit, action or expense, or otherwise admit fault of the other Party or consent to any judgment, without the written consent of the other Party (such consent not to be unreasonably withheld). Notwithstanding the foregoing, no delay in the notification of the existence of any claim of Loss shall cause a failure to comply with this ***Section 10.3*** as long as such delay shall not have materially impaired the rights of the indemnifying Party.

10.4 **Insurance**.

(a) Within [***] days following the Effective Date, Licensee shall procure at its sole expense and provide to COH evidence of [***] insurance ([***]) with limits of at least: (i) each occurrence, $[***]; (ii) [***]; and (iii) [***], provided that, prior to initiating a clinical trial, Licensee shall procure at its sole expense and provide to COH evidence of [***] with limits of at least: (i) each occurrence, $[***]; (ii) [***]; (iii) [***]; and (iv) [***].

(b) The foregoing policies will provide primary coverage to COH and shall name the COH Indemnitees as additional insureds, and shall remain in effect during the term of this Agreement and for five years following the termination or expiration of the term of this Agreement. The COH Indemnitees shall be notified in writing by Licensee not less than [***]

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days prior to any modification, cancellation or non-renewal of such policy. Licensee's insurance must include a provision that the coverages will be primary and will not participate with nor will be excess over any valid and collective insurance or program of self-insurance carried or maintained by the COH Indemnitees. Such insurance coverage shall be maintained with an insurance company or companies having an A.M. Best's rating (or its equivalent) of A-XII or better.

(c) Licensee expressly understands that the coverage limits in ***Section 10.4(a)*** do not in any way limit the Licensee's liability.

10.5 **LIMITATION ON DAMAGES**. **NOTWITHSTANDING ANYTHING CONTAINED IN THIS AGREEMENT TO THE CONTRARY, EXCEPT ARISING OUT OF A PARTY'S INDEMNIFICATION OBLIGATIONS UNDER THIS AGREEMENT OR A PARTY'S BREACH OF ARTICLE 11, IN NO EVENT SHALL EITHER PARTY BE LIABLE TO THE OTHER PARTY FOR ANY SPECIAL, PUNITIVE, CONSEQUENTIAL, INDIRECT, OR INCIDENTAL DAMAGES (INCLUDING LOSS OF PROFITS, COSTS OF PROCURING SUBSTITUTE GOODS, LOST BUSINESS OR ENHANCED DAMAGES FOR INTELLECTUAL PROPERTY INFRINGEMENT) ARISING OUT OF OR RELATING TO THIS AGREEMENT, WHETHER BASED UPON BREACH OF WARRANTY, BREACH OF CONTRACT, NEGLIGENCE, STRICT LIABILITY IN TORT OR ANY OTHER LEGAL THEORY. IN NO EVENT SHALL COH BE LIABLE TO LICENSEE FOR AN AGGREGATE AMOUNT IN EXCESS OF TWO-THIRDS OF THE TOTAL CONSIDERATION PAID TO COH HEREUNDER.**

ARTICLE 11
CONFIDENTIALITY

11.1 **Confidential Information**. During the term of this Agreement and for [***] years thereafter without regard to the means of termination: (i) COH shall not use, for any purpose other than the purpose contemplated by this Agreement, or reveal or disclose to any Third Party any Licensee Confidential Information; and (ii) Licensee shall not use, for any purpose other than the purpose contemplated by this Agreement, or reveal or disclose COH Confidential Information to any Third Party. The Parties shall take reasonable measures to assure that no unauthorized use or disclosure is made by others to whom access to such information is granted.

11.2 **Exceptions**. Notwithstanding the foregoing, a Party may use and disclose Confidential Information of the other Party as follows:

(a) to the extent required by applicable law, rule, regulation, government requirement and/or court order, provided, that, the disclosing Party promptly notifies the other Party of its notice of any such requirement, takes all reasonable steps to limit disclosure of the Confidential Information, and provides the other Party a reasonable opportunity to seek a protective order or other appropriate remedy and/or to waive compliance with the provisions of this Agreement;

(b) subject to ***Section 11.4***, to the extent such use and disclosure occurs in the filing or publication of any patent application or patent on inventions, pursuant to ***Section 11.4*** (Publication);

(c) as necessary or desirable for securing any regulatory approvals, including pricing approvals, for any Licensed Products or Licensed Services, provided, that, the disclosing Party shall take all reasonable steps to limit disclosure of the Confidential Information outside such regulatory agency and to otherwise maintain the confidentiality of the Confidential Information;

(d) to take any lawful action that it deems necessary to enforce compliance with the terms and conditions of, this Agreement; provided, that, the disclosing Party shall take all reasonable steps to limit disclosure of the Confidential Information and to otherwise maintain the confidentiality of the Confidential Information;

(e) to the extent necessary, to its Affiliates, directors, officers, employees, consultants, vendors and clinicians under written agreements of confidentiality at least as restrictive as those set forth in this Agreement, who have a need to know such information in connection with such Party performing its obligations or exercising its rights under this Agreement; and

(f) by Licensee, to actual and potential investors, licensees, Sublicensees, consultants, vendors and suppliers, and academic and commercial collaborators, under written agreements of confidentiality at least as restrictive as those set forth in this Agreement.

11.3 **Certain Obligations**. During the Term and for a period of [***] years thereafter and subject to the exceptions set forth in ***Section 11.2***, Licensee, with respect to COH Confidential Information, and COH, with respect to Licensee Confidential Information, agree:

(a) to use such Confidential Information only for the purposes contemplated under this Agreement,

(b) to treat such Confidential Information as it would its own proprietary information which in no event shall be less than a reasonable standard of care,

(c) to take reasonable precautions to prevent the disclosure of such Confidential Information to a Third Party without written consent of the other Party, and

(d) to only disclose such Confidential Information to those employees, agents and Third Parties who have a need to know such Confidential Information for the purposes set forth herein and who are subject to obligations of confidentiality no less restrictive than those set forth herein.

11.4 **Publication**.

(a) The Parties acknowledge that results of the Research may be published or otherwise publicly disclosed, subject to the terms hereof. Without limiting the foregoing, but subject to ***Section 11.4(b)*** herein, each Party reserves the right to publicly disclose the results of any research related to the Core Patents, Core Know-How, Licensed Products or Licensed Services (the "**Research**"). In connection with a publication, the Parties agree to abide by the policies of journals in which the publications will appear on such matters as the public release or availability of data or biological materials relating to the publication. Authorship of results of the Research will be determined in accordance with academic standards and custom. Proper acknowledgment will be made for the contributions of each Party to the results of the Research being published.

(b) For any public disclosure of Research, the Party proposing a public disclosure (the "**Publishing Party**") will provide a copy of the proposed written or oral publication (including manuscripts, abstracts and oral presentations) to the other Party (the "**Reviewing Party**") at least [***] ([***]) days prior to submission for publication in order to allow the Reviewing Party an opportunity to protect its Confidential Information or inventions that may be disclosed by the proposed public disclosure. If the Reviewing Party determines that its Confidential Information or an invention would likely be disclosed by the proposed public disclosure, it shall so advise the Disclosing Party within such [***] ([***]) day period, whereupon (a) the Publishing Party shall delete all references to such Confidential Information and (b) the Publishing Party shall postpone the proposed publication or presentation for up to an additional [***] ([***]) days to afford the Reviewing Party, or if applicable, the Publishing Party, the opportunity to prepare and file one or more patent applications with respect thereto. In addition, a Party will not publish Confidential Information received from the other Party without such other Party's prior written consent.

11.5 **Confidentiality upon Termination**. Upon termination of this Agreement pursuant to ***Section 8.2*** (but excluding COH's bankruptcy under ***Section 8.2.3***, and for clarity, not in the case of Expiration), and upon the request of the disclosing Party, the receiving Party shall promptly return to the disclosing Party or destroy all copies of Confidential Information received from such Party, and shall return or destroy, and document the destruction of, all summaries, abstracts, extracts, or other documents which contain any Confidential Information of the other Party in any form, except that each Party shall be permitted to retain a copy (or copies, as necessary) of such Confidential Information for archival purposes or to enforce or verify compliance with this Agreement, or as required by any applicable law or regulation.

ARTICLE 12
DISPUTE RESOLUTION

All Disputes shall be first referred to a [***] or [***] for resolution, prior to proceeding under the other provisions of this ***Article 12***. A Dispute shall be referred to such executives upon one Party (the "**Initiating Party**") providing the other Party (the "**Responding Party**") with notice that such Dispute exists, together with a written statement describing the Dispute with reasonable specificity and proposing a resolution to such Dispute that the Initiating Party is willing to accept, if any. Within [***] days after having received such statement and proposed resolution, if any,

the Responding Party shall respond with a written statement that provides additional information, if any, regarding such Dispute, and proposes a resolution to such Dispute that the Responding Party is willing to accept, if any. In the event that such Dispute is not resolved within [***] days after the Responding Party's receipt of the Initiating Party's notice, either Party may bring and thereafter maintain suit against the other with respect to such Dispute; provided, however, that the exclusive jurisdiction of any such suit shall be the state and federal courts located in Los Angeles County, California, and the Parties hereby consent to the exclusive jurisdiction and venue of such courts.

ARTICLE 13
GOVERNMENTAL MATTERS

13.1 **Governmental Approval or Registration**. If this Agreement or any associated transaction is required by the law of any nation to be either approved or registered with any governmental agency, Licensee shall assume all legal obligations to do so. Licensee shall notify COH if it becomes aware that this Agreement is subject to a U.S. or foreign government reporting or approval requirement. Licensee shall make all necessary filings and pay all costs including fees, penalties and all other out-of-pocket costs associated with such reporting or approval process.

13.2 **Export Control Laws**. Licensee shall observe all applicable U.S. and foreign laws with respect to the transfer of Licensed Products and related technical data to foreign countries, including, without limitation, the International Traffic in Arms Regulations and the Export Administration Regulations.

13.3 **Preference for United States Industry**. If Licensee sells a Licensed Product in the U.S., Licensee shall manufacture said product substantially in the U.S. to the extent required by applicable law; provided that upon Licensee's request, COH shall make reasonable efforts to waive any such requirement of applicable law.

ARTICLE 14
MISCELLANEOUS

14.1 **Assignment and Delegation**. Neither this Agreement nor any right or obligation hereunder shall be assignable in whole or in part, whether by operation of law, or otherwise by Licensee without the prior written consent of COH, not to be unreasonably withheld, provided, however, and notwithstanding the foregoing, Licensee may assign or transfer its rights and obligations under this Agreement to a person that succeeds to all or substantially all of Licensee's business or assets, whether by sale, merger, operation of law or otherwise; provided further that any assignment or transfer of this Agreement must be accompanied by a transfer or assignment of Licensee's rights under the SRA. Neither this Agreement nor any right or obligation hereunder shall be assignable in whole or in part, whether by operation of law, or otherwise by COH, without the prior written consent of Licensee. This Agreement shall be binding upon and inure to the benefit of and be enforceable by the Parties hereto and their respective successors and permitted assignees. Any transfer or assignment of this Agreement in violation of this ***Section 14.1*** shall be null and void.

EXECUTION COPY

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

14.2 **Entire Agreement**. With the exception of the SRA and the Mutual Nondisclosure Agreement dated [***], this Agreement contains the entire agreement between the Parties relating to the subject matter hereof, and all prior understandings, representations and warranties between the Parties are superseded by this Agreement. In the event of any conflict among or between any of the foregoing agreements, this Agreement shall prevail.

14.3 **Amendments**. Changes and additional provisions to this Agreement shall be binding on the Parties only if agreed upon in writing and signed by the Parties.

14.4 **Applicable Law**. This Agreement shall be construed and interpreted in accordance with the laws of the State of California and all rights and remedies shall be governed by such laws without regard to principles of conflicts of law.

14.5 **Force Majeure**. If the performance of this Agreement or any obligations hereunder is prevented, restricted or interfered with by reason of earthquake, fire, flood or other casualty or due to strikes, riot, storms, explosions, acts of God, war, terrorism, changes in governmental regulation, embargo, shortage of transportation facilities, or a similar occurrence or condition beyond the reasonable control of the Parties, the Party so affected shall, upon giving prompt notice to the other Parties, be excused from such performance during such prevention, restriction or interference, and any failure or delay resulting therefrom shall not be considered a breach of this Agreement.

14.6 **Severability**. The Parties do not intend to violate any public policy or statutory common law. However, if any sentence, paragraph, clause or combination of this Agreement is in violation of any law or is found to be otherwise unenforceable, such sentence, paragraph, clause or combination of the same shall be deleted and the remainder of this Agreement shall remain binding, provided that such deletion does not alter the basic purpose and structure of this Agreement.

14.7 **Notices**. All notices, requests, demands, and other communications relating to this Agreement shall be in writing in the English language and shall be delivered in person or by mail, international courier or facsimile transmission (with a confirmation copy forwarded by courier or mail). Notices sent by mail shall be sent by first class mail or the equivalent, registered or certified, postage prepaid, and shall be deemed to have been given on the date actually received. Notices sent by international courier shall be sent using a service which provides traceability of packages. Notices shall be sent as follows:

Notices to COH:	with a copy to:
Office of Technology Licensing City of Hope 1500 East Duarte Road Duarte, CA 91010 Attn: VP, Center for Applied Technology Development Fax [***]	Office of General Counsel City of Hope 1500 East Duarte Road Duarte, CA 91010 Attn: General Counsel Fax [***]
Notices to Licensee:	with a copy to:
Homology Medicines, Inc. 44 Hartwell Avenue, Suite 102, Lexington, Massachusetts 02421 Attn: President & CEO Fax: 781-457-6134	Jeffrey L. Quillen, Esq. Foley Hoag LLP 155 Seaport Boulevard Boston, MA 02210 Fax: 617-832-7000

Either Party may change its address for notices or facsimile number at any time by sending notice to the other Party.

14.8 **Independent Contractor**. Nothing herein shall create any association, partnership, joint venture, fiduciary duty or the relation of principal and agent between the Parties hereto, it being understood that each Party is acting as an independent contractor, and neither Party shall have the authority to bind the other or the other's representatives in any way.

14.9 **Waiver**. No delay on the part of either Party hereto in exercising any power or right hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any power or right hereunder preclude other or further exercise thereof or the exercise of any other power or right. No waiver of this Agreement or any provision hereof shall be enforceable against any Party hereto unless in writing, signed by the Party against whom such waiver is claimed, and shall be limited solely to the one event.

14.10 **Interpretation**. This Agreement has been prepared jointly and no rule of strict construction shall be applied against either Party. In this Agreement, the singular shall include the plural and vice versa and the word "including" shall be deemed to be followed by the phrase "without limitation." The section headings contained in this Agreement are inserted for convenience only and shall not affect in any way the meaning or interpretation of this Agreement.

14.11 **Licensee Covenant**. Licensee covenants and agrees that, in conducting activities contemplated under this Agreement, it shall comply in all material respects with all applicable laws and regulations including, without limitation, those related to the manufacture, use, labeling importation and marketing of Licensed Products and Licensed Services.

EXECUTION COPY

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

14.12 **Counterparts**. This Agreement may be executed in counterparts, each of which together shall constitute one and the same Agreement. For purposes of executing this agreement, a facsimile copy or an emailed PDF of this Agreement, including the signature pages, will be deemed an original.

14.13 **Licensee Certification**. Licensee warrants to COH that Licensee has not been convicted of a criminal offense related to health care, is not currently debarred, excluded or otherwise ineligible for participation in federally funded health care programs and has not arranged or contracted (by employment or otherwise) with any employee, contractor, or agent that it knew or should have known are excluded from participation in any federal health care program, and will not arrange or contract with any such individuals or entities during the term of this Agreement. Licensee agrees to notify COH in writing immediately of any threatened, proposed or actual conviction relating to health care, of any threatened, proposed or actual debarment or exclusion from participation in federally funded programs, of COH or any employee, contractor or agent of COH. Any breach of the warranty in this ***Section 14.13*** by Licensee shall be grounds for termination of this Agreement by COH in accordance with ***Section 8.2.1***.

14.14 **Publicity**. There shall be no press release or other public statement issued by either party relating to this Agreement except that, within [***] days of the Effective Date, the Parties shall issue a mutually agreed press release regarding the Parties entering this Agreement, which press release may, upon request of COH, disclose the overall potential value of the Agreement to COH, so long as the detailed and specific terms and conditions of this Agreement are not disclosed. If a third party inquires whether a license is available, COH may disclose the existence of the Agreement and the extent of its grant in ***Sections 3.1 and 3.2*** to such third party.

* * * * *

EXECUTION COPY

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

IN WITNESS WHEREOF, the Parties have executed this Agreement by their duly authorized representatives.

HOMOLOGY MEDICINES, INC.

By: /s/ Arthur Tzianabos
Name Arthur Tzianabos
Title: President and CEO

CITY OF HOPE

By: /s/ Robert Stone
Name: Robert Stone
Title: President and CEO

EXECUTION COPY

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EXHIBIT 1

CERTIFICATE OF INCORPORATION OF LICENSEE

Delaware
The First State

I, JEFFREY W. BULLOCK, SECRETARY OF STATE OF THE STATE OF DELAWARE, DO HEREBY CERTIFY THE ATTACHED IS A TRUE AND CORRECT COPY OF THE RESTATED CERTIFICATE OF "HOMOLOGY MEDICINES, INC.", FILED IN THIS OFFICE ON THE TWENTY-SECOND DAY OF DECEMBER, A.D. 2015, AT 11:35 O'CLOCK A.M.

A FILED COPY OF THIS CERTIFICATE HAS BEEN FORWARDED TO THE NEW CASTLE COUNTY RECORDER OF DEEDS.

5708930 8100
SR# 20151485659

Authentication: 10667803
Date: 12-22-15

You may verify this certificate online at corp.delaware.gov/authver.shtml

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

AMENDED AND RESTATED
CERTIFICATE OF INCORPORATION
OF
HOMOLOGY MEDICINES, INC.

(Pursuant to Sections 242 and 245 of the
General Corporation Law of the State of Delaware)

Homology Medicines, Inc., a corporation organized and existing under and by virtue of the provisions of the General Corporation Law of the State of Delaware,

DOES HEREBY CERTIFY:

1. That the name of this corporation is Homology Medicines, Inc., and that this corporation was originally incorporated pursuant to the General Corporation Law of the State of Delaware on March 12, 2015.

2. That the Board of Directors duly adopted resolutions proposing to amend and restate the Certificate of Incorporation of this corporation, declaring said amendment and restatement to be advisable and in the best interests of this corporation and its stockholders, and authorizing the appropriate officers of this corporation to solicit the consent of the stockholders therefor, which resolution setting forth the proposed amendment and restatement is as follows:

RESOLVED, that the Certificate of Incorporation of this corporation be amended and restated in its entirety to read as follows:

FIRST: The name of this corporation is Homology Medicines, Inc. (the "**Corporation**").

SECOND: The address of the registered office of the Corporation in the State of Delaware is 1209 Orange Street, in the City of Wilmington, County of New Castle, Delaware 19801. The name of its registered agent at such address is The Corporation Trust Company.

THIRD: The nature of the business or purposes to be conducted or promoted is to engage in any lawful act or activity for which corporations may be organized under the General Corporation Law of the State of Delaware (the "**DGCL**").

FOURTH: The total number of shares of all classes of stock which the Corporation shall have authority to issue is (i) 86,000,000 shares of Common Stock, $0.0001 par value per share ("**Common Stock**"), and (ii) 62,269,145 shares of Preferred Stock, $0.0001 par value per share ("**Preferred Stock**").

The following is a statement of the designations and the powers, privileges and rights, and the qualifications, limitations or restrictions thereof in respect of each class of capital stock of the Corporation.

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

A. COMMON STOCK

1. General. The voting, dividend and liquidation rights of the holders of the Common Stock are subject to and qualified by the rights, powers and preferences of the holders of the Preferred Stock set forth herein.

2. Voting. The holders of the Common Stock are entitled to one vote for each share of Common Stock held at all meetings of stockholders (and written actions in lieu of meetings) ; provided, however, that, except as otherwise required by law, holders of Common Stock, as such, shall not be entitled to vote on any amendment to this Amended and Restated Certificate of Incorporation (the "**Restated Certificate**") that relates solely to the terms of one or more outstanding series of Preferred Stock if the holders of such affected series are entitled, either separately or together with the holders of one or more other such series, to vote thereon pursuant to the Restated Certificate or pursuant to the DGCL. There shall be no cumulative voting. The number of authorized shares of Common Stock may be increased or decreased (but not below the number of shares thereof then outstanding) by (in addition to any vote of the holders of one or more series of Preferred Stock that may be required by the terms of the Restated Certificate) the affirmative vote of the holders of shares of capital stock of the Corporation representing a majority of the votes represented by all outstanding shares of capital stock of the Corporation entitled to vote, irrespective of the provisions of Section 242(b)(2) of the DGCL.

B. PREFERRED STOCK

62,269,145 shares of the authorized and unissued Preferred Stock of the Corporation are hereby designated "**Series A Preferred Stock**" with the following rights, preferences, powers, privileges and restrictions, qualifications and limitations. Unless otherwise indicated, references to "sections" or 'subsections" in this Part B of this Article Fourth refer to sections and subsections of Part B of this Article Fourth.

1. Dividends.

The holders of Series A Preferred Stock shall be entitled to receive non-cumulative cash dividends, out of any assets legally available therefor, prior and in preference to any declaration or payment of any dividend on shares of Common Stock (payable other than in Common Stock or other securities and rights convertible into or entitling the holder thereof to receive, directly or indirectly, additional shares of Common Stock of the Corporation) at the rate of eight percent (8%) of the Series A Original Issue Price (as defined below) per share of Series A Preferred Stock per annum, payable only when, as and if declared by the Board of Directors of the Corporation. The Corporation shall not declare, pay or set aside any dividends on shares of any other class or series of capital stock of the Corporation (other than dividends on shares of Common Stock payable in shares of Common Stock) unless (in addition to the obtaining of any consents required elsewhere in the Restated Certificate) the holders of the Series A Preferred Stock then outstanding shall first receive, or simultaneously receive, in addition to the dividend described in the first sentence of this Section 1, a dividend on each outstanding share of Series A Preferred Stock in an amount at least equal to (i) in the case of a dividend on Common Stock or

any class or series that is convertible into Common Stock, that dividend per share of Series A Preferred Stock as would equal the product of (A) the dividend payable on each share of such class or series determined, if applicable, as if all shares of such class or series had been converted into Common Stock and (B) the number of shares of Common Stock issuable upon conversion of a share of Series A Preferred Stock, in each case calculated on the record date for determination of holders entitled to receive such dividend or (ii) in the case of a dividend on any class or series that is not convertible into Common Stock, at a rate per share of Series A Preferred Stock determined by (A) dividing the amount of the dividend payable on each share of such class or series of capital stock by the original issuance price of such class or series of capital stock (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to such class or series) and (B) multiplying such fraction by an amount equal to the Series A Original Issue Price (as defined below); provided that, if the Corporation declares, pays or sets aside, on the same date, a dividend on shares of more than one class or series of capital stock of the Corporation, the dividend payable to the holders of Series A Preferred Stock pursuant to this Section 1 shall be calculated based upon the dividend on the class or series of capital stock that would result in the highest Series A Preferred Stock dividend. The "**Series A Original Issue Price**" shall mean $0.71 per share, subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Series A Preferred Stock.

2. Liquidation, Dissolution or Winding Up; Certain Mergers, Consolidations and Asset Sales.

2.1 Preferential Payments to Holders of Series A Preferred Stock. In the event of any voluntary or involuntary liquidation, dissolution or winding up of the Corporation or Deemed Liquidation Event, the holders of shares of Series A Preferred Stock then outstanding shall be entitled to be paid out of the assets of the Corporation available for distribution to its stockholders before any payment shall be made to the holders of Common Stock by reason of their ownership thereof, an amount per share equal to the Series A Original Issue Price, plus any dividends declared but unpaid thereon. If upon any such liquidation, dissolution or winding up of the Corporation or Deemed Liquidation Event, the assets of the Corporation available for distribution to its stockholders shall be insufficient to pay the holders of shares of Series A Preferred Stock the full amount to which they shall be entitled under this Subsection 2.1, the holders of shares of Series A Preferred Stock shall share ratably in any distribution of the assets available for distribution in proportion to the respective amounts which would otherwise be payable in respect of the shares held by them upon such distribution if all amounts payable on or with respect to such shares were paid in full.

2.2 Distribution of Remaining Assets. In the event of any voluntary or involuntary liquidation, dissolution or winding up of the Corporation or Deemed Liquidation Event, after the payment of all preferential amounts required to be paid to the holders of shares of Series A Preferred Stock the remaining assets of the Corporation available for distribution to its stockholders shall be distributed among the holders of the shares of Series A Preferred Stock and Common Stock, pro rata based on the number of shares held by each such holder, treating for this purpose all such securities as if they had been converted to Common Stock pursuant to the terms of the Restated Certificate immediately prior to such dissolution, liquidation, winding

up or Deemed Liquidation Event of the Corporation; provided, that if the aggregate amount (including upon such dissolution, liquidation, winding up or Deemed Liquidation Event and at each other date after such event on which additional amounts (such as earn-out payments, escrow amounts or other contingent payment(s)) are available for distribution) which the holders of Series A Preferred Stock shall have received under Subsections 2.1 and 2.2 shall exceed three (3) times the Series A Original Issue Price per share (subject to appropriate adjustment in the event of a stock split, stock dividend, combination, reclassification, or similar event affecting the Series A Preferred Stock) (the "**Series A Maximum Participation Amount**"), each holder of Series A Preferred Stock shall be entitled to receive upon such liquidation, dissolution or winding up or Deemed Liquidation Event (including upon such dissolution, liquidation, winding up or Deemed Liquidation Event and at each other date after such event on which additional amounts (such as earn-out payments, escrow amounts or other contingent payment(s)) are available for distribution) of the Corporation the greater of (i) the Series A Maximum Participation Amount and (ii) the amount such holder would have received if all shares of Series A Preferred Stock had been converted into Common Stock immediately prior to such liquidation, dissolution, winding up or Deemed Liquidation Event of the Corporation (giving effect to the proceeds available for distribution at the liquidation, dissolution, winding up or Deemed Liquidation Event of the Corporation and at each other date after such event on which additional amounts are available for distribution). The aggregate amount which a holder of a share of Series A Preferred Stock is entitled to receive under Subsections 2.1 and 2.2 is hereinafter referred to as the "**Series A Liquidation Amount**."

2.3 Deemed Liquidation Events.

2.3.1 Definition. Each of the following events shall be considered a "**Deemed Liquidation Event**" unless the holders of at least sixty-seven percent (67%) of the outstanding shares of Series A Preferred Stock elect otherwise by written notice sent to the Corporation at least ten days prior to the effective date of any such event:

(a) a merger or consolidation in which

(i) the Corporation is a constituent party or

(ii) a subsidiary of the Corporation is a constituent party and the Corporation issues shares of its capital stock pursuant to such merger or consolidation,

except any such merger or consolidation involving the Corporation or a subsidiary in which the shares of capital stock of the Corporation outstanding immediately prior to such merger or consolidation continue to represent, or are converted into or exchanged for shares of capital stock that represent, immediately following such merger or consolidation, a majority, by voting power, of the capital stock of (1) the surviving or resulting corporation or (2) if the surviving or resulting corporation is a wholly owned subsidiary of another corporation immediately following such merger or consolidation, the parent corporation of such surviving or resulting corporation; or

(b) the sale, lease, transfer, exclusive license or other disposition, in a single transaction or series of related transactions, by the Corporation or any subsidiary of the Corporation of all or substantially all the assets of the Corporation and its subsidiaries taken as a whole, or the sale or disposition (whether by merger or otherwise) of one or more subsidiaries of the Corporation if substantially all of the assets of the Corporation and its subsidiaries taken as a whole are held by such subsidiary or subsidiaries, except where such sale, lease, transfer, exclusive license or other disposition is to a wholly owned subsidiary of the Corporation.

2.3.2 Effecting a Deemed Liquidation Event.

(a) The Corporation shall not have the power to effect a Deemed Liquidation Event referred to in Subsection 2.3.1(a)(i) unless the agreement or plan of merger or consolidation for such transaction (the "**Merger Agreement**") provides that the consideration payable to the stockholders of the Corporation shall be allocated among the holders of capital stock of the Corporation in accordance with Subsections 2.1 and 2.2.

(b) In the event of a Deemed Liquidation Event referred to in Subsections 2.3.1(a)(ii) or 2.3.1(b), if the Corporation does not effect a dissolution of the Corporation under the DGCL within 90 days after such Deemed Liquidation Event, then (i) the Corporation shall send a written notice (the "**Redemption Notice**") to each holder of Series A Preferred Stock no later than the 90th day after the Deemed Liquidation Event advising such holders of their right (and the requirements to be met to secure such right) pursuant to the terms of the following clause (ii) to require the redemption of such shares of Series A Preferred Stock, and (ii) if holders of at least sixty-seven percent (67%) of the then outstanding shares of Series A Preferred Stock so request in a written instrument delivered to the Corporation not later than 120 days after such Deemed Liquidation Event, the Corporation shall use the consideration received by the Corporation in respect of such Deemed Liquidation Event (net of any retained liabilities associated with the assets sold or technology licensed, as determined in good faith by the Board of Directors), together with any other assets of the Corporation available for distribution to its stockholders, all to the extent permitted by Delaware law governing distributions to stockholders (the "**Available Proceeds**"), on the 150th day after such Deemed Liquidation Event (the "**Redemption Date**"), to redeem each outstanding share of Series A Preferred Stock at a price per share equal to the Series A Liquidation Amount or the amount payable in respect thereof pursuant to Subsections 2.1 and 2.2, as applicable (the "**Redemption Price**"). The Redemption Notice shall state (i) the Redemption Date and the Redemption Price, (ii) the date upon which the holder's right to convert the shares of Series A Preferred Stock held by such holder terminates (as determined in accordance with Subsection 4.1), and (iii) that the holder is to surrender to the Corporation, in the manner and at the place designated, his, her or its certificate or certificates representing the shares of Series A Preferred Stock. Notwithstanding the foregoing, in the event of a redemption pursuant to this Subsection 1.Fourth: B.2.3.2(b), if the Available Proceeds are not sufficient to redeem all outstanding shares of Series A Preferred Stock, the Corporation shall redeem a pro rata portion of each holder's shares of Series A Preferred Stock to the fullest extent of such Available Proceeds, based on the respective amounts that would otherwise be payable in respect of the shares to be redeemed had the Available Proceeds been sufficient to redeem all such shares, and shall redeem the remaining shares as soon as it may lawfully do so under

Delaware law governing distributions to stockholders. In the event of a redemption pursuant to this Subsection 1.Fourth: B.2.3.2(b), on or before the Redemption Date, each holder of shares of Series A Preferred Stock, unless such holder has exercised his, her or its right to convert such shares as provided in Section 4, shall surrender the certificate or certificates representing such shares (or, if such registered holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate) to the Corporation, in the manner and at the place designated in the Redemption Notice, and thereupon the Redemption Price for such shares shall be payable to the order of the individual or entity whose name appears on such certificate or certificates as the owner thereof. If on the Redemption Date the Redemption Price is paid or tendered for payment or deposited with an independent payment agent so as to be available therefor in a timely manner, then notwithstanding that any of the certificates for any of the shares of Series A Preferred Stock shall not have been surrendered, dividends with respect to such shares of Series A Preferred Stock shall cease to accrue after such Redemption Date and all rights, preferences and privileges with respect to such shares shall forthwith after the Redemption Date terminate, except only the right of the holders to receive the Redemption Price without interest upon surrender of such certificate or certificates. Prior to the distribution or redemption provided for in this Subsection 2.3.1(b), the Corporation shall not expend or dissipate the consideration received for such Deemed Liquidation Event, except to discharge expenses incurred in connection with such Deemed Liquidation Event or in the ordinary course of business.

2.3.3 Amount Deemed Paid or Distributed. The amount deemed paid or distributed to the holders of capital stock of the Corporation upon any such merger, consolidation, sale, transfer, exclusive license, other disposition or redemption shall be the cash or the value of the property, rights or securities paid or distributed to such holders by the Corporation or the acquiring person, firm or other entity. The value of such property, rights or securities shall be determined in good faith by the Board of Directors of the Corporation.

2.3.4 Allocation of Escrow and Contingent Consideration**.** In the event of a Deemed Liquidation Event pursuant to Subsection 2.3.1(a)(i), if any portion of the consideration payable to the stockholders of the Corporation is payable only upon satisfaction of contingencies (the "**Additional Consideration**"), the Merger Agreement shall provide that (a) the portion of such consideration that is not Additional Consideration (such portion, the "**Initial Consideration**") shall be allocated among the holders of capital stock of the Corporation in accordance with Subsections 2.1 and 2.2 as if the Initial Consideration were the only consideration payable in connection with such Deemed Liquidation Event and (b) any Additional Consideration which becomes payable to the stockholders of the Corporation upon satisfaction of such contingencies shall be allocated among the holders of capital stock of the Corporation in accordance with Subsections 2.1 and 2.2 after taking into account the previous payment of the Initial Consideration as part of the same transaction. For the purposes of this Subsection 2.3.3, consideration placed into escrow or retained as holdback to be available for satisfaction of indemnification or similar obligations in connection with such Deemed Liquidation Event shall be deemed to be Additional Consideration.

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3. Voting.

3.1 General. On any matter presented to the stockholders of the Corporation for their action or consideration at any meeting of stockholders of the Corporation (or by written consent of stockholders in lieu of meeting), each holder of outstanding shares of Series A Preferred Stock shall be entitled to cast the number of votes equal to the number of whole shares of Common Stock into which the shares of Series A Preferred Stock held by such holder are convertible as of the record date for determining stockholders entitled to vote on such matter. Except as provided by law or by the other provisions of the Restated Certificate, holders of Series A Preferred Stock shall vote together with the holders of Common Stock as a single class.

3.2 Election of Directors. The holders of record of the shares of Series A Preferred Stock, exclusively and as a separate class, shall be entitled to elect two (2) directors of the Corporation (the "**Series A Directors**") and the holders of record of the shares of Common Stock, exclusively and as a separate class, shall be entitled to elect one (1) director of the Corporation. Any director elected as provided in the preceding sentence may be removed without cause by, and only by, the affirmative vote of the holders of the shares of the class or series of capital stock entitled to elect such director or directors, given either at a special meeting of such stockholders duly called for that purpose or pursuant to a written consent of stockholders. If the holders of shares of Series A Preferred Stock or Common Stock, as the case may be, fail to elect a sufficient number of directors to fill all directorships for which they are entitled to elect directors, voting exclusively and as a separate class, pursuant to the first sentence of this Subsection 3.2, then any directorship not so filled shall remain vacant until such time as the holders of the Series A Preferred Stock or Common Stock, as the case may be, elect a person to fill such directorship by vote or written consent in lieu of a meeting; and no such directorship may be filled by stockholders of the Corporation other than by the stockholders of the Corporation that are entitled to elect a person to fill such directorship, voting exclusively and as a separate class. The holders of record of the shares of Common Stock and of any other class or series of voting stock (including the Series A Preferred Stock), exclusively and voting together as a single class, shall be entitled to elect the balance of the total number of directors of the Corporation. At any meeting held for the purpose of electing a director, the presence in person or by proxy of the holders of a majority of the outstanding shares of the class or series entitled to elect such director shall constitute a quorum for the purpose of electing such director. Except as otherwise provided in this Subsection 3.2, a vacancy in any directorship filled by the holders of any class or series shall be filled only by vote or written consent in lieu of a meeting of the holders of such class or series or by any remaining director or directors elected by the holders of such class or series pursuant to this Subsection 3.2.

3.3 Series A Preferred Stock Protective Provisions. At any time when at least 6,600,000 shares of Series A Preferred Stock (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Series A Preferred Stock) are outstanding, the Corporation shall not, either directly or indirectly by amendment, merger, consolidation or otherwise, do any of the following without (in addition to any other vote required by law or the Restated Certificate) the written consent or affirmative vote of the holders of at least sixty-seven percent (67%) of the then outstanding shares of Series A Preferred Stock, given in writing or by vote at a meeting, consenting or voting (as the case may be) separately as a class, and any such act or transaction entered into without such consent or vote shall be null and void *ab initio*, and of no force or effect.

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3.3.1 liquidate, dissolve or wind-up the business and affairs of the Corporation, effect any merger or consolidation or any other Deemed Liquidation Event, or consent to any of the foregoing;

3.3.2 (i) amend, alter or repeal any provision of the Restated Certificate or Bylaws of the Corporation, (ii) increase or decrease the authorized number of shares of Common Stock or Preferred Stock of the Corporation or (iii) otherwise take any action to alter any of the rights, preferences or privileges of the Series A Preferred Stock;

3.3.3 create, or authorize the creation of, any additional class or series of capital stock unless the same ranks junior to the Series A Preferred Stock with respect to the distribution of assets on the liquidation, dissolution or winding up of the Corporation, the payment of dividends and rights of redemption, or increase the authorized number of shares of Series A Preferred stock;

3.3.4 (i) reclassify, alter or amend any existing security of the Corporation that is pari passu with the Series A Preferred Stock in respect of the distribution of assets on the liquidation, dissolution or winding up of the Corporation, the payment of dividends or rights of redemption, if such reclassification, alteration or amendment would render such other security senior to the Series A Preferred Stock in respect of any such right, preference or privilege, or (ii) reclassify, alter or amend any existing security of the Corporation that is junior to the Series A Preferred Stock in respect of the distribution of assets on the liquidation, dissolution or winding up of the Corporation, the payment of dividends or rights of redemption, if such reclassification, alteration or amendment would render such other security senior to or pari passu with the Series A Preferred Stock in respect of any such right, preference or privilege;

3.3.5 purchase or redeem (or permit any subsidiary to purchase or redeem) or pay or declare any dividend or make any distribution on, any shares of capital stock of the Corporation other than (i) redemptions of or dividends or distributions on the Series A Preferred Stock as expressly authorized herein, (ii) dividends or other distributions payable on the Common Stock solely in the form of additional shares of Common Stock, (iii) repurchases of stock from former employees, officers, directors, consultants or other persons who performed services for the Corporation or any subsidiary in connection with the cessation of such employment or service at the lower of the original purchase price or the then-current fair market value thereof, and (iv) repurchases of stock upon exercise of the Corporation's contractual rights of first refusal with respect to proposed transfers of stock;

3.3.6 create, or authorize the creation of, or issue, or authorize the issuance of any debt security, or permit any subsidiary to take any such action with respect to any debt security, if the aggregate indebtedness of the Corporation and its subsidiaries for borrowed money following such action would exceed $1.0 million;

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3.3.7 enter into any agreement or arrangement pursuant to which the Company is obligated to make or guarantee payments or has financial obligations in excess of $1.0 million;

3.3.8 issue any equity securities of the Company in connection with the acquisition of all of the equity capital of any third party or all or substantially all of the assets of a third party, which securities would constitute more than ten percent of the shares of the Corporation's outstanding Common Stock immediately prior to such transaction (calculated on an as-converted to Common Stock basis including the exercise of all outstanding options);

3.3.9 create, or hold capital stock in, any subsidiary that is not wholly owned (either directly or through one or more other subsidiaries) by the Corporation, or sell, transfer or otherwise dispose of any capital stock of any direct or indirect subsidiary of the Corporation, or permit any direct or indirect subsidiary to sell, lease, transfer, exclusively license or otherwise dispose (in a single transaction or series of related transactions) of all or substantially all of the assets of such subsidiary;

3.3.10 unless otherwise approved by the Board of Directors, including a majority of the Series A Directors, grant any stock option or stock equivalent containing acceleration of vesting provisions upon the change of control of the Corporation, sale of all or substantially all assets of the Corporation, termination of employment with or service to the Corporation or similar event; or

3.3.11 enter into any agreement to do any of the foregoing.

4. Optional Conversion.

The holders of the Series A Preferred Stock shall have conversion rights as follows (the "**Conversion Rights**"):

4.1 Right to Convert.

4.1.1 Conversion Ratio. Each share of Series A Preferred Stock shall be convertible, at the option of the holder thereof, at any time and from time to time, and without the payment of additional consideration by the holder thereof, into such number of fully paid and nonassessable shares of Common Stock as is determined by dividing the Series A Original Issue Price by the Series A Conversion Price (as defined below) in effect at the time of conversion. The "**Series A Conversion Price**" shall initially be equal to $0.71. Such initial Series A Conversion Price, and the rate at which shares of Series A Preferred Stock may be converted into shares of Common Stock, shall be subject to adjustment as provided below.

4.1.2 Termination of Conversion Rights. In the event of a liquidation, dissolution or winding up of the Corporation or a Deemed Liquidation Event, the Conversion Rights shall terminate at the close of business on the last full day preceding the date fixed for the payment of any such amounts distributable on such event to the holders of Series A Preferred Stock.

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4.2 Fractional Shares. No fractional shares of Common Stock shall be issued upon conversion of the Series A Preferred Stock. In lieu of any fractional shares to which the holder would otherwise be entitled, the Corporation shall pay cash equal to such fraction multiplied by the fair market value of a share of Common Stock as determined in good faith by the Board of Directors of the Corporation. Whether or not fractional shares would be issuable upon such conversion shall be determined on the basis of the total number of shares of Series A Preferred Stock the holder is at the time converting into Common Stock and the aggregate number of shares of Common Stock issuable upon such conversion.

4.3 Mechanics of Conversion.

4.3.1 Notice of Conversion. In order for a holder of Series A Preferred Stock to voluntarily convert shares of Series A Preferred Stock into shares of Common Stock, such holder shall surrender the certificate or certificates for such shares of Series A Preferred Stock (or, if such registered holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate), at the office of the transfer agent for the Series A Preferred Stock (or at the principal office of the Corporation if the Corporation serves as its own transfer agent), together with written notice that such holder elects to convert all or any number of the shares of the Series A Preferred Stock represented by such certificate or certificates and, if applicable, any event on which such conversion is contingent. Such notice shall state such holder's name or the names of the nominees in which such holder wishes the certificate or certificates for shares of Common Stock to be issued. If required by the Corporation, certificates surrendered for conversion shall be endorsed or accompanied by a written instrument or instruments of transfer, in form satisfactory to the Corporation, duly executed by the registered holder or his, her or its attorney duly authorized in writing. The close of business on the date of receipt by the transfer agent (or by the Corporation if the Corporation serves as its own transfer agent) of such certificates (or lost certificate affidavit and agreement) and notice shall be the time of conversion (the "**Conversion Time**"), and the shares of Common Stock issuable upon conversion of the shares represented by such certificate shall be deemed to be outstanding of record as of such date. The Corporation shall, as soon as practicable after the Conversion Time, (i) issue and deliver to such holder of Series A Preferred Stock, or to his, her or its nominees, a certificate or certificates for the number of full shares of Common Stock issuable upon such conversion in accordance with the provisions hereof and a certificate for the number (if any) of the shares of Series A Preferred Stock represented by the surrendered certificate that were not converted into Common Stock, (ii) pay in cash such amount as provided in Subsection 4.2 in lieu of any fraction of a share of Common Stock otherwise issuable upon such conversion and (iii) pay all declared but unpaid dividends on the shares of Series A Preferred Stock converted.

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4.3.2 Reservation of Shares. The Corporation shall at all times when the Series A Preferred Stock shall be outstanding, reserve and keep available out of its authorized but unissued capital stock, for the purpose of effecting the conversion of the Series A Preferred Stock, such number of its duly authorized shares of Common Stock as shall from time to time be sufficient to effect the conversion of all outstanding Series A Preferred Stock; and if at any time the number of authorized but unissued shares of Common Stock shall not be sufficient to effect the conversion of all then outstanding shares of the Series A Preferred Stock, the Corporation shall take such corporate action as may be necessary to increase its authorized but unissued shares of Common Stock to such number of shares as shall be sufficient for such purposes, including, without limitation, engaging in best efforts to obtain the requisite stockholder approval of any necessary amendment to the Restated Certificate. Before taking any action which would cause an adjustment reducing the Series A Conversion Price below the then par value of the shares of Common Stock issuable upon conversion of the Series A Preferred Stock, the Corporation will take any corporate action which may, in the opinion of its counsel, be necessary in order that the Corporation may validly and legally issue fully paid and nonassessable shares of Common Stock at such adjusted Series A Conversion Price.

4.3.3 Effect of Conversion. All shares of Series A Preferred Stock which shall have been surrendered for conversion as herein provided shall no longer be deemed to be outstanding and all rights with respect to such shares shall immediately cease and terminate at the Conversion Time, except only the right of the holders thereof to receive shares of Common Stock in exchange therefor, to receive payment in lieu of any fraction of a share otherwise issuable upon such conversion as provided in Subsection 4.2 and to receive payment of any dividends declared but unpaid thereon. Any shares of Series A Preferred Stock so converted shall be retired and cancelled and may not be reissued as shares of such series, and the Corporation may thereafter take such appropriate action (without the need for stockholder action) as may be necessary to reduce the authorized number of shares of Series A Preferred Stock accordingly.

4.3.4 No Further Adjustment. Upon any such conversion, no adjustment to the Series A Conversion Price shall be made for any declared but unpaid dividends on the Series A Preferred Stock surrendered for conversion or on the Common Stock delivered upon conversion.

4.3.5 Taxes. The Corporation shall pay any and all issue and other similar taxes that may be payable in respect of any issuance or delivery of shares of Common Stock upon conversion of shares of Series A Preferred Stock pursuant to this Section 4. The Corporation shall not, however, be required to pay any tax which may be payable in respect of any transfer involved in the issuance and delivery of shares of Common Stock in a name other than that in which the shares of Series A Preferred Stock so converted were registered, and no such issuance or delivery shall be made unless and until the person or entity requesting such issuance has paid to the Corporation the amount of any such tax or has established, to the satisfaction of the Corporation, that such tax has been paid.

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4.4 Adjustments to Series A Conversion Price for Diluting Issues.

4.4.1 Special Definitions. For purposes of this Article Fourth, the following definitions shall apply:

(a) "**Option**" shall mean rights, options or warrants to subscribe for, purchase or otherwise acquire Common Stock or Convertible Securities.

(b) "**Series A Original Issue Date**" shall mean the date on which the first share of Series A Preferred Stock was issued.

(c) "**Convertible Securities**" shall mean any evidences of indebtedness, shares or other securities directly or indirectly convertible into or exchangeable for Common Stock, but excluding Options.

(d) "**Additional Shares of Common Stock**" shall mean all shares of Common Stock issued (or, pursuant to Subsection 4.4.3 below, deemed to be issued) by the Corporation after the Series A Original Issue Date, other than (1) the following shares of Common Stock and (2) shares of Common Stock deemed issued pursuant to the following Options and Convertible Securities (clauses (1) and (2), collectively, "**Exempted Securities**"):

(i) shares of Common Stock, Options or Convertible Securities issued as a dividend or distribution on Series A Preferred Stock;

(ii) shares of Common Stock, Options or Convertible Securities issued by reason of a dividend, stock split, split-up or other distribution on shares of Common Stock that is covered by Subsection 4.5, 4.6, 4.7 or 4.8**;**

(iii) shares of Common Stock or Options issued to employees or directors of, or consultants or advisors to, the Corporation or any of its subsidiaries pursuant to a plan, agreement or arrangement that is in effect as of the filing of this Restated Certificate (the "**Effective Date**"), or is subsequently approved by the Board of Directors of the Corporation, including a majority of the Series A Directors (including any amendments to any existing plans, agreements or arrangements after the Effective Date);

(iv) shares of Common Stock or Convertible Securities actually issued upon the exercise of Options or shares of Common Stock actually issued upon the conversion or exchange of Convertible Securities, in each case provided such issuance is pursuant to the terms of such Option or Convertible Security;

(v) shares of Common Stock, Options or Convertible Securities issued to banks, equipment lessors or other financial institutions, or to real property lessors, pursuant to a debt financing, equipment leasing or real property leasing transaction approved by the Board of Directors of the Corporation, including a majority of the Series A Directors;

(vi) shares of Common Stock, Options or Convertible Securities issued to suppliers or third party service providers in connection with the provision of goods or services pursuant to transactions approved by the Board of Directors of the Corporation, provided, that such exclusion from antidilution protection as Exempted Securities hereunder is specifically approved by the Board of Directors of the Corporation, including a majority of the Series A Directors;

(vii) shares of Common Stock, Options or Convertible Securities issued pursuant to the acquisition of another corporation by the Corporation by merger, purchase of substantially all of the assets or other reorganization or to a joint venture agreement, provided, that such issuances are approved by the Board of Directors of the Corporation, including a majority of the Series A Directors; or

(viii) shares of Common Stock, Options or Convertible Securities issued in connection with sponsored research, collaboration, technology license, development, OEM, marketing or other similar agreements or strategic partnerships approved by the Board of Directors of the Corporation, provided, that such exclusion from antidilution protection as Exempted Securities hereunder is specifically approved by the Board of Directors of the Corporation, including a majority of the Series A Directors.

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4.4.2 No Adjustment of Series A Conversion Price. No adjustment in the Series A Conversion Price shall be made as the result of the issuance or deemed issuance of Additional Shares of Common Stock if the Corporation receives written notice from the holders of at least sixty-seven percent (67%) of the then outstanding shares of Series A Preferred Stock agreeing that no such adjustment shall be made as the result of the issuance or deemed issuance of such Additional Shares of Common Stock.

4.4.3 Deemed Issue of Additional Shares of Common Stock.

(a) If the Corporation at any time or from time to time after the Series A Original Issue Date shall issue any Options or Convertible Securities (excluding Options or Convertible Securities which are themselves Exempted Securities) or shall fix a record date for the determination of holders of any class of securities entitled to receive any such Options or Convertible Securities, then the maximum number of shares of Common Stock (as set forth in the instrument relating thereto, assuming the satisfaction of any conditions to exercisability, convertibility or exchangeability but without regard to any provision contained therein for a subsequent adjustment of such number) issuable upon the exercise of such Options or, in the case of Convertible Securities and Options therefor, the conversion or exchange of such Convertible Securities, shall be deemed to be Additional Shares of Common Stock issued as of the time of such issue or, in case such a record date shall have been fixed, as of the close of business on such record date.

(b) If the terms of any Option or Convertible Security, the issuance of which resulted in an adjustment to the Series A Conversion Price pursuant to the terms of Subsection 4.4.4, are revised as a result of an amendment to such terms or any other adjustment pursuant to the provisions of such Option or Convertible Security (but excluding automatic adjustments to such terms pursuant to anti-dilution or similar provisions of such Option or Convertible Security) to provide for either (1) any increase or decrease in the number of shares of Common Stock issuable upon the exercise, conversion and/or exchange of any such Option or Convertible Security or (2) any increase or decrease in the consideration payable to the Corporation upon such exercise, conversion and/or exchange, then, effective upon such increase or decrease becoming effective, the Series A Conversion Price computed upon the original issue of such Option or Convertible Security (or upon the occurrence of a record date with respect thereto) shall be readjusted to such Series A Conversion Price as would have obtained had such revised terms been in effect upon the original date of issuance of such Option or Convertible Security. Notwithstanding the foregoing, no readjustment pursuant to this clause (b) shall have the effect of increasing the Series A Conversion Price to an amount which exceeds the lower of (i) the Series A Conversion Price in effect immediately prior to the original adjustment made as a result of the issuance of such Option or Convertible Security, or (ii) the Series A Conversion Price that would have resulted from any issuances of Additional Shares of Common Stock (other than deemed issuances of Additional Shares of Common Stock as a result of the issuance of such Option or Convertible Security) between the original adjustment date and such readjustment date.

(c) If the terms of any Option or Convertible Security (excluding Options or Convertible Securities which are themselves Exempted Securities), the issuance of which did not result in an adjustment to the Series A Conversion Price pursuant to the terms of Subsection 4.4.4 (either because the consideration per share (determined pursuant to Subsection 4.4.5) of the Additional Shares of Common Stock subject thereto was equal to or greater than the Series A Conversion Price then in effect, or because such Option or Convertible Security was issued before the Series A Original Issue Date), are revised after the Series A Original Issue Date as a result of an amendment to such terms or any other adjustment pursuant to the provisions of such Option or Convertible Security (but excluding automatic adjustments to such terms pursuant to anti-dilution or similar provisions of such Option or Convertible Security) to provide for either (1) any increase in the number of shares of Common Stock issuable upon the exercise, conversion or exchange of any such Option or Convertible Security or (2) any decrease in the consideration payable to the Corporation upon such exercise, conversion or exchange, then such Option or Convertible Security, as so amended or adjusted, and the Additional Shares of Common Stock subject thereto (determined in the manner provided in Subsection 4.4.3(a) shall be deemed to have been issued effective upon such increase or decrease becoming effective.

(d) Upon the expiration or termination of any unexercised Option or unconverted or unexchanged Convertible Security (or portion thereof) which resulted (either upon its original issuance or upon a revision of its terms) in an adjustment to the Series A Conversion Price pursuant to the terms of Subsection 4.4.4, the Series A Conversion Price shall be readjusted to such Series A Conversion Price as would have obtained had such Option or Convertible Security (or portion thereof) never been issued.

(e) If the number of shares of Common Stock issuable upon the exercise, conversion and/or exchange of any Option or Convertible Security, or the consideration payable to the Corporation upon such exercise, conversion and/or exchange, is calculable at the time such Option or Convertible Security is issued or amended but is subject to adjustment based upon subsequent events, any adjustment to the Series A Conversion Price provided for in this Subsection 4.4.3 shall be effected at the time of such issuance or amendment based on such number of shares or amount of consideration without regard to any provisions for subsequent adjustments (and any subsequent adjustments shall be treated as provided in clauses (b) and (c) of this Subsection 4.4.3). If the number of shares of Common Stock issuable upon the exercise, conversion and/or exchange of any Option or Convertible Security, or the consideration payable to the Corporation upon such exercise, conversion and/or exchange, cannot be calculated at all at the time such Option or Convertible Security is issued or amended, any adjustment to the Series A Conversion Price that would result under the terms of this Subsection 4.4.3 at the time of such issuance or amendment shall instead be effected at the time such number of shares and/or amount of consideration is first calculable (even if subject to subsequent adjustments), assuming for purposes of calculating such adjustment to the Series A Conversion Price that such issuance or amendment took place at the time such calculation can first be made.

4.4.4 Adjustment of Series A Conversion Price Upon Issuance of Additional Shares of Common Stock. In the event the Corporation shall at any time after the Series A Original Issue Date issue Additional Shares of Common Stock (including Additional Shares of Common Stock deemed to be issued pursuant to Subsection 4.4.3), without consideration or for a consideration per share less than the Series A Conversion Price in effect immediately prior to such issue, then the Series A Conversion Price shall be reduced, concurrently with such issue, to a price (calculated to the nearest one-hundredth of a cent) determined in accordance with the following formula:

$$CP_2 = CP_1 * (A + B) \div (A + C).$$

For purposes of the foregoing formula, the following definitions shall apply:

(a) "CP_2" shall mean the Series A Conversion Price in effect immediately after such issue of Additional Shares of Common Stock

(b) "CP_1" shall mean the Series A Conversion Price in effect immediately prior to such issue of Additional Shares of Common Stock;

(c) "A" shall mean the number of shares of Common Stock outstanding immediately prior to such issue of Additional Shares of Common Stock (treating for this purpose as outstanding all shares of Common Stock issuable upon exercise of Options outstanding immediately prior to such issue or upon conversion or exchange of Convertible Securities (including the Series A Preferred Stock) outstanding (assuming exercise of any outstanding Options therefor) immediately prior to such issue);

(d) "B" shall mean the number of shares of Common Stock that would have been issued if such Additional Shares of Common Stock had been issued at a price per share equal to CP_1 (determined by dividing the aggregate consideration received by the Corporation in respect of such issue by CP_1); and

(e) "C" shall mean the number of such Additional Shares of Common Stock issued in such transaction.

4.4.5 Determination of Consideration. For purposes of this Subsection 4.4, the consideration received by the Corporation for the issue of any Additional Shares of Common Stock shall be computed as follows:

(a) Cash and Property: Such consideration shall:

(i) insofar as it consists of cash, be computed at the aggregate amount of cash received by the Corporation, excluding amounts paid or payable for accrued interest;

(ii) insofar as it consists of property other than cash, be computed at the fair market value thereof at the time of such issue, as determined in good faith by the Board of Directors of the Corporation; and

(iii) in the event Additional Shares of Common Stock are issued together with other shares or securities or other assets of the Corporation for consideration which covers both, be the proportion of such consideration so received, computed as provided in clauses (i) and (ii) above, as determined in good faith by the Board of Directors of the Corporation.

(b) Options and Convertible Securities. The consideration per share received by the Corporation for Additional Shares of Common Stock deemed to have been issued pursuant to Subsection 4.4.3, relating to Options and Convertible Securities, shall be determined by dividing the total amount, if any, received or receivable by the Corporation as consideration for the issue of such Options or Convertible Securities, plus the minimum aggregate amount of additional consideration (as set forth in the instruments relating thereto, without regard to any provision contained therein for a subsequent adjustment of such consideration) payable to the Corporation upon the exercise of such Options or the conversion or exchange of such Convertible Securities, or in the case of Options for Convertible Securities, the exercise of such Options for Convertible Securities and the conversion or exchange of such Convertible Securities, by

(i) the maximum number of shares of Common Stock (as set forth in the instruments relating thereto, without regard to any provision contained therein for a subsequent adjustment of such number) issuable upon the exercise of such Options or the conversion or exchange of such Convertible Securities, or in the case of Options for Convertible Securities, the exercise of such Options for Convertible Securities and the conversion or exchange of such Convertible Securities.

4.4.6 Multiple Closing Dates. In the event the Corporation shall issue on more than one date Additional Shares of Common Stock that are a part of one transaction or a series of related transactions and that would result in an adjustment to the Series A Conversion Price pursuant to the terms of Subsection 4.4.4, then, upon the final such issuance, the Series A Conversion Price shall be readjusted to give effect to all such issuances as if they occurred on the date of the first such issuance (and without giving effect to any additional adjustments as a result of any such subsequent issuances within such period).

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

4.5 Adjustment for Stock Splits and Combinations. If the Corporation shall at any time or from time to time after the Series A Original Issue Date effect a subdivision of the outstanding Common Stock, the Series A Conversion Price in effect immediately before that subdivision shall be proportionately decreased so that the number of shares of Common Stock issuable on conversion of each share of such series shall be increased in proportion to such increase in the aggregate number of shares of Common Stock outstanding. If the Corporation shall at any time or from time to time after the Series A Original Issue Date combine the outstanding shares of Common Stock, the Series A Conversion Price in effect immediately before the combination shall be proportionately increased so that the number of shares of Common Stock issuable on conversion of each share of such series shall be decreased in proportion to such decrease in the aggregate number of shares of Common Stock outstanding. Any adjustment under this subsection shall become effective at the close of business on the date the subdivision or combination becomes effective.

4.6 Adjustment for Certain Dividends and Distributions. In the event the Corporation at any time or from time to time after the Series A Original Issue Date shall make or issue, or fix a record date for the determination of holders of Common Stock entitled to receive, a dividend or other distribution payable on the Common Stock in additional shares of Common Stock, then and in each such event the Series A Conversion Price in effect immediately before such event shall be decreased as of the time of such issuance or, in the event such a record date shall have been fixed, as of the close of business on such record date, by multiplying the Series A Conversion Price then in effect by a fraction:

(1) the numerator of which shall be the total number of shares of Common Stock issued and outstanding immediately prior to the time of such issuance or the close of business on such record date, and

(2) the denominator of which shall be the total number of shares of Common Stock issued and outstanding immediately prior to the time of such issuance or the close of business on such record date plus the number of shares of Common Stock issuable in payment of such dividend or distribution.

Notwithstanding the foregoing, (a) if such record date shall have been fixed and such dividend is not fully paid or if such distribution is not fully made on the date fixed therefor, the Series A Conversion Price shall be recomputed accordingly as of the close of business on such record date and thereafter the Series A Conversion Price shall be adjusted pursuant to this subsection as of the time of actual payment of such dividends or distributions; and (b) that no such adjustment shall be made if the holders of Series A Preferred Stock simultaneously receive a dividend or other distribution of shares of Common Stock in a number equal to the number of shares of Common Stock as they would have received if all outstanding shares of Series A Preferred Stock had been converted into Common Stock on the date of such event.

4.7 Adjustments for Other Dividends and Distributions. In the event the Corporation at any time or from time to time after the Series A Original Issue Date shall make or issue, or fix a record date for the determination of holders of Common Stock entitled to receive, a dividend or other distribution payable in securities of the Corporation (other than a

distribution of shares of Common Stock in respect of outstanding shares of Common Stock) or in other property and the provisions of Section 1 do not apply to such dividend or distribution, then and in each such event the holders of Series A Preferred Stock shall receive, simultaneously with the distribution to the holders of Common Stock, a dividend or other distribution of such securities or other property in an amount equal to the amount of such securities or other property as they would have received if all outstanding shares of Series A Preferred Stock had been converted into Common Stock on the date of such event.

4.8 Adjustment for Merger or Reorganization, etc. Subject to the provisions of Subsection 2.3, if there shall occur any reorganization, recapitalization, reclassification, consolidation or merger involving the Corporation in which the Common Stock (but not the Series A Preferred Stock) is converted into or exchanged for securities, cash or other property (other than a transaction covered by Subsections 4.4, 4.6 or 4.7), then, following any such reorganization, recapitalization, reclassification, consolidation or merger, each share of Series A Preferred Stock shall thereafter be convertible in lieu of the Common Stock into which it was convertible prior to such event into the kind and amount of securities, cash or other property which a holder of the number of shares of Common Stock of the Corporation issuable upon conversion of one share of Series A Preferred Stock immediately prior to such reorganization, recapitalization, reclassification, consolidation or merger would have been entitled to receive pursuant to such transaction; and, in such case, appropriate adjustment (as determined in good faith by the Board of Directors of the Corporation) shall be made in the application of the provisions in this Section 4 with respect to the rights and interests thereafter of the holders of the Series A Preferred Stock, to the end that the provisions set forth in this Section 4 (including provisions with respect to changes in and other adjustments of the Series A Conversion Price) shall thereafter be applicable, as nearly as reasonably may be, in relation to any securities or other property thereafter deliverable upon the conversion of the Series A Preferred Stock. For the avoidance of doubt, nothing in this Subsection 4.8 shall be construed as preventing the holders of Series A Preferred Stock from seeking any appraisal rights to which they are otherwise entitled under the DGCL in connection with a merger triggering an adjustment hereunder, nor shall this Subsection 4.8 be deemed conclusive evidence of the fair value of the shares of Series A Preferred Stock in any such appraisal proceeding.

4.9 Certificate as to Adjustments. Upon the occurrence of each adjustment or readjustment of the Series A Conversion Price pursuant to this Section 4, the Corporation at its expense shall, as promptly as reasonably practicable but in any event not later than 30 days thereafter, compute such adjustment or readjustment in accordance with the terms hereof and furnish to each holder of Series A Preferred Stock a certificate setting forth such adjustment or readjustment (including the kind and amount of securities, cash or other property into which the Series A Preferred Stock is convertible) and showing in detail the facts upon which such adjustment or readjustment is based. The Corporation shall, as promptly as reasonably practicable after the written request at any time of any holder of Series A Preferred Stock (but in any event not later than 10 days thereafter), furnish or cause to be furnished to such holder a certificate setting forth (i) the Series A Conversion Price then in effect, and (ii) the number of shares of Common Stock and the amount, if any, of other securities, cash or property which then would be received upon the conversion of Series A Preferred Stock.

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

4.10 Notice of Record Date. In the event:

(a) the Corporation shall take a record of the holders of its Common Stock (or other capital stock or securities at the time issuable upon conversion of the Series A Preferred Stock) for the purpose of entitling or enabling them to receive any dividend or other distribution, or to receive any right to subscribe for or purchase any shares of capital stock of any class or any other securities, or to receive any other security; or

(b) of any capital reorganization of the Corporation, any reclassification of the Common Stock of the Corporation, or any Deemed Liquidation Event; or

(c) of the voluntary or involuntary dissolution, liquidation or winding-up of the Corporation,

then, and in each such case, the Corporation will send or cause to be sent to the holders of the Series A Preferred Stock a notice specifying, as the case may be, (i) the record date for such dividend, distribution or right, and the amount and character of such dividend, distribution or right, or (ii) the effective date on which such reorganization, reclassification, consolidation, merger, transfer, dissolution, liquidation or winding-up is proposed to take place, and the time, if any is to be fixed, as of which the holders of record of Common Stock (or such other capital stock or securities at the time issuable upon the conversion of the Series A Preferred Stock) shall be entitled to exchange their shares of Common Stock (or such other capital stock or securities) for securities or other property deliverable upon such reorganization, reclassification, consolidation, merger, transfer, dissolution, liquidation or winding-up, and the amount per share and character of such exchange applicable to the Series A Preferred Stock and the Common Stock. Such notice shall be sent at least 10 days prior to the record date or effective date for the event specified in such notice.

5. Mandatory Conversion.

5.1 Trigger Events. Upon either (a) the closing of the sale of shares of Common Stock to the public at a price of at least $2.13 per share (subject to appropriate adjustment in the event of any stock dividend, stock split, combination or other similar recapitalization with respect to the Common Stock), in a firm-commitment underwritten public offering pursuant to an effective registration statement under the Securities Act of 1933, as amended, resulting in at least $50 million of gross proceeds to the Corporation or (b) the date and time, or the occurrence of an event, specified by vote or written consent of the holders of at least sixty-seven percent (67%) of the then outstanding shares of Series A Preferred Stock (the time of such closing or the date and time specified or the time of the event specified in such vote or written consent is referred to herein as the "**Mandatory Conversion Time**"), (i) all outstanding shares of Series A Preferred Stock shall automatically be converted into shares of Common Stock, at the then effective conversion rate and (ii) such shares may not be reissued by the Corporation.

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

5.2 Procedural Requirements. All holders of record of shares of Series A Preferred Stock shall be sent written notice of the Mandatory Conversion Time and the place designated for mandatory conversion of all such shares of Series A Preferred Stock pursuant to this Section 5. Such notice need not be sent in advance of the occurrence of the Mandatory Conversion Time. Upon receipt of such notice, each holder of shares of Series A Preferred Stock shall surrender his, her or its certificate or certificates for all such shares (or, if such holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate) to the Corporation at the place designated in such notice. If so required by the Corporation, certificates surrendered for conversion shall be endorsed or accompanied by written instrument or instruments of transfer, in form satisfactory to the Corporation, duly executed by the registered holder or by his, her or its attorney duly authorized in writing. All rights with respect to the Series A Preferred Stock converted pursuant to Subsection 5.1, including the rights, if any, to receive notices and vote (other than as a holder of Common Stock), will terminate at the Mandatory Conversion Time (notwithstanding the failure of the holder or holders thereof to surrender the certificates at or prior to such time), except only the rights of the holders thereof, upon surrender of their certificate or certificates (or lost certificate affidavit and agreement) therefor, to receive the items provided for in the next sentence of this Subsection 5.2. As soon as practicable after the Mandatory Conversion Time and the surrender of the certificate or certificates (or lost certificate affidavit and agreement) for Series A Preferred Stock, the Corporation shall issue and deliver to such holder, or to his, her or its nominees, a certificate or certificates for the number of full shares of Common Stock issuable on such conversion in accordance with the provisions hereof, together with cash as provided in Subsection 4.2 in lieu of any fraction of a share of Common Stock otherwise issuable upon such conversion and the payment of any declared but unpaid dividends on the shares of Series A Preferred Stock converted. Such converted Series A Preferred Stock shall be retired and cancelled and may not be reissued as shares of such series, and the Corporation may thereafter take such appropriate action (without the need for stockholder action) as may be necessary to reduce the authorized number of shares of Series A Preferred Stock accordingly.

5A. Special Mandatory Conversion.

5A.1. Trigger Event. In the event that any holder of shares of Series A Preferred Stock fails to fulfill its entire obligation to participate in the Milestone Closing (as defined below) by purchasing, in the aggregate, in the Milestone Closing such holder's Designated Amount (as defined below), then (i) each share of Preferred Stock held by such holder shall automatically, effective upon, subject to, and concurrently with the consummation of the Milestone Closing and without any further action on the part of such holder, be converted into a number of shares of Common Stock equal to the quotient of (a) the number of shares of Common Stock into which such share of Preferred Stock is convertible pursuant to Subsection 4.1.1 immediately prior to the consummation of such Milestone Closing, divided by (b) ten and (ii) (a) nine out of every ten shares of Common Stock issued upon conversion of Preferred Stock and held by such holder as of immediately prior to the Milestone Closing shall immediately be deemed surrendered and cancelled without any action on the part of such holder, (b) the certificate or certificates formerly

evidencing the shares of Common Stock held by such holder prior to such cancellation shall be deemed only to represent the portion of such shares remaining outstanding following such cancellation, and (c) upon surrender of such certificate or certificates (or, if such holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate) for such shares of Common Stock, the Corporation shall issue and deliver to such holder, a certificate or certificates for the number of full shares of Common Stock that remain outstanding in accordance with the provisions hereof. For purposes of determining whether a holder of Preferred Stock has purchased in the Milestone Closing its Designated Amount, all shares of Preferred Stock purchased by Investor Affiliates (as defined below) of such holder in the Milestone Closing shall be aggregated with the shares of Preferred Stock purchased by such holder in the Milestone Closing (provided that no shares or securities shall be attributed to more than one entity or person within any such group of affiliated entities or persons). Such conversion is referred to as a "**Special Mandatory Conversion.**"

5A.2. Procedural Requirements. Upon a Special Mandatory Conversion, each holder of shares of Series A Preferred Stock converted pursuant to Subsection 5A.1 shall be sent written notice of such Special Mandatory Conversion and the place designated for mandatory conversion of all such shares of Series A Preferred Stock pursuant to this Section 5A. Upon receipt of such notice, each holder of such shares of Series A Preferred Stock shall surrender his, her or its certificate or certificates for all such shares (or, if such holder alleges that such certificate has been lost, stolen or destroyed, a lost certificate affidavit and agreement reasonably acceptable to the Corporation to indemnify the Corporation against any claim that may be made against the Corporation on account of the alleged loss, theft or destruction of such certificate) to the Corporation at the place designated in such notice. If so required by the Corporation, certificates surrendered for conversion shall be endorsed or accompanied by written instrument or instruments of transfer, in form satisfactory to the Corporation, duly executed by the registered holder or by his, her or its attorney duly authorized in writing. All rights with respect to the Series A Preferred Stock converted pursuant to Subsection 5A.1, including the rights, if any, to receive notices and vote (other than as a holder of Common Stock), will terminate at the time of the Special Mandatory Conversion (notwithstanding the failure of the holder or holders thereof to surrender the certificates for such shares at or prior to such time), except only the rights of the holders thereof, upon surrender of their certificate or certificates therefor (or lost certificate affidavit and agreement), to receive the items provided for in the next sentence of this Subsection 5A.2. As soon as practicable after the Special Mandatory Conversion and the surrender of the certificate or certificates (or lost certificate affidavit and agreement) for Series A Preferred Stock so converted, the Corporation shall issue and deliver to such holder, or to his, her or its nominees, a certificate or certificates for the number of full shares of Common Stock issuable on such conversion in accordance with the provisions hereof, together with cash as provided in Subsection 4.2 in lieu of any fraction of a share of Common Stock otherwise issuable upon such conversion and the payment of any declared but unpaid dividends on the shares of Series A Preferred Stock converted. Such converted Series A Preferred Stock shall be retired and cancelled and may not be reissued as shares of such series, and the Corporation may thereafter take such appropriate action (without the need for stockholder action) as may be necessary to reduce the authorized number of shares of Series A Preferred Stock accordingly.

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

5A.3. Definitions. For purposes of this Section 5A, the following definitions shall apply:

5A.3.1 "**Designated Amount**" shall mean, with respect to any holder of Preferred Stock, the number of shares of Series A Preferred Stock set forth opposite such holder's name on Exhibit A to the Purchase Agreement under the heading "Milestone Closing Shares."

5A.3.2 "**Investor Affiliate**" shall mean, with respect to any holder of shares of Series A Preferred Stock, any person, entity or firm which, directly or indirectly, controls, is controlled by or is under common control with such holder, including, without limitation, any entity of which the holder is a partner or member, any partner, officer, director, member or employee of such holder and any venture capital fund now or hereafter existing of which the holder is a partner or member which is controlled by or under common control with one or more general partners of such holder or shares the same management company with such holder.

5A.3.3 "**Milestone Closing**" shall mean the closing of the sale of Series A Preferred Stock in accordance with Section 1.3 of the Purchase Agreement.

5A.3.4 "**Purchase Agreement**" means the Preferred Stock Purchase Agreement dated on or about the Series A Original Issue Date, by and among the Corporation and the other parties thereto, as the same may be amended from time to time.

6. Acquired Shares. Any shares of Series A Preferred Stock that are acquired by the Corporation or any of its subsidiaries shall be automatically and immediately cancelled and retired and shall not be reissued, sold or transferred. Neither the Corporation nor any of its subsidiaries may exercise any voting or other rights granted to the holders of Series A Preferred Stock following any acquisition thereof.

7. Waiver. Any of the rights, powers, preferences and other terms of the Series A Preferred Stock set forth herein may be waived on behalf of all holders of Series A Preferred Stock by the affirmative written consent or vote of the holders of at least sixty-seven percent (67%) of the shares of Series A Preferred Stock then outstanding.

8. Notices. Any notice required or permitted by the provisions of this Article Fourth to be given to a holder of shares of Series A Preferred Stock shall be mailed, postage prepaid, to the post office address last shown on the records of the Corporation, or given by electronic communication in compliance with the provisions of the DGCL, and shall be deemed sent upon such mailing or electronic transmission.

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

FIFTH: Subject to any additional vote required by the Restated Certificate or Bylaws, in furtherance and not in limitation of the powers conferred by statute, the Board of Directors is expressly authorized to make, repeal, alter, amend and rescind any or all of the Bylaws of the Corporation.

SIXTH: Subject to any additional vote required by the Restated Certificate, the number of directors of the Corporation shall be determined in the manner set forth in the Bylaws of the Corporation.

SEVENTH: Elections of directors need not be by written ballot unless the Bylaws of the Corporation shall so provide.

EIGHTH: Meetings of stockholders may be held within or without the State of Delaware, as the Bylaws of the Corporation may provide. The books of the Corporation may be kept outside the State of Delaware at such place or places as may be designated from time to time by the Board of Directors or in the Bylaws of the Corporation.

NINTH: To the fullest extent permitted by law, a director of the Corporation shall not be personally liable to the Corporation or its stockholders for monetary damages for breach of fiduciary duty as a director. If the DGCL or any other law of the State of Delaware is amended after approval by the stockholders of this Article Ninth to authorize corporate action further eliminating or limiting the personal liability of directors, then the liability of a director of the Corporation shall be eliminated or limited to the fullest extent permitted by the DGCL as so amended.

Any repeal or modification of the foregoing provisions of this Article Ninth by the stockholders of the Corporation shall not adversely affect any right or protection of a director of the Corporation existing at the time of, or increase the liability of any director of the Corporation with respect to any acts or omissions of such director occurring prior to, such repeal or modification.

TENTH: To the fullest extent permitted by applicable law, the Corporation is authorized to provide indemnification of (and advancement of expenses to) directors, officers and agents of the Corporation (and any other persons to which General Corporation Law permits the Corporation to provide indemnification) through Bylaw provisions, agreements with such agents or other persons, vote of stockholders or disinterested directors or otherwise, in excess of the indemnification and advancement otherwise permitted by Section 145 of the DGCL.

Any amendment, repeal or modification of the foregoing provisions of this Article Tenth shall not adversely affect any right or protection of any director, officer or other agent of the Corporation existing at the time of such amendment, repeal or modification.

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ELEVENTH: The Corporation renounces, to the fullest extent permitted by law, any interest or expectancy of the Corporation in, or in being offered an opportunity to participate in, any Excluded Opportunity. An "**Excluded Opportunity**" is any matter, transaction or interest that is presented to, or acquired, created or developed by, or which otherwise comes into the possession of, (i) any director of the Corporation who is not an employee of the Corporation or any of its subsidiaries, or (ii) any holder of Series A Preferred Stock or any partner, member, director, stockholder, employee or agent of any such holder, other than someone who is an employee of the Corporation or any of its subsidiaries (collectively, "**Covered Persons**"), unless such matter, transaction or interest is presented to, or acquired, created or developed by, or otherwise comes into the possession of, a Covered Person expressly and solely in such Covered Person's capacity as a director of the Corporation.

TWELFTH: Unless the Corporation consents in writing to the selection of an alternative forum, the Court of Chancery in the State of Delaware shall be the sole and exclusive forum for any stockholder (including a beneficial owner) to bring (i) any derivative action or proceeding brought on behalf of the Corporation, (ii) any action asserting a claim of breach of fiduciary duty owed by any director, officer or other employee of the Corporation to the Corporation or the Corporation's stockholders, (iii) any action asserting a claim against the Corporation, its directors, officers or employees arising pursuant to any provision of the DGCL or the Corporation's certificate of incorporation or bylaws or (iv) any action asserting a claim against the Corporation, its directors, officers or employees governed by the internal affairs doctrine, except for, as to each of (i) through (iv) above, any claim as to which the Court of Chancery determines that there is an indispensable party not subject to the jurisdiction of the Court of Chancery (and the indispensable party does not consent to the personal jurisdiction of the Court of Chancery within ten days following such determination), which is vested in the exclusive jurisdiction of a court or forum other than the Court of Chancery, or for which the Court of Chancery does not have subject matter jurisdiction. If any provision or provisions of this Article Twelfth shall be held to be invalid, illegal or unenforceable as applied to any person or entity or circumstance for any reason whatsoever, then, to the fullest extent permitted by law, the validity, legality and enforceability of such provisions in any other circumstance and of the remaining provisions of this Article Twelfth (including, without limitation, each portion of any sentence of this Article Twelfth containing any such provision held to be invalid, illegal or unenforceable that is not itself held to be invalid, illegal or unenforceable) and the application of such provision to other persons or entities and circumstances shall not in any way be affected or impaired thereby.

* * *

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

3. That the foregoing amendment and restatement was approved by the holders of the requisite number of shares of this corporation in accordance with Section 228 of the DGCL.

4. That this Amended and Restated Certificate of Incorporation, which restates and integrates and amends the provisions of this Corporation's Certificate of Incorporation, has been duly adopted in accordance with Sections 242 and 245 of the DGCL.

IN WITNESS WHEREOF, this Amended and Restated Certificate of Incorporation has been executed by a duly authorized officer of this corporation on this 22nd day of December, 2015.

By: /s/ Kush Parmar
Kush Parmar, President

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

EXHIBIT 2

BACKGROUND PATENTS

[***]

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

EXHIBIT 3

CORE KNOW-HOW

[***]

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

EXHIBIT 4

GROUP PATENTS

[***]

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

Confidential Treatment Requested by Homology Medicines, Inc.

EXHIBIT 5

PRE-EXISTING AAVFs

[***]

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

Schedule 9.3

[***]

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

CONFIDENTIAL EXECUTION COPY

LICENSE AGREEMENT

THIS AGREEMENT is effective as of the 14th day of September, 2016 (the "Effective Date"), between the **CALIFORNIA INSTITUTE OF TECHNOLOGY** ("Caltech"), a not-for-profit corporation duly organized and existing under the laws of the State of California with an address at 1200 East California Boulevard, MC 6-32, Pasadena, California 91125 and **HOMOLOGY MEDICINES, INC.** ("Licensee"), a Delaware corporation having a place of business at 44 Hartwell Avenue, Suite 102, Lexington, Massachusetts 02421 (the "Parties").

WHEREAS, Licensee is desirous of obtaining, and Caltech wishes to grant to Licensee, a co-exclusive license, with one third party, under the Co-Exclusively Licensed Patent Rights, a non-exclusive license under the Non-exclusively Licensed Patent Rights, and a non-exclusive license under the Technology and Derivatives, as further defined below;

NOW, THEREFORE, the Parties agree as follows:

ARTICLE 1
DEFINITIONS

1.1 **"Affiliate"** means any corporation, limited liability company, or other legal entity which directly or indirectly controls, is controlled by, or is under common control with Licensee as of the Effective Date of this Agreement. For the purpose of this Agreement, "control" shall mean the direct or indirect ownership of greater than fifty percent (>50%) of the outstanding shares on a fully diluted basis or other voting rights of the subject entity to elect directors, or if not meeting the preceding, any entity owned or controlled by or owning or controlling at the maximum control or ownership right permitted in the country where such entity exists. In addition, a party's status as an Affiliate of Licensee shall terminate if and when such control ceases to exist.

1.2 **"Caltech IP"** means the Licensed Patent Rights and the Technology.

1.3 **"Co-exclusive License**" shall have the meaning set forth in Section 2.6.

1.4 **"Co-exclusive Licensee**" shall have the meaning set forth in Section 2.6.

1.5 **"Co-exclusively Licensed Patent Rights"** means all Licensed Patent Rights Covering compositions and methods of using said compositions.

1.6 **"Covered**" means that the manufacture, use, sale, offering for sale, or importation of product or method would, but for the ownership of, or a license under, the relevant patent rights, infringe a Valid Claim in the country in which the activity occurs.

1.7 **"Deductible Expenses"** means the following expenses incurred in connection with sales or licensing of Licensed Products to the extent actually paid by Licensee, Affiliates or Sublicensees in accordance with generally recognized principles of accounting: (a) sales, use or turnover taxes; (b) excise, value added, or other taxes, or custom, import or brokerage duties or charges; (c) transportation, freight, and handling charges, and insurance on shipments to customers; (d) trade, cash or quantity discounts, chargebacks, allowances or rebates to the extent actually granted; (e) agent fees or commissions; and (f) rebates, refunds, and credits for any rejected or returned Licensed Products or because of retroactive price reductions or rebates.

1.8 "**Derivative**" means [***] that is (a) derived by the Licensee, Affiliate or Sublicensee in one or more steps from a composition that is Covered by a Valid Claim or that is a Technology, and (b) comprises [***] that is recited in said Valid Claim or that is an engineered peptide contained in a Technology.

1.9 **"Effective Date"** has the meaning set forth in the preamble.

1.10 **"Field"** means all human therapeutic applications.

1.11 "**Improvements**" means patents or patent applications claiming Technology.

1.12 **"Licensed Patent Rights"** means Caltech's rights under: (a) all patents and patent applications listed in Exhibit A attached hereto and patents issuing therefrom; (b) any patents or patent applications claiming a right of priority to a patent application or patent described in clause (a) (including reissues, reexaminations, renewals, extensions, divisionals,

continuations, continued prosecution applications, request for continued examination (RCE) applications, and continuations-in-part (only to the extent that the claims in such continuations-in-part are fully supported under 35 U.S.C. §112 by another patent or patent application in the Licensed Patent Rights; *provided* that, all claims in any continuation-in-part filed in connection with the US or PCT conversion of the 7380-P provisional patent application shall be included in the "Licensed Patent Rights" whether or not fully supported under 35 U.S.C. § 112 by the 7380-P provisional patent application)), including PCT applications and patents issuing therefrom and (c) foreign counterparts of any of the patent applications and patents listed in the foregoing clauses (a) or (b); and (d) patent rights in Improvements.

1.13 **"Licensed Product"** means products that are made, made for, used, imported, offered for sale or sold by Licensee, its Affiliates or Sublicensees and that (a) are Covered by, or the making or use of which is Covered by, a Valid Claim, (b) are discovered or developed through a process or method Covered by a Valid Claim, (c) are developed with or use Technology, or (d) are Derivatives.

1.14 **"Net Revenues"** means all amounts, less Deductible Expenses, received by Licensee, Affiliates, and Sublicensees from the sale or other distribution (whether commercial or not) of Licensed Products. Any non-cash consideration received by Licensee for the sale or other distribution of Licensed Products or the licensing of Licensed Patent Rights will be converted to a cash value based on the fair market value or a value mutually agreed upon. Sales of Licensed Products between or among Licensee, its Affiliates or its Sublicensees shall be excluded from the computation of Net Revenues. Further, transfers of reasonable quantities of Licensed Product by Licensee, any of its Affiliates or its Sublicensee to a third party that is not a Sublicensee for use in the development of such Licensed Product (and not for resale) and transfers of industry standard quantities of Licensed Product for promotional purposes shall not be deemed a sale of such Licensed Product that gives rise to Net Revenues for purposes of this definition.

If more than one product or service sold separately by Licensee are combined for sale at a single offering price ("Combination Product"), the total gross amount invoiced for purposes of determining Net Revenues shall be calculated by multiplying the revenue for sale of the Combination Product by the fraction A/(A+B), where A is the sum of the offering prices of each product and service that each independently constitutes a Licensed Product when sold separately, and B is the sum of the offering prices of each other product or service, which do not constitute a Licensed Product when sold separately ("Other Products") and which are combined therewith at said single offering price. If the Other Products have not been sold separately by Licensee, Sublicensee or an Affiliate in the last year, Net Revenues shall be calculated by multiplying the revenue for sale of the Combination Product by the fraction A/C, where A is the sum of the offering prices of each of the Licensed Product(s) when sold separately, and C is the offering price of the Combination Product during such period. If the Licensed Product has not been sold or licensed separately by Licensee, Sublicensee, or an Affiliate in the last year, regardless of whether the Combination Product without the Licensed Product is sold or licensed separately, Net Revenues shall be calculated as in the immediately preceding sentence except that A shall be the total manufacturing cost of the Licensed Product and C shall be the total manufacturing cost of the Combination Product.

1.15 **"Non-exclusively Licensed Patent Rights"** means all Licensed Patent Rights not included within the Co-exclusively Licensed Patent Rights, including without limitation, Licensed Patent Rights [***].

1.16 "**Patent Management Agreement**" means the Patent Management Agreement between Licensee, Caltech, and the Co-Exclusive Licensee dated September 9, 2016 and attached hereto as Exhibit C, as the same may be amended from time to time according to its terms.

1.17 "**Sublicensee"** means any person or entity sublicensed by Licensee or a Sublicensee under this Agreement.

1.18 "**Sublicensing Revenue"** means cash consideration and cash value of all equity consideration valued at fair market value that Licensee and/or Affiliates receive from a Sublicensee in consideration for, and to the extent attributable to, the grant of a sublicense under the Caltech IP that is not royalties on Net Revenues. Sublicensing Revenue includes, but is not

limited to, license fees, license maintenance fees, milestone payments, and other payments that Licensee receives (including payments for technical assistance and the like). Such Sublicensing Revenue specifically shall not include payments made by a Sublicensee solely: (a) in consideration of equity or debt securities of Licensee sold at market value; (b) to support research or development activities to be undertaken by Licensee; (c) upon the achievement by Licensee of specified milestones or benchmarks relating to the research or development of Licensed Products (excluding milestones tied to sales or marketing performance, which shall be subject to the percentage-based payments to Caltech herein); (d) for pilot studies; (e) in consideration of the license or sublicense of any intellectual property other than Caltech IP; (f) relating to products other than Licensed Products; or (g) to reimburse patent or other expenses. All Sublicensing Revenue that Licensee receives in the form of equity that is payable to Caltech shall be converted to cash based on its fair market value.

1.19 **"Technology"** means Verified [***], including reports that detail or describe the Verification of [***], from the laboratory of Dr. Benjamin Deverman that are provided to Licensee by Caltech pursuant to this Agreement, whether or not patentable, and as set forth in Exhibit B, as the same may be updated from time to time pursuant to Section 7.3.

1.20 **"Territory"** means worldwide.

1.21 **"Valid Claim"** means:

(a) a claim of an issued patent within the Licensed Patent Rights that has not:

(i) expired or been canceled,

(ii) been finally adjudicated to be invalid or unenforceable by a decision of a court or other appropriate body of competent jurisdiction (and from which no appeal is or can be taken),

(iii) been admitted to be invalid or unenforceable through reissue, disclaimer or otherwise, or

(iv) been abandoned in accordance with, or as permitted by, the terms of this Agreement or by mutual written agreement; or

(b) a claim included in a pending patent application within the Licensed Patent Rights, which claim is being actively prosecuted in accordance with this Agreement and which has not been:

(i) canceled,

(ii) withdrawn from consideration,

(iii) finally determined to be unallowable by the applicable governmental authority (and from which no appeal is or can be taken),

(iv) abandoned in accordance with, or as permitted by, the terms of this Agreement or by mutual written agreement, or

(v) pending for more than [***] ([***]) years from the date of filing.

1.22 **"Verified"** means that experimentation has demonstrated improved properties of [***] function and/or [***].

ARTICLE 2
LICENSE GRANT

2.1 **Grant of Rights**. Caltech hereby grants to Licensee and its Affiliates the following licenses:

(a) a co-exclusive, with one third party Co-exclusive Licensee, royalty-bearing license, with the right to sublicense under the Co-exclusively Licensed Patent Rights, to make, have made, import, export, use, sell, offer for sale, have sold, and otherwise exploit Licensed Products in the Field in the Territory; provided that upon termination or expiration of the Co-exclusive License for any reason, Licensee shall have an exclusive option to obtain an exclusive royalty-bearing license, with the right to sublicense, under the Co-exclusively Licensed Patent Rights, subject to Section 2.6, to make, have made, import, export, use, sell, offer for sale, have sold, and otherwise exploit Licensed Products in the Field in the Territory;

(b) a non-exclusive, royalty-bearing license, without the right to sublicense except in accordance with Section 2.3, under the Non-exclusively Licensed Patent Rights to make, have made, import, export, use, sell, offer for sale, have sold, and otherwise exploit Licensed Products in the Field in the Territory;

(c) a non-exclusive, royalty-bearing license, without the right to sublicense except in accordance with Section 2.3, under the Technology to make, have made, import, export, use, sell, offer for sale, reproduce, distribute, display, perform, create derivative works of, and otherwise exploit Licensed Products in the Field in the Territory; and

(d) a non-exclusive, royalty-bearing license, with the right to sublicense, to make, have made, import, export, use, sell, offer for sale, have sold, and otherwise exploit Derivatives in the Field in the Territory.

These licenses are personal to and nontransferable by Licensee, except as provided in Article 6. Rights not explicitly granted herein are reserved by Caltech.

2.2 **Reservation of Rights; Government Rights**. These licenses are subject to: (a) the reservation of Caltech's right to make, have made, import, and use Licensed Patent Rights for noncommercial educational and non-clinical research purposes, including that which is sponsored by a for-profit third party, so long as no sponsored research involves the practice of Co-Exclusively Licensed Patent Rights by any third party other than the Licensee or the Co-Exclusive Licensee, but not for (i) commercial sale or other distribution to third parties or (ii) commercial research sponsored by a for-profit third party; and (b) any existing right of the U.S. Government under Title 35, United States Code, Section 200 et seq. and under 37 Code of Federal Regulations, Section 401 et seq., including but not limited to the grant to the U.S. Government of a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced any invention conceived or first actually reduced to practice in the performance of work for or on behalf of the U.S. Government throughout the world. Licensed Products shall be substantially manufactured in the United States to the extent (if at all) required by 35 U.S.C. Section 204. In addition, Caltech reserves the right to grant the Licensed Patent Rights and associated technology to other non-profit institutions for noncommercial educational and research purposes, but not including clinical research, subject to the same limitations as Caltech's right under Section 2.2(a). In the event that Licensee conducts a clinical trial for a lysosomal storage disorder indication, Licensee agrees to consider the National Institutes of Health (NIH) as a clinical trial site.

2.3 **Sublicensing**. Licensee has the right hereunder to grant sublicenses (through multiple tiers) under the Co-exclusively Licensed Patent Rights and to Derivatives, to third parties. Licensee or Sublicensee may grant sublicenses under the Non-exclusively Licensed Patent Rights and Technology to third parties only to the extent necessary or useful for Licensee's or Sublicensee's development, manufacturing or sale of Licensed Products. Sublicensees shall not have the right to grant further sublicenses of Non-exclusively Licensed Patent Rights or Technology, and any sublicenses may be of no greater scope than the licenses granted under Section 2.1. For avoidance of doubt, Sublicensees may engage contract research (including academic or non-profit research), development, manufacturing, and/or sales organizations in connection with Licensed Products.

Licensee and Sublicensees shall require that all sublicenses:

(a) are consistent with the terms and conditions of this Agreement;

(a) are subject to the terms and conditions of this Agreement; and

(b) contain the Sublicensee's acknowledgment of the disclaimer of warranty and limitation on Caltech's liability, as provided by Articles 9 and 13 below; and

(c) contain provisions under which the Sublicensee accepts duties at least equivalent to those accepted by the Licensee in the following Sections: 5.10-5.11 (duty to keep records); 8.1 (duty to properly mark Licensed Products with patent numbers); 9.4 (duty to defend, hold harmless, and indemnify Caltech); 13.2 (duty to maintain insurance); 14.8 (duty to restrict the use of Caltech's name); and 14.9 (duty to control exports).

Licensee and Sublicensee shall not receive, or agree to receive, anything of value in lieu of cash or equity from a third party under a sublicense granted pursuant to this Section 2.3 without Caltech's express prior written permission which shall not be unreasonably withheld.

Licensee shall furnish Caltech within [***] ([***]) days of the execution thereof a true and complete copy of each sublicense and any changes or additions thereto. Licensee shall inform Caltech of each sublicensee's entity status for the determination of fees payable to the U.S. Patent and Trademark Office (USPTO).

Any sublicenses granted by Licensee shall survive termination of the licenses granted in Section 2.1, or of this Agreement, provided that the following conditions are met as of the date of such termination:

(a) the written agreement between Licensee and Sublicensee pursuant to which the sublicense was granted (i) obligates the Sublicensee to thereafter render to Caltech all sublicense royalties or other sublicense-related consideration that the Sublicensee would have owed to Licensee under the sublicense, (ii) names Caltech as a third party beneficiary, and (iii) affirms that Licensee shall remain responsible for all obligations to Sublicensee (other than those requiring Licensee to hold a license under the Licensed Patent Rights or Technology) unless Caltech (at its discretion) elects to assume such obligations;

(b) Licensee informs the Sublicensee in writing (with a copy to Caltech) that the Sublicensee's obligations pursuant to (a) are in effect as a result of the termination; and

(c) the sublicense was granted in accordance with the sublicensing provisions of this Agreement.

Licensee shall be responsible for collecting and paying to Caltech all royalties on Net Revenues and Sublicensing Revenues owed by all Sublicensees.

2.4 **No Other Rights Granted**. The Parties agree that neither this Agreement, nor any action of the Parties related hereto, may be interpreted as conferring by implication, estoppel or otherwise, any license or rights under any intellectual property rights of Caltech other than as expressly and specifically set forth in this Agreement, regardless of whether such other intellectual property rights are dominant or subordinate to the Licensed Patent Rights.

2.5 **Preferential Purchaser Status**. Caltech shall be entitled to purchase Licensed Products from Licensee for educational, non-clinical research or other noncommercial purposes on pricing terms that are [***] made available by Licensee to any third party.

2.6 **Co-exclusive Licensee**. A co-exclusive license to the Co-Exclusively Licensed Patent Rights may be granted to a single third party (the "**Co-exclusive Licensee**") that (a) has entered into a co-exclusive license agreement to the Co-exclusively Licensed Patent Rights as of the Effective Date, or (b) enters into such a license agreement within [***] ([***]) days after the Effective Date ((a) or (b), as applicable, the "**Co-exclusive License**"). Should the Co-exclusive License terminate, Caltech shall notify Licensee in writing, after which notice Licensee shall have the right to exercise the option set forth in Section 2.5 of the Patent Management Agreement.

ARTICLE 3
RESERVED

ARTICLE 4
RESERVED

ARTICLE 5
CONSIDERATION

5.1 **Timing and Computation**. Until the first year in which aggregate Net Revenues reach $[***], royalty payments shall be paid annually within [***] ([***]) days following the end of the calendar year. Thereafter all royalties hereunder (except for license issue fee and annual minimum royalties) shall be computed on a quarterly basis for the quarters ending March 31st, June 30th, September 30th, and December 31st of each calendar year. Royalties for each such quarter shall be due and payable within [***] ([***]) months after the end of such quarter. The royalty payment for the quarter ending December 31st shall be adjusted as necessary to resolve any over- or underpayment in the preceding three quarters, based on actual Net Sales for the year.

5.2 **License Issue Fee**. Licensee shall pay to Caltech a License Issue Fee in the amount of one hundred thousand dollars ($100,000). The License Issue Fee is nonrefundable and is due [***] ([***]) days from the complete execution of this Agreement.

5.3 **Royalty on Co-exclusively Licensed Patent Rights**. For Licensed Products Covered by a Valid Claim of the Co-exclusively Licensed Patent Rights, Licensee shall pay Caltech a royalty of:

(a) [***] percent ([***] %) of the [***] ($[***]) of Net Revenues;

(b) [***] percent ([***] %) of Net Revenues exceeding [***] dollars and up to [***] dollars ($[***]—$[***]); and

(c) [***] percent ([***] %) of Net Revenues exceeding [***] dollars ($[***]).

Royalties due under this Section 5.3 shall be payable on [***] basis until such Licensed Product is no longer Covered by a Valid Claim in such country.

5.4 **Royalty on Non-exclusively Licensed Patent Rights, Technology, and Derivatives**. Licensee shall pay Caltech a royalty of [***] percent ([***]%) of Net Revenues of each Licensed Product that was not at any time Covered by any Co-exclusively Licensed Patent Rights but (a) was discovered or developed by Licensee or its Affiliates or Sublicensees using a method Covered by a Valid Claim of the Non-exclusively Licensed Patent Rights, (b) is a Technology not Covered by the Licensed Patent Rights, or (c) is a Derivative. Royalties due under this Section 5.4 shall be payable on a Licensed Product-by-Licensed Product basis for [***] ([***]) years from the date of the first commercial sale of each Licensed Product or for [***] ([***]) years from the Effective Date, whichever is earlier; provided that (i) royalties on Technology will not be due if, at the time of disclosure to Licensee or within [***] ([***]) year thereafter, Technology was published by or with the authorization of Caltech, and (ii) royalties on Derivatives will not be due after the Term of this Agreement.

5.5 **Milestone Payments**. The following one-time milestone payments are due to Caltech [***] ([***]) days after Licensee, Affiliate or a Sublicensee meets the applicable milestone for the first Licensed Product:

(a) [***] dollars ($[***]) upon [***];

(b) [***] dollars ($[***]) upon [***];

(c) [***] dollars ($[***]) upon [***];

(d) [***] dollars ($[***]) upon [***]; and

(e) [***] dollars ($[***]) upon [***].

5.6 **Royalty on Sublicensing Revenue**. Licensee shall pay Caltech [***] percent ([***] %) of the Sublicensing Revenue received within [***] ([***]) years of the Effective Date, and [***] percent ([***] %) received thereafter.

5.7 **Annual Minimum Royalties**. An annual minimum royalty of [***] is due to Caltech on the first anniversary of the Effective Date and each anniversary thereof. Any royalties or payments paid under Sections 5.3, 5.4, 5.5, and 5.6 for the one-year period preceding the date of payment of the annual minimum royalty shall be creditable against the annual minimum. Caltech shall have the right to terminate this Agreement pursuant to Section 10.2 (Termination for Monetary Breach) for failure to pay such annual minimum royalty.

5.8 **Third Party Royalty Offset**. Royalties due to Caltech under Sections 5.3, 5.4, 5.6 and 5.7 **[***]**.

5.9 **Currency Conversion**. For the purpose of determining royalties payable under this Agreement, any Net Revenues or Sublicensing Revenue denominated in currencies other than U.S. dollars shall be converted into U.S. dollars according to the noon buying rate of the Federal Reserve Bank of New York on the last business day of the period for which such royalties are calculated.

5.10 **Recordkeeping and Audits**. Licensee shall keep complete and accurate production and accounting records relating to commercialization (including via sublicensing) of Licensed Products. Upon at least [***] ([***]) days' advance notice, Caltech shall be entitled to audit such records through an internationally recognized independent accounting firm reasonably acceptable to Licensee, during Licensee's normal business hours, to determine Licensee's

compliance with the provisions of this Article 5. Licensee shall reimburse Caltech [***] percent ([***]%) of any unpaid royalties resulting from any noncompliance discovered as a result of any such audit. Such audits shall be at Caltech's expense, and shall occur no more than once annually, except that in the case of any underpayment exceeding [***] ([***]%) of the amount actually paid: (a) Licensee shall reimburse Caltech for the cost of such audit; and (b) Caltech shall be entitled to conduct additional [***] audits on the conditions set forth above, [***] until any such audit demonstrates that Licensee is in compliance with its obligations. Licensee must flow this requirement down to all Sublicensees.

5.11 **Royalty Reports.** For so long as royalties are payable under this Agreement, Licensee shall provide a royalty report in writing to Caltech on or before the last day of May, August, November and February of each year, provided that when royalties are payable on an annual basis, the royalty report shall be due annually in February. The report shall include, for all Licensed Products that are sold or otherwise distributed by Licensee, Affiliates, and each Sublicensee, [***]:

(a) a description of all Licensed Products;

(b) the Licensed Patent Rights, the Technology or the Derivative used by each Licensed Product;

(c) number of Licensed Products sold;

(d) total revenues from each of the Licensed Products received by Licensee, Affiliates, and Sublicensees;

(e) Deductible Expenses for each of the Licensed Products;

(f) Net Revenues from Licensed Product(s);

(g) royalties on Net Revenues due to Caltech;

(h) Sublicensing Revenue, including supporting data;

(i) foreign currency conversion rate and calculations (if applicable) and total royalties due; and

(j) names and contact information for all Sublicensees having a sublicense or option therefor any time during the particular royalty period.

Each such report shall also set forth an explanation of the calculation of the royalties payable hereunder and be accompanied by payment of the royalties shown by said report to be due Caltech.

5.12 **Common Stock Grant**. Licensee agrees to irrevocably issue to Caltech, in partial consideration of Licensee's receipt of the licenses granted under this Agreement, 533,695 shares of common stock of Licensee (the "**Shares**"), representing approximately [***] of the outstanding common and preferred shares, on a fully diluted basis, of Licensee on the date of this Agreement, pursuant to an agreed-upon stock purchase agreement between Licensee and Caltech. A stock certificate representing the Shares shall be delivered to Caltech within [***] of the Effective Date.

5.13 **"Piggy-Back" Registration Rights.** As soon as practicable following the Effective Date, Licensee shall amend the Investors' Rights Agreement among Licensee and the Investors parties thereto dated [***] (the "Investors' Rights Agreement") to add Caltech as a "Holder" and to include the Shares as "Registrable Securities", in each case, for purposes of Section 2.2 thereof (Company Registration). Caltech shall agree to be bound by the terms and conditions of the Investors' Rights Agreement, as amended, insofar as they relate to Section 2.2 thereof. The Piggy-Back Registration Rights granted to Caltech pursuant to the Investors' Rights Agreement shall terminate in accordance with Section 2.13 thereof.

5.14 **Participation Rights**. As soon as practicable following the Effective Date, Licensee shall amend the Investors' Rights Agreement such that (i) Caltech will have the right to participate in offerings of New Securities (as defined therein) after the Effective Date, pursuant to Section 4 of the Investors' Rights Agreement (Rights to Future Stock Issuances) and (ii) the Participation Rights granted to Caltech pursuant to the Investors' Rights Agreement may be assigned by Caltech to either (a) [***] or (b) any other entity approved in writing by Licensee prior to such assignment. Caltech shall agree to be bound by the terms and conditions of the Investors' Rights Agreement, as amended, insofar as they relate to Section 4 thereof. The Participation Rights granted to Caltech pursuant to the Investors' Rights Agreement shall terminate in accordance with Section 4.2 of the Investors' Rights Agreement.

5.15 **Transfer Restrictions**. Caltech agrees that, in the event of any underwritten or public offering of securities of Licensee or an Affiliate, Caltech shall comply with and agree to any restriction on the transfer of its equity interest, or any part thereof, imposed by the underwriter, and shall perform all acts and sign all necessary documents required with respect thereto. Other than the foregoing, Caltech shall not be restricted from transferring the Shares to any entity in any manner not prohibited by law.

ARTICLE 6
ASSIGNMENT AND TRANSFER

6.1 "**Assign**" (including all variations thereof) shall mean to transfer, including Assignment of rights and delegation of duties.

6.2 **Assignment by Caltech**. This Agreement shall be binding upon and inure to the benefit of any successor or Assignee of Caltech.

6.3 **Assignment by Licensee.** Licensee cannot Assign this Agreement without the prior written consent of Caltech, except that Licensee may Assign this Agreement without the prior written consent of Caltech to any Affiliate or any successor of, or purchaser of substantially all of, the assets or operations of its business to which this Agreement pertains. Any permitted Assignee shall succeed to all of the rights and obligations of Licensee under this Agreement.

6.4 **Any Other Assignment by Licensee.** Any other attempt to Assign this Agreement or to pledge any of the license rights granted in this Agreement as security for any creditor by Licensee is null and void from the beginning.

6.5 **Conditions of Assignment.** Prior to any Assignment, the following conditions must be met:

(a) Licensee must give Caltech [***] days prior written notice of the assignment, including the new Assignee's contact information; and
(b) the new Assignee must agree in writing to Caltech to be bound by this Agreement.

6.6 **After the Assignment.** Upon a permitted Assignment by Licensee of this Agreement pursuant to this Article, Licensee will be released of liability under this Agreement and the term "Licensee" in this Agreement will mean the Assignee.

ARTICLE 7
DUE DILIGENCE; TECHNOLOGY TRANSFER

7.1 **Commercialization**. Licensee agrees to use commercially reasonable efforts to commercially introduce and reasonably fulfill market demand for Licensed Products in the Field as soon as it is practicable. Licensee shall be deemed to have satisfied its obligations under this Section 7.1 if:

(a) Licensee has an ongoing and active research, development or marketing program directed primarily toward commercial production, use, and sale of one or more Licensed Products, and

(b) has filed an IND to initiate a clinical trial for a Licensed Product within [***] ([***]) years of the Effective Date.

Any efforts of Licensee's Affiliates or Sublicensees shall be considered efforts of Licensee for the sole purpose of determining Licensee's compliance with its obligations under this Section 7.1. Caltech's sole remedy for breach of Section 7.1 shall be as set forth in Section 7.4 (Failure to Commercialize).

7.2 **Commercialization Reporting**. On each yearly anniversary of the Effective Date, Licensee shall issue to Caltech a detailed written report on its progress in introducing commercial Licensed Product(s). Such report shall include any milestone that has been achieved, and any milestone that was due but not achieved. The report will be considered confidential information of Licensee subject to Article 11.

7.3 **Technology Transfer and Reporting**. Caltech shall provide to Licensee all Technology as of the date [***] ([***]) days after the Effective Date. Caltech represents and warrants that the Technology identified on Exhibit B constitutes all of the Technology as of the Effective Date. No later than [***] ([***]) days following the Effective Date, Caltech shall provide to Licensee a true and complete copy of [***] that constitutes Technology. Within [***] ([***]) days after the Effective Date, Caltech shall update Exhibit B to include all Technology in existence as of the date [***] ([***]) days after the Effective Date and a true and complete copy of [***] that constitutes Technology, to the extent not already provided to Licensee. At Licensee's request for a particular Technology, (or some or all of the Technology), Caltech will provide information relating to [***] of such Technology, including without limitation, information sufficient to describe the known characteristics of such Technology. Caltech shall provide a written Technology transfer report to Licensee on or before April 30th, July 31st, October 31st, and January 31st of each year, but only when Technology transfer has occurred during the previous quarter. Such report shall identify the new Technology the Licensee received from Caltech in the previous quarter. Licensee and Caltech hereby agree that Exhibit B shall be automatically amended to include Technology transfer reports upon Licensee's acknowledged receipt of such reports.

7.4 **Failure to Commercialize**. If [***] ([***]) years after the Effective Date, Licensee is not fulfilling its obligations under Section 7.1 with respect to the Field in at least [***] within the Territory, and Caltech so notifies Licensee in writing, Caltech and Licensee shall negotiate in good faith any additional efforts to be taken by Licensee. If the Parties do not reach agreement within [***] ([***]) days of Caltech's written notice, Caltech may notify Licensee in writing that the license granted under Section 2.1(a) will be converted to a non-exclusive license grant. Licensee hereby acknowledges that said notification shall constitute a conversion of Licensee's co-exclusive rights under Section 2.1(a) to non-exclusive rights, and that Licensee shall no longer be obligated under Sections 7.1 or 7.2.

ARTICLE 8
LITIGATION; PATENTS

8.1 **Marking**. Licensee agrees to mark the Licensed Products with the numbers of applicable issued patents within the Licensed Patent Rights, unless such marking is commercially infeasible in accordance with normal commercial practices in the Field, in which case the Parties shall cooperate to devise a commercially reasonable alternative to such marking.

8.2 **Expiration or Abandonment**. In a case where one or more patents or particular claims thereof within the Licensed Patent Rights expire, or are abandoned, or are declared invalid or unenforceable by a court of last resort or by a lower court from whose decree no appeal is taken, or certiorari is not granted within the period allowed therefor, then the effect thereof hereunder shall be:

(a) that such patents or particular claims shall, as of the date of expiration or abandonment or final decision as the case may be, cease to be included within the Licensed Patent Rights for the purpose of this Agreement; and

(b) that such construction so placed upon the Licensed Patent Rights by the court shall be followed from and after the date of entry of the decision, and royalties shall thereafter be payable by Licensee only in accordance with such construction.

8.3 **Adjustment**. In the event that any of the contingencies provided for in Section 8.2 occurs, Caltech agrees to renegotiate in good faith with Licensee a reasonable royalty rate under the remaining Licensed Patent Rights which are unexpired and in effect and under which Licensee desires to retain a license.

8.4 **Licensee Challenges.** If Licensee or any of its Affiliates brings an action or proceeding, or assists any third party in bringing an action or proceeding, seeking a declaration or ruling that any claim in any of the Licensed Patent Rights is invalid or unenforceable, or asserts that any product does not infringe the Licensed Patent Rights:

(a) during the pendency of such action or proceeding, [***] or [***];

(b) should the outcome of such action or proceeding determine that any such claim challenged by Licensee is valid, enforceable, and/or infringed by a Licensed Product, [***] and [***];

(c) Licensee shall have [***];

(d) Licensee shall [***]; and

(e) [***].

Licensee shall provide written notice to Caltech at least [***] ([***]) days before Licensee or any of its Affiliates initiates any action or proceeding seeking a declaration or ruling that any claim within the Licensed Patent Rights is invalid or unenforceable or that any product would not infringe (but for this Agreement) any claim in the Licensed Patent Rights. Licensee will include with such written notice an identification of all prior art it believes is material.

Any dispute regarding the validity or enforceability of any of the Licensed Patent Rights, or whether any product would infringe (but for this Agreement) any claim in the Licensed Patent Rights, shall be litigated exclusively in the U.S. District Court for the Central District of California situated in the County of Los Angeles, and each Party hereby agrees to submit to the exclusive jurisdiction of such court, and waives any objection to venue, for such purposes.

ARTICLE 9
REPRESENTATIONS AND WARRANTIES; INDEMNIFICATION

9.1 **Covenants, Representations and Warranties of Caltech**. Caltech hereby covenants, represents and warrants to Licensee that, to the knowledge of Caltech's Office of Technology Transfer, as of the Effective Date and during the term of this Agreement:

(a) except for the Co-exclusive License or pursuant to Section 2.6, there are no licenses, options or agreements that grant rights relating to the Co-exclusively Licensed Patent Rights in the Field;

(b) there are no exclusive licenses, exclusive options or other agreements granting exclusive rights to the Non-exclusively Licensed Patent Rights in the Field; and

(c) Caltech owns the Licensed Patent Rights and Technology free of any liens, encumbrances, security interests, or legal actions, has the power to grant the rights, licenses and privileges granted herein and can perform as set forth in this Agreement without violating the terms of any agreement that Caltech has with any third party.

9.2 **Exclusions**. The Parties agree that nothing in this Agreement shall be construed as, and CALTECH HEREBY DISCLAIMS, ANY EXPRESS OR IMPLIED REPRESENTATION, WARRANTY, COVENANT, OR OTHER OBLIGATION:

(a) THAT ANY PRACTICE BY OR ON BEHALF OF LICENSEE OF ANY INTELLECTUAL PROPERTY LICENSED HEREUNDER IS OR WILL BE FREE FROM INFRINGEMENT OF RIGHTS OF THIRD PARTIES;

(b) AS TO WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NONINFRINGEMENT OF THIRD PARTY RIGHTS, WITH RESPECT TO ANY TECHNOLOGY PROVIDED BY CALTECH TO LICENSEE HEREUNDER.

9.3 **Indemnification by Caltech**. Caltech shall indemnify, defend and hold harmless Licensee from and against any and all losses, damages, costs and expenses (including attorneys' fees) arising out of a material breach by Caltech of its representations and warranties ("Indemnification Claims"), except to the extent involving or relating to a material breach by Licensee of its representations and warranties, provided that: (a) Caltech is notified promptly of any Indemnification Claims; (b) Caltech has the sole right to control and defend or settle any litigation within the scope of this indemnity; and (c) all indemnified parties cooperate to the extent necessary in the defense of any Indemnification Claims. [***].

9.4 **Indemnification by Licensee**. Licensee shall indemnify, defend and hold harmless Caltech, its trustees, officers, agents and employees from and against any and all losses, damages, costs and expenses (including reasonable attorneys' fees) arising out of third party claims brought against Caltech relating to the manufacture, sale, licensing, distribution or use of Licensed Products by or on behalf of Licensee or its Affiliates, except to the extent involving or relating to a material breach by Caltech of its representations and warranties, provided that: (a) Licensee is notified promptly of any such claims; (b) Licensee has the sole right to control and defend or settle any litigation within the scope of this indemnity; and (c) all indemnified parties cooperate to the extent necessary in the defense of any such claims.

9.5 **Certain Damages**. EXCEPT FOR INDEMNIFICATION OF THIRD PARTY DAMAGES CLAIMS, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY SPECIAL, CONSEQUENTIAL, INCIDENTAL, OR INDIRECT DAMAGES ARISING OUT OF THIS AGREEMENT, HOWEVER CAUSED, UNDER ANY THEORY OF LIABILITY.

ARTICLE 10
TERM AND TERMINATION

10.1 **Term**. This Agreement and the rights and licenses hereunder shall take effect on the Effective Date and continue until the expiration, revocation, invalidation, or unenforceability of the Licensed Patent Rights licensed to Licensee hereunder, or as long as royalties are due pursuant to Article 5 of this Agreement, whichever is later, unless earlier terminated pursuant to the terms of this Agreement. Upon expiration, Caltech hereby grants Licensee a perpetual, irrevocable, royalty-free, fully paid-up, non-exclusive right and license to the Technology and Derivatives, to make, have made, import, export, use, sell, offer to sell, have sold, and otherwise exploit Licensed Products in the Field in the Territory. Upon termination or expiration of this Agreement, the Patent Management Agreement will automatically terminate as to Licensee.

10.2 **Termination for Monetary Breach**. Caltech shall have the right to terminate this Agreement and the rights and licenses hereunder if Licensee fails to make any payment due including patent expenses, milestone payments, annual minimum royalties or royalties hereunder and Licensee continues to fail to make the payment (either to Caltech directly or by placing any disputed amount into an interest-bearing escrow account to be released when the dispute is resolved) for a period of [***] ([***]) days after receiving written notice from Caltech specifying Licensee's failure. Upon any such termination, (a) Licensee shall have [***] to complete the manufacture of any Licensed Products that are then works in progress for sale and to sell its inventory of Licensed Products, provided that Licensee pays the applicable royalties, and (b) any sublicenses and options for sublicenses shall survive termination in accordance with Section 2.3.

10.3 **Termination at Will by Licensee**. Licensee shall have the right to terminate this Agreement prior to its expiration upon notice to Caltech without cause, effective no fewer than ninety (90) days following the date of such notice.

10.4 **Termination for Non-Monetary Breach**. Non-monetary breach shall include, but is not limited to: (a) failure to fulfill the obligations in Section 8.7 (Marking); and (b) pursuit of exploitation of Licensed Patent Rights outside the Field. Non-monetary breach shall include the cessation of Licensee's operations in general, or breach of the warranties in Section 9.1. If this Agreement is materially breached by either party, the non-breaching party may elect to give the breaching party written notice describing the alleged breach. If the breaching party has not cured such breach within thirty (30) days after receipt of such notice, the notifying party will be entitled, in addition to any other rights it may have under this Agreement, to terminate this Agreement and the rights and licenses hereunder; such termination shall be deemed to have been effective as of the date of the written notice.

10.5 **Bankruptcy or Insolvency**. Either party may terminate this Agreement, upon written notice, (a) upon the other party's filing for bankruptcy, receivership or bankruptcy proceedings or any other proceedings for the settlement of Licensee's debts; (b) upon the other party's making an assignment for the benefit of creditors; or (c) upon the other party's dissolution or ceasing to do business. Either party may terminate this Agreement upon written notice upon the insolvency of the other party. Licensee must inform Caltech of its intention to file a voluntary petition of bankruptcy, or of another's intention to file an involuntary petition of bankruptcy, at least [***] ([***]) days prior to the filing of such a petition. All rights and licenses granted under or pursuant to this Agreement by either party are, and shall otherwise be deemed to be, for purposes of Section 365(n) of the United States Bankruptcy Code (the "**Bankruptcy Code**"), licenses of rights to "intellectual property" as defined under Section 101 of the Bankruptcy Code. The Parties agree that the Parties, as the Licensee or owner of such rights under this Agreement, as it may apply, shall retain and may fully exercise all of their rights and elections under the Bankruptcy Code.

10.6 **Accrued Liabilities**. Termination of this Agreement for any reason shall not release any party hereto from any liability which, at the time of such termination, has already accrued to the other party or which is attributable to a period prior to such termination, nor preclude either party from pursuing any rights and remedies it may have hereunder or at law or in equity which accrued or are based upon any event occurring prior to such termination.

10.7 **Survival**. The following shall survive any expiration or termination (in whole or in part) of this Agreement: (a) any provision plainly indicating that it should survive; (b) any royalty due and payable on account of activity prior to the termination; and (c) Sections or Articles 5.4 (Royalty on Non-exclusively Licensed Patent Rights, Technology, Improvements and Derivatives), 5.10 (Recordkeeping and Audits), 9 (Representations and Warranties; Indemnification), 11 (Confidentiality), 12 (Dispute Resolution), 13 (Product Liability), and 14.7 (Governing Law).

ARTICLE 11
CONFIDENTIALITY

11.1 **Nondisclosure and Nonuse**. Each party agrees not to disclose any of the terms of this Agreement to any third party without the prior written consent of the other party. Caltech agrees not to disclose to any third party Licensee's reports provided pursuant to Sections 5.1 and 7.2, or to use such reports except as necessary to perform its obligations or to exercise its rights under this Agreement, and further agrees to take reasonable measures to confine access to such reports to those employees with a reasonable need to access the information therein. Licensee agrees not to disclose Technology or reports provided pursuant to Section 7.3 to any third party except to Affiliates, Sublicensees, consultants, contractors or those under reasonable confidentiality obligations and whose receipt of said information is necessary for Licensee's business activities.

11.2 **Permitted Disclosures**. Notwithstanding the foregoing, each party may disclose: (a) confidential information as required by securities or other applicable laws or pursuant to governmental proceedings, provided that the disclosing party gives advance written notice to the other party and reasonably cooperates therewith in limiting the disclosure to only those third

parties having a need to know; and (b) the fact that Licensee has been granted a license under the Licensed Patent Rights, provided, however, that each party shall have the right to review any press release proposed to be published by the other party with respect to the transactions contemplated by this Agreement prior to publication and shall consider in good faith any comments the other party may have regarding any such proposed press release, and provided further that Caltech shall obtain Licensee's advance approval to any such press release, which approval shall not be unreasonably withheld or delayed.

ARTICLE 12
DISPUTE RESOLUTION

12.1 No issue of the validity of any of the licensed patents, enforceability of any of the licensed patents, infringement of any of the licensed patents, the scope of any of the claims of the licensed patents, and/or any dispute that includes any such issue, shall be subject to mediation under this Agreement unless otherwise agreed by the Parties in writing. In addition, no dispute between the Parties as to any matter relating to this Agreement shall be subject to arbitration unless otherwise agreed by the Parties in writing.

12.2 Except for those issues and/or disputes described in Section 12.1, any dispute between the Parties concerning the interpretation, construction or application of any terms, covenants or conditions of this Agreement shall be resolved by mediation.

12.3 Mediation shall be in the Los Angeles office of ADR Services, Inc. (http://www.adrservices.org/) before an attorney or a retired judge with experience in intellectual property or patent matters, and contract, commercial or business disputes, selected by the Parties from candidates proposed by ADR Services, Inc. in accordance with the ADR Mediation Rules and Procedures in force at the time the mediation is initiated.

12.4 The requirement for mediation shall not be deemed a waiver of (a) any right of termination under this Agreement, (b) a Party's right to seek interim judicial relief, including on an expedited or ex parte basis, or (c) a Party's right to seek judicial relief in connection with any dispute if not resolved after that Party's good faith participation in mediation for at least [***] ([***]) days.

12.5 Each party shall bear its own expenses incurred in connection with any attempt to resolve disputes hereunder, but the compensation and expenses of the mediator shall be borne equally.

ARTICLE 13
PRODUCT LIABILITY

13.1 **Indemnification**. Licensee agrees that Caltech (including its trustees, officers, faculty and employees) shall have no liability to Licensee, its Affiliates, their customers, or any third party for any claims, demands, losses, costs, or other damages which may result from personal injury, death, or property damage related to the Licensed Products ("Product Liability Claims"). Licensee agrees to defend, indemnify, and hold harmless Caltech, its trustees, officers, faculty and employees from any such Product Liability Claims, provided that: (a) Licensee is notified promptly of any Product Liability Claims; (b) Licensee has the sole right to control and defend or settle any litigation within the scope of this indemnity; and (c) all indemnified parties cooperate to the extent necessary in the defense of any Claims.

13.2 **Insurance**. Prior to such time as Licensee initiates a clinical trial using Licensed Products, Licensee shall at its sole expense procure and maintain policies of comprehensive general liability insurance in amounts not less than [***] dollars ($[***]) per incident and [***] dollars ($[***]) in annual aggregate, and naming those indemnified under Section 13.1 as additional insureds. Such comprehensive general liability insurance shall provide: (a) product liability coverage and (b) broad form contractual liability coverage for Licensee's indemnification of Caltech under Section 13.1. In the event the aforesaid product liability coverage does not provide for occurrence liability, Licensee shall maintain such comprehensive general liability insurance for a reasonable period of not less than [***] ([***]) years after it has ceased commercial distribution or use of any Licensed Product. Licensee shall provide Caltech with written evidence of such insurance upon request of Caltech.

13.3 **Loss of Coverage**. Licensee shall provide Caltech with notice at least [***] ([***]) days prior to any cancellation, non-renewal or material change in such insurance, to the extent Licensee receives advance notice of such matters from its insurer. If Licensee does not obtain replacement insurance providing comparable coverage within [***] ([***]) days following the date of such cancellation, non-renewal or material change, Caltech shall have the right to terminate this Agreement effective at the end of such [***] ([***]) day period without any additional waiting period; provided that if Licensee provides credible written evidence that it has used reasonable efforts, but is unable, to obtain the required insurance, Caltech shall not have the right to terminate this Agreement, and Caltech instead shall cooperate with Licensee to either (at Caltech's discretion) grant a limited waiver of Licensee's obligations under this Article or assist Licensee in identifying a carrier to provide such insurance or in developing a program for self-insurance or other alternative measures.

ARTICLE 14
MISCELLANEOUS

14.1 **Notices**. All notices, requests, demands and other communications hereunder shall be in English and shall be given in writing and shall be: (a) personally delivered; (b) sent by telecopier, facsimile transmission or other electronic means of transmitting written documents with confirmation of receipt; or (c) sent to the Parties at their respective addresses indicated herein by registered or certified mail, return receipt requested and postage prepaid, or by private overnight mail courier services with confirmation of receipt. The respective addresses to be used for all such notices, demands or requests are as follows:

(a) If to CALTECH, to:

California Institute of Technology
1200 East California Boulevard
Mail Code 6-32
Pasadena, CA 91125
ATTN: Chief Innovation Officer

Phone No.: (626) 395-3066
Fax No.: (626) 356-2486
Email: ott-finance@caltech.edu

Or to such other person or address as Caltech shall furnish to Licensee in writing.

(b) If to LICENSEE, to:

Homology Medicines, Inc.
44 Hartwell Avenue, Suite 102
Lexington, MA 02421
ATTN: President

Phone No.: (781) 301-7277
Fax No.: not applicable
Email: ATzianabos@homologymedicines.com

If personally delivered, such communication shall be deemed delivered upon actual receipt by the "attention" addressee or a person authorized to accept for such addressee; if transmitted by facsimile or other electronic means pursuant to this Section 14.1, such communication shall be deemed delivered the next business day after transmission, provided that sender has a transmission confirmation sheet or other written confirmation indicating successful receipt by the receiving party; if sent by overnight courier pursuant to this Section 14.1, such communication shall be deemed delivered upon receipt by the "attention" addressee or a person authorized to accept for such addressee; and if sent by mail pursuant to this Section 14.1, such communication shall be deemed delivered as of the date of delivery indicated on the receipt issued by the relevant postal service. If the Licensee fails or refuses to accept delivery by courier or mail at the address most recently provided under this Section 14.1, communication shall be deemed delivered as of the date of such failure or refusal. Any party to this Agreement may change its address for the purposes of this Agreement by giving notice thereof in accordance with this Section 14.1.

14.2 **Entire Agreement**. This Agreement, together with the Patent Management Agreement, sets forth the complete agreement of the Parties concerning the subject matter hereof. No claimed oral agreement in respect thereto shall be considered as any part hereof. No amendment or change in any of the terms hereof subsequent to the execution hereof shall have any force or effect unless agreed to in writing by duly authorized representatives of the Parties.

14.3 **Waiver**. No waiver of any provision of this Agreement shall be effective unless in writing. No waiver shall be deemed to be, or shall constitute, a waiver of a breach of any other provision of this Agreement, whether or not similar, nor shall such waiver constitute a continuing waiver of such breach unless otherwise expressly provided in such waiver.

14.4 **Severability**. Each provision contained in this Agreement is declared to constitute a separate and distinct covenant and provision and to be severable from all other separate, distinct covenants and provisions. It is agreed that should any clause, condition or term, or any part thereof, contained in this Agreement be unenforceable or prohibited by law or by any present or future legislation then: (a) such clause, condition, term or part thereof, shall be amended, and is hereby amended, so as to be in compliance with the legislation or law; but (b) if such clause, condition or term, or part thereof, cannot be amended so as to be in compliance with the legislation or law, then such clause, condition, term or part thereof shall be severed from this Agreement and all the rest of the clauses, terms and conditions or parts thereof contained in this Agreement shall remain unimpaired.

14.5 **Construction**. The headings in this Agreement are inserted for convenience only and shall not constitute a part hereof. Unless expressly noted, the term “include” (including all variations thereof) shall be construed as merely exemplary rather than as a term of limitation.

14.6 **Counterparts/Facsimiles**. This Agreement may be executed in one or more counterparts, all of which taken together shall be deemed one original. Facsimile and scanned signatures shall be deemed original.

14.7 **Governing Law**. This Agreement, the legal relations between the Parties and any action, whether contractual or non-contractual, instituted by any party with respect to matters arising under or growing out of or in connection with or in respect of this Agreement shall be governed by and construed in accordance with the internal laws of the State of California, excluding any conflict of law or choice of law rules that may direct the application of the laws of another jurisdiction, and be brought in the state or federal courts in Los Angeles, California.

14.8 **No Endorsement**. Licensee agrees that it shall not make any form of representation or statement which would constitute an express or implied endorsement by Caltech or the Jet Propulsion Laboratory (JPL) of any Licensed Product, and that it shall not authorize others to do so, without first having obtained written approval from Caltech, except as may be required by governmental law, rule or regulation.

14.9 **Export Regulations**. This Agreement is subject in all respects to the laws and regulations of the United States of America, including the Export Administration Act of 1979, as amended, and any regulations thereunder. Licensee, its Affiliates, or its Sublicensees will not in any form export, re-export, resell, ship, divert, or cause to be exported, re-exported, resold, shipped, or diverted, directly or indirectly, any product or technical data or software of the other party, or the direct product of such technical data or software, to any country for which the United States Government or any agency thereof requires an export license or other governmental approval without first obtaining such license or approval.

14.10 **Force Majeure**. Neither party shall lose any rights hereunder or be liable to the other party for damages or losses (except for payment obligations) on account of failure of performance by the defaulting party if the failure is occasioned by war, strike, fire, Act of God, earthquake, flood, lockout, embargo, governmental acts or orders or restrictions, failure of suppliers, or any other reason where failure to perform is beyond the reasonable control and not caused by the negligence or intentional conduct or misconduct of the nonperforming party, and such party has exerted all reasonable efforts to avoid or remedy such force majeure; provided, however, that in no event shall a party be required to settle any labor dispute or disturbance.

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed:

CALIFORNIA INSTITUTE OF TECHNOLOGY (Caltech)

Date: September 14, 2016

By: /s/ Frederic Farina

Name: Frederic Farina

Title: Chief Innovation Officer

HOMOLOGY MEDICINES, INC. (Licensee)

Date: September 13, 2016

By: /s/ Arthur Tzianabos

Name: Arthur Tzianabos

Title: President & CEO

Exhibit A

Licensed Patent Rights

[***]

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

Exhibit B

Technology

[***]

(copy attached)

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

Confidential Portions of this Exhibit marked as [***] have been omitted pursuant to a request for confidential treatment and have been filed separately with the Securities and Exchange Commission.

Exhibit C

Patent Management Agreement

(copy attached)

[***]

Confidential Treatment Requested by Homology Medicines, Inc.

FIRST AMENDMENT TO LICENSE AGREEMENT

This amendment to the License Agreement (the "First License Amendment"), effective on the date last signed below, ("Amendment Effective Date") is by and between Homology Medicines, Inc., a Delaware corporation having a place of business at 45 Wiggins Avenue, Bedford, MA 01730 ("HMI") and California Institute of Technology, a not-for-profit corporation duly organized and existing under the laws of the State of California with an address at 1200 East California Boulevard, MC 6-32, Pasadena, California 91125 ("Caltech"; HMI and Caltech together are the "Parties").

Whereas, HMI and Caltech entered into that certain License Agreement, effective September 9, 2016 (the "Agreement");

Whereas, Caltech and the Co-exclusive Licensee, as defined by the Agreement, entered into a Co-exclusive License, as defined by the Agreement, that grants the same rights to the Co-exclusively Licensed Patent Rights, as defined in the Agreement, as those granted to HMI; and

Whereas, HMI and Caltech desire to amend the Agreement as set forth in this First License Amendment.

Now therefore, in consideration of the mutual covenants contained herein, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties agree as follows:

1. Section 1.19 is deleted in its entirety and replaced with the following:

   "Technology" means Verified [***], including reports

   that detail or describe the Verification of [***], from the laboratories Professor [***] or Professor [***] that are provided to Licensee by Caltech pursuant to this Agreement, whether or not patentable, and as set forth in Exhibit B, as the same may be updated from time to time pursuant to Section 7.3.

2. It is understood that Caltech's patent counsel determined that Caltech's employee, Professor [***], made an inventive contribution to certain patent applications found in Exhibit A, specifically, patent applications having serial numbers [***]. Furthermore, Caltech's patent counsel has filed formal paperwork with the pertinent patent offices to have Professor [***] added as an inventor on said patent applications, and the Parties wish Exhibit A to reflect this inventor addition. Therefore, the name [***] shall be added to the list of inventors for the aforementioned patent applications of Exhibit A.

3. The following patent applications shall be added to Exhibit A:

   [***]

4. Accordingly, Exhibit A to the Agreement is hereby amended and replaced in full with Exhibit A (Amended) as attached hereto.

5. The following sections are hereby inserted after Section 9.1 of the Agreement:

   "9.1A Caltech hereby covenants, represents and warrants to Licensee:

   (a) that the Co-exclusive Licensee to the Co-Exclusively Licensed Patent Rights will, or has already, entered into an identical first amendment to their Co-exclusive License (the "Third Party First Amendment"), and that said Third Party First Amendment shall have the same effect on the Co-exclusive License as those amendments herein shall have on the Agreement;

   (b) that Caltech has secured Caltech's ownership rights for the Licensed Patent Rights, as defined in the Agreement, including the rights afforded by Professor [***] as an inventor, and that [***] has assigned to Caltech all her right, title and interest in the Licensed Patent Rights;

(c) that Caltech will add [***] as an inventor to certain patent applications in the Licensed Patent Rights as indicated in Exhibit A (Amended) and that, upon such addition, the inventorship of the patents and patent applications in the Licensed Patent Rights will be correct to the best of Caltech's Office of Technology Transfer & Corporate Partnerships knowledge;

(d) that all Technology developed in the laboratories of Professor [***] or Professor [***] as of the date thirty (30) days after the Effective Date has been provided to Licensee in accordance with Section 7.3.

6. Caltech shall assume responsibility for legal issues arising out of the inventorship change detailed in this First License Amendment.

7. The last sentence of Section 11.1 of the Agreement is hereby amended to read as follows:

"Licensee agrees not to disclose Technology or reports provided pursuant to Section 7.3 to any third party except to the extent the information therein has been published, provided that Licensee may disclose such Technology and/or reports, and/or the terms of this Agreement, to actual or potential investors, actual or potential strategic partners, Affiliates, Sublicensees, consultants, contractors or those under reasonable confidentiality obligations and whose receipt of said information is necessary for Licensee's business activities."

8. All other terms and conditions of the Agreement that are not modified or amended pursuant to this First License Amendment shall remain in full force and effect and unaffected hereby. This First License Amendment along with the Agreement and all applicable exhibits, constitutes the complete agreement of the Parties concerning the subject matter hereof, and supersedes any other agreements, promises, representations or discussions, written or oral, concerning such subject matter. This First License Amendment may be executed in several counterparts, all of which taken together shall constitute one single agreement between the Parties. This First License Amendment will be of no force or effect until signed by an authorized representative of each of the Parties. After the Amendment Effective Date, every reference in the Agreement to the "Agreement" shall mean the Agreement as amended by this First License Amendment.

In witness whereof, the duly authorized representatives of each of the parties hereto executed this First License Amendment.

CALIFORNIA INSTITUTE OF TECHNOLOGY		HOMOLOGY MEDICINES, INC.	
By:	/s/ Frederic Farina (Authorized Signature)	By:	/s/ Sam Rasty (Authorized Signature)
Name:	Frederic Farina	Name:	Sam Rasty
Title:	Chief Innovation & Corporate Partnerships Officer	Title:	Chief Operating Officer
Date:	May 16, 2017	Date:	May 3, 2017

Exhibit A (Amended)

Licensed Patent Rights

[***]

Confidential Treatment Requested by Homology Medicines, Inc.

Confidential

November 14, 2017

California Institute of Technology
1200 East California Boulevard
Mail Code 6-32
Pasadena, CA 91125
Attention: Chief Innovation & Corporate Partnerships Officer

Novartis Institutes for BioMedical Research, Inc.
250 Massachusetts Avenue
Cambridge, MA 02139
Attention: President, Novartis Institutes for BioMedical Research, Inc.

*Re: Amendment and Stand-by License Arrangement with Novartis Institutes for BioMedical Research, Inc. ("**NVS**")*

Ladies and Gentlemen:

Reference is hereby made to that certain License Agreement dated September 14, 2016 by and between Homology Medicines, Inc. ("**HMI**") and the California Institute of Technology ("**Caltech**"), as amended by the First Amendment to License Agreement dated May 16, 2017 (the "**Caltech-HMI License**"). All capitalized terms used but not defined herein will have the meaning set forth in the Caltech-HMI License.

This letter agreement (this "**Letter Agreement**") serves as the second amendment to the Caltech-HMI License, effective on the date last signed below. HMI and Caltech agree as follows:

The fifth paragraph of Section 2.3 (Sublicensing) of the Caltech-HMI License is hereby deleted and replaced in its entirety with the following:

"Any sublicenses granted by Licensee shall survive termination of the licenses granted in Section 2.1 or termination of this Agreement, provided that the following conditions are met as of the date of such termination:

(a) the written agreement between Licensee and Sublicensee pursuant to which the sublicense was granted (i) [***], (ii) [***], and (iii) [***];

(b) Licensee informs the Sublicensee in writing (with a copy to Caltech) that the Sublicensee's obligations pursuant to the foregoing clause (a) are in effect as a result of the termination; and

(c) the sublicense was granted in accordance with the sublicensing provisions of this Agreement."

In addition, HMI proposes to enter into an agreement (the "**Collaboration Agreement**") with NVS pursuant to which, among other things, HMI grants to NVS an exclusive sublicense of the rights licensed to HMI by Caltech under the Caltech-HMI License (the "**Licensed Caltech Rights**") with respect to certain candidates and products (as defined under the Collaboration Agreement, "**Candidates**" and "**Products**") as well as other patent rights and know-how controlled by HMI. As a condition to entering into the Collaboration Agreement, NVS has requested that Caltech and HMI memorialize, in this Letter Agreement, their agreement to the following:

1. **Term**. The following provisions of this Letter Agreement will be effective as of the date of this Letter Agreement, but will be null and void if the Collaboration Agreement is not executed by each of HMI and NVS within [***] days after the date of this Letter Agreement.

2. **Approval of Sublicense; Delivery of Collaboration Agreement**. Caltech hereby acknowledges that HMI may grant a sublicense of the Licensed Caltech Rights and stipulates that the version of the Collaboration Agreement provided to Caltech grants to NVS a sublicense of the Licensed Caltech Rights in accordance with the sublicensing provisions of the Caltech-HMI License, as required under Section 2.3 (Sublicensing) of the Caltech-HMI License (as amended pursuant to this Letter Agreement), and the parties agree that the final version of the Collaboration Agreement will remain consistent with Section 2.3 (Sublicensing) of the Caltech-HMI License. HMI will deliver to Caltech a true and complete copy of the Collaboration Agreement promptly following the execution thereof, which copy, notwithstanding to the contrary set forth in Section 2.3 (Sublicensing) of the Caltech-HMI License, may be redacted to remove any confidential, proprietary, or competitive information of HMI or NVS to the extent that such redactions do not impair Caltech's ability to ensure that the Collaboration Agreement is consistent with the Caltech-HMI License.

3. **No Breach**. Caltech confirms that as of the date of this Letter Agreement: (a) the Caltech-HMI License remains in full force and effect; and (b) Caltech has not given any notice to HMI of any breach by HMI under the Caltech-HMI License.

4. **Waiver of Sublicense Obligations**.

   (a) Caltech hereby irrevocably waives [***] and confirms that HMI will be in compliance with [***].

(b) Caltech hereby waives the requirement in [***], provided however, that:

i. NVS and Caltech promptly execute an agreement memorializing Caltech's adoption, as the licensor, of the sublicense to the Licensed Caltech Rights under the Collaboration Agreement should the licenses granted in Section 2.1 (Grant of Rights) of the Caltech-HMI License or the Caltech-HMI License terminate; and

ii. in the event of a conflict between the terms, conditions or obligations under the Caltech-HMI License and the Collaboration Agreement (except as specifically waived under this Letter Agreement) with respect to the Licensed Caltech Rights, the terms of the Caltech-HMI License will prevail.

5. **Assignment of Caltech-HMI License**. Caltech agrees that if it assigns its rights under the Caltech-HMI License or any of the intellectual property licensed to HMI thereunder, then Caltech will cause the applicable assignee to be bound by the terms of this Letter Agreement applicable to Caltech.

6. **Notices**. Any notices required or permitted under this Letter Agreement will be in writing, will specifically refer to this Letter Agreement, and will be sent by recognized national overnight courier, or registered or certified mail, postage prepaid, return receipt requested, to the following addresses:

If to Caltech:

California Institute of Technology
1200 East California Boulevard
Mail Code 6-32
Pasadena, CA 91125
Attention: Chief Innovation Officer

If to HMI:

Homology Medicines, Inc.
45 Wiggins Avenue
Bedford, MA 01730
Attention: Chief Operating Officer

If to NVS:

Novartis Institutes for BioMedical Research, Inc.
250 Massachusetts Avenue
Cambridge, MA 02139
Attention: General Counsel.

All notices will be deemed effective: (a) if by courier, on the Business Day (as defined under the Collaboration Agreement) of delivery as evidenced by the courier's receipt (or if delivered or sent on a non-Business Day, then on the next Business Day); or (b) if sent by registered or certified mail, on the Business Day of receipt as evidenced on the return receipt. Caltech, HMI or NVS may change its contact information immediately upon written notice to the other party in the manner provided in this Section 6 (Notices).

7. **Miscellaneous**.

(a) **Governing Law**. This Letter Agreement will be construed and interpreted in accordance with the laws of the State of California and all rights and remedies will be governed by such laws without regard to principals of conflicts of law. The exclusive jurisdiction of any such suit shall be the state and federal courts located in Los Angeles County, California, and the parties hereto consent to the exclusive jurisdiction and venue of such courts.

(b) **Amendment**. Changes and additional provisions to this Letter Agreement will be binding on the parties only if agreed upon in writing and signed by all parties.

(c) **Assignment of this Letter Agreement**. This Letter Agreement may not be assigned by any party without the prior written consent of the other parties, which consent may not be unreasonably withheld, *except that*, a party may assign this Letter Agreement without such prior written consent to an affiliate or in connection with a merger, consolidation, sale of all of the equity interests of such party, or a sale of all or substantially all of the assets of such party to which this Letter Agreement relates.

(d) **Confidentiality**. The terms of this Letter Agreement will not be disclosed by any party hereto without the prior written consent of each of the other parties; provided, that each party will be entitled to disclose the terms of this Letter Agreement to the extent permitted in Section 11.2 (Permitted Disclosures) of the Caltech-HMI License *mutatis mutandis* as if such Section were set forth in this Letter Agreement and the terms of this Letter Agreement were Confidential Information of each of the parties.

(e) **Severability**. The parties do not intend to violate any public policy or statutory common law. However, if any sentence, paragraph, clause, or combination of this Letter Agreement is in violation of any law or is found to be otherwise unenforceable, such sentence, paragraph, clause, or combination of the same will be deleted and the remainder of this Agreement will remain binding, provided that such deletion does not alter the basic purpose and structure of this Letter Agreement.

(f) **Independent Contractor**. Nothing herein will create any association, partnership, joint venture, fiduciary duty, or the relation of principal and agent between the parties hereto, it being understood that each party is acting as an independent contractor, and no party will have the authority to bind the others or the others' representatives in any way.

(g) **Further Assurances**. Each party hereto agrees to execute, acknowledge, and deliver such further instructions, and to do all such other acts, as may be necessary or appropriate in order to carry out the purposes and intent of this Letter Agreement.

(h) **Interpretation**. This Letter Agreement has been prepared by all of the parties hereto and no rule of strict construction will be applied against any party. In this Agreement, the singular will include the plural and vice versa and the word "including" will be deemed to be followed by the phrase "without limitation." The section headings contained in this Letter Agreement are inserted for convenience only and will not affect in any way the meaning or interpretation of this Letter Agreement.

(i) **Counterparts**. This Letter Agreement may be executed in counterparts, each of which together will constitute one and the same Letter Agreement. For purposes of executing this Letter Agreement, a facsimile copy or an emailed PDF of this Agreement, including the signature pages, will be deemed an original.

(j) **Entire Agreement**. This Letter Agreement, the Caltech-HMI License, and the Collaboration Agreement, together with all exhibits and schedules attached hereto and thereto, set forth the entire agreement with respect to the subject matter hereof and thereof and supersede all other agreements and understandings between the parties with respect to such subject matter.

(k) **Waiver**. No delay on the part of any party hereto in exercising any power or right hereunder shall operate as a waiver thereof, nor shall any single or partial exercise of any power or right hereunder preclude other or further exercise thereof or the exercise of any other power or right. No waiver of this Letter Agreement or any provision hereof shall be enforceable against any party hereto unless in writing, signed by the party against whom such waiver is claimed, and shall be limited solely to the one event.

[Remainder of this page intentionally left blank]

Please sign and return a copy of this Letter Agreement to us to acknowledge each party's agreement on this matter. Thank you for all of your assistance.

Sincerely,

HOMOLOGY MEDICINES, INC.

/s/ Arthur Tzianabos

Name: Arthur Tzianabos

Title: President and Chief Executive Officer

ACKNOWLEDGED AND AGREED:

CALIFORNIA INSTITUTE OF TECHNOLOGY

/s/ Fred Farina

Name: Fred Farina

Title: Chief Innovation & Corporate Partnerships Officer

NOVARTIS INSTITUTES FOR BIOMEDICAL RESEARCH, INC.

/s/ Scott A. Brown

Name: Scott A. Brown

Title: VP, General Counsel

Exhibit 21.1

SUBSIDIARIES OF HOMOLOGY MEDICINES, INC.

Legal Name of Subsidiary	**Jurisdiction of Organization**
Homology Medicines Security Corporation	Massachusetts

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the use in this Registration Statement on Form S-1 of our report dated February 23, 2018 relating to the financial statements of Homology Medicines, Inc. appearing in the Prospectus, which is part of this Registration Statement.

We also consent to the reference to us under the heading “Experts” in such Prospectus.

/s/ DELOITTE & TOUCHE LLP

Boston, Massachusetts
March 2, 2018