

ACHILLION PHARMACEUTICALS INC

FORM 10-K (Annual Report)

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UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2016

OR

TRANSITION REPORT PURSUANT TO SECTIONS 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from _____ to _____

Commission File Number 001-33095

ACHILLION PHARMACEUTICALS, INC.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)

52-2113479
(I.R.S. Employer
Identification No.)

300 George Street, New Haven, CT 06511

(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code: (203) 724-6000

Securities registered pursuant to Section 12(b) of the Act:

<u>Title of Class</u>	<u>Name of Exchange on Which Registered</u>
Common Stock, \$0.001 par value per share	NASDAQ Global Select Market

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

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

Large accelerated filer

Accelerated filer

Non-accelerated filer

Smaller reporting company

(Do not check if smaller reporting company)

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes No

The aggregate market value of the voting stock held by non-affiliates of the Registrant on June 30, 2016 was approximately \$1,046,681,641 based on the closing price of such stock as reported by the NASDAQ Global Select Market on June 30, 2016.

As of February 20, 2017, the registrant had 136,721,929 shares of Common Stock, \$0.001 par value per share, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Items 10, 11, 12, 13 and 14 of Part III (except for information required with respect to our executive officers, which is set forth under "Part I, Item 1—Business—Executive Officers of the Registrant") have been omitted from this report, as we intend to file with the Securities and Exchange Commission, not later than 120 days after the close of our fiscal year ended December 31, 2016, a definitive proxy statement for our annual meeting of stockholders to be held on May 23, 2017. Such information will appear in our definitive proxy statement and is incorporated by reference into this Annual Report on Form 10-K.

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Cautionary Note Regarding Forward-Looking Information

This Annual Report on Form 10-K contains forward-looking statements within the meaning of the U.S. Private Securities Litigation Reform Act and Section 21E of the Securities Exchange Act of 1934, as amended, that involve a number of risks and uncertainties. All statements other than statements relating to historical matters (including statements with words such as “believe,” “expect,” “anticipate,” “plan,” “target,” “intend,” “may,” “predict,” “project,” “potential,” “goals,” “will,” “would,” “could,” “should,” “continue” and similar expressions) should be considered forward-looking statements, although not all forward-looking statements contain these identifying words. The forward-looking statements in this Annual Report on Form 10-K include information with respect to our plans and strategy for our business, the possible achievement of discovery and development goals and milestones, our future discovery and development efforts, our collaborations, and our future operating results and financial position. There are a number of important risks and uncertainties that could cause our actual results to differ materially from those indicated by forward-looking statements. These risks and uncertainties include those inherent in pharmaceutical research and development, such as adverse results in our drug discovery and clinical development programs, decisions made by the U.S. Food and Drug Administration and other regulatory authorities with respect to the development and commercialization of our drug candidates, our ability to obtain, maintain and enforce intellectual property rights for our drug candidates, the ability of our competitors to advance their competing drug candidates, our ability to obtain any necessary financing to conduct our planned activities, or dependence on our collaborators and other third parties, and other risk factors. We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Please refer to the section entitled “Risk Factors” in Part I—Item 1A of this report for a description of risks and uncertainties relating to our business. Unless required by law, we assume no obligation to update these forward-looking statements to reflect events or circumstances that arise after the date hereof.

PART I

ITEM 1. BUSINESS

Overview

We are a science-driven, patient-focused biopharmaceutical company seeking to leverage our believed strengths across the continuum from discovery through commercialization by discovering and developing small molecule therapeutics to meet the needs of patients with infectious and complement-mediated diseases.

Our current focus is on our complement inhibitor platform, directed at advancing small molecule compounds that have the potential to be used in the treatment of immune-related diseases associated with the alternative pathway of the complement system. The complement system is a part of the human innate immune system and is believed to comprise three pathways, the alternative pathway, the lectin pathway and the classical pathway. We are advancing novel small molecules from this platform which will initially target complement factor D, an essential protein within the amplification loop of the alternative pathway. The alternative pathway is thought to play a critical role in a number of disease conditions including rare orphan conditions such as paroxysmal nocturnal hemoglobinuria, or PNH, a blood disorder, and C3 glomerulopathy, or C3G, a kidney disease, as well as more prevalent indications such as dry age-related macular degeneration, or dry AMD, an ophthalmologic disease.

We have generated a platform of potent and specific orally-administered compounds that, in preclinical studies, bind to factor D with high affinity, resulting in alternative pathway inhibition. Our lead drug candidate has demonstrated complete suppression of alternative pathway complement activity after oral dosing in healthy volunteers in a phase I clinical trial. We believe that our alternative pathway factor D inhibitor compounds may have a pharmacological advantage in addressing extravascular hemolysis, or red blood cell destruction outside of blood vessels, that affects patients with PNH, including those whose intravascular hemolysis, or red blood cell

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destruction within blood vessels, is successfully treated with currently approved treatments. In addition, we believe we may be able to treat the proportion of patients with PNH who have suboptimal response to, or who fail to respond to, currently approved treatments for PNH. Further, because C3G is a disease resulting from alternative pathway over-activation, we believe our factor D inhibitors may be effective in treating patients with C3G. In addition, we are advancing other small molecule compounds with characteristics that have the potential to be appropriate for treatment of dry AMD. We may also seek to advance other factor D inhibitors for oral systemic administration to treat PNH, C3G, or other diseases.

We also have a collaboration with Janssen Pharmaceuticals, Inc., or Janssen, the pharmaceutical subsidiary of Johnson & Johnson Inc., under which we have granted to Janssen exclusive worldwide rights to develop and commercialize a portfolio of antiviral drug candidates we discovered and developed for the treatment of chronic hepatitis C virus, or HCV, infection in exchange for specified milestone payments, future royalties, if any, and an equity investment in us.

We also intend to continue to leverage our extensive expertise in structural biology and synthetic chemistry to discover and develop additional small molecule compounds to meet other significant unmet medical needs. We believe our drug discovery capabilities will allow us to further expand our drug candidate portfolio, providing us with strong growth potential and, over time, reducing our reliance on the success of any single drug candidate. Our research team has successfully discovered and advanced multiple compounds into clinical development including sovalprevir, odalasvir, and ACH-3422 in our HCV program, all of which we have licensed to Janssen, and ACH-4471, a first-generation complement factor D inhibitor from our broad alternative pathway complement inhibitor platform.

We were incorporated on August 17, 1998 in Delaware. Since our inception, we have spent substantial research and development funds to develop our drug candidate pipeline and expect to continue to do so for the foreseeable future. We have incurred losses of \$503.6 million from inception through December 31, 2016 and had an accumulated deficit of \$517.4 million as of December 31, 2016, which includes preferred stock dividends recognized until our initial public offering in 2006. Our net losses were \$61.7 million, \$5.0 million, and \$69.0 million for the years ended December 31, 2016, 2015, and 2014, respectively.

Collaboration with Janssen Pharmaceuticals, Inc.

In May 2015, we entered into an exclusive collaboration and license agreement with Janssen, and its affiliate, JJDC, which we refer to as the Janssen Agreement. Under the Janssen Agreement, we granted Janssen exclusive worldwide rights to develop and commercialize products that contain one or more of our drug candidates for the treatment of HCV, namely odalasvir, a second-generation NS5A inhibitor, ACH-3422, a NS5B HCV polymerase inhibitor, and sovalprevir, a NS3/4A HCV protease inhibitor. We completed the transfer of our portfolio of drug candidates for the treatment of chronic HCV to Janssen in December 2015.

Under the terms of the Janssen Agreement, we are eligible to receive (1) up to \$115.0 million of milestone payments based upon achievement of clinical enrollment and dosing in specified studies, substantially all of which is related to dosing in one study, (2) up to an additional \$290.0 million of milestone payments based upon regulatory approvals and first commercial sale in specified territories, the majority of which relates to regulatory approval and the first commercial sale in the U.S., and (3) up to an additional \$500.0 million of milestone payments based upon achieving worldwide sales targets. We recognized revenue of \$15.0 million in December 2016 related to the achievement of a clinical enrollment milestone under the Janssen Agreement.

We are also eligible to receive royalties on worldwide annual net sales of licensed products, if any, at tiered royalty rate percentages beginning in the mid-teens and rising to the low-twenties, subject to customary reductions. The royalty term is determined on a licensed-product-by-licensed-product and country-by-country basis and begins on the first commercial sale of a licensed product in a country and ends on the expiration of the last to expire of specified patents or regulatory exclusivity covering such licensed product in such country or,

with a customary royalty reduction, ten years after such first commercial sale if there is no such exclusivity. Janssen will bear the future costs of worldwide development and commercialization of licensed products.

In addition, effective on July 1, 2015, we entered into a stock purchase agreement with JJDC, which we refer to as the JJDC Stock Purchase Agreement. Pursuant to the JJDC Stock Purchase Agreement, we issued 18,367,346 shares of common stock to JJDC at a price of \$12.25 per share for an aggregate purchase price of \$225.0 million.

Our Strategy

Our objective is to become the leading biopharmaceutical company focused on discovering, developing and commercializing small molecule therapies that specifically target the alternative pathway of the human complement system, while continuing our interests in HCV through collaboration with our partner, Janssen. Specifically, our near-term strategy includes the following efforts:

- ***Become the leading pharmaceutical company focused on the complement alternative pathway by:***
 - ***Advancing the first alternative pathway factor D inhibitor in clinical development for PNH and C3G.*** We believe ACH-4471 is the first small molecule alternative pathway factor D inhibitor to be tested in humans. We began clinical development with this compound in February 2016 and we have completed a single-ascending dose trial and have completed dosing of four cohorts in a multiple-ascending dose trial designed to understand the safety, pharmacokinetics and pharmacodynamics of the drug candidate after oral administration for which final data analysis is ongoing. We have initiated screening in a phase II clinical trial in patients with PNH and anticipate providing an update on the status of the program in the first half of 2017. In addition, we anticipate initiating a clinical trial in patients with C3G in the second half of 2017.
 - ***Advancing next-generation compounds for PNH and C3G .*** Our highly skilled discovery team has designed and advanced a robust portfolio of compounds with a goal of improving the efficacy, pharmacokinetic and safety profiles of our first factor D inhibitors. In addition to advancing ACH-4471, our objective is to design improved next-generation compounds that move into IND-enabling preclinical studies, as well as another set of compounds that move into late-stage preclinical characterization. We anticipate initiating phase I clinical trials with a second alternative pathway factor D inhibitor before year-end 2017.
 - ***Advancing other compounds for treatment of ophthalmologic conditions where over activation of the alternative pathway is implicated.*** Excessive activation of alternative pathway in the complement system has been implicated in multiple therapeutic areas outside of rare diseases including dry AMD. We have designed, discovered and begun preclinical testing of a number of compounds for potential clinical development for dry AMD and its advanced form, geographic atrophy.
 - ***Advancing our understanding of the role of alternative pathway factor D inhibition in human disease.*** We have established research collaborations with a number of academic institutions and scientific and clinical leaders to better elucidate the role of the alternative pathway and factor D in causing human disease. These collaborations have served to advance our understanding of the implications of inhibiting the alternative pathway. We believe our understanding of the biology underlying complement-mediated disease is highly valuable and provides us with a competitive advantage.
- ***Collaborating with Janssen in HCV.***

In order to access the worldwide development and commercialization expertise of a major pharmaceutical organization to facilitate the advancement of our HCV drug candidate portfolio, we entered into a collaboration with Janssen in June 2015. Despite the fact that Janssen has the deciding vote on collaborative matters we will seek to maximize the value of this collaboration by leveraging our participation in the joint steering committee,

or JSC, with Janssen management to support the clinical development of a safe, effective, short-duration combination regimen to treat chronic HCV infection. Janssen is currently conducting OMEGA-1, a phase IIb clinical study of JNJ-4178, a once daily oral regimen of odalasvir, AL-335, and simeprevir, in patients with genotypes 1, 2, 4, 5 and 6 HCV, including both treatment-naïve and treatment-experienced patients.

Our Programs

Our expertise in structural biology and synthetic chemistry, coupled with our work in antimicrobial discovery research, led us to consider how the immune system plays a part in inhibiting pathogens in the body. This research led to the development of our platform focused on complement system inhibition.

The first clinical compound from our complement inhibitor platform is ACH-4471, which entered phase I clinical development in healthy volunteers in February 2016. ACH-4471 is designed to target and inhibit complement factor D, a critical protein in the amplification loop within the alternative pathway of the complement system.

ACH-4471. ACH-4471 is a potent and specific inhibitor of factor D which demonstrated complete inhibition of the complement alternative pathway in human healthy volunteers in a phase I clinical trial. Further, the compound has demonstrated dose-proportional *in vitro* suppression of red blood cell destruction, or hemolysis, in plasma samples from PNH patients and similar suppression of cell killing in serum from patients with atypical hemolytic uremic syndrome, or aHUS. ACH-4471 has exhibited the following characteristics in preclinical studies and clinical trials:

- **Potency** . ACH-4471 is highly specific for inhibition of factor D, a protein critical to the amplification of the complement system. In oral administration of ACH-4471 in non-human primates at a dose of 200mg/kg, we noted complete and sustained suppression of alternate pathway activity. In phase I clinical trials in healthy human volunteers, we noted similar complete suppression of alternative pathway activity to 24 hours post-dosing. The compound has been shown *in vitro* to efficiently block the alternative pathway of the complement system in both PNH and aHUS, patient blood samples.
- **Pharmacokinetics and Metabolism** . Pharmacokinetic results and activity in preclinical studies suggest that ACH-4471 should be explored in clinical development for potential oral dosing twice or three times daily. Controlled release formulation systems are being developed for ACH-4471 with the objective of once daily dosing.
- **Safety** . We have completed fourteen day and twenty eight day toxicology studies in rats and dogs, respectively, in which ACH-4471 demonstrated high safety margins with minimal dose-related effects even at high drug exposures. Three month toxicology studies testing the effects of ACH-4471 in both rats and dogs are completed and support progression of ACH-4471. In single-ascending and multi-ascending dose phase I clinical trials in healthy volunteers, ACH-4471 has been generally well tolerated with no treatment-related serious adverse events reported. Two cases of self-limited, alanine aminotransferase, or ALT, elevations (Grade 3 and 4) were observed post-treatment at doses of 500mg and 800mg twice daily, respectively, with neither subject exhibiting signs or symptoms of hepatic decompensation. Both subjects' ALT levels normalized without intervention during follow up. Further, no treatment-associated fever or infections were observed.

Next Generation Factor D Inhibitors for Oral Administration. Our research team has synthesized almost 2,000 factor D inhibitor compounds from which we have selected several to advance into further development. The most advanced of these is currently in IND-enabling studies. Other compounds are in late screening and we anticipate selecting additional compounds to advance into IND-enabling studies in 2017.

Next Generation Factor D Inhibitors for Intravitreal Administration. Our research team has selected several compounds from our library for the pharmacophysical properties that may be advantageous for delivery

to the back of the eye. We are advancing a number of these compounds in preclinical studies and anticipate selecting one or more lead compounds later in 2017.

The Complement System

The complement system is part of the body's immune system. The immune system protects the body by recognizing and eliminating bacteria, viruses and other infectious agents, referred to as pathogens, and abnormal cells such as cancer cells. The activities of the immune system are undertaken by its two components, the innate immune system and the adaptive immune system. The role of the innate immune system is to provide a rapid nonspecific response to pathogens or abnormal cells in the body and to activate the adaptive immune system. The role of the adaptive immune system is to provide a specific response to pathogens or abnormal cells. Once a pathogen or abnormal cell has been recognized, the adaptive immune system generates immune cells and antibodies that specifically attack that pathogen or abnormal cell.

Complement is activated via three pathways: the alternative pathway, lectin pathway and the classical pathway. At sites of infection, the complement system activates and triggers a series of potent inflammatory responses. There are also many regulatory mechanisms to prevent uncontrolled complement over-activation.

The complement system consists of over 30 small proteins and protein fragments found in the blood, generally synthesized by the liver, and normally circulating in an inactive state. Complement proteins account for about 5% of the globulin portion of blood serum. A number of complement proteins are proteases. When stimulated by one of several triggers, proteases in the system cleave specific proteins and initiate an amplifying cascade of further cleavages. The end-result of this activation cascade is amplification of the response and activation of the pathogen- and cell-killing membrane attack complex, or MAC.

The alternative pathway is one of three complement pathways that opsonize, or prepare a pathogen for destruction, and kill pathogens. The alternative pathway is initiated by the spontaneous hydrolysis, or breaking of protein C3 chemical bonds through the introduction of water. This is sometimes referred to as "tickover" and is the initiation of alternative pathway. Many inflammatory, autoimmune, neurodegenerative and age-related diseases are associated with inefficient complement regulation or excessive activity of the complement system and are believed to be specifically related to the alternative pathway.

Current therapies, including those in development, to treat PNH target other complement proteins such as C5 or C3 that are active "downstream" of factor D within the protein activation cascade of the complement system.

The PNH Market

PNH is a life-threatening, ultra-rare genetic blood disorder defined by chronic uncontrolled complement activation leading to the destruction of red blood cells, or hemolysis, which can take place both inside, or intravascularly, and outside, or extravascularly, of the circulatory system. Based on internal research, we estimate that PNH affects approximately 10,000 people in North America and Western Europe. The chronic hemolysis in patients with PNH may be associated with life-threatening thrombotic events, recurrent pain, kidney disease, disabling fatigue, severe anemia, pulmonary hypertension, shortness of breath and intermittent episodes of dark-colored urine or hemoglobinuria. The only currently approved therapy for PNH patients is eculizumab, or Soliris[®], which originally was approved in 2007 and is currently approved in the United States, Europe, Japan and in several other territories. Sales of Soliris[®] were reported to be \$2.8 billion in 2016.

We estimate that approximately 25% of patients currently treated with eculizumab, the current standard of care for patients with PNH, have suboptimal response in the form of symptomatic extravascular hemolysis due to the accumulation of C3 protein fragments on red blood cells, or due to genetic mutations that prevent binding of eculizumab to C5, the protein target of eculizumab. Patients who respond sub-optimally to eculizumab through extravascular hemolysis often require dosing at higher than recommended levels or greater dosing frequency.

The C3G Market

C3G is a life-threatening, ultra-rare disorder characterized by over-activation of the alternative pathway. The condition includes both dense deposit disease, or DDD, and C3 glomerulonephritis, and is typically characterized by abnormalities in complement protein levels which results in deposits of complement protein C3 fragments within the glomeruli of the kidney, thereby inhibiting proper filtration of the blood, tissue scarring, and ultimately impaired kidney function. The overall prognosis for patients with C3G is poor, with approximately 50% of C3G patients progressing to end-stage renal disease, or ESRD, within 10 years of diagnosis. Dialysis and renal transplantation are options available for patients who reach ESKD; however, disease recurrence is frequent after transplantation, occurring in more than 50% of patients. Only about 50% of patients have a functioning graft 5 years after transplantation. Based on internal research, we estimate that C3G affects approximately 6,000 people in North America and Western Europe. Other than dialysis and renal transplantation, there are no approved treatments for patients with C3G.

The Dry AMD Market

Age-related macular degeneration, or AMD, is the leading cause of irreversible blindness in elderly people, and we estimate that there are more than 10 million intermediate and advanced stage patients with AMD worldwide. AMD may reach epidemic levels in the next decade as the population in developed markets ages. Dry AMD is one of two advanced stages of AMD that, according to internal research, affects approximately 1.5 million patients. There are no currently approved therapies for patients with dry AMD, including its advanced form, geographic atrophy. One therapy currently being evaluated in a phase III clinical trial uses a monoclonal antibody for injection every 4-6 weeks. Due to their lower molecule weight and greater relative potency, we believe our small molecule factor D inhibitors, while leveraging the same mechanism of action as the phase III monoclonal antibody, may have the potential for dosing to the eye at frequencies of every three months or longer.

Benefits of Our Approach

We believe that compounds advanced from our complement inhibitor platform have distinct potential advantages over currently available therapies.

Focus on the Alternative Pathway

Many complement-mediated diseases are the direct result of dysregulation of the alternative pathway. While other complement treatments marketed or in development focus on inhibiting the classical, lectin or terminal pathways (the terminal pathway being the final stage of all three complement pathways), these treatments do not affect the complement system at the root of dysregulation. For example, C3G results from overproduction of C3 fragments that ultimately deposit in the kidney, impairing renal function. This overproduction of C3 fragments stems from dysregulation of the fluid phase of the alternative pathway. Factor D inhibitors can potentially block or suppress over activation of the alternative pathway, limiting or eliminating C3 fragment deposition in the kidney. Conversely, other complement inhibitors, such as C3 and C5 inhibitors, do not specifically inhibit the alternative pathway.

Targeting Factor D

In blood serum, factor D has one of the lowest concentration of all the complement proteins, including targets of other therapies including C5 and C3. It is therefore limited and has the potential to provide a highly specific target for drug intervention while, we believe, limiting off-target effects and potentially leading to lower doses. Our expertise in synthetic chemistry has allowed our scientists to utilize crystal structures with high resolution to synthesize compounds that bind specifically to factor D. Further, because factor D is rate-limiting in activation of the alternative pathway, targeting factor D effectively shuts down the amplification loop that can lead to indiscriminant activation of the complement system.

Small Molecule Inhibitors

All our complement factor D inhibitor compounds for the potential treatment of rare diseases are orally-available small molecule compounds. This is in contrast to biologic compounds that require intravenous or subcutaneous dosing. The current therapy for PNH is dosed intravenously, requiring routine hospital visits. We believe that oral dosing could provide a more convenient regimen for patients and their care-givers. Additional small molecule compounds stemming from our alternative pathway factor D inhibitor platform, are also being optimized for ophthalmic administration. These compounds may have dosing advantages in ophthalmological complement-mediated diseases such as dry AMD, with the goal of dosing intervals of every three months or longer. We also believe that our factor D inhibitor compounds have the potential to treat C3G, a disease for which there are no approved therapies, by preventing or reducing the accumulation of C3 fragments.

Our Collaboration with Janssen Pharmaceuticals, Inc.

In May 2015, we entered into parallel transactions with Janssen and its affiliate, JJDC, Inc., consisting of (i) an exclusive collaboration and license agreement with Janssen, which we refer to as the Janssen Agreement, pursuant to which we granted Janssen exclusive worldwide rights to develop and commercialize products that contain one or more of our drug candidates for the treatment of HCV, namely odalasvir, a second-generation NS5A inhibitor, ACH-3422, a NS5B HCV polymerase inhibitor, and sovalprevir, a NS3/4A HCV protease inhibitor, and (ii) a stock purchase agreement, which we refer to as the JJDC Stock Purchase Agreement, pursuant to which JJDC purchased 18,367,346 shares of our common stock at a price of \$12.25 per share, for an aggregate purchase price of \$225.0 million. The Janssen Agreement became effective on June 29, 2015 upon the early termination of applicable waiting periods under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended. The JJDC Stock Purchase Agreement became effective July 1, 2015. In connection with the closing of the transactions contemplated by the JJDC Stock Purchase Agreement, we and JJDC entered into an investor agreement on July 1, 2015, which we refer to as the Investor Agreement, governing specified rights and obligations of JJDC with respect to its ownership of shares of our common stock.

Under the terms of the Janssen Agreement, we are eligible to receive (1) up to \$115.0 million of milestone payments based upon achievement of clinical enrollment and dosing in specified studies, substantially all of which is related to dosing in one study, (2) up to an additional \$290.0 million of milestone payments based upon regulatory approvals and first commercial sale in specified territories, the majority of which relates to regulatory approval and the first commercial sale in the U.S., and (3) up to an additional \$500.0 million of milestone payments based upon achieving worldwide sales targets. We recognized revenue of \$15.0 million in December 2016 related to the achievement of a clinical enrollment milestone under the Janssen Agreement.

We are also eligible to receive royalties on worldwide annual net sales of licensed products, if any, at tiered royalty rate percentages beginning in the mid-teens and rising to the low-twenties, subject to customary reductions. The royalty term is determined on a licensed-product-by-licensed-product and country-by-country basis and begins on the first commercial sale of a licensed product in a country and ends on the expiration of the last to expire of specified patents or regulatory exclusivity covering such licensed product in such country or, with a customary royalty reduction, ten years after such first commercial sale if there is no such exclusivity. Janssen will bear the future costs of worldwide development and commercialization of licensed products.

Under the Janssen Agreement, Janssen has agreed to use commercially reasonable efforts to develop a specified licensed product toward regulatory approval in several specified major market countries and, if such development is successful, to seek regulatory approval in such countries. Following regulatory approval (and pricing and reimbursement approvals, as applicable) of any licensed product in any of the major market countries, Janssen will use commercially reasonable efforts during the applicable royalty term to commercialize such licensed product in each major market country where it has been approved.

The term of the Janssen Agreement will continue, unless earlier terminated, until expiration of the royalty term for licensed products or all payment obligations under the Janssen Agreement. Janssen may terminate the

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Janssen Agreement upon 60 days written notice to us at any time prior to submission of the first application for marketing approval for a licensed product in any of the specified major market countries. Janssen may also terminate the Janssen Agreement under specified circumstances relating to the safety or regulatory approvability of a licensed product. Either we or Janssen may terminate the Janssen Agreement if the other party is in material breach of the agreement and fails to cure such breach within specified cure periods. Either we or Janssen may terminate the Janssen Agreement in the event of specified insolvency events involving the other party. Upon any early termination, rights to our licensed drug candidates will revert to us.

In connection with the closing of the transactions contemplated by the JJDC Stock Purchase Agreement, we and JJDC entered into an Investor Agreement on July 1, 2015, which we refer to as the Investor Agreement. Pursuant to the terms of the Investor Agreement the shares of common stock that we issued and sold to JJDC were subject to lock-up restrictions and voting arrangements which have since expired. In addition, there are specified limitations on JJDC's ability to acquire additional shares of our common stock. We have also agreed to provide JJDC with certain "piggyback" registration rights such that for the seven year period following the expiration of the lock-up, June 29, 2016, subject to specified conditions, whenever we propose to register shares of our common stock for our own account, JJDC will have the right to include some or all of the shares it acquired from us pursuant to the JJDC Stock Purchase Agreement in such registration. In addition, JJDC has the right to compel us to file a registration statement to register shares acquired from us pursuant to the JJDC Stock Purchase Agreement.

Pursuant to the Janssen Agreement, the JSC consisting of three members from each of Janssen and our company will provide strategic guidance for the joint HCV program. If the JSC fails to reach a unanimous decision on a matter within its authority, the matter shall be referred to the applicable executive officers of Janssen and our company who shall attempt to reach a mutual decision. If the executive officers cannot reach a mutual decision, then Janssen has the deciding vote with regard to such matter.

We established our HCV drug candidate pipeline entirely through our internal discovery capabilities. Through these efforts, we identified and developed a portfolio of drug candidates including odalasvir, ACH-3422 and sovalprevir. Prior to entering into the Janssen Agreement, we were focused on the development of the following HCV drug candidates:

- **Odalasvir, a NS5A Inhibitor.** We completed three phase IIa clinical trials with odalasvir including the -007 trial with sovalprevir, the -005 study, which examined the use of odalasvir with ribavirin alone, and the Proxy Doublet study which examined the use of odalasvir in combination with sofosbuvir, a nucleotide NS5B polymerase inhibitor marketed by Gilead Sciences, Inc., or Gilead, under the brand name Sovaldi[®]. HCV patients treated for both eight weeks and six weeks with the combination of odalasvir and sofosbuvir achieved 100% SVR24, or sustained viral response 24 weeks after cessation of therapy, demonstrating the differentiation of odalasvir within the NS5A class.
- **ACH-3422, a NS5B Nucleotide Polymerase Inhibitor.** ACH-3422 has demonstrated excellent potency and was well-tolerated in a phase Ib proof of concept study in which HCV patients receiving a once-daily 700mg dose of ACH-3422 for 14 days demonstrated mean maximal viral load reduction of 4.6 log₁₀.
- **Sovaprevir, a NS3 Protease Inhibitor.** We completed a phase II clinical trial that evaluated 12 weeks of treatment consisting of sovalprevir and our NS5A inhibitor, odalasvir, with ribavirin for the treatment of genotype 1 HCV (the -007 trial). In this trial, genotype 1b patients achieved 100% SVR24; however, in genotype 1a patients, the combination regimen results were suboptimal.

ACH-3422 and sovalprevir are not currently in clinical development under the Janssen Agreement.

In September 2016, we announced clinical trial results from the first triple combination regimen under the collaboration. Initiated in October 2015, the phase IIa clinical trial tested a combination regimen consisting of

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Olysio[®] (simeprevir), a protease inhibitor marketed by Janssen, AL-335, a nucleotide polymerase inhibitor in clinical development by Janssen, and odalasvir. This study was designed to determine the safety, pharmacokinetics, and efficacy of different dosing regimens containing odalasvir and AL-335, with or without simeprevir, in treatment-naïve patients with genotype 1 HCV infection for treatment durations of eight or six weeks.

Of patients who received the triple combination of odalasvir, AL-335, and simeprevir, the combination now denoted as JNJ-4178, 100% had undetectable levels of HCV infection at SVR12 and all patients in cohort 1 achieved SVR24 (i.e., cohorts 1, 3, and 4; N=60,20/cohort). Cohort 1 evaluated the triple combination of odalasvir (50mg QD), AL-335 (400 mg QD) and simeprevir (100mg QD) for eight weeks, while cohorts 3 and 4 assessed odalasvir (50 mg QOD), AL-335 (800 mg QD), and simeprevir (75 mg QD) for eight and six weeks, respectively. In cohort 2, which assessed the dual combination of odalasvir (50 mg QOD) and AL-335 (800 mg QD) for eight weeks, 90% of patients achieved SVR12 (N=20). In all of these cohorts, the dosing regimens were generally well-tolerated. The majority of adverse events were mild and the most commonly reported events were headache, fatigue, and upper respiratory tract infection. There was also one serious adverse event in cohort 1 that resulted in premature discontinuation of all study drugs. This consisted of a Mobitz Type 1 2nd degree atrioventricular block and was deemed probably related to odalasvir and possibly related to AL-335 and simeprevir. The event was not associated with clinical or echocardiographic abnormalities, did not require any therapeutic intervention, resolved following treatment discontinuation, and the patient went on to achieve SVR24. Other than the one serious adverse event, no clinically significant laboratory, echocardiography, or ECG abnormalities were reported.

In November 2016, we announced that Janssen had initiated OMEGA-1, a phase IIb clinical trial of JNJ-4178 in patients with genotypes 1, 2, 4, 5 and 6 HCV, including both treatment-naïve and treatment-experienced patients. Genotype 3 patients and patients with cirrhosis may be added to OMEGA-1 after those patient populations are studied in additional arms of the on-going phase IIa clinical trial, now designated study 604. This study is ongoing.

The HCV Market

The hepatitis-C virus is a common cause of viral hepatitis, which leads to inflammation of the liver. HCV infection is contracted by transmission through the blood of an infected person. Hepatitis due to HCV can result in an acute process in which a person is affected for only several months and then the virus is cleared from the body. However, the Department of Health and Human Services Centers for Disease Control, or CDC, estimates that 70% to 85% of newly infected individuals become chronically infected following exposure. HCV disease progression then occurs over a period of 20 to 30 years during which patients are generally asymptomatic, meaning they exhibit no symptoms of the disease, until they experience late-stage disease. Chronic hepatitis can lead to permanent liver damage, which can result in the development of liver cancer, liver failure or death. Estimates by the World Health Organization in July 2016 indicated that approximately 130 million to 150 million individuals worldwide are chronically infected with HCV.

The HCV market has seen significant change in recent years, notably with the 2011-2013 introductions of the first directly acting antivirals (DAAs)—protease inhibitors boceprevir (Victrelis[®]), telaprevir (Incivek[®]), simeprevir (Olysio[®]), and nucleotide polymerase inhibitor, sofosbuvir (Sovaldi[®]). These were first approved for treatment of patients with HCV genotype 1 in combination with pegylated interferon and ribavirin. Sofosbuvir was also approved for use with ribavirin alone for use in treatment of patients with HCV genotype 2. In 2014, all-oral combination regimens entered the market including the combination of sofosbuvir and ledipasvir (Harvoni[®]) and the ombitasvir/paritaprevir/ritonavir/dasabuvir/ribavirin combination (Viekira Pak[™]). In 2016, the oral combination of elbasvir/grazoprevir (Zepatier) also entered the HCV market. These treatment regimens for HCV offer improved SVR rates for patients of the appropriate genotype, who do not have base-line resistant viral variants, and who can tolerate the combination therapy. According to public filings, sales for marketed HCV regimens were reported to be approximately \$19 billion in 2016, including sales of boceprevir (Victrelis[®]),

telaprevir (Incivek[®]) sofosbuvir (Sovaldi[®]) and sofosbuvir/ledipasvir (Harvoni[™]) by Gilead and Viekira Pak[™] by AbbVie, Inc. Even though the number of patients treated for HCV is anticipated to peak in 2016 through 2020, and competitive pricing may result from the introduction of all-oral combination regimens with broad genotypic coverage in 2015 and beyond, the HCV DAA market is expected to be a multi-billion dollar market for the next several years in the combined markets of the United States, the European Union and Japan according to Citi Research in February 2017.

Despite recent improvements in the treatment landscape for HCV infected patients, there remains a goal for a new HCV therapy that addresses the needs of a broader range of HCV patients, both across the spectrum of HCV genotypes 1—6, and across varying stages of liver disease, and that shortens the duration of treatment. We believe our collaboration with Janssen can provide a combination regimen that contains our NS5A inhibitor, odalasvir, in combination with other agents that may be able to address these goals.

Our Drug Discovery Programs and Capabilities

To date we have successfully advanced eight drug candidates into human clinical trials, with two additional drug candidates that we advanced into late-stage preclinical studies. We discovered nine of these ten drug candidates in house by applying our expertise in biology and synthetic chemistry. We intend to continue to capitalize on our internal drug discovery and development capabilities to expand our drug candidate portfolio.

From early lead identification through clinical candidate selection, we have coupled our knowledge base in genomic replication targets with an integrated drug discovery infrastructure to aid in the advancement of our discovery programs.

Target Selection and Assay Development

We are focused on addressing unmet medical needs with an emphasis on inhibiting essential proteins or enzymes with small molecule inhibitors. We select targets for our drug discovery programs based upon the relevance of the target to key steps within the biological system, our ability to develop appropriate assays for early assessment of potency, selectivity and safety and our ability to identify small molecules that can be optimized within a reasonable time period to become drug candidates.

Compound Synthesis, Hit Identification and Lead Optimization

Our focused compound library contains a diverse set of molecules that have been synthesized for specific biological targets. We have developed the following tools that enable us to manage our compounds efficiently and advance our programs:

- AACP (Achillion Automated Chemistry Platform) is a proprietary software that facilitates synthesis of thousands of small molecules in parallel by automating several cumbersome steps involved;
- CART (Compound Acquisition and Repository Tracking) streamlines our scientists' ability to select and acquire compounds for lead identification and optimization;
- CHEM-ACH is a data mining software that allows analysis of our proprietary compounds and their biological activities. Such analysis helps in studying the structure-activity relationships and designing and synthesizing compounds for lead optimization;
- CIDM (Competitive Intelligence & Data Mining) is a web application. It analyzes publicly available information to display competitive information including clinical and preclinical development activities, intellectual property and scientific literature;
- ComplementWiki is an in-house database of ongoing and completed complement- related drug development and clinical trial designs and results. It also has an in-house developed, user friendly interface for accessing and analyzing this data;

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- HCVWiki is an in-house database of ongoing and completed HCV therapy clinical trial designs and results. It also has an in-house developed, user friendly interface for accessing and analyzing this data; and
- PSTS (Preclinical Study Tracking System) is a web interface which is used for accessing the details of our preclinical studies. It allows scientists to enter, modify, and query preclinical study documents.

Preclinical Candidate Selection

A cornerstone of our approach to drug discovery and development is the early assessment of the drug-like properties associated with optimized lead compounds. Potency and activity against a given target are necessary but not sufficient predictors of eventual successful clinical development of a new drug. In order to perform an early assessment of the potential for successful development, prior to progression of a compound into late-stage preclinical studies in support of clinical trials, we rigorously evaluate compounds in numerous tests relating to safety, metabolism, pharmacokinetic properties and physical properties associated with the feasibility for an oral formulation.

Competition

The development and commercialization of new drug products is highly competitive. We expect that we, our collaborators and future collaborators, if any, will face significant competition from major pharmaceutical companies, specialty pharmaceutical companies and biotechnology companies worldwide with respect to any of our drug candidates that we, or they, may seek to develop or commercialize. There are a number of pharmaceutical and biotechnology companies that currently market and sell products or are pursuing the development of drug candidates for the treatment of the key complement-mediated disease indications such as those from Alexion Pharmaceuticals, Inc. and other potential therapies in development by Akari Therapeutics, PLC, Alnylam Pharmaceuticals, Inc., Amyndas Pharmaceuticals, S.A., Apellis Pharmaceuticals, Inc., BioCryst Pharmaceuticals, Inc., ChemoCentryx, Inc., Genentech, Inc., Omeros Corporation, Ra Pharmaceuticals, Inc. and True North Therapeutics, Inc. Additionally, Novartis AG also has intellectual property rights in the complement area.

In the HCV market, there are a number of pharmaceutical companies that currently market and sell products for HCV or are pursuing the development of drug candidates for HCV including AbbVie Inc., Enanta Pharmaceuticals, Inc., Gilead, Merck & Co., Inc. and Regulus Therapeutics Inc.

Our competitors may succeed in developing, acquiring or licensing technologies and drug products that are more effective, have fewer or more tolerable side effects or are less costly than any drug candidates that we are currently developing or that we may develop, which could render our drug candidates obsolete and noncompetitive.

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, or any current or future collaborators, may develop. In addition to currently approved products, our competitors also may obtain additional FDA or other marketing approvals for their products before we or any current or future collaborators, are able to obtain approval for ours, which could result in our competitors establishing a strong market position before we, or any current or future collaborators, are able to enter the market.

Many of our existing and potential future competitors have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials, obtaining marketing approvals and marketing approved products than we do. Mergers and acquisitions in the pharmaceutical and biotechnology industries may result in even more resources being concentrated among a

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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.

Intellectual Property

Our strategy is to pursue patents, developed internally and licensed from third parties, and other means to protect our technology, inventions and improvements that are commercially important to the development of our business. We also rely on trade secrets that may be important to the development of our business.

Our success will depend significantly on our ability to:

- obtain and maintain patent and other proprietary protection for the technology, inventions, improvements and know-how we consider important to our business;
- defend and enforce our patents;
- preserve the confidentiality of our trade secrets; and
- operate without infringing the valid and enforceable patents and proprietary rights of third parties.

We hold issued patents and pending patent applications in the United States, and in foreign countries we deem appropriate, covering intellectual property developed as part of our research and development programs.

Our complement inhibitor patent portfolio currently includes a large number of pending U.S. applications, international applications filed under the Patent Cooperation Treaty, referred to as the PCT, and applications that have been entered into the national phase of prosecution in foreign countries. These patents and patent applications, if issued, will expire in 2035 or 2036, without regard to possible patent term extensions to account for regulatory delay to market our drugs. These applications include claims directed to composition of matter, pharmaceutical composition and their methods of use to treat complement factor D related disorders, including PNH, macular age degeneration, and C3G. The applications include specific claims directed to our lead drug candidate, ACH-4471 and its medical use, as well as other compounds and their medical uses.

Our first family of complement inhibitor patent filings, which consists of eight subfamilies, are based on a priority provisional application filed in February 2014. These applications were entered into the international phase with PCT applications in February 2015 and were entered into the national phase of prosecution in foreign countries in August 2016. In addition to the United States, five of the applications were filed in 14 foreign countries (including the major market countries of China, Australia, Brazil, Canada, Japan and South Korea) and four regional patent offices (European Patent Office (EPO), African Regional Patent Office (ARIPO), Eurasian Patent Office (EAPO) and Gulf Cooperation Council (GCC)). One application was filed in the United States, 6 foreign countries (including the major market countries of China, Australia, India, Canada, Japan and South Korea) and one region (European Patent Office (EPO)). Two applications were filed in the United States and Europe.

Our second family of complement inhibitor patent filings, which consists of nine subfamilies, are based on priority provisional applications filed in August 2015. These applications were entered into the international phase with PCT applications in August 2016 and five of the subfamilies were also filed in Argentina and Taiwan. Our third family of complement inhibitor patent filings, which also consists of nine subfamilies, are also based on priority provisional applications filed in August 2015. These applications were entered into the international phase with PCT applications in August 2016.

In 2015, we entered into the Janssen Agreement. Under the Janssen Agreement, we granted Janssen exclusive worldwide rights to develop and commercialize products that contain one or more of our drug

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candidates for the treatment of HCV, namely: odalasvir, a second-generation NS5A inhibitor; ACH-3422, a NS5B HCV polymerase inhibitor; and sovalprevir, a NS3/4A HCV protease inhibitor. Under the Janssen Agreement, we have granted Janssen an exclusive, worldwide license to our intellectual property related to these compounds. Janssen is in Phase IIb development with a three drug combination for the treatment of HCV, JNJ-4178, which includes one of the HCV drug candidates we licensed to Janssen, odalasvir. The other two drug candidates licensed to Janssen, ACH-3422 and sovalprevir, are not currently in clinical development. Our patent portfolio on odalasvir is comprised of (i) U.S. Patent Nos. 8,809,313 and 9,474,742, and an allowed U.S. application, with claims covering the composition of matter of odalasvir, methods to use odalasvir to treat HCV, and pharmaceutical compositions including odalasvir, and (ii) U.S. Patent No. 9,468,629, with claims covering methods of manufacture of odalasvir as well as compositions of matter claims covering intermediates in its synthesis. These U.S. Patents will expire in 2032, without regard to any patent term extension that may be available to compensate for the delay to market caused by regulatory review by the U.S. FDA. In addition, we co-own with our partner Janssen two pending unpublished U.S. patent applications covering aspects of odalasvir and its methods of use and compositions thereof, and an international Patent Cooperation Treaty application, which if granted, will expire in 2037. We have granted patents on odalasvir in the major market foreign jurisdictions of Europe and China, and we have pending patent applications on odalasvir in the additional significant market countries of Australia, Brazil, Canada, Eurasia, India, Japan and South Korea, which will expire in 2032, unless the patent term is extended by a country's law that allows further protection for the time required to obtain regulatory approval, such as a Supplementary Protection Certificate in Europe.

We rely on trade secrets to protect our technology, especially where we do not believe patent protection is appropriate or obtainable. However, trade secrets are difficult to protect. In order to protect our proprietary technology and processes, we also rely in part on confidentiality and intellectual property assignment agreements with our corporate partners, employees, consultants, outside scientific collaborators and sponsored researchers and other advisors.

Manufacturing and Supply

We currently rely on contract manufacturers to produce drug substances and drug products required for our clinical trials under current good manufacturing practices (cGMP), with oversight by our internal managers. We plan to continue to rely upon contract manufacturers and collaboration partners to manufacture commercial quantities of our drug candidates if and when approved for marketing by the FDA. We currently rely on a limited number of manufacturers for the preclinical or clinical supplies of each of our drug candidates we are developing and do not currently have relationships for redundant supply or a second source for any of these drug candidates. We believe that there are alternate sources of supply that can satisfy our clinical trial requirements without significant delay or material additional costs.

Sales and Marketing

We intend to establish our own sales and marketing capabilities if and when we obtain regulatory approval of our drug candidates. In North America and Western Europe, patients in the markets for our drug candidates are largely managed by medical specialists in the areas of immunology, nephrology, and hematology. Historically, companies have experienced substantial commercial success through the deployment of specialized sales forces which can address a majority of key prescribers. Therefore, we expect to utilize a specialized sales force in North America for the sales and marketing of drug candidates that we may successfully develop. We currently have no marketing, sales or distribution capabilities. In order to participate in the commercialization of any of our drugs, we must develop these capabilities on our own or in collaboration with third parties. We may also choose to hire a third party to provide sales personnel instead of developing our own staff.

Outside of North America, and in situations or markets where a more favorable return may be realized through licensing commercial rights to a third party, we may license a portion or all of our commercial rights in a territory to a third party in exchange for one or more of the following: up-front payments, research funding, development funding, milestone payments and royalties on drug sales.

Under the Janssen Agreement, we granted Janssen exclusive worldwide rights to develop and commercialize products that contain one or more of our drug candidates for the treatment of HCV, namely odalasvir, a second-generation NS5A inhibitor, ACH-3422, a NS5B HCV polymerase inhibitor, and sovalprevir, a NS3/4A HCV protease inhibitor. ACH-3422 and sovalprevir are not currently in clinical development under the Janssen Agreement.

Regulatory Matters

Government Regulation and Product Approval

Government authorities in the United States, at the federal, state and local level, and in other countries and jurisdictions, including the European Union, extensively regulate, among other things, the research, development, testing, manufacture, quality control, approval, packaging, storage, recordkeeping, labeling, advertising, promotion, distribution, marketing, sales, post-approval monitoring and reporting, and import and export of pharmaceutical products. 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, require the expenditure of substantial time and financial resources.

Review and Approval of Drugs in the United States

In the United States, the FDA approves and regulates drugs under the Federal Food, Drug, and Cosmetic Act, or FDCA, and implementing regulations. The failure to comply with requirements under the FDCA and other applicable laws at any time during the product development process, approval process or after approval may subject an applicant and/or sponsor to a variety of administrative or judicial sanctions, including refusal by the FDA to approve pending applications, withdrawal of an approval, imposition of a clinical hold, issuance of warning letters and other types of letters, product recalls, product seizures, total or partial suspension of production or distribution, injunctions, fines, refusals of government contracts, restitution, disgorgement of profits, or civil or criminal investigations and penalties brought by the FDA and the Department of Justice or other governmental entities.

A drug product candidate must be approved by the FDA through the new drug application, or NDA. An applicant seeking approval to market and distribute a new drug product in the United States must typically undertake the following:

- completion of preclinical laboratory tests, animal studies and formulation studies in compliance with the FDA's good laboratory practice, or GLP, regulations;
- submission to the FDA of an IND, which must take effect before human clinical trials may begin in the U.S.;
- approval by an independent institutional review board, or IRB, representing each clinical site before each clinical trial may be initiated;
- performance of adequate and well-controlled human clinical trials in accordance with good clinical practices, or GCP, to establish the safety and efficacy of the proposed drug product for each indication;
- preparation and submission to the FDA of a new drug application, or NDA, requesting marketing for one or more proposed indications;
- review by an FDA advisory committee, if requested by the FDA;
- satisfactory completion of one or more FDA inspections of the manufacturing facility or facilities at which the product, or components thereof, are produced to assess compliance with current Good Manufacturing Practices, or cGMP, requirements and to assure that the facilities, methods and controls are adequate to preserve the product's identity, strength, quality and purity;

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- satisfactory completion of FDA audits of clinical trial sites to assure compliance with GCPs and the integrity of the clinical data;
- payment of user fees and securing FDA approval of the NDA; and
- compliance with any post-approval requirements, including the potential requirement to implement a Risk Evaluation and Mitigation Strategy, or REMS, and potentially post-market requirement, or PMR, and commitment, or PMC, studies.

Preclinical Studies

Before an applicant begins testing a compound with potential therapeutic value in humans, the drug candidate enters the preclinical testing stage. Preclinical studies include laboratory evaluation of the purity and stability of the manufactured drug substance or active pharmaceutical ingredient and the formulated drug or drug product, as well as in vitro and animal studies to assess the safety and activity of the drug for initial testing in humans and to establish a rationale for therapeutic use. The conduct of preclinical studies is subject to federal regulations and requirements, including GLP regulations. The results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and plans for clinical studies, among other things, are submitted to the FDA as part of an IND. Some long-term preclinical testing, such as animal tests of reproductive adverse events and carcinogenicity, and long term toxicity studies, may continue after the IND is submitted.

The IND and IRB Processes

An IND is an exemption from the FDCA that allows an unapproved drug to be shipped in interstate commerce for use in an investigational clinical trial and a request for FDA authorization to administer an investigational drug to humans. Such authorization must be secured prior to interstate shipment and administration of any new drug that is not the subject of an approved NDA. In support of the IND application, applicants must submit a protocol for each clinical trial and any subsequent protocol amendments. In addition, the results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and plans for clinical trials, among other things, are submitted to the FDA as part of an IND. The FDA requires a 30-day waiting period after the submission of each IND before clinical trials may begin. This waiting period is designed to allow the FDA to review the IND to determine whether human research subjects will be exposed to unreasonable health risks. At any time during this 30-day period, or thereafter, the FDA may raise concerns or questions about the conduct of the trials as outlined in the IND and impose a clinical hold or partial clinical hold. In this case, the IND sponsor and the FDA must resolve any outstanding concerns before clinical trials can begin (or resume if the clinical trial had been ongoing at the time a clinical hold was imposed).

In addition to the foregoing IND requirements, an IRB/ethics committee representing each institution participating in the clinical trial must review and approve the plan for any clinical trial before it commences at that institution, and the IRB must conduct continuing review and reapprove the study at least annually. The IRB must review and approve, among other things, the study protocol and informed consent information to be provided to study subjects. An IRB must operate in compliance with FDA regulations. Information about certain clinical trials must be submitted within specific timeframes to the National Institutes of Health, or NIH, for public dissemination on its ClinicalTrials.gov website. An IRB can suspend or terminate approval of a clinical trial at its institution, or an institution it represents, if the clinical trial is not being conducted in accordance with the IRB's requirements or if the drug has been associated with unexpected serious harm to patients.

Human Clinical Studies in Support of an NDA

Clinical trials involve the administration of the investigational product to human subjects under the supervision of qualified investigators in accordance with GCP requirements, which include, among other things, the requirement that all research subjects provide their informed consent in writing before their participation in

any clinical trial. Clinical trials are conducted under written study protocols detailing, among other things, the inclusion and exclusion criteria, the objectives of the study, the parameters to be used in monitoring safety and the effectiveness criteria to be evaluated.

Human clinical trials are typically conducted in four sequential phases, which may overlap or be combined:

- **Phase 1.** The drug is initially introduced into a small number of healthy human subjects or, in certain indications such as cancer, patients with the target disease or condition (e.g., cancer) and tested for safety, dosage tolerance, absorption, metabolism, distribution, excretion and, if possible, to gain an early indication of its effectiveness and to determine optimal dosage.
- **Phase 2.** The drug is administered to 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 and optimal dosage.
- **Phase 3.** These clinical trials are commonly referred to as “pivotal” studies, which denote a study that presents the data that the FDA or other relevant regulatory agency will use to determine whether or not to approve a drug. The drug is administered to an expanded patient population, generally at geographically dispersed clinical trial sites, in well-controlled clinical trials to generate enough data to statistically evaluate the efficacy and safety of the product for approval, identify adverse effects, establish the overall risk-benefit profile of the product and to provide adequate information for the labeling of the product.
- **Phase 4 .** Post-approval studies may be conducted after initial marketing approval. These studies are used to gain additional experience from the treatment of patients in the intended therapeutic indication.

Progress reports detailing the results of the clinical trials conducted under the IND must be submitted at least annually to the FDA. In addition, IND safety reports must be submitted to the FDA for any of the following: serious and unexpected suspected adverse reactions; findings from other studies or animal or *in vitro* testing that suggest a significant risk in humans exposed to the drug; and any clinically important increase in the case of a serious suspected adverse reaction over that listed in the protocol or investigator brochure. The FDA or the sponsor or the data monitoring committee may suspend or terminate a clinical trial at any time on various grounds, including a finding that the research subjects are being exposed to an unacceptable health risk. The FDA will typically inspect one or more clinical sites to assure compliance with GCP and the integrity of the clinical data submitted.

Section 505(b)(2) NDAs

NDAs for most new drug products are based on two full clinical studies which must contain substantial evidence of the safety and efficacy of the proposed new product for the proposed use. These applications are submitted under Section 505(b)(1) of the FDCA. The FDA is, however, authorized to approve an alternative type of NDA under Section 505(b)(2) of the FDCA. This type of application allows the applicant to rely, in part, on the FDA’s previous findings of safety and efficacy for a similar product, or published literature. Specifically, Section 505(b)(2) applies to NDAs for a drug for which the investigations made to show whether or not the drug is safe for use and effective in use and relied upon by the applicant for approval of the application “were not conducted by or for the applicant and for which the applicant has not obtained a right of reference or use from the person by or for whom the investigations were conducted.”

Thus, Section 505(b)(2) authorizes the FDA to approve an NDA based on safety and effectiveness data that were not developed by the applicant. NDAs filed under Section 505(b)(2) may provide an alternate and potentially more expeditious pathway to FDA approval for new or improved formulations or new uses of previously approved products. If the 505(b)(2) applicant can establish that reliance on the FDA’s previous approval is scientifically appropriate, the applicant may eliminate the need to conduct certain preclinical or clinical studies of the new product. The FDA may also require companies to perform additional studies or

measurements to support the change from the approved product. The FDA may then approve the new drug candidate for all or some of the label indications for which the referenced product has been approved, as well as for any new indication sought by the Section 505(b)(2) applicant.

Review of an NDA by the FDA

If clinical trials are successful, the next step in the drug development process is the preparation and submission to the FDA of a NDA. The NDA is the vehicle through which drug applicants formally propose that the FDA approve a new drug for marketing and sale in the United States for one or more indications. The NDA must contain a description of the manufacturing process and quality control methods, as well as results of preclinical tests, toxicology studies, clinical trials and proposed labeling, among other things. Every new drug must be the subject of an approved NDA before it may be commercialized in the United States. Under federal law, the submission of most NDAs is subject to an application user fee, currently exceeding \$2.0 million, and the sponsor of an approved NDA is also subject to annual product and establishment user fees, currently exceeding \$98,000 per product and \$512,000 per establishment. These fees are typically increased annually. Certain exceptions and waivers are available for some of these fees, such as an exception from the application fee for drugs with orphan designation and a waiver for certain small businesses, an exception from the establishment fee when the establishment does not engage in manufacturing the drug during a particular fiscal year, and an exception from the product fee for a drug that is the same as another drug approved under an abbreviated pathway.

Following submission of an NDA, the FDA conducts a preliminary review of an NDA within 60 calendar days of its receipt and strives to inform the sponsor by the 74th day after the FDA's receipt of the submission to determine whether the application is sufficiently complete to permit substantive review. The FDA may request additional information rather than accept an NDA for filing. In this event, the application must be resubmitted with the additional information. The resubmitted application is also 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. The FDA has agreed to specified performance goals in the review process of NDAs. Under that agreement, 90% of applications seeking approval of New Molecular Entities, or NMEs, are meant to be reviewed within ten months from the date on which FDA accepts the NDA for filing, and 90% of applications for NMEs that have been designated for "priority review" are meant to be reviewed within six months of the filing date. For applications seeking approval of drugs that are not NMEs, the ten-month and six-month review periods run from the date that FDA receives the application. The review process and the Prescription Drug User Fee Act goal date may be extended by the FDA for three additional months (denoted as a major amendment) to consider new information or clarification provided by the applicant to address an outstanding deficiency identified by the FDA following the original submission.

Before approving an NDA, the FDA typically will inspect the facility or facilities where the product is or will be manufactured. These pre-approval inspections may cover all facilities associated with an NDA submission, including drug component manufacturing (e.g., active pharmaceutical ingredients), finished drug product manufacturing, and control testing laboratories. The FDA will not approve an application 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 an NDA, the FDA will typically inspect one or more clinical sites to assure compliance with GCP. In addition, as a condition of approval, the FDA may require an applicant to develop a REMS. REMS use risk minimization strategies beyond the professional labeling to ensure that the benefits of the product outweigh the potential risks. To determine whether a REMS is needed, the FDA will consider the size of the population likely to use the product, seriousness of the disease, expected benefit of the product, expected duration of treatment, seriousness of known or potential adverse events, and whether the product is a new molecular entity.

The FDA is required to refer an application for a novel drug to an advisory committee or explain why such referral was not made. Typically, an advisory committee is a panel of independent experts, including clinicians

and other scientific experts, that reviews, evaluates and provides 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.

Fast Track, Breakthrough Therapy and Priority Review Designations

The FDA is authorized to designate certain products for expedited review if they are intended to address an unmet medical need in the treatment of a serious or life-threatening disease or condition. These programs are fast track designation, breakthrough therapy designation and priority review designation.

Specifically, the FDA may designate a product for fast track review if it is intended, whether alone or in combination with one or more other drugs, for the treatment of a serious or life-threatening disease or condition, and it demonstrates the potential to address unmet medical needs for such a disease or condition. For fast track products, sponsors may have greater interactions with the FDA and the FDA may initiate review of sections of a fast track product's NDA before the application is complete. This rolling review may be available if the FDA determines, after preliminary evaluation of clinical data submitted by the sponsor, that a fast track product may be effective. The sponsor must also provide, and the FDA must approve, a schedule for the submission of the remaining information and the sponsor must pay applicable user fees. However, the FDA's time period goal for reviewing a fast track application does not begin until the last section of the NDA is submitted. In addition, the fast track designation may be withdrawn by the FDA if the FDA believes that the designation is no longer supported by data emerging in the clinical trial process.

Second, in 2012, Congress enacted the Food and Drug Administration Safety and Improvement Act. This law established a new regulatory scheme allowing for expedited review of products designated as "breakthrough therapies." A product may be designated as a breakthrough therapy if it is intended, either 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 product 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 FDA may take certain actions with respect to breakthrough therapies, including holding meetings with the sponsor throughout the development process; providing timely advice to the product sponsor regarding development and approval; involving more senior staff in the review process; assigning a cross-disciplinary project lead for the review team; and taking other steps to design the clinical trials in an efficient manner.

Third, the FDA may designate a product for priority review if it is a drug that treats a serious condition and, if approved, would provide a significant improvement in safety or effectiveness. The FDA determines, on a case-by-case basis, whether the proposed drug represents a significant improvement when compared with other available therapies. Significant improvement may be illustrated by evidence of increased effectiveness in the treatment of a condition, elimination or substantial reduction of a treatment-limiting drug reaction, documented enhancement of patient compliance that may lead to improvement in serious outcomes, and evidence of safety and effectiveness in a new subpopulation. A priority designation is intended to direct overall attention and resources to the evaluation of such applications, and to shorten the FDA's review clock goal for taking action on a marketing application from ten months to six months. For new chemical entities, or NCEs, the review clock starts after the NDA is filed with a total clock of twelve and eight months, respectively.

Accelerated Approval Pathway

The FDA may grant accelerated approval to a drug for a serious or life-threatening condition that provides meaningful therapeutic advantage to patients over existing treatments based upon a determination that the drug has an effect on a surrogate endpoint that is reasonably likely to predict clinical benefit. The FDA may also grant accelerated approval for such a condition when the product has an effect on an intermediate clinical endpoint that can be measured earlier than an effect on irreversible morbidity or mortality, or IMM, and 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. Drugs granted accelerated approval must meet the same statutory standards for safety and effectiveness as those granted traditional approval.

For the purposes of accelerated approval, a surrogate endpoint is a marker, such as a laboratory measurement, radiographic image, physical sign, or other measure that is thought to predict clinical benefit, but is not itself a measure of clinical benefit. Surrogate endpoints can often be measured more easily or more rapidly than clinical endpoints. An intermediate clinical endpoint is a measurement of a therapeutic effect that is considered reasonably likely to predict the clinical benefit of a drug, such as an effect on IMM. The FDA has limited experience with accelerated approvals based on intermediate clinical endpoints, but has indicated that such endpoints generally may support accelerated approval where the therapeutic effect measured by the endpoint is not itself a clinical benefit and basis for traditional approval, if there is a basis for concluding that the therapeutic effect is reasonably likely to predict the ultimate clinical benefit of a drug.

The accelerated approval pathway is most often used in settings in which the course of a disease is long and an extended period of time is required to measure the intended clinical benefit of a drug, even if the effect on the surrogate or intermediate clinical endpoint occurs rapidly. Thus, accelerated approval has been used extensively in the development and approval of drugs for treatment of a variety of cancers in which the goal of therapy is generally to improve survival or decrease morbidity and the duration of the typical disease course requires lengthy and sometimes large trials to demonstrate a clinical or survival benefit.

The accelerated approval pathway is usually contingent on a sponsor's agreement to conduct, in a diligent manner, additional post-approval confirmatory studies to verify and describe the drug's clinical benefit. As a result, a drug candidate approved on this basis is subject to rigorous post-marketing compliance requirements, including the completion of Phase 4 or post-approval clinical trials to confirm the effect on the clinical endpoint. Failure to conduct required post-approval studies, or confirm a clinical benefit during post-marketing studies, would allow the FDA to withdraw the drug from the market on an expedited basis. All promotional materials for drug candidates approved under accelerated regulations are subject to prior review by the FDA.

The FDA's Decision on an NDA

On the basis of the FDA's evaluation of the NDA and accompanying information, including the results of the inspection of the manufacturing facilities, the FDA may issue an approval letter or a complete response letter. An approval letter authorizes commercial marketing of the product with specific prescribing information for specific indications. A complete response letter generally outlines the deficiencies in the submission and may require substantial additional testing or information in order for the FDA to reconsider the application. If and when those deficiencies have been addressed to the FDA's satisfaction in a resubmission of the NDA, the FDA will issue an approval letter. The FDA has committed to reviewing such resubmissions in two or six months depending on the type of information included. Even with submission of this additional information, the FDA ultimately may decide that the application does not satisfy the regulatory criteria for approval.

If the FDA approves a product, it may limit the approved indications for use for the product, require that contraindications, warnings or precautions be included in the product labeling, require that post-approval studies, including Phase 4 clinical trials, be conducted to further assess the drug's safety after approval, require testing and surveillance programs to monitor the product after commercialization, or impose other conditions, including distribution restrictions or other risk management mechanisms, including REMS, which can materially affect the potential market and profitability of the product. The FDA may prevent or limit further marketing of a product based on the results of post-market studies or surveillance programs. After approval, many types of changes to the approved product, such as adding new indications, manufacturing changes and additional labeling claims, are subject to further testing requirements and FDA review and approval.

Post-Approval Requirements

If a product receives regulatory approval, the approval may be significantly limited to specific diseases and dosages or the indications for use may otherwise be limited, which could restrict the commercial value of the product. Further, the FDA may require that certain contraindications, warnings or precautions be included in the product labeling. In addition, condition of NDA approval may include sponsor agreement to PMR or PMC studies, which are designed to further assess drug safety and effectiveness and may require testing and surveillance programs to monitor the safety of approved products that have been commercialized.

Drugs manufactured or distributed pursuant to FDA approvals are subject to pervasive and continuing regulation by the FDA, including, among other things, requirements relating to recordkeeping, periodic reporting, product sampling and distribution, advertising and promotion and reporting of adverse experiences with the product. After approval, most changes to the approved product, such as adding new indications or other labeling claims, are subject to prior FDA review and approval. There also are continuing, annual user fee requirements for any marketed products and the establishments at which such products are manufactured, as well as new application fees for supplemental applications with clinical data.

In addition, drug manufacturers and other entities involved in the manufacture and distribution of approved drugs are required to register their establishments with the FDA and state agencies, and are subject to periodic unannounced inspections by the FDA and these state agencies for compliance with cGMP requirements. Changes to the manufacturing process are strictly regulated and often require prior FDA approval before being implemented. FDA regulations also require investigation and correction of any deviations from cGMP and impose reporting and documentation requirements upon the sponsor and any third-party manufacturers that the sponsor may decide to use. Accordingly, manufacturers must continue to expend time, money, and effort in the area of production and quality control to maintain cGMP compliance.

Once an approval is granted, the FDA may withdraw the approval if compliance with regulatory requirements and standards is not maintained or if problems occur after the product reaches the market. Later discovery of previously unknown problems with a product, including adverse events of unanticipated severity or frequency, or with manufacturing processes, or failure to comply with regulatory requirements, may result in revisions to the approved labeling to add new safety information; imposition of post-market studies or clinical trials to assess new safety risks; or imposition of distribution or other restrictions under a REMS program. Other potential consequences include, among other things:

- restrictions on the marketing or manufacturing of the product, suspension of the approval, or complete withdrawal of the product from the market or product recalls;
- fines, warning letters or holds on post-approval clinical trials;
- refusal of the FDA to approve pending NDAs or supplements to approved NDAs, or suspension or revocation of product license approvals;
- product seizure or detention, or refusal to permit the import or export of products; or
- injunctions or the imposition of civil or criminal penalties.

The FDA strictly regulates marketing, labeling, advertising and promotion of products that are placed on the market. Drugs may be promoted only for the approved indications and in accordance with the provisions of the approved label. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses, and a company that is found to have improperly promoted off-label uses may be subject to significant liability.

In addition, the distribution of prescription pharmaceutical products is subject to the Prescription Drug Marketing Act, or PDMA, and its implementing regulations, as well as the Drug Supply Chain Security Act, or DSCA, which regulate the distribution and tracing of prescription drugs and prescription drug samples at the

federal level, and set minimum standards for the regulation of drug distributors by the states. The PDMA, its implementing regulations and state laws limit the distribution of prescription pharmaceutical product samples, and the DSCA imposes requirements to ensure accountability in distribution and to identify and remove counterfeit and other illegitimate products from the market.

Abbreviated New Drug Applications for Generic Drugs

In 1984, with passage of the Hatch-Waxman Amendments to the FDCA, Congress established an abbreviated regulatory scheme authorizing the FDA to approve generic drugs that are shown to contain the same active ingredients as, and to be bioequivalent to, drugs previously approved by the FDA pursuant to NDAs. To obtain approval of a generic drug, an applicant must submit an abbreviated new drug application, or ANDA, to the agency. An ANDA is a comprehensive submission that contains, among other things, data and information pertaining to the active pharmaceutical ingredient, bioequivalence, drug product formulation, specifications and stability of the generic drug, as well as analytical methods, manufacturing process validation data and quality control procedures. ANDAs are “abbreviated” because they generally do not include preclinical and clinical data to demonstrate safety and effectiveness. Instead, in support of such applications, a generic manufacturer may rely on the preclinical and clinical testing previously conducted for a drug product previously approved under an NDA, known as the reference-listed drug, or RLD.

Specifically, in order for an ANDA to be approved, the FDA must find that the generic version is identical to the RLD with respect to the active ingredients, the route of administration, the dosage form, the strength of the drug and the conditions of use of the drug. At the same time, the FDA must also determine that the generic drug is “bioequivalent” to the innovator drug. Under the statute, a generic drug is bioequivalent to a RLD if “the rate and extent of absorption of the drug do not show a significant difference from the rate and extent of absorption of the listed drug.” Upon approval of an ANDA, the FDA indicates whether the generic product is “therapeutically equivalent” to the RLD in its publication “Approved Drug Products with Therapeutic Equivalence Evaluations,” also referred to as the “Orange Book.” Physicians and pharmacists consider a therapeutic equivalent generic drug to be fully substitutable for the RLD. In addition, by operation of certain state laws and numerous health insurance programs, the FDA’s designation of therapeutic equivalence often results in substitution of the generic drug without the knowledge or consent of either the prescribing physician or patient.

Under the Hatch-Waxman Amendments, the FDA may not approve an ANDA until any applicable period of non-patent exclusivity for the RLD has expired. The FDCA provides a period of five years of non-patent data exclusivity for a new drug containing a new chemical entity. For the purposes of this provision, a new chemical entity, or NCE, is a drug that contains no active moiety that has previously been approved by the FDA in any other NDA. An active moiety is the molecule or ion responsible for the physiological or pharmacological action of the drug substance. In cases where such NCE exclusivity has been granted, an ANDA may not be filed with the FDA until the expiration of five years unless the submission is accompanied by a Paragraph IV certification, in which case the applicant may submit its application four years following the original product approval. The FDCA also provides for a period of three years of exclusivity if the NDA includes reports of one or more new clinical investigations, other than bioavailability or bioequivalence studies, that were conducted by or for the applicant and are essential to the approval of the application.

Orphan Drug Designation and Exclusivity

Under the Orphan Drug Act, the FDA may designate a drug product as an “orphan drug” if it is intended to treat a rare disease or condition, generally meaning that it affects fewer than 200,000 individuals in the United States, or more in cases in which there is no reasonable expectation that the cost of developing and making a drug product available in the United States for treatment of the disease or condition will be recovered from sales of the product. A company must request orphan drug designation before submitting an NDA for the drug and rare disease or condition. If the request is granted, the FDA will disclose the identity of the therapeutic agent and its potential use. Orphan drug designation does not shorten the PDUFA goal dates for the regulatory

review and approval process, although it does convey certain advantages such as tax benefits and exemption from the PDUFA application fee.

If a product with orphan designation receives the first FDA approval for the disease or condition for which it has such designation or for a select indication or use within the rare disease or condition for which it was designated, the product generally will receive orphan drug exclusivity. Orphan drug exclusivity means that the FDA may not approve another sponsor's marketing application for the same drug for the same indication for seven years, except in certain limited circumstances. Orphan exclusivity does not block the approval of a different drug for the same rare disease or condition, nor does it block the approval of the same drug for different indications. If a drug designated as an orphan drug ultimately receives marketing approval for an indication broader than what was designated in its orphan drug application, it may not be entitled to exclusivity. Orphan exclusivity will not bar approval of another product under certain circumstances, including if a subsequent product with the same drug for the same indication is shown to be clinically superior to the approved product on the basis of greater efficacy or safety, or providing a major contribution to patient care, or if the company with orphan drug exclusivity is not able to meet market demand.

Pediatric Studies and Exclusivity

In the US, there are two regulations that govern the requirements and incentives to conduct pediatric drug trials: the Pediatric Research Equity Act, or PREA, and Best Pharmaceuticals for Children Act, or BPCA.

Under the PREA, an NDA or supplement thereto must contain data that are adequate to assess the safety and effectiveness of the drug product 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. With enactment of the Food and Drug Safety and Innovation Act, or the FDASIA, in 2012, sponsors must also submit pediatric study plans within sixty days of the end-of-phase II meeting, unless the product has received orphan drug designation, which exempts that drug for that indication from the PREA requirements. Those plans must contain an outline of the proposed pediatric study or studies the applicant plans to conduct, including study objectives and design, any deferral or waiver requests, and any other information required by regulation. The applicant, the FDA, and the FDA's internal review committee must then review the information submitted, consult with each other, and agree upon a final plan. The FDA or the applicant may request an amendment to the plan at any time.

The FDA may, on its own initiative or at the request of the applicant, grant deferrals for submission of some or all pediatric data until after approval of the product for use in adults, or full or partial waivers from the pediatric data requirements. Additional requirements and procedures relating to deferral requests and requests for extension of deferrals are contained in FDASIA. Unless and until FDA promulgates a regulation stating otherwise, the pediatric data requirements do not apply to products with orphan designation.

Pediatric exclusivity under BPCA is another type of non-patent marketing exclusivity in the United States and, if granted, provides for the attachment of an additional six months of marketing protection to the term of any existing regulatory exclusivity, including the non-patent and orphan exclusivity. In order to obtain pediatric exclusivity, a sponsor and the FDA have to agree on a Written Request which details the studies that need to be conducted in order for the product to obtain pediatric exclusivity. The data from these studies does not need to show the product is effective in the pediatric population studied. If reports of the studies outlined in the Written Request are submitted to and accepted by the FDA within the statutory time limits, whatever statutory or regulatory periods of exclusivity or patent protection cover the product are extended by six months. This is not a patent term extension, but it effectively extends the regulatory period during which the FDA cannot approve another application. With regard to patents, the six-month pediatric exclusivity period will not attach to any patents for which an ANDA or 505(b)(2) applicant submitted a paragraph IV patent certification, unless the NDA sponsor or patent owner first obtains a court determination that the patent is valid and infringed by the proposed product.

The 21st Century Cures Act

On December 13, 2016, President Obama signed the 21st Century Cures Act, or Cures Act, into law. The Cures Act is designed to modernize and personalize healthcare, spur innovation and research, and streamline the discovery and development of new therapies through increased federal funding of particular programs. It authorizes increased funding for the FDA to spend on innovation projects. The new law also amends the Public Health Service Act to reauthorize and expand funding for the National Institutes of Health. The Act establishes the NIH Innovation Fund to pay for the cost of development and implementation of a strategic plan, early stage investigators and research. It also charges NIH with leading and coordinating expanded pediatric research. Further, the Cures Act directs the Centers for Disease Control and Prevention to expand surveillance of neurological diseases.

With amendments to the FDCA and the Public Health Service Act, or PHSA, Title III of the Cures Act seeks to accelerate the discovery, development, and delivery of new medicines and medical technologies. To that end, and among other provisions, the Cures Act reauthorizes the existing priority review voucher program for certain drugs intended to treat rare pediatric diseases until 2020; creates a new priority review voucher program for drug applications determined to be material national security threat medical countermeasure applications; revises the FDCA to streamline review of combination product applications; requires FDA to evaluate the potential use of “real world evidence” to help support approval of new indications for approved drugs; provides a new “limited population” approval pathway for antibiotic and antifungal drugs intended to treat serious or life-threatening infections; and authorizes FDA to designate a drug as a “regenerative advanced therapy,” thereby making it eligible for certain expedited review and approval designations.

Review and Approval of Drug Products Outside the United States

In order to market any product outside of the United States, a company must also comply with numerous and varying regulatory requirements of other countries and jurisdictions regarding quality, safety and efficacy and governing, among other things, clinical trials, marketing authorization, commercial sales and distribution of drug products. Whether or not it obtains FDA approval for a product, the company would need to obtain the necessary approvals by the comparable foreign regulatory authorities before it can commence clinical trials or marketing of the product in those countries or jurisdictions. The approval process ultimately varies between countries and jurisdictions and can involve additional product testing and additional administrative review periods. The time required to obtain approval in other countries and jurisdictions might differ from and be longer than that required to obtain FDA approval. Regulatory approval in one country or jurisdiction does not ensure regulatory approval in another, but a failure or delay in obtaining regulatory approval in one country or jurisdiction may negatively impact the regulatory process in others.

Clinical Trial Approval in the EU

Pursuant to the currently applicable Clinical Trials Directive 2001/20/EC and the Directive 2005/28/EC on Good Clinical Practice, or GCP, an applicant must obtain approval from the competent national authority of the EU Member State in which the clinical trial is to be conducted. If the clinical trial is conducted in different EU Member States, the competent authorities in each of these EU Member States must provide their approval for the conduct of the clinical trial. Furthermore, the applicant may only start a clinical trial at a specific study site after the competent ethics committee has issued a favorable opinion.

In April 2014, the EU adopted a new Clinical Trials Regulation (EU) No 536/2014, which is set to replace the current Clinical Trials Directive 2001/20/EC. The new Clinical Trials Regulation will be directly applicable to and binding in all 28 EU Member States without the need for any national implementing legislation. The new Clinical Trials Regulation (EU) No 536/2014 will become applicable in 2018. It will overhaul the current system of approvals for clinical trials in the EU. Specifically, the new legislation aims at simplifying and streamlining the approval of clinical trials in the EU. Under the new coordinated procedure for the approval of clinical trials, the sponsor of a clinical trial will be required to submit a single application for approval of a clinical trial to a

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reporting EU Member State (RMS) through an EU Portal. The submission procedure will be the same irrespective of whether the clinical trial is to be conducted in a single EU Member State or in more than one EU Member State. The Clinical Trials Regulation also aims to streamline and simplify the rules on safety reporting for clinical trials.

Marketing Authorization

In the EU, marketing authorizations for medicinal products may be obtained through several different procedures founded on the same basic regulatory process.

The centralized procedure provides for the grant of a single marketing authorization that is valid for all EU Member States. The centralized procedure is compulsory for medicinal products produced by certain biotechnological processes, products designated as orphan medicinal products, and products with a new active substance indicated for the treatment of certain diseases. It is optional for those products that are highly innovative or for which a centralized process is in the interest of patients. Under the centralized procedure in the EU, the maximum timeframe for the evaluation of a marketing authorization application, or MAA, is 210 days, excluding clock stops, when additional written or oral information is to be provided by the applicant in response to questions asked by the Committee for Medicinal Products for Human use or CHMP. Accelerated evaluation may be granted by the CHMP in exceptional cases. These are defined as circumstances in which a medicinal product is expected to be of a “major public health interest.” Three cumulative criteria must be fulfilled in such circumstances: the seriousness of the disease, such as severely disabling or life-threatening diseases, to be treated; the absence or insufficiency of an appropriate alternative therapeutic approach; and anticipation of high therapeutic benefit. In these circumstances, the EMA ensures that the opinion of the CHMP is given within 150 days.

The decentralized procedure provides for approval by one or more other concerned EU Member States of an assessment of an application for marketing authorization conducted by one EU Member State, known as the reference EU Member State. In accordance with this procedure, an applicant submits an application for marketing authorization to the reference EU Member State and the concerned EU Member States. This application is identical to the application that would be submitted to the EMA for authorization through the centralized procedure. The reference EU Member State prepares a draft assessment and drafts of the related materials within 120 days after receipt of a valid application. The resulting assessment report is submitted to the concerned EU Member States which, within 90 days of receipt, must decide whether to approve the assessment report and related materials. If a concerned EU Member State cannot approve the assessment report and related materials due to concerns relating to a potential serious risk to public health, disputed elements may be referred to the European Commission, whose decision is binding on all EU Member States. In accordance with the mutual recognition procedure, the sponsor applies for national marketing authorization in one EU Member State. Upon receipt of this authorization the sponsor can then seek the recognition of this authorization by other EU Member States. Authorization in accordance with either of these procedures will result in authorization of the medicinal product only in the reference EU Member State and in the other concerned EU Member States.

A marketing authorization may be granted only to an applicant established in the EU. Regulation No. 1901/2006 provides that, prior to validating a marketing authorization in the EU, an applicant must demonstrate compliance with all measures included in a Pediatric Investigation Plan, or PIP, approved by the Pediatric Committee of the EMA, covering all subsets of the pediatric population, unless the EMA has granted a product-specific waiver, class waiver, or a deferral for one or more of the measures included in the PIP.

Orphan Drug Designation and Exclusivity in the EU

Regulation (EC) No 141/2000 and Regulation (EC) No. 847/2000 provide that a product can be designated as an orphan medicinal product by the European Commission if its sponsor can establish that the product is intended for the diagnosis, prevention or treatment of: (1) a life-threatening or chronically debilitating condition affecting not more than five in ten thousand persons in the EU when the application is made, or (2) a life-

threatening, seriously debilitating or serious and chronic condition in the EU and that without incentives the medicinal product is unlikely to be developed. For either of these conditions, the applicant must demonstrate that there exists no satisfactory method of diagnosis, prevention or treatment of the condition in question that has been authorized in the EU or, if such method exists, the medicinal product will be of significant benefit to those affected by that condition. The criteria required to obtain orphan status will be reevaluated at the time of MAA review and must still be met in order to retain orphan status.

Once authorized, orphan medicinal products are entitled to ten years of market exclusivity in all EU Member States and, in addition, a range of other benefits during the development and regulatory review process, including scientific assistance for study protocols, authorization through the centralized marketing authorization procedure covering all member countries and a reduction or elimination of registration and marketing authorization fees. However, marketing authorization may be granted to a similar medicinal product with the same orphan indication during the ten year period with the consent of the marketing authorization holder for the original orphan medicinal product or if the manufacturer of the original orphan medicinal product is unable to supply sufficient quantities. Marketing authorization may also be granted to a similar medicinal product with the same orphan indication if the product is safer, more effective or otherwise clinically superior to the original orphan medicinal product. The period of market exclusivity may, in addition, be reduced to six years if it can be demonstrated on the basis of available evidence that the original orphan medicinal product is sufficiently profitable not to justify maintenance of market exclusivity.

Pharmaceutical Coverage, Pricing and Reimbursement

In the United States and markets in other countries, patients who are prescribed treatments for their conditions and providers performing the prescribed services generally rely on third-party payors to reimburse all or part of the associated healthcare costs. Significant uncertainty exists as to the coverage and reimbursement status of products approved by the FDA and other government authorities. Thus, even if a product candidate is approved, sales of the product will depend, in part, on the extent to which third-party payors, including government health programs in the United States such as Medicare and Medicaid, commercial health insurers and managed care organizations, provide coverage, and establish adequate reimbursement levels for, the product. The process for determining whether a payor will provide coverage for a product may be separate from the process for setting the price or reimbursement rate that the payor will pay for the product once coverage is approved. Third-party payors are increasingly challenging the prices charged, examining the medical necessity, and reviewing the cost-effectiveness of medical products and services and imposing controls to manage costs. Third-party payors may limit coverage to specific products on an approved list, also known as a formulary, which might not include all of the approved products for a particular indication.

In order to secure coverage and reimbursement for any product that might be approved for sale, a company may need to conduct expensive pharmacoeconomic studies in order to demonstrate the medical necessity and cost-effectiveness of the product, in addition to the costs required to obtain FDA or other comparable marketing approvals. Nonetheless, product candidates may not be considered medically necessary or cost effective. A decision by a third-party payor not to cover a product candidate could reduce physician utilization once the product is approved and have a material adverse effect on sales, results of operations and financial condition. Additionally, a payor's decision to provide coverage for a product does not imply that an adequate reimbursement rate will be approved. Further, one payor's determination to provide coverage for a drug product does not assure that other payors will also provide coverage and reimbursement for the product, and the level of coverage and reimbursement can differ significantly from payor to payor.

The containment of healthcare costs also has become a priority of federal, state and foreign governments and the prices of drugs have been a focus in this effort. Governments have shown significant interest in implementing cost-containment programs, including price controls, restrictions on 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 a

company's revenue generated from the sale of any approved products. Coverage policies and third-party reimbursement rates may change at any time. Even if favorable coverage and reimbursement status is attained for one or more products for which a company or its collaborators receive marketing approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

Outside the United States, ensuring adequate coverage and payment for a product also involves challenges. Pricing of prescription pharmaceuticals is subject to governmental control in many countries. Pricing negotiations with governmental authorities can extend well beyond the receipt of regulatory marketing approval for a product and may require a clinical trial that compares the cost effectiveness of a product to other available therapies. The conduct of such a clinical trial could be expensive and result in delays in commercialization.

In the European Union, pricing and reimbursement schemes vary widely from country to country. Some countries provide that products may be marketed only after a reimbursement price has been agreed. Some countries may require the completion of additional studies that compare the cost-effectiveness of a particular drug candidate to currently available therapies or so called health technology assessments, in order to obtain reimbursement or pricing approval. For example, the European Union provides options for its member states to restrict the range of products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. European Union member states may approve a specific price for a product or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the product on the market. Other member states allow companies to fix their own prices for products, but monitor and control prescription volumes and issue guidance to physicians to limit prescriptions. Recently, many countries in the European Union have increased the amount of discounts required on pharmaceuticals and these efforts could continue as countries attempt to manage healthcare expenditures, especially in light of the severe fiscal and debt crises experienced by many countries in the European Union. The downward pressure on health care costs in general, particularly prescription drugs, has become intense. As a result, increasingly high barriers are being erected to the entry of new products. Political, economic and regulatory developments may further complicate pricing negotiations, and pricing negotiations may continue after reimbursement has been obtained. Reference pricing used by various European Union member states, and parallel trade, i.e., arbitrage between low-priced and high-priced member states, can further reduce prices. There can be no assurance that any country that has price controls or reimbursement limitations for pharmaceutical products will allow favorable reimbursement and pricing arrangements for any products, if approved in those countries.

Healthcare Law and Regulation

Healthcare providers and third-party payors play a primary role in the recommendation and prescription of drug products that are granted marketing approval. Arrangements with providers, consultants, third-party payors and customers are subject to broadly applicable fraud and abuse, anti-kickback, false claims laws, reporting of payments to physicians and teaching physicians, patient privacy laws and regulations, and other healthcare laws and regulations that may constrain business and/or financial arrangements. Restrictions under applicable federal and state healthcare laws and regulations include the following:

- the federal Anti-Kickback Statute, which prohibits, among other things, persons and entities from knowingly and willfully soliciting, offering, paying, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward either the referral of an individual for, or the purchase, order or recommendation of, any good or service, for which payment may be made, in whole or in part, under a federal healthcare program such as Medicare and Medicaid;
- the federal civil and criminal false claims laws, including the civil False Claims Act, and civil monetary penalties laws, which prohibit individuals or entities from, among other things, knowingly presenting, or causing to be presented, to the federal government, claims for payment that are false, fictitious or fraudulent or knowingly making, using or causing to be made or used a false record or statement to avoid, decrease or conceal an obligation to pay money to the federal government.

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- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, which created additional federal criminal laws that prohibit, among other things, knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program or making false statements relating to healthcare matters;
- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act, and their respective implementing regulations, including the Final Omnibus Rule published in January 2013, which impose obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information;
- the federal false statements statute, which prohibits 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;
- the federal transparency requirements known as the federal Physician Payments Sunshine Act, under the Patient Protection and Affordable Care Act, as amended by the Health Care Education Reconciliation Act, or the Affordable Care Act, which requires certain manufacturers of drugs, devices, biologics and medical supplies to report annually to the Centers for Medicare & Medicaid Services, or CMS, within the United States Department of Health and Human Services, information related to payments and other transfers of value made by that entity to physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members; and
- analogous state and foreign laws and regulations, such as state anti-kickback and false claims laws and transparency statutes, which may apply to healthcare items or services that are reimbursed by third-party payors, including private insurers.

Some state laws require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government in addition to requiring drug manufacturers to report information related to payments and transfers of value to other health care providers and health care entities, or marketing expenditures. State and foreign laws also govern the privacy and security of health information in some circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

Healthcare Reform

A primary trend in the United States healthcare industry and elsewhere is cost containment. There have been a number of federal and state proposals during the last few years regarding the pricing of pharmaceutical and biopharmaceutical products, limiting coverage and reimbursement for drugs and other medical products, government control and other changes to the healthcare system in the United States.

By way of example, the United States and state governments continue to propose and pass legislation designed to reduce the cost of healthcare. In March 2010, the United States Congress enacted the Affordable Care Act, or ACA, which, among other things, includes changes to the coverage and payment for products under government health care programs. In January 2017, Congress voted to adopt a budget resolution for fiscal year 2017, or the Budget Resolution, that authorizes the implementation of legislation that would repeal portions of the ACA. The Budget Resolution is not a law, however, it is widely viewed as the first step toward the passage of legislation that would repeal certain aspects of the ACA. Further, on January 20, 2017, President Trump signed an Executive Order directing federal agencies with authorities and responsibilities under the ACA to waive, defer, grant exemptions from, or delay the implementation of any provision of the ACA that would impose a fiscal or regulatory burden on states, individuals, healthcare providers, health insurers, or manufacturers of pharmaceuticals or medical devices. Congress also could consider subsequent legislation to replace elements of the ACA that are repealed.

Other legislative changes have been proposed and adopted in the United States since the ACA was enacted. For example, in August 2011, the Budget Control Act of 2011, among other things, created measures for

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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 2012 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 up to 2% per fiscal year, which went into effect in April 2013 and will remain in effect through 2024 unless additional Congressional action is taken. In January 2013, President Obama signed into law the American Taxpayer Relief Act of 2012, which, among other things, further reduced Medicare payments to several 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.

With the new Administration and Congress, there will likely be additional legislative changes, including repeal and replacement of certain provisions of the ACA. It remains to be seen, however, precisely what the new legislation will provide, when it will be enacted and what impact it will have on the availability of healthcare and containing or lowering the cost of healthcare. Such reforms could have an adverse effect on anticipated revenue from product candidates that we may successfully develop and for which we may obtain marketing approval and may affect our overall financial condition and ability to develop product candidates.

Segment Reporting

We are engaged solely in the discovery and development of innovative small molecule drug therapies for infectious diseases and immune system disorders. Accordingly, we have determined that we operate in one operating segment.

Employees

As of February 20, 2017, we had 81 full-time employees, 33 of whom hold doctoral degrees. Approximately 60 of our employees are engaged in research and development, with the remainder engaged in administration, finance and business development functions. None of our employees is represented by a labor union or covered by collective bargaining agreements. We believe our relations with our employees are good.

Information Available on the Internet

Our Internet address is www.achillion.com. We are not including the information contained in our website as part of, or incorporating it by reference into, this Annual Report on Form 10-K. We make available free of charge through our website our Annual Reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to these reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, as soon as reasonably practicable after we electronically file such materials with the Securities and Exchange Commission, or the SEC. We also make available on our website our corporate governance guidelines, the charters for our audit committee, nominating and corporate governance committee, compensation committee, and strategy committee, and our code of business conduct and ethics, which applies to our directors, officers and employees, and such information is available in print and free of charge to any of our stockholders who requests it. In addition, we intend to disclose on our website any amendments to, or waivers from, our code of business conduct and ethics that are required to be publicly disclosed pursuant to rules of the SEC.

Executive Officers of the Registrant

<u>Name</u>	<u>Age</u>	<u>Position</u>
Milind S. Deshpande, Ph.D.	60	President and Chief Executive Officer, Director
Mary Kay Fenton	52	Executive Vice President and Chief Financial Officer
David Apelian, M.D., Ph.D.	51	Executive Vice President and Chief Medical Officer
Joel Barrish, Ph.D.	59	Executive Vice President and Chief Scientific Officer
Martha Manning, Esq.	62	Executive Vice President, General Counsel and Corporate Secretary
Joseph Truitt	52	Executive Vice President and Chief Commercial Officer

Milind S. Deshpande, Ph.D., President and Chief Executive Officer. Dr. Deshpande was appointed our President and Chief Executive Officer in May 2013, at which time he was also elected to our board of directors. Prior to that, he was our President of Research and Development and Chief Scientific Officer. Prior to joining Achillion in September 2001, Dr. Deshpande was Associate Director of Lead Discovery and Early Discovery Chemistry at the Pharmaceutical Research Institute at Bristol-Myers Squibb, a pharmaceutical company, from 1991 to 2001, where he managed the identification of new clinical candidates to treat infectious and neurological diseases. From 1988 to 1991, he held a faculty position at Boston University Medical School. Dr. Deshpande is on the board of directors of Spero Therapeutics, a biotechnology company. Dr. Deshpande received his Ph.D. in Organic Chemistry from Ohio University, following his undergraduate education in India.

Mary Kay Fenton, Executive Vice President and Chief Financial Officer. Prior to joining Achillion in October 2000, Ms. Fenton, a certified public accountant, held various positions within the Technology Industry Group at PricewaterhouseCoopers LLP, an independent registered public accounting firm, from 1991 to 2000, most recently as Senior Manager responsible for the life sciences practice in Connecticut. Prior to 1991, Ms. Fenton was an economic development associate in the nonprofit sector. Ms. Fenton is on the Executive Committee of the board of directors of Connecticut Business and Industry Association, a representative business organization. Ms. Fenton holds an M.B.A. in Finance from the Graduate School of Business at the University of Connecticut and an A.B. in Economics from the College of the Holy Cross.

David Apelian, M.D., Ph.D., Executive Vice President and Chief Medical Officer. Prior to joining Achillion in May 2013, Dr. Apelian was Senior Vice President and Chief Medical Officer at GlobeImmune, a biopharmaceutical company, from 2005 to 2013, where he was responsible for clinical development, regulatory affairs, clinical immunology, development of companion diagnostics, as well as target discovery and preclinical research. Prior to GlobeImmune, Dr. Apelian was Clinical Director in the Infectious Diseases Group at Bristol-Myers Squibb, or BMS, a pharmaceutical company, serving as medical co-lead for the clinical development and NDA submission of entecavir for chronic hepatitis B viral infection. Prior to BMS, Dr. Apelian served as Clinical Director in the Department of Hepatology/Gastroenterology at Schering Plough, a pharmaceutical company, coordinating a supplemental NDA filing for interferon alpha-2b and ribavirin for the treatment of pediatric patients with chronic hepatitis C viral infection. Dr. Apelian completed his residency training in Pediatrics at New York Hospital, Cornell Medical Center. He received his M.D. from the University of Medicine and Dentistry of New Jersey, and his Ph.D. in Biochemistry and B.A. from Rutgers University. He also holds an M.B.A. from Quinnipiac University.

Joel Barrish, Ph.D., Executive Vice President and Chief Scientific Officer. Prior to joining Achillion in January 2016, Dr. Barrish was Vice President and Head of Discovery Chemistry at Bristol-Myers Squibb, a pharmaceutical company, from December 2010 to December 2015, leading chemical research on small molecules and other modalities across all therapeutic areas and sites. Prior to that role, from January 1990 to December 2010, he was responsible for teams at BMS that advanced more than 20 compounds into clinical development including SPRYCEL[®] (dasatinib), a marketed kinase inhibitor used for the treatment of chronic myelogenous leukemia, which he co-invented. He and his co-inventors received the 2008 Thomas Alva Edison Patent Award for its discovery. Dr. Barrish has co-authored over 120 peer-reviewed publications, is a co-inventor on more than 35 issued U.S. patents, and has been invited to give more than 40 lectures at international

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conferences and universities. In 2010, Dr. Barrish was elected to the Executive Committee of the American Chemical Society Medicinal Chemistry Division and served as its Chair in 2013. He was named an American Chemical Society Fellow in 2012. Dr. Barrish is also a Scientific Advisory Board member for the chemistry departments at the University of Pennsylvania. Dr. Barrish graduated summa cum laude in Chemistry from the University of Pennsylvania and received a doctorate in Organic Chemistry from Columbia University.

Martha Manning, Esq., Executive Vice President, General Counsel and Corporate Secretary. Prior to joining Achillion in February 2016, Ms. Manning was General Counsel of iCeutica Inc., a drug development company from 2013 to 2016. She served as Chief Legal Officer of OraPharma, Inc., a pharmaceutical company, from 2011 to 2012 when the company was acquired by Valeant Pharmaceuticals, Inc. She joined OraPharma from Sandoz Inc., the generic pharmaceutical division of Novartis AG, where she served as Vice President and General Counsel from 2008 to 2011. Prior to Sandoz, she served as Senior Vice President, General Counsel and Secretary for Adolor Corporation, a publicly traded biopharmaceutical company from 2002 to 2008. Ms. Manning began her legal career with the law firm of Morgan, Lewis & Bockius. She received her J.D. from the University of Pennsylvania School of Law and her Bachelor of Business Administration from the University of Massachusetts.

Joseph Truitt, Executive Vice President and Chief Commercial Officer. Prior to joining Achillion in January 2009, Mr. Truitt was Vice President of Business Development and Product Strategy for Lev Pharmaceuticals, Inc., a biotechnology company, from October 2007 to December 2008. From July 2006 through September 2007, he served as Lev's Vice President of Sales and Marketing and led the build out of the commercial team and infrastructure in preparation for product launch. From February 2002 to July 2006, Mr. Truitt was Vice President of Sales and Operations at Johnson & Johnson, a pharmaceutical company, where he directed commercial operations at the company's OraPharma subsidiary. From 2000 to 2002, Mr. Truitt was Vice President of Sales and Operations of OraPharma, Inc., a pharmaceutical company, prior to its acquisition by Johnson & Johnson. Mr. Truitt holds an M.B.A. from St. Joseph's University, Philadelphia and a B.S. in Marketing from LaSalle University, Philadelphia.

ITEM 1A. RISK FACTORS

The following risk factors and other information included in this Annual Report on Form 10-K should be carefully considered. The risks and uncertainties described below are not the only ones we face. Additional risks and uncertainties not presently known to us or that we presently deem less significant may also impair our business operations. Please see page 1 of this Annual Report on Form 10-K for a discussion of some of the forward-looking statements that are qualified by these risk factors. If any of the following risks occur, our business, financial condition, results of operations and future growth prospects could be materially and adversely affected.

Risks Related to the Discovery and Development of Our Drug Candidates

Our approach to the discovery and development of drug candidates that target complement alternative pathway factor D inhibition is unproven, and we do not know whether we will be able to develop any products of commercial value.

We are focused on the research and development of our complement inhibitor platform, pursuant to which we are initially targeting complement factor D, an essential protein of the complement alternative pathway that is a part of the human innate immune system. Our complement inhibitor platform is focused on advancing small molecule compounds that inhibit the alternative pathway, and have the potential to be used in the treatment of immune-related diseases where the complement pathway plays a critical role. We anticipate that our complement inhibitor platform may play a role in addressing needs of patients with paroxysmal nocturnal hemoglobinuria, or PNH, including patients who have suboptimal response to, or who fail to respond to, currently approved treatments for PNH, and C3 glomerulopathy, or C3G, as well as the needs of patients with other complement-mediated diseases where the alternative pathway plays a significant role, such as dry age-related macular degeneration, or dry AMD.

Our approach to the discovery and development of drug candidates that target the alternative pathway is unproven. While complement factor D is a clinically validated target in certain ophthalmic diseases, it is unproven in demonstrating efficacy in systemic diseases. We are currently only in the early clinical testing stages for our most advanced drug candidate under this program with other drug candidates in the discovery and preclinical phases. We may not successfully develop any medicines that target alternative pathway inhibition, and even if we are successful in early development, any medicines that we develop may not effectively inhibit the alternative pathway, or provide a clinical benefit. Even if we are able to develop a product candidate that effectively inhibits complement factor D in preclinical studies, we may not succeed in demonstrating safety and efficacy of the product candidate in human clinical trials. Our focus on using our proprietary technology to identify drug candidates targeting the alternative pathway may not result in the discovery and development of commercially viable medicines to treat human disease.

If we are unable to develop, obtain marketing approval for or successfully commercialize drug candidates, either alone or through a collaboration, or if we experience significant delays in doing so, our business could be materially harmed.

We currently have no products approved for sale and are investing substantially all of our efforts and financial resources on the development of our complement inhibitor platform. Moreover, under the Janssen Agreement, we granted Janssen exclusive worldwide rights to develop and commercialize our portfolio of HCV product candidates. Our prospects are substantially dependent on our ability, or that of any collaborator, including Janssen, to develop, obtain marketing approval for, and successfully commercialize at least one drug candidate in one or more disease indications based upon our programs.

The success of our complement inhibitor platform as well as our HCV program in collaboration with Janssen, will depend on several factors, including the following:

- initiation, successful enrollment and completion of clinical trials;

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- safety, tolerability and efficacy profiles that are satisfactory to the U.S. Food and Drug Administration, or FDA, or any comparable foreign regulatory authority for marketing approval;
- timely receipt of marketing approvals from applicable regulatory authorities;
- the performance of our collaborators;
- the extent of any required post-marketing approval commitments to applicable regulatory authorities;
- establishment of supply arrangements with third party raw materials suppliers and manufacturers;
- establishment of arrangements with third party manufacturers to obtain finished drug products that are appropriately packaged for sale;
- obtaining and maintaining patent, trade secret protection and regulatory exclusivity, both in the United States and internationally;
- protection of our rights in our intellectual property portfolio;
- successful commercial launch following any marketing approval;
- a continued acceptable safety profile following any marketing approval; and
- commercial acceptance of our products or those of our collaborators, if and when approved, by patients, the medical community and third party payors;

The success of our complement inhibitor platform also depends on our ability to compete with other marketed therapies for complement-mediated disease such as those from Alexion Pharmaceuticals, Inc., and other potential therapies in development by Akari Therapeutics PLC, Alnylam Pharmaceuticals, Inc., Amyndas Pharmaceuticals S.A., Apellis Pharmaceuticals, Inc., BioCryst Pharmaceuticals, Inc., ChemoCentryx, Inc., Genentech, Inc., Omeros Corporation, Ra Pharmaceuticals Inc. and True North Therapeutics, Inc. Additionally, Novartis AG also has intellectual property rights in the complement area.

Under the terms of our collaboration, Janssen has significant discretion in determining the efforts and resources that they will apply to development and any future commercialization of the drug candidates in our HCV program. For example, development plans and strategies are conducted in accordance with a plan and budget approved by a joint committee as to which Janssen generally has final decision-making authority, and, subject to specified diligence requirements, Janssen has full discretion over commercialization plans and strategies. Currently, Janssen is only pursuing clinical development of one of the three HCV compounds we licensed to Janssen under the collaboration.

Many of the factors on which our success is dependent are beyond our control, including clinical development, the regulatory submission process, potential threats to our intellectual property rights and the manufacturing, marketing and sales efforts of our current and any future collaborators. If we or our collaborators are unable to develop, receive marketing approval for and successfully commercialize products based on our technologies, or experience delays as a result of any of these factors or otherwise, our business could be substantially harmed.

Results of preclinical studies and early clinical trials may not be predictive of results of future clinical trials.

The outcome of preclinical studies and early clinical trials may not be predictive of the success of later clinical trials, and interim results of clinical trials do not necessarily predict success in future clinical trials. Many companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in late-stage clinical trials after achieving positive results in earlier development, and we cannot be certain that we will not face similar setbacks. The design of a clinical trial can determine whether its results will support approval of a product and flaws in the design of a clinical trial may not become apparent until the clinical trial is well advanced. We have limited

experience in designing clinical trials and may be unable to design and execute a clinical trial to support marketing approval. In addition, preclinical and clinical data are often susceptible to varying interpretations and analyses. Many companies that believed their drug candidates performed satisfactorily in preclinical studies and clinical trials have nonetheless failed to obtain marketing approval for the drug candidates. Even if we, or any current or future collaborators, believe that the results of clinical trials for our drug candidates warrant marketing approval, the FDA or comparable foreign regulatory authorities may disagree and may not grant marketing approval of our drug candidates.

In some instances, there can be significant variability in safety or efficacy results between different clinical trials of the same drug candidate due to numerous factors, including changes in trial procedures set forth in protocols, differences in the size and type of the patient populations, variability of the disease being studied, changes in and adherence to the dosing regimen and other clinical trial protocols and the rate of dropout among clinical trial participants. If we fail to receive positive results in clinical trials of our drug candidates, the development timeline and regulatory approval and commercialization prospects for our most advanced drug candidates, and, correspondingly, our business and financial prospects would be negatively impacted.

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

Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. Our spending on current and future research and development programs and drug candidates for specific indications may not yield any commercially viable drug candidates. If we do not accurately evaluate the commercial potential or target market for a particular drug candidate, we may relinquish valuable rights to that drug 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 the drug candidate.

Clinical drug development involves a lengthy and expensive process with an uncertain outcome.

Clinical testing is expensive, time-consuming and uncertain as to outcome. We cannot guarantee that any clinical trials will be conducted as planned or completed on schedule, if at all. The clinical development of our drug candidates is susceptible to the risk of failure inherent at any stage of drug development, including failure to demonstrate efficacy in a clinical trial or across a broad population of patients, the occurrence of adverse events that are severe or medically or commercially unacceptable, failure to comply with protocols or applicable regulatory requirements and determination by the FDA or any comparable foreign regulatory authority that a drug candidate may not continue development or is not approvable. It is possible that even if one or more of our drug candidates has a beneficial effect, that effect will not be detected during clinical evaluation as a result of one or more of a variety of factors, including the size, duration, design, measurements, conduct or analysis of any clinical trials. Conversely, as a result of the same factors, any clinical trials may indicate an apparent positive effect of a drug candidate that is greater than the actual positive effect, if any. Similarly, in any clinical trials we may fail to detect toxicity or of intolerability caused by our drug candidates, or mistakenly believe that our drug candidates are toxic or not well tolerated when that is not in fact the case.

Additional factors that may negatively impact our clinical development efforts include:

- delay or failure in obtaining approval by institutional review board or similar reviewing entities to conduct a clinical trial at each site;
- delay or failure in reaching agreement on acceptable terms with prospective contract research organizations, and clinical trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different contract research organizations and trial sites;

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- clinical sites and investigators deviating from trial protocol, failing to conduct the trial in accordance with regulatory requirements, or dropping out of a trial;
- slow patient enrollment, particularly in rare diseases being studied;
- delay or failure in having patients complete a trial or return for post-treatment follow-up;
- disruption of clinical supply or clinical operations at our clinical trial sites;
- adverse medical events or side effects in treated patients, and the threat of legal claims and litigation alleging injuries;
- lack of effectiveness or safety of the product candidate being tested; and
- decisions by regulatory authorities, the institutional review board, ethics committee, or us, or recommendation by a data safety monitoring board, to suspend or terminate clinical trials at any time for safety issues or for any other reason.

Our failure to successfully initiate and complete clinical trials of our drug candidates and to demonstrate the efficacy and safety necessary to obtain regulatory approval to market any of our drug candidates would significantly harm our business.

If clinical trials of our drug candidates fail to satisfactorily demonstrate safety and efficacy to the FDA and other regulators, we, or any current or future collaborators, may incur additional costs or experience delays in completing, or ultimately be unable to complete, the development and commercialization of these drug candidates.

We, and any current or future collaborators, are not permitted to commercialize, market, promote or sell any drug candidate in the United States without obtaining marketing approval from the FDA. Foreign regulatory authorities, such as the European Medicines Agency, or the EMA, impose similar requirements. We, and any current or future collaborators, may never receive such approvals. We, and any current or future collaborators, must complete extensive preclinical development and clinical trials to demonstrate the safety and efficacy of our drug candidates in humans before we, or they, will be able to obtain these approvals.

Clinical testing is expensive, difficult to design and implement, can take many years to complete and is inherently uncertain as to outcome. In addition, our interest in developing potential therapies for rare diseases for which there is no currently available treatment, such as C3G, makes the difficulty in study design and outcome more challenging, as the appropriate endpoints for obtaining approval from regulatory authorities have not been previously defined. Additionally, the clinical course of C3G is highly variable and it may be difficult to identify appropriate patients for clinical studies. PNH and C3G are chronic conditions and regulatory authorities may require clinical trials for longer periods than anticipated by us. Any inability to successfully complete preclinical and clinical development could result in additional costs to us, or any current or future collaborators, and impair our ability to generate revenues from product sales, regulatory and commercialization milestones and royalties. Moreover, if (1) we, or any current or future collaborators, are required to conduct additional clinical trials or other testing of our drug candidates beyond the trials and testing that we, or they contemplate, (2) we, or any current or future collaborators, are unable to successfully complete clinical trials of our drug candidates or other testing, (3) the results of these trials or tests are unfavorable, uncertain or are only modestly favorable, or (4) there are unacceptable safety concerns associated with our drug candidates, we, or any current or future collaborators, in addition to incurring additional costs, may:

- be delayed in obtaining marketing approval for our drug candidates;
- not obtain marketing approval at all;
- obtain approval for indications or patient populations that are not as broad as intended or desired;
- obtain approval with labeling that includes significant use or distribution restrictions or significant safety warnings, including boxed warnings;

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- be subject to additional post-marketing testing or other requirements; or
- be required to remove the product from the market after obtaining marketing approval.

Adverse events or undesirable side effects caused by, or other unexpected properties of, any of our drug candidates may be identified during development that could delay or prevent their marketing approval or limit their use.

Adverse events or undesirable side effects caused by, or other unexpected properties of, our drug candidates could cause us, any current or future collaborators, an institutional review board or regulatory authorities to interrupt, delay or halt clinical trials of one or more of our drug candidates and could result in a more restrictive label or FDA requirement for a risk evaluation and mitigation strategy, or REMS, or the delay or denial of marketing approval by the FDA or comparable foreign regulatory authorities. For example, treatment with complement inhibitors like our factor D inhibitor ACH-4471 may decrease the body's ability to fend off infection by certain types of pathogens. Treatment with the marketed complement C5 inhibitor, Soliris, is associated with increased risk for certain types of infection, including meningococcal infection. For this reason, patients treated with complement inhibitors, including patients treated in our future clinical trials, may be vaccinated for pathogens known to have increased risk of infection with complement deficiency or inhibition and may also be treated with prophylactic antibiotics in an effort to reduce the risk of an adverse event resulting from an infection. However, there is a risk that vaccination and/or prophylactic antibiotics will not prevent or reduce the risk of infections, including meningococcal infection.

Other adverse events may occur. In our ongoing phase I multiple ascending dose study of ACH-4471 in healthy volunteers, two cases of self-limited, ALT elevations (Grade 3 and 4) were observed post-treatment in the two highest dose groups, with neither subject exhibiting signs or symptoms of liver decompensation. Both subjects' ALT levels normalized without intervention during follow up. Further, no treatment-associated fever or infections were observed. ALT is a liver enzyme measure to see whether a liver is damaged or diseased. There is a risk that increases in ALT will be seen in other healthy subjects or patients dosed with ACH-4471. In addition, in Janssen's phase IIa clinical trial of a triple combination regimen consisting of Olysio (simeprevir), AL-335, and odalasvir for HCV, one trial participant experienced a Mobitz Type 1 2nd degree atrioventricular block that was deemed a serious adverse event and probably related to odalasvir and possibly related to AL-335 and simeprevir. The event was not associated with clinical or echocardiographic abnormalities, did not require any therapeutic intervention, resolved following treatment discontinuation, and the patient went on to achieve a sustained viral response 24 weeks after cessation of therapy.

If any of our drug candidates is associated with adverse events or undesirable side effects or has properties that are unexpected, we, or any current or future collaborators, may need to abandon development or limit development of that drug candidate to certain uses or subpopulations in which the undesirable side effects or other characteristics are less prevalent, less severe or more acceptable from a risk-benefit perspective. Many compounds that initially showed promise in clinical or earlier stage testing have later been found to cause undesirable or unexpected side effects that prevented further development of the compound.

If we, or any current or future collaborators, experience any of a number of possible unforeseen events in connection with clinical trials of our drug candidates, potential marketing approval or commercialization of our drug candidates could be delayed or prevented.

We, or any current or future collaborators, may experience numerous unforeseen events during, or as a result of, clinical trials that could delay or prevent marketing approval or commercialization of our drug candidates, including:

- clinical trials of our drug candidates may produce unfavorable or inconclusive results;
- we, or any current or future collaborators, may decide, or regulators may require us or them, to conduct additional clinical trials or abandon product development programs;

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- the number of patients required for clinical trials of our drug candidates may be larger than we, or any current or future collaborators, anticipate, patient enrollment in these clinical trials may be slower than we, or any current or future collaborators, anticipate or participants may drop out of these clinical trials at a higher rate than we, or any current or future collaborators, anticipate;
- the cost of planned clinical trials of our drug candidates may be greater than we anticipate;
- our third party contractors or those of any current or future collaborators, including those manufacturing our drug candidates or components or ingredients thereof or conducting clinical trials on our behalf or on behalf of any current or future collaborators, may fail to comply with regulatory requirements or meet their contractual obligations to us or any current or future collaborators in a timely manner or at all;
- regulators or institutional review boards may not authorize us, any current or future collaborators or our or their investigators to commence a clinical trial or conduct a clinical trial at a prospective trial site;
- we, or any current or future collaborators, may have delays in reaching or fail to reach agreement on acceptable clinical trial contracts or clinical trial protocols with prospective trial sites;
- patients that enroll in a clinical trial may misrepresent their eligibility to do so or may otherwise not comply with the clinical trial protocol, resulting in the need to drop the patients from the clinical trial, increase the needed enrollment size for the clinical trial or extend the clinical trial's duration;
- we, or any current or future collaborators, may have to delay, suspend or terminate clinical trials of our drug candidates for various reasons, including a finding that the participants are being exposed to unacceptable health risks, undesirable side effects or other unexpected characteristics of the drug candidate;
- regulators or institutional review boards may require that we, or any current or future collaborators, or our or their investigators suspend or terminate clinical research for various reasons, including noncompliance with regulatory requirements or their standards of conduct, a finding that the participants are being exposed to unacceptable health risks, undesirable side effects or other unexpected characteristics of the drug candidate or findings of undesirable effects caused by a chemically or mechanistically similar drug or drug candidate;
- the FDA or comparable foreign regulatory authorities may disagree with our, or any current or future collaborators', clinical trial designs or our or their interpretation of data from preclinical studies and clinical trials;
- the FDA or comparable foreign regulatory authorities may fail to approve or subsequently find fault with the manufacturing processes or facilities of third party manufacturers with which we, or any current or future collaborators, enter into agreements for clinical and commercial supplies;
- the supply or quality of raw materials or manufactured drug candidates or other materials necessary to conduct clinical trials of our drug candidates may be insufficient, inadequate or not available at an acceptable cost, or we may experience interruptions in supply; and
- the approval policies or regulations of the FDA or comparable foreign regulatory authorities may significantly change in a manner rendering our clinical data insufficient to obtain marketing approval.

Product development costs for us, or any current or future collaborators, will increase if we, or they, experience delays in testing or pursuing marketing approvals and we, or they, may be required to obtain additional funds to complete clinical trials and prepare for possible commercialization of our drug candidates. We do not know whether any preclinical tests or clinical trials will begin as planned, will need to be restructured, or will be completed on schedule or at all. Significant preclinical or clinical trial delays also could shorten any periods during which we, or any current or future collaborators, may have the exclusive right to commercialize our drug candidates or allow our competitors, or the competitors of any current or future collaborators, to bring

products to market before we, or any current or future collaborators, do and impair our ability, or the ability of any current or future collaborators, to successfully commercialize our drug candidates and may harm our business and results of operations. In addition, many of the factors that lead to clinical trial delays may ultimately lead to the denial of marketing approval of any of our drug candidates.

If we, or any current or future collaborators, experience delays or difficulties in the enrollment of patients in clinical trials, our or their receipt of necessary regulatory approvals could be delayed or prevented.

We, or any current or future collaborators, may not be able to initiate or continue clinical trials for any of our drug candidates if we, or they, are unable to locate and enroll a sufficient number of eligible patients to participate in clinical trials. Patient enrollment is a significant factor in the timing of clinical trials, and is affected by many factors, including:

- the size and nature of the patient population, particularly for rare diseases such as PNH and C3G;
- the severity of the disease under investigation;
- the proximity of patients to clinical sites;
- the eligibility criteria for the trial;
- the design of the clinical trial;
- efforts to facilitate timely enrollment;
- competing clinical trials; and
- clinicians' and patients' perceptions as to the potential advantages and risks of the drug being studied in relation to other available therapies, including any new drugs that may be approved for the indications we are investigating.

Our inability, or the inability of any current or future collaborators, to enroll a sufficient number of patients for our, or their, clinical trials could result in significant delays or may require us or them to abandon one or more clinical trials altogether. Enrollment delays in our, or their, clinical trials may result in increased development costs for our drug candidates, delay or halt the development of and approval processes for our drug candidates and jeopardize our, or any current or future collaborators', ability to commence sales of and generate revenues from our drug candidates, which could cause the value of our company to decline and limit our ability to obtain additional financing, if needed.

If any of our drug candidates receives marketing approval and we, or others, later discover that the drug is less effective than previously believed or causes undesirable side effects that were not previously identified, our ability, or that of any current or future collaborators, to market the drug could be compromised.

Clinical trials of our drug candidates are expected to be conducted in carefully defined subsets of patients who have agreed to enter into clinical trials. Consequently, it is possible that our clinical trials, or those of any current or future collaborator, may indicate an apparent positive effect of a drug candidate that is greater than the actual positive effect, if any, or alternatively fail to identify undesirable side effects. If, following approval of a drug candidate, we, or others, discover that the drug is less effective than previously believed or causes undesirable side effects that were not previously identified, any of the following adverse events could occur:

- regulatory authorities may withdraw their approval of the drug;
- we, or any current or future collaborators, may be required to recall the drug, change the way the drug is administered or conduct additional clinical trials;
- additional restrictions may be imposed on the marketing of, or the manufacturing processes for, the particular drug;

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- we may be subject to fines, injunctions or the imposition of civil or criminal penalties;
- regulatory authorities may require the addition of labeling statements, such as a “black box” warning or a contraindication;
- we, or any current or future collaborators, may be required to create a Medication Guide outlining the risks of the previously unidentified side effects for distribution to patients;
- we, or any current or future collaborators, could be sued and held liable for harm caused to patients;
- the drug may become less competitive; and
- our reputation may suffer.

Any of these events could have a material and adverse effect on our operations and business and could adversely impact our stock price.

Even if one of our drug candidates receives marketing approval, it may fail to achieve the degree of market acceptance by physicians, patients, third party payors and others in the medical community necessary for commercial success and the market opportunity for the drug candidate may be smaller than we estimate.

We have never commercialized a product. Even if one of our drug candidates is approved by the appropriate regulatory authorities for marketing and sale, it may nonetheless fail to gain sufficient, or even any, market acceptance by physicians, patients, third party payors, health authorities and others in the medical community. For example, physicians are often reluctant to switch their patients from existing therapies even when new and potentially more effective or convenient treatments enter the market. Further, patients often acclimate to the therapy that they are currently taking and do not want to switch unless their physicians recommend switching products or they are required to switch therapies due to lack of reimbursement for existing therapies.

Efforts to educate the medical community and third party payors on the benefits of our drug candidates may require significant resources and may not be successful. If any of our drug candidates is approved but does not achieve an adequate level of market acceptance, we may not generate significant revenues and we may not become profitable. The degree of market acceptance of our drug candidates, if approved for commercial sale, will depend on a number of factors, including:

- the efficacy and safety of the product;
- the potential advantages of the product compared to alternative treatments;
- the prevalence and severity of any side effects;
- the clinical indications for which the product is approved;
- whether the product is designated under physician treatment guidelines as a first-line therapy or as a second- or third-line therapy;
- limitations or warnings, including distribution or use restrictions, contained in the product’s approved labeling;
- our ability, or the ability of any current or future collaborators, to offer the product for sale at competitive prices;
- the product’s convenience and ease of administration compared to alternative treatments;
- the willingness of the target patient population to try, and of physicians to prescribe, the product;
- the strength of sales, marketing and distribution support;
- the approval of other products for the same indications;

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- changes in the standard of care for the targeted indications for the product;
- the timing of market introduction of our approved products as well as competitive products;
- availability and amount of reimbursement from government payors, managed care plans and other third party payors;
- adverse publicity about the product or favorable publicity about competitive products; and
- potential product liability claims.

If we are unable to establish sales, marketing and distribution capabilities or enter into sales, marketing and distribution arrangements with third parties, we may not be successful in commercializing any drug candidates that we develop if and when those drug candidates are approved.

We do not have a sales, marketing or distribution infrastructure and have no experience in the sale, marketing or distribution of pharmaceutical products. To achieve commercial success for any approved product, we must either develop a sales and marketing organization or outsource these functions to third parties. We plan to use a combination of focused in-house sales and marketing capabilities and third party collaboration, licensing and distribution arrangements to sell any of our products that receive marketing approval.

We generally plan to seek to retain full commercialization rights in the United States for products that we can commercialize with a small specialized sales force in certain rare diseases. The development of sales, marketing and distribution capabilities will require substantial resources, will be time-consuming and could delay any product launch. If the commercial launch of a drug candidate for which we recruit a sales force and establish marketing and distribution capabilities is delayed or does not occur for any reason, we could have prematurely or unnecessarily incurred these commercialization costs. This may be costly, and our investment could be lost if we cannot retain or reposition our sales and marketing personnel. In addition, we may not be able to hire or retain a sales force in the United States that is sufficient in size or has adequate expertise in the medical markets that we plan to target. If we are unable to establish or retain a sales force and marketing and distribution capabilities, our operating results may be adversely affected. If a potential partner has development or commercialization expertise that we believe is particularly relevant to one of our products, then we may seek to collaborate with that potential partner even if we believe we could otherwise develop and commercialize the product independently.

We generally plan to collaborate with third parties for commercialization in the United States of any products that we cannot commercialize with a small sales force and that require a large sales, marketing and product distribution infrastructure. We also plan to commercialize our drug candidates outside the United States through collaboration, licensing and distribution arrangements with third parties. As a result of entering into arrangements with third parties to perform sales, marketing and distribution services, our product revenues or the profitability of these product revenues may be lower, perhaps substantially lower, than if we were to directly market and sell products in those markets. Furthermore, we may be unsuccessful in entering into the necessary arrangements with third parties or may be unable to do so on terms that are favorable to us. In addition, we may have little or no control over such third parties, and any of them may fail to devote the necessary resources and attention to sell and market our products effectively.

If we do not establish sales, marketing and distribution capabilities, either on our own or in collaboration with third parties, we will not be successful in commercializing any of our drug candidates that receive marketing approval.

We face substantial competition from other pharmaceutical and biotechnology companies, and our operating results may suffer if we fail to compete effectively.

The development and commercialization of new drug products is highly competitive. We expect that we, our current collaborator and future collaborators, if any, will face significant competition from major

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pharmaceutical companies, specialty pharmaceutical companies and biotechnology companies worldwide with respect to any of our drug candidates that we, or they, may seek to develop or commercialize in the future. There are a number of pharmaceutical companies that currently market and sell products for HCV or are pursuing the development of additional drug candidates for HCV including AbbVie Inc., Enanta Pharmaceuticals, Inc., Gilead Sciences, Inc., Merck & Co., Inc. and Regulus Therapeutics Inc. Some of these marketed products have demonstrated good efficacy rates and safety profiles. We and our collaborator, Janssen, would have to demonstrate similar efficacy and safety profiles in order to be competitive, which cannot be assured. In addition, while the market for HCV therapies remains very large, reaching \$19 billion in sales in 2016 according to public filings, the market is anticipated to decrease in size as more existing patients are cured and the number of newly infected patients, while rising, is fewer on an annual basis than those cured. This decrease in market size may heighten competitive pressures among market participants.

In addition, there are also a number of pharmaceutical and biotechnology companies that currently market and sell products or are pursuing the development of drug candidates for the treatment of the key complement-mediated disease indications. For example, Alexion Pharmaceuticals, Inc.'s eculizumab (Soliris[®]) is a marketed therapy for the treatment of PNH and atypical hemolytic uremic syndrome, or aHUS. Akari Therapeutics PLC, Alnylam Pharmaceuticals, Inc., Amyndas Pharmaceuticals S.A., Apellis Pharmaceuticals, Inc., BioCryst Pharmaceuticals, Inc., ChemoCentryx, Inc., Genentech, Inc., Omeros Corporation, Ra Pharmaceuticals Inc. and True North Therapeutics, Inc. have complement inhibitor therapies in development for other hematologic diseases. Additionally, Novartis AG also has intellectual property rights in the complement area.

Our competitors may succeed in developing, acquiring or licensing technologies and drug products that are more effective, have fewer or more tolerable side effects or are less costly than any drug candidates that we are currently developing or that we may develop, which could render our drug candidates obsolete and noncompetitive.

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, or any current or future collaborators, may develop. Our competitors also may obtain FDA or other marketing approval for their products before we, or any current or future collaborators, are able to obtain approval for ours, which could result in our competitors establishing a strong market position before we, or any current or future collaborators, are able to enter the market.

Many of our existing and potential future competitors have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials, obtaining marketing approvals and marketing approved products than we do. Mergers and acquisitions in the pharmaceutical and biotechnology 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.

If the FDA or comparable foreign regulatory authorities approve generic versions of any of our products that receive marketing approval, or such authorities do not grant our products appropriate periods of data exclusivity before approving generic versions of our products, the sales of our products could be adversely affected.

Once a new drug application, or NDA, is approved, the product covered thereby becomes a "reference-listed drug" in the FDA's publication, "Approved Drug Products with Therapeutic Equivalence Evaluations." Manufacturers may seek approval of generic versions of reference-listed drugs through submission of abbreviated new drug applications, or ANDAs, in the United States. In support of an ANDA, a generic

manufacturer need not conduct clinical studies. Rather, the applicant generally must show that its product has the same active ingredient(s), dosage form, strength, route of administration and conditions of use or labeling as the reference-listed drug and that the generic version is bioequivalent to the reference-listed drug, meaning it is absorbed in the body at the same rate and to the same extent. Generic products may be significantly less costly to bring to market than the reference-listed drug and companies that produce generic products are generally able to offer them at lower prices. Thus, following the introduction of a generic drug, a significant percentage of the sales of any branded product or reference-listed drug may be typically lost to the generic product.

The FDA may not approve an ANDA for a generic product until any applicable period of non-patent exclusivity for the reference-listed drug has expired. The Federal Food, Drug, and Cosmetic Act, or FDCA, provides a period of five years of non-patent exclusivity for a new drug containing a new chemical entity, or NCE. Specifically, in cases where such exclusivity has been granted, an ANDA may not be filed with the FDA until the expiration of five years unless the submission is accompanied by a Paragraph IV certification that a patent covering the reference-listed drug is either invalid or will not be infringed by the generic product, in which case the applicant may submit its application four years following approval of the reference-listed drug. If any product we develop does not receive five years of NCE exclusivity, the FDA may approve generic versions of such product three years after its date of approval. Manufacturers may seek to launch these generic products following the expiration of the applicable marketing exclusivity period, even if we still have patent protection for our product.

Competition that our products may face from generic versions of our products could materially and adversely impact our future revenue, profitability and cash flows and substantially limit our ability to obtain a return on the investments we have made in those drug candidates.

Even if we, or any current or future collaborators, are able to commercialize any drug candidate that we, or they, develop, the product may become subject to unfavorable pricing regulations, third party payor reimbursement practices or healthcare reform initiatives that could harm our business.

The commercial success of our drug candidates will depend substantially, both domestically and abroad, on the extent to which the costs of our drug candidates will be paid by third party payors, including government health administration authorities and private health coverage insurers. If coverage and reimbursement is not available, or reimbursement is available only to limited levels, we, or any current or future collaborators, may not be able to successfully commercialize our drug candidates. Even if coverage is provided, the approved reimbursement amount may not be high enough to allow us, or any current or future collaborators, to establish or maintain pricing sufficient to realize a sufficient return on our or their investments. In the United States, no uniform policy of coverage and reimbursement for products exists among third party payors and coverage and reimbursement for products can differ significantly from payor to payor.

There is significant uncertainty related to third party payor coverage and reimbursement of newly approved drugs. Marketing approvals, pricing and reimbursement for new drug products vary widely from country to country. Some countries require approval of the sale price of a drug before it can be marketed. In many countries, the pricing review period begins after marketing or product licensing approval is granted. In some foreign markets, prescription pharmaceutical pricing remains subject to continuing governmental control even after initial approval is granted. As a result, we, or any current or future collaborators, might obtain marketing approval for a product in a particular country, but then be subject to price regulations that delay commercial launch of the product, possibly for lengthy time periods, which may negatively impact the revenues we are able to generate from the sale of the product in that country. Adverse pricing limitations may hinder our ability or the ability of any current or future collaborators to recoup our or their investment in one or more drug candidates, even if our drug candidates obtain marketing approval.

Patients who are provided medical treatment for their conditions generally rely on third party payors to reimburse all or part of the costs associated with their treatment. Therefore, our ability, and the ability of any

current or future collaborators, to commercialize any of our drug candidates will depend in part on the extent to which coverage and reimbursement for these products and related treatments will be available from third party payors. Third party payors decide which medications they will cover and establish reimbursement levels. The healthcare industry is acutely focused on cost containment, both in the United States and elsewhere. Government authorities and other third party payors have attempted to control costs by limiting coverage and the amount of reimbursement for particular medications, which could affect our ability or that of any current or future collaborators to sell our drug candidates profitably. These payors may not view our products, if any, as cost-effective, and coverage and reimbursement may not be available to our customers, or those of any current or future collaborators, or may not be sufficient to allow our products, if any, to be marketed on a competitive basis. Cost-control initiatives could cause us, or any current or future collaborators, to decrease the price we, or they, might establish for products, which could result in lower than anticipated product revenues. If the prices for our products, if any, decrease or if governmental and other third party payors do not provide coverage or adequate reimbursement, our prospects for revenue and profitability will suffer.

There may also be delays in obtaining coverage and reimbursement for newly approved drugs, and coverage may be more limited than the indications for which the drug is approved by the FDA or comparable foreign regulatory authorities. Moreover, eligibility for reimbursement does not imply that any drug will be paid for in all cases or at a rate that covers our costs, including research, development, manufacture, sale and distribution. Reimbursement rates may vary, by way of example, according to the use of the drug and the clinical setting in which it is used. Reimbursement rates may also be based on reimbursement levels already set for lower cost drugs or may be incorporated into existing payments for other services.

In addition, increasingly, third party payors are requiring higher levels of evidence of the benefits and clinical outcomes of new technologies and are challenging the prices charged. We cannot be sure that coverage will be available for any drug candidate that we, or any current or future collaborator, commercialize and, if available, that the reimbursement rates will be adequate. Further, the net reimbursement for drug products may be subject to additional reductions if there are changes to laws that presently restrict imports of drugs from countries where they may be sold at lower prices than in the United States. An inability to promptly obtain coverage and adequate payment rates from both government-funded and private payors for any of our drug candidates for which we, or any current or future collaborator, obtain marketing approval could significantly harm our operating results, our ability to raise capital needed to commercialize products and our overall financial condition.

Spurred by recent examples of large price increases for certain drugs, political candidates and others have raised media attention to the issue of pharmaceutical price regulation. For example, recently announced plans have included elements such as patient spending caps, requirements for drug makers to spend a defined portion of their profits on research and development, allowing Americans to import lower-priced drugs from other countries and addressing specialty pharmaceuticals which tend to have higher prices than other drugs. If greater regulation of pharmaceutical pricing is approved, we may not be able to receive adequate reimbursement for our drug therapies, or may be forced to accept pricing at levels lower than that which would make us profitable. We cannot predict the political or regulatory climate that may result in enhanced drug pricing regulations.

Product liability lawsuits against us could divert our resources, cause us to incur substantial liabilities and limit commercialization of any products that we may develop.

We face an inherent risk of product liability claims as a result of the clinical testing of our drug candidates despite obtaining appropriate informed consents from any clinical trial participants. We will face an even greater risk if we or any current or future collaborators commercially sell any product that we may or they may develop. For example, we may be sued if any product we develop allegedly causes injury or is found to be otherwise unsuitable during clinical testing, manufacturing, marketing or sale. Any such product liability claims may include allegations of defects in manufacturing, defects in design, a failure to warn of dangers inherent in the product, negligence, strict liability or a breach of warranties. Claims could also be asserted under state consumer

protection acts. If we cannot successfully defend ourselves against product liability claims, we may incur substantial liabilities or be required to limit commercialization of our drug candidates. Regardless of the merits or eventual outcome, liability claims may result in:

- decreased demand for our drug candidates or products that we may develop;
- injury to our reputation and significant negative media attention;
- withdrawal of clinical trial participants;
- significant costs to defend resulting litigation;
- substantial monetary awards to trial participants or patients;
- loss of revenue;
- reduced resources of our management to pursue our business strategy; and
- the inability to commercialize any products that we may develop.

Although we maintain general liability insurance and clinical trial liability insurance, this insurance may not fully cover potential liabilities that we may incur. The cost of any product liability litigation or other proceeding, even if resolved in our favor, could be substantial. We will need to increase our insurance coverage if and when we begin selling any drug candidate that receives marketing approval. In addition, insurance coverage is becoming increasingly expensive. If we are unable to obtain or maintain sufficient insurance coverage at an acceptable cost or to otherwise protect against potential product liability claims, it could prevent or inhibit the development and commercial production and sale of our drug candidates, which could adversely affect our business, financial condition, results of operations and prospects.

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

Despite the implementation of security measures, our internal computer systems are vulnerable to damage from computer viruses, unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. Any system failure, accident or security breach that causes interruptions in our operations could result in a material disruption of our product development programs. For example, the loss of clinical trial data from completed clinical 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 results in a loss or damage to our data or applications, or inappropriate disclosure of confidential or proprietary information, we may incur liabilities and the further development of our drug candidates may be delayed.

Risks Related to our Financial Position and Need for Additional Capital

We have incurred significant losses since inception, expect to incur significant and increasing losses for at least the next several years, and we may never achieve or maintain profitability.

We have incurred significant annual net operating losses since our inception. We expect to continue to incur significant and increasing net operating losses for at least the next several years. Our net losses were \$61.7 million, \$5.0 million, and \$69.0 million for years ended December 31, 2016, 2015, and 2014, respectively. As of December 31, 2016, we had an accumulated deficit of \$517.4 million. We have not generated any revenues from product sales, have not completed the development of any drug candidate and may never have a drug candidate approved for commercialization. We are currently only in the early clinical testing stages for our most advanced drug candidate under our complement inhibitor platform and expect that it will be many years, if ever, before we have a drug candidate ready for commercialization.

We have devoted substantially all of our financial resources and efforts to research and development, including preclinical studies and our clinical development programs. Our net losses may fluctuate significantly from quarter to quarter and year to year. Net losses and negative cash flows have had, and will continue to have, an adverse effect on our stockholders' (deficit) equity and working capital.

We anticipate that our expenses will increase substantially if and as we:

- continue research and initiate preclinical and clinical development efforts for our drug candidates, including ACH-4471;
- seek regulatory and marketing approvals for our drug candidates that successfully complete clinical trials, if any;
- establish sales, marketing, distribution and other commercial infrastructure to commercialize various products for which we may obtain marketing approval, if any;
- contract for the manufacture of larger quantities of drug candidates for clinical development and potentially commercialization;
- maintain, expand and protect our intellectual property portfolio; and
- hire and retain additional personnel, such as clinical, quality control and scientific personnel.

Our ability to become and remain profitable depends on our ability to generate revenue. We do not expect to generate significant revenue unless and until we are, or any current or future collaborator is, able to obtain marketing approval for, and successfully commercialize, products based on our programs. This will require success in a range of challenging activities, including completing clinical trials of our drug candidates, obtaining marketing approval for these drug candidates, manufacturing, marketing and selling those products for which we, or any of our current or current or future collaborators, may obtain marketing approval, satisfying any post-marketing requirements and obtaining reimbursement for our products from private insurance or government payors. Because of the uncertainties and risks associated with these activities, we are unable to accurately predict the timing and amount of increased expenses, and if or when we might achieve profitability. We and any current or future collaborators may never succeed in these activities and, even if we do, or any current or future collaborators do, we may never generate revenues that are large enough for us to achieve profitability. Even if we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis. Our failure to become and remain profitable would decrease the value of our company and adversely impact our stock price and could impair our ability to raise capital, expand our business, maintain our research and development efforts, diversify our pipeline of drug candidates or continue our operations.

We may need additional funding. 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.

Developing pharmaceutical products, including conducting preclinical studies and clinical trials, is a very time-consuming, expensive and uncertain process that takes years to complete. We expect our expenses to increase in connection with our ongoing activities, particularly as we initiate clinical trials of, initiate new research and preclinical development efforts for and seek marketing approval for, our drug candidates. In addition, if we obtain marketing approval for any of our drug candidates, we may incur significant commercialization expenses related to product sales, marketing, manufacturing and distribution to the extent that such sales, marketing, manufacturing and distribution are not the responsibility of a current or future collaborator. Accordingly, we may need to obtain additional funding in connection with our continuing operations. If we are unable to raise capital when needed or on attractive terms, we may be forced to delay, reduce or eliminate our research and development programs or any future commercialization efforts.

We will be required to expend significant funds in order to advance the development of our complement factor D inhibitor platform. In addition, while we may seek one or more collaborators for future development of our drug candidates, we may not be able to enter into a collaboration for any of our drug candidates on suitable terms or at all. In any event, our existing cash, cash equivalents and marketable securities will not be sufficient to fund all of the efforts that we plan to undertake or to fund the completion of development of any of our drug candidates. Accordingly, we will be required to obtain further funding through public or private equity offerings, debt financings, collaborations and licensing arrangements or other sources. We do not have any committed

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external source of funds. 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 impact on our financial condition and our ability to pursue our business strategy. Moreover, we are dependent on Janssen for the timing and success of the HCV collaboration and we cannot assure you that we will receive any milestone-based or royalty payments under that arrangement.

We believe that our existing cash, cash equivalents and marketable securities as of December 31, 2016, will enable us to fund our current projected operating requirements for at least the next 12 months. Our estimate as to how long we expect our existing cash and cash equivalents to be able to continue to fund our operations is based on assumptions that may prove to be wrong, and we could use our available capital resources sooner than we currently expect. Further, changing circumstances, some of which may be beyond our control, could cause us to consume capital significantly faster than we currently anticipate, and we may need to seek additional funds sooner than planned. Our future funding requirements, both short-term and long-term, will depend on many factors, including:

- the scope, progress, results and costs of drug discovery, preclinical development, laboratory testing and clinical trials for our drug candidates;
- our ability to enter into and the terms and timing of any collaborations, licensing or other arrangements that we may establish;
- the number of future drug candidates that we pursue and their development requirements;
- the outcome, timing and costs of seeking regulatory approvals;
- the costs of commercialization activities for any of our drug candidates that receive marketing approval to the extent such costs are not the responsibility of any current or future collaborators, including the costs and timing of establishing product sales, marketing, distribution and manufacturing capabilities;
- subject to receipt of marketing approval, revenue, if any, received from commercial sales of our drug candidates;
- our headcount growth and associated costs as we seek to expand our research and development and establish a commercial infrastructure;
- the costs involved in preparing, filing, prosecuting, maintaining, enforcing and defending patent and other intellectual property rights and defending against intellectual property-related claims;
- the timing and amount of proceeds received from milestones achieved and royalties earned, if any, by us under the Janssen Agreement;
- our ability to raise debt or equity capital, including any changes in the credit or equity markets that may impact our ability to obtain capital in the future;
- the costs associated with, and the outcome of, lawsuits against us, if any;
- our acquisition and development of new technologies and drug candidates; and
- competing technological and market developments, including those currently unknown to us.

Raising additional capital may cause dilution to our stockholders, restrict our operations or require us to relinquish rights to our technologies or drug candidates.

We expect that we will need additional capital in the future to continue our planned operations. To the extent that we raise additional capital through the sale of common stock, convertible securities or other equity securities, the ownership interests of our stockholders may be materially diluted, and the terms of these securities could include liquidation or other preferences and anti-dilution protections that could adversely affect the rights of a common stockholder. In February 2017, we entered into a sales agreement with Cantor Fitzgerald & Co., or

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Cantor, pursuant to which, from time to time, we may offer and sell shares of our common stock having an aggregate offering price of up to \$75,000,000 through Cantor pursuant to a universal shelf registration statement that we expect to file in February 2017, after such time as the registration statement is declared effective by the SEC. Sales of our common stock, if any, under the agreement with Cantor may be made in sales deemed to be an “at-the-market offering” as defined in Rule 415(a)(4) under the Securities Act of 1933, as amended. Sales of substantial amounts of shares of our common stock or other securities could cause dilution to our stockholders and lower the market price of our common stock.

In addition, debt financing, if available, would result in fixed payment obligations and may involve agreements that include restrictive covenants that limit our ability to take specific actions, such as incurring additional debt, making capital expenditures, creating liens, redeeming stock or declaring dividends, that could adversely impact our ability to conduct our business. In addition, securing financing could require a substantial amount of time and attention from our management and may divert a disproportionate amount of their attention away from day-to-day activities, which may adversely affect our management’s ability to oversee the development of our drug candidates.

If we raise additional funds through collaborations or marketing, distribution or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams or drug candidates or grant licenses on terms that may not be favorable to us. If we are unable to raise additional funds 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 drug candidates that we would otherwise prefer to develop and market ourselves.

Our ability to use our net operating loss carryforwards and certain other tax attributes may be limited.

Under Section 382 of the Internal Revenue Code of 1986, as amended, if a company undergoes an “ownership change,” generally defined as a greater than 50% change (by value) in its equity ownership over a three-year period, the corporation’s ability to use its pre-change net operating loss carryforwards and other pre-change tax attributes (such as research tax credits) to offset its post-change taxable income or taxes may be limited. Changes in our stock ownership, some of which are outside of our control, may have resulted or could in the future result in an ownership change. For example, we completed a review of our changes in ownership through December 31, 2015, and determined that we had four ownership changes since inception. The changes of ownership will result in net operating loss and research and development credit carryforwards that we expect to expire unutilized. If additional limitations were to apply, utilization of a portion of our net operating loss and tax credit carryforwards could be further limited in future periods and a portion of the carryforwards could expire before being available to reduce future income tax liabilities.

If the estimates we make and the assumptions on which we rely in preparing our financial statements prove inaccurate, our actual results may vary significantly.

Our financial statements have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amounts of our assets, liabilities, revenues and expenses. Such estimates and judgments include revenue recognition, stock-based compensation expense, the valuation of investments, accrued expenses and deferred tax assets and liabilities. We base our estimates and judgments on historical experience and on various other assumptions that we believe to be reasonable under the circumstances. However, these estimates and judgments, or the assumptions underlying them, may change over time. Accordingly, our actual financial results may vary significantly from the estimates contained in our financial statements.

Risks Related to Our Dependence on Third Parties

We depend on our collaboration with Janssen and may depend on collaborations with additional third parties for the development and commercialization of our drug candidates. If those collaborations are not successful, we may not be able to capitalize on the market potential of these drug candidates.

We are party to an exclusive collaboration and license agreement with Janssen pursuant to which we granted Janssen exclusive worldwide rights to develop and commercialize products based on certain of our HCV drug candidates. We may in the future seek other third-party collaborators for the development and commercialization of product candidates based on our complement inhibitor platform. Our likely collaborators for any collaboration arrangements include large and mid-size pharmaceutical companies, regional and national pharmaceutical companies and biotechnology companies. If we enter into such collaborations, we will have limited control over the amount and timing of resources that our collaborators will dedicate to the development or commercialization of our drug candidates. Our ability to generate revenues from the collaboration and license agreement with Janssen or any future arrangements will depend on the collaborators' abilities to successfully perform the functions assigned to them in these arrangements. In addition, any collaborators may have the right to abandon research or development projects and terminate applicable agreements, including any funding obligations, prior to or upon the expiration of the agreed upon terms.

Collaborations involving our drug candidates, including our collaboration with Janssen, pose a number of risks, including the following:

- collaborators have significant discretion in determining the efforts and resources that they will apply to these collaborations. For example, under the terms of our collaboration with Janssen, development plans and strategies for all licensed products will be conducted in accordance with a plan and budget approved by a joint committee comprised of equal numbers of representatives from each of us and Janssen, as to which Janssen generally has final decision-making authority, and, subject to specified diligence requirements, Janssen has full discretion over commercialization plans and strategies for all licensed products. Currently, Janssen is only pursuing clinical development of one of the three HCV compounds we licensed to Janssen under the collaboration;
- collaborators may not perform their obligations as expected;
- collaborators may not pursue development and commercialization of our drug candidates or may elect not to continue or renew development or commercialization programs, based on clinical trial results, changes in the collaborators' strategic focus, changes in the competitive environment, available funding or external factors, such as an acquisition, that divert resources or create competing priorities;
- collaborators may delay clinical trials, provide insufficient funding for a clinical trial program, stop a clinical trial or abandon a drug candidate, repeat or conduct new clinical trials or require a new formulation of a drug candidate for clinical testing;
- a collaborator with marketing and distribution rights to one or more products may not commit sufficient resources to the marketing and distribution of such product or products;
- disagreements with collaborators, including disagreements over proprietary rights, contract interpretation or the preferred course of development, might cause delays or termination of the research, development or commercialization of drug candidates, might lead to additional responsibilities for us with respect to drug candidates, or might result in litigation or arbitration, any of which would be time-consuming and expensive;
- collaborators may not properly maintain or defend our intellectual property rights or may use our proprietary information in such a way as to invite litigation that could jeopardize or invalidate our intellectual property or proprietary information or expose us to potential litigation. For example, under specified circumstances Janssen has the first right to maintain or defend certain of our intellectual property rights under the terms of our collaboration agreement and, although we may have the right to

assume the maintenance or defense of such intellectual property rights if Janssen does not, our ability to do so may be compromised by Janssen's actions;

- collaborators may infringe the intellectual property rights of third parties, which may expose us to litigation and potential liability;
- collaborations may be terminated and, if terminated, may result in a need for additional capital to pursue further development or commercialization of the applicable drug candidates. For example, Janssen can terminate its agreement with us in its entirety upon sixty days' notice at any time prior to submission of the first application for marketing approval for a licensed product in any specified major market country, and can terminate the entire agreement with us in connection with any undisputed material breach of the agreement by us that remains uncured for a specified period of time; and
- collaboration agreements may not lead to development or commercialization of drug candidates in the most efficient manner or at all. If any current or future collaborator of ours is involved in a business combination, it could decide to delay, diminish or terminate the development or commercialization of any drug candidate licensed to it by us.

We may seek to establish additional collaborations and, if we are not able to establish them on commercially reasonable terms, we may have to alter our development and commercialization plans.

Our drug development programs and the potential commercialization of our drug candidates will require substantial additional cash to fund expenses. For some of our drug candidates, we may decide to collaborate with additional pharmaceutical and biotechnology companies for the development and potential commercialization of those drug candidates. We face significant competition in seeking appropriate collaborators. Whether we reach a definitive agreement for a collaboration will depend, among other things, upon our assessment of the collaborator's resources and expertise, the terms and conditions of the proposed collaboration and the proposed collaborator's evaluation of a number of factors. Those factors may include the potential differentiation of our drug candidate from competing drug candidates, design or results of clinical trials, the likelihood of approval by the FDA or comparable foreign regulatory authorities and the regulatory pathway for any such approval, the potential market for the drug candidate, the costs and complexities of manufacturing and delivering the product to patients and the potential of competing products. The collaborator may also consider alternative drug candidates or technologies for similar indications that may be available for collaboration and whether such a collaboration could be more attractive than the one with us for our drug candidate.

Collaborations are complex and time-consuming to negotiate and document. Further, there have been a significant number of recent business combinations among large pharmaceutical companies that have resulted in a reduced number of potential future collaborators. In addition, any collaboration agreements that we enter into in the future may contain, restrictions on our ability to enter into potential collaborations or to otherwise develop specified compounds.

We may not be able to negotiate collaborations on a timely basis, on acceptable terms, or at all. If we are unable to do so, we may have to curtail the development of the drug candidate for which we are seeking to collaborate, reduce or delay its development program or one or more of our other development programs, delay its potential commercialization or reduce the scope of any sales or marketing activities, or increase our expenditures and undertake development or commercialization activities at our own expense. If we elect to increase our expenditures to fund development or commercialization activities on our own, we may need to obtain additional capital, which may not be available to us on acceptable terms or at all. If we do not have sufficient funds, we may not be able to further develop our drug candidates or bring them to market and generate product revenue.

We have and intend to continue to rely on third parties to conduct any clinical trials. If they do not perform satisfactorily, our business could be materially harmed.

We have and intend to continue to rely on third parties, such as contract research organizations, clinical data management organizations, medical institutions and clinical investigators, to conduct clinical trials and expect to rely on these third parties to conduct clinical trials of any drug candidate that we develop. Any of these third parties may terminate their engagements with us under certain circumstances. We may not be able to enter into alternative arrangements or do so on commercially reasonable terms. In addition, there is a natural transition period when a new contract research organization begins work. As a result, delays would likely occur, which could materially impact our ability to meet our expected clinical development timelines and harm our business, financial condition and prospects.

Further, our reliance on these third parties for clinical development activities limits our control over these activities, but we remain responsible for ensuring that each of our trials is conducted in accordance with the applicable protocol, legal, regulatory and scientific standards. For example, notwithstanding the obligations of a contract research organization for a trial of one of our drug candidates, we will remain responsible for ensuring that each of our clinical trials is conducted in accordance with the general investigational plan and protocols for the trial. Moreover, the FDA requires us to comply with standards, commonly referred to as current Good Clinical Practices, or cGCPs, for conducting, recording and reporting the results of clinical trials to assure that data and reported results are credible and accurate and that the rights, integrity and confidentiality of trial participants are protected. The FDA enforces these cGCPs through periodic inspections of trial sponsors, principal investigators, clinical trial sites and institutional review boards. If we or our third-party contractors fail to comply with applicable cGCPs, the clinical data generated in any clinical trials may be deemed unreliable and the FDA may require us to perform additional clinical trials before approving our drug candidates, which would delay the marketing approval process. We cannot be certain that, upon inspection, the FDA will determine that any of our clinical trials comply with cGCPs. We are also required to register clinical trials and post the results of completed clinical trials on a government-sponsored database, ClinicalTrials.gov, within certain timeframes. Failure to do so can result in fines, adverse publicity and civil and criminal sanctions.

Furthermore, the third parties that we intend to engage to conduct clinical trials on our behalf are not our employees, and except for remedies available to us under agreements with such contractors, we cannot control whether or not they devote sufficient time, skill and resources to our development programs. These contractors may also have relationships with other commercial entities, including our competitors, for whom they may also be conducting clinical trials or other drug development activities, which could impede their ability to devote appropriate time to our clinical programs. If these third parties do not successfully carry out their contractual duties, meet expected deadlines or conduct any clinical trials in accordance with regulatory requirements or our stated protocols, we may not be able to obtain, or may be delayed in obtaining, marketing approvals for our drug candidates. If that occurs, we will not be able to, or may be delayed in our efforts to, successfully commercialize our drug candidates. In such an event, our financial results and the commercial prospects for any drug candidates that we seek to develop could be harmed, our costs could increase and our ability to generate revenues could be delayed, impaired or foreclosed.

We also intend to rely on other third parties to store and distribute drug supplies for any clinical trials. Any performance failure on the part of our distributors could delay clinical development or marketing approval of our drug candidates or commercialization of any resulting products, producing additional losses and depriving us of potential product revenue.

We have and intend to continue to contract with third parties for the manufacture and distribution of any drug candidates for clinical trials in connection with our future development and commercialization efforts. This reliance on third parties increases the risk that we will not have sufficient quantities of our drug candidates or such quantities at an acceptable cost, which could delay, prevent or impair our development or commercialization efforts.

We currently have no manufacturing facilities and limited personnel with manufacturing experience. We have and intend to continue to rely on contract manufacturers to produce both drug substance and drug product required for any clinical trials. We also intend to rely upon contract manufacturers, and, potentially collaboration partners, to manufacture commercial quantities of our products, if approved. Reliance on such third party contractors entails risks, including:

- manufacturing delays if our third party contractors give greater priority to the supply of other products over our drug candidates or otherwise do not satisfactorily perform according to the terms of the agreements between us and them;
- the possible termination or nonrenewal of agreements by our third party contractors at a time that is costly or inconvenient for us;
- the possible breach by the third party contractors of our agreements with them;
- the failure of third party contractors to comply with applicable regulatory requirements;
- the possible mislabeling of clinical supplies, potentially resulting in the wrong dose amounts being supplied or active drug or placebo not being properly identified;
- the possibility of clinical supplies not being delivered to clinical sites on time, leading to clinical trial interruptions, or of drug supplies not being distributed to commercial vendors in a timely manner, resulting in lost sales; and
- the possible misappropriation of our proprietary information, including our trade secrets and know-how.

We currently rely, and expect to continue to rely, on a small number of third party contract manufacturers to supply active pharmaceutical ingredient and required finished product for our preclinical studies and any clinical trials. We do not have long-term agreements with any of these third parties. If any of our existing manufacturers should become unavailable to us for any reason, we may incur some delay in identifying or qualifying replacements.

Any manufacturing problem or the loss of a contract manufacturer could be disruptive to our operations, delay any clinical trials and, if our products are approved for sale, result in lost sales. Additionally, we intend to rely on third parties to supply the raw materials needed to manufacture any drug candidates. Any reliance on suppliers may involve several risks, including a potential inability to obtain critical materials and reduced control over production costs, delivery schedules, reliability and quality. Any unanticipated disruption to future contract manufacture caused by problems at suppliers could delay shipment of our drug candidates, increase our cost of goods sold and result in lost sales.

If any of our future drug candidates are approved by any regulatory agency, we plan to enter into agreements with third party contract manufacturers for the commercial production and distribution of those products. It may be difficult for us to reach agreement with a contract manufacturer on satisfactory terms or in a timely manner. In addition, we may face competition for access to manufacturing facilities as there are a limited number of contract manufacturers operating under current good manufacturing practices, or cGMPs, that are capable of manufacturing our drug candidates. Consequently, we may not be able to reach agreement with third party manufacturers on satisfactory terms, which could delay our commercialization efforts.

Third party manufacturers are required to comply with cGMPs and similar regulatory requirements outside the United States. Facilities used by our third party manufacturers must be approved by the FDA after we submit an NDA and before potential approval of the drug candidate. Similar regulations apply to manufacturers of our drug candidates for use or sale in foreign countries. We do not control the manufacturing process and are

completely dependent on our third party manufacturers for compliance with the applicable regulatory requirements for the manufacture of our drug candidates. If our manufacturers cannot successfully manufacture material that conforms to our specifications or the strict regulatory requirements of the FDA and any applicable foreign regulatory authority, they will not be able to secure the applicable approval for their manufacturing facilities. If these facilities are not approved for commercial manufacture, we may need to find alternative manufacturing facilities, which could result in delays in obtaining approval for the applicable drug candidate.

In addition, our manufacturers are subject to ongoing periodic inspections by the FDA and corresponding state and foreign agencies for compliance with cGMPs and similar regulatory requirements both prior to and following the receipt of marketing approval for any of our drug candidates. Some of these inspections may be unannounced. Failure by any of our manufacturers to comply with applicable cGMPs or other regulatory requirements could result in sanctions being imposed on us, including fines, injunctions, civil penalties, delays, suspensions or withdrawals of approvals, operating restrictions, interruptions in supply and criminal prosecutions, any of which could significantly and adversely affect supplies of our drug candidates and have a material adverse impact on our business, financial condition and results of operations.

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

Risks Related to Our Intellectual Property

If our patent position does not adequately protect our drug candidates, others could compete against us more directly, which would harm our business.

We own or hold exclusive licenses to a number of U.S. issued patents, pending U.S. provisional and non-provisional patent applications, as well as pending PCT applications and associated foreign patents and patent applications. Our success depends in large part on our ability to obtain and maintain patent protection both in the United States and in other countries for our drug candidates. Our ability to protect our drug candidates from unauthorized or infringing use by third parties depends in substantial part on our ability to obtain and maintain valid and enforceable patents. Due to evolving legal standards relating to the patentability, validity and enforceability of patents covering pharmaceutical inventions and the scope of claims made under these patents, our ability to maintain, obtain and enforce patents is uncertain and involves complex legal and factual questions. Accordingly, rights under any issued patents may not provide us with sufficient protection for our drug candidates or provide sufficient protection to afford us a commercial advantage against competitive products or processes. We cannot guarantee that any patents will issue from any pending or future patent applications owned by or licensed to us.

Patent applications in the United States are maintained in confidence for up to 18 months after their filing. In some cases, however, patent applications remain confidential in the U.S. Patent and Trademark Office, which we refer to as the U.S. Patent Office, for the entire time prior to issuance as a U.S. patent. Similarly, publication of discoveries in the scientific or patent literature often lags behind actual discoveries. Consequently, we cannot be certain that we or our licensors or co-owners were the first to invent, or the first to file patent applications on, our drug candidates or their intended uses. Furthermore, we may not have identified all U.S. and foreign patents or published applications that affect our business either by blocking our ability to commercialize our drugs or by covering similar technologies that affect our drug market or patentability, or all prior art that could be considered relevant to our patent claims.

The claims of the issued patents that are licensed to us, and the claims of any patents which have already issued or may issue in the future and are owned by us, may not confer on us significant commercial protection against competing products. Additionally, our patents may be challenged by third parties, resulting in the patent being deemed invalid, unenforceable or narrowed in scope, or the third party may circumvent any such issued

patents. The cost of these procedures could be substantial and it is possible that our efforts would be unsuccessful resulting in a loss of our U.S. patent position. Also, our pending patent applications may not issue, and we may not receive any additional patents. Our patents might not contain claims that are sufficiently broad to prevent others from utilizing our technologies. For instance, the issued patents relating to our drug candidates may be limited to a particular molecule or a related group of molecules. Consequently, our competitors may independently develop competing products that do not infringe our patents or other intellectual property. To the extent a competitor can develop similar products using a different molecule, our patents may not prevent others from directly competing with us.

The Leahy-Smith America Invents Act, or the America Invents Act, was signed into law in September 2011, and many of the substantive changes became effective in March 2013. The America Invents Act revised United States patent law in part by changing the standard for patent approval from a “first to invent” standard to a “first to file” standard and developing a post-grant review system. This legislation changes United States patent law in a way that may weaken our ability to obtain patent protection in the United States for those applications filed after March 2013. For example, if we are the first to invent a new drug or its use, but another party is the first to file a patent application on this invention, under the new law the other party may be entitled to the patent rights on the invention.

Further, the America Invents Act created for the first time new procedures to challenge issued patents in the United States, including post-grant review and inter partes review proceedings, which some third parties have been using to cause the cancellation of selected or all claims of issued patents of competitors. For a patent with a priority date of March 16, 2013 or later, a petition for post-grant review can be filed by a third party in a nine month window from issuance of the patent. A petition for inter partes review can be filed immediately following the issuance of a patent if the patent was filed prior to March 16, 2013. A petition for inter partes review can be filed after the nine month period for filing a post-grant review petition has expired for a patent with a priority date of March 16, 2013 or later. Post-grant review proceedings can be brought on any ground of challenge, whereas inter partes review proceedings can only be brought to raise a challenge based on published prior art. These adversarial actions at the U.S. Patent Office review patent claims without the presumption of validity afforded to U.S. patents in lawsuits in U.S. federal courts, and use a lower burden of proof than used in litigation in U.S. federal courts. Therefore, it is generally considered easier for a competitor or third party to have a U.S. patent cancelled in a Patent Office post-grant review or inter partes review proceeding than invalidated in a litigation in a U.S. federal court. If any of our patents are challenged by a third party in such a U.S. patent office proceeding, there is no guarantee that we or our licensors will be successful in defending the patent, which would result in a loss of the challenged patent right to us.

The laws of some foreign jurisdictions do not protect intellectual property rights to the same extent as in the United States and many companies have encountered significant difficulties in protecting and defending such rights in foreign jurisdictions. If we encounter such difficulties in protecting or are otherwise precluded from effectively protecting our intellectual property rights in foreign jurisdictions, our business prospects could be substantially harmed. For example, we could become a party to foreign opposition proceedings, such as at the European Patent Office, or patent litigation and other proceedings in a foreign court. If so, uncertainties resulting from the initiation and continuation of such proceedings could have a material adverse effect on our ability to compete in the market place. The cost of foreign adversarial proceedings can also be substantial, and in many foreign jurisdictions, the losing party must pay the attorney fees of the winning party.

Because of the extensive time required for development, testing and regulatory review of a potential product, it is possible that, before any of our drug candidates can be commercialized, any related patent may expire or remain in force for only a short period following commercialization of our drug candidates, thereby reducing any advantages of the patent. To the extent our drug candidates based on that technology are not commercialized significantly ahead of the date of any applicable patent, or to the extent we have no other patent protection on such drug candidates, those drug candidates would not be protected by patents, and we would then rely solely on other forms of exclusivity, such as regulatory exclusivity provided by the FDCA or trade secret protection.

As a result of our collaboration with Janssen, Janssen has received certain rights in our HCV patents which affect how our patents are prosecuted and litigated, and any lack of validity or enforceability of our patents licensed to Janssen, or third party competition, can affect our royalty income.

Under the Janssen Agreement, we have granted Janssen an exclusive, worldwide license to all of our intellectual property pertaining to odalasvir, sovalprevir and ACH-3422. Janssen is currently conducting a phase IIb clinical trial of a three drug combination for the treatment of HCV, which is denoted as JNJ-4178. Odalasvir, one of the HCV drug candidates we licensed to Janssen, is included in JNJ-4178. The other two drug candidates licensed to Janssen, ACH-3422 and sovalprevir, are not currently in clinical development. Janssen will pay us royalties on a country by country basis during the later of (i) the term during which we have a valid claim covering the product or where the market is protected by regulatory data exclusivity or (ii) ten years from first commercialization. If neither of these conditions exist in a country, our royalties will be reduced. Even if one of these conditions do exist, however, if there is generic competition in a country, Janssen can reduce our royalties in that country until the generic sales are abated. As only one of our licensed compounds, odalasvir, is currently in JNJ-4178, the determination of whether we have a valid claim covering the product will be based on patent coverage pertaining to odalasvir, its pharmaceutical composition or a method to use odalasvir to treat hepatitis C.

A patent working group which reports to the joint steering committee has been established to coordinate all prosecution and litigation activities. Under this arrangement, we will continue to prosecute the HCV patents owned by us, at Janssen's expense, and Janssen has primary responsibility for patent prosecution of all jointly created patent rights under the Janssen Agreement.

Janssen has the initial right to bring and control any enforcement actions under our and jointly owned patent rights, and thus we do not have the primary right to enforce our HCV patents. If Janssen declines to enforce a patent, then we have the right to do so at our expense. If Janssen or we do not elect to enforce a patent, our commercial market, and thus our product revenues, if any, can be negatively affected by third party competition. If the Janssen Agreement is terminated, we and Janssen shall each have the right to use joint patent rights without the consent of the other.

If we infringe or are alleged to infringe intellectual property rights of third parties, our business could be harmed.

Our research, development or commercialization activities, including any drug candidates or products resulting from these activities, may infringe or be claimed to infringe patents or other proprietary rights owned by third parties and to which we do not hold licenses or other rights. We may not be aware of third party patents that a third party might assert against us. For example, there may be third party applications that have been filed but not published that, if issued, could be asserted against us. If a patent infringement suit were brought against us, we could be forced to stop or delay research, development, manufacturing or sales of the drug or drug candidate that is the subject of the suit. Further, if we are found to have infringed a third-party patent, we could be obligated to pay royalties and/or other payments to the third party for the sale of our product, which may be substantial, or we could be enjoined from selling our product. We could also incur substantial litigation costs.

As the commercializing entity of our HCV candidates odalasvir, sovalprevir and ACH-3422, Janssen will be primarily responsible for handling any issues pertaining to asserted infringement by third parties of their patents through the development, offer for sale, sale, importation or exportation of these products in the U.S. and other countries. Under our Agreement, Janssen can offset part of the cost of any licenses with third parties required for commercialization against our royalties.

Litigation regarding patents, intellectual property, and other proprietary rights may be expensive and time consuming. If we are involved in such litigation, it could cause delays in bringing drug candidates to market and harm our ability to operate.

Our success will depend in part on our ability to operate without infringing the proprietary rights of third parties. Although we are not currently aware of any litigation or other proceedings or third-party claims of intellectual property infringement against us related to our drug candidates, the pharmaceutical industry is characterized by extensive litigation regarding patents and other intellectual property rights. Other parties may obtain patents in the future and allege that the use of our technologies infringes these patent claims or that we are employing their proprietary technology without authorization. Likewise, third parties may challenge or infringe upon our existing or future patents. Proceedings involving our patents or patent applications or those of others could result in adverse decisions regarding:

- the patentability of our inventions relating to our drug candidates; and/or
- the enforceability, validity or scope of protection offered by our patents relating to our drug candidates.

Even if we are successful in these proceedings, we may incur substantial costs and divert management time and attention in pursuing these proceedings, which could have a material adverse effect on us. If we are unable to avoid infringing the patent rights of others, we may be required to seek a license, defend an infringement action or challenge the validity of the patents in court. Patent litigation is costly and time consuming. We may not have sufficient resources to bring these actions to a successful conclusion. In addition, if we do not obtain a license, develop or obtain non-infringing technology, fail to defend an infringement action successfully or have infringed patents declared invalid, we may:

- incur substantial monetary damages;
- encounter significant delays in bringing our drug candidates to market; and/or
- be precluded from participating in the manufacture, use or sale of our drug candidates or methods of treatment requiring licenses.

Furthermore, 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. In addition, during the course of this kind of litigation, there could be public announcements of the results of hearings, motions or other interim proceedings or developments. If investors perceive these results to be negative, the market price for our common stock could be significantly harmed.

We may not be able to enforce our intellectual property rights throughout the world.

Filing, prosecuting and defending patents on our drug candidates in all countries throughout the world would be prohibitively expensive. The requirements for patentability may differ in certain countries, particularly in developing countries. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and, further, may export otherwise infringing products to territories where we may obtain patent protection, but where patent enforcement is not as strong as that in the United States. These products may compete with our products in jurisdictions where we do not have any issued or licensed patents and any future patent claims or other intellectual property rights may not be effective or sufficient to prevent them from so competing.

Moreover, our ability to protect and enforce our intellectual property rights may be adversely affected by changes in foreign intellectual property laws. Additionally, laws of some countries outside of the United States and Europe do not afford intellectual property protection to the same extent as the laws of the United States and Europe. Many companies have encountered significant problems in protecting and defending intellectual property rights in certain foreign jurisdictions. The legal systems of some countries, including India, China and other developing countries, may not favor the enforcement of our patents and other intellectual property rights.

This could make it difficult for us to stop the infringement of our patents or the misappropriation of our other intellectual property rights. A number of foreign countries have stated that they are willing to issue compulsory licenses to patents held by innovator companies on approved drugs to allow the government or one or more third party companies to sell the approved drug without the permission of the innovator patentee where the foreign government concludes it is in the public interest. India, for example, has used such a procedure to allow domestic companies to make and sell patented drugs without innovator approval. There is no guarantee that patents covering any of our drugs will not be subject to a compulsory license in a foreign country, or that we will have any influence over if or how such a compulsory license is granted. Further, in at least Brazil, the country allows its regulatory agency ANVISA to participate in the decision of whether to grant a drug patent in that country, including based not on whether the patent meets the requirements for a patent but whether such a patent is deemed in the country's interest. In addition, several other countries have created laws that make it more difficult to enforce drug patents than patents on other kinds of technologies. Further, under the treaty on the Trade-Related Aspects of Intellectual Property (TRIPS) as interpreted by the Doha Declaration, countries in which drugs are manufactured are required to allow exportation of the drug to a developing country that lacks adequate manufacturing capability. Therefore, our drug markets in the U.S. or foreign countries may be affected by the influence of current public policy on patent issuance, enforcement or involuntary licensing in the healthcare area.

We rely on our ability to stop others from competing by enforcing our patents, however some jurisdictions may require us to grant licenses to third parties. Such compulsory licenses could be extended to include some of our drug candidates, which may limit our potential revenue opportunities.

Many foreign countries have compulsory licensing laws under which a patent owner must grant licenses to third parties, in certain circumstances. For example, compulsory licensing, or the threat of compulsory licensing, of life-saving products and expensive products is becoming increasingly popular in developing countries, either through direct legislation or international initiatives. Compulsory licenses could be extended to include some of our drug candidates, if they receive marketing approval, which may limit our potential revenue opportunities. Consequently, we may not be able to prevent third parties from practicing our inventions in certain countries outside the United States and Europe. Competitors may also use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and, further, may export otherwise infringing products to territories where we have patent protection, if our ability to enforce our patents to stop infringing activities is inadequate. These products may compete with our products, and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing. Proceedings to enforce our patent rights in foreign jurisdictions, whether or not successful, could result in substantial costs and divert our efforts and resources from other aspects of our business. Furthermore, while we intend to protect our intellectual property rights in major markets for our products, 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 products. Accordingly, our efforts to protect our intellectual property rights in such countries may be inadequate.

In addition, some countries limit the enforceability of patents against government agencies or government contractors. In these countries, the patent owner may be limited to monetary relief and may be unable to enjoin infringement if a government is the infringer, which could materially diminish the value of the patent.

The rights we rely upon to protect our unpatented trade secrets may be inadequate.

We rely on unpatented trade secrets, know-how and technology, which are difficult to protect, especially in the pharmaceutical industry, where much of the information about a product must be made public during the regulatory approval process. We seek to protect trade secrets, in part, by entering into confidentiality agreements with employees, consultants and others. These parties may breach or terminate these agreements, or may refuse to enter into such agreements with us, and we may not have adequate remedies for such breaches. Furthermore, these agreements may not provide meaningful protection for our trade secrets or other proprietary information or result in the effective assignment to us of intellectual property, and may not provide an adequate remedy in the event of unauthorized use or disclosure of confidential information or other breaches of the agreements. Despite

our efforts to protect our trade secrets, we or our collaboration partners, board members, employees, consultants, contractors or scientific and other advisors may unintentionally or willfully disclose our proprietary information to competitors.

If we fail to maintain trade secret protection, our competitive position may be adversely affected. Competitors may also independently discover our trade secrets. Enforcement of claims that a third party has illegally obtained and is using trade secrets is expensive, time consuming and uncertain. If our competitors independently develop equivalent knowledge, methods and know-how, we would not be able to assert our trade secrets against them and our business could be harmed.

Confidentiality agreements with employees and others may not adequately prevent disclosure of trade secrets and other proprietary information and may not adequately protect our intellectual property.

We rely on trade secrets to protect our technology, especially where we do not believe patent protection is appropriate or obtainable. However, trade secrets are difficult to protect. To protect our proprietary technology and processes, we also rely in part on confidentiality and intellectual property assignment agreements with our corporate partners, employees, consultants, outside scientific collaborators and sponsored researchers and other advisors. These agreements may not effectively prevent disclosure of confidential information nor result in the effective assignment to us of intellectual property, and may not provide an adequate remedy in the event of unauthorized disclosure of confidential information or other breaches of the agreements. In addition, others may independently discover our trade secrets and proprietary information, and in such case we could not assert any trade secret rights against such party. Enforcing a claim that a party illegally obtained and is using our trade secrets is difficult, expensive and time consuming, and the outcome is unpredictable. In addition, courts outside the United States may be less willing to protect trade secrets. Costly and time-consuming litigation could be necessary to seek to enforce and determine the scope of our proprietary rights, and failure to obtain or maintain trade secret protection could adversely affect our competitive business position.

Risks Related to Employee Matters and Managing Growth

If we are not able to attract and retain key management, scientific personnel and advisors, we may not successfully develop our drug candidates or achieve our other business objectives.

We depend upon our senior management and scientific staff for our business success. All of our employment agreements with our senior management employees are terminable without notice by the employee. The loss of the service of any of the key members of our senior management may significantly delay or prevent the achievement of drug development and other business objectives. Our ability to attract and retain qualified personnel, consultants and advisors is critical to our success. We face intense competition for qualified individuals, particularly those experienced in discovering and developing complement inhibitor drug candidates, from numerous pharmaceutical and biotechnology companies, universities, governmental entities and other research institutions. We may be unable to attract and retain these individuals, and our failure to do so would adversely affect our business.

If we acquire or license technologies, resources or drug candidates, we will incur a variety of costs and may never realize benefits from the transaction.

If appropriate opportunities become available, we may license or acquire technologies, resources, drugs or drug candidates. We may never realize the anticipated benefits of such a transaction. In particular, due to the risks inherent in drug development, we may not successfully develop or obtain marketing approval for the drug candidates we acquire. Future licenses or acquisitions could result in potentially dilutive issuances of equity securities, the incurrence of debt, the creation of contingent liabilities, material impairment expenses related to goodwill, and impairment or amortization expenses related to other intangible assets, which could harm our financial condition.

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

Over time, we expect to experience significant growth in the number of our employees and the scope of our operations, particularly in the areas of drug manufacturing, regulatory affairs and sales, marketing and distribution. 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. Our management may need to devote a disproportionate amount of its attention to managing these growth activities. We may not be able to effectively manage the expansion of our operations or identify, recruit and train additional qualified personnel. Our inability to manage the expansion of our operations effectively 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 also require significant capital expenditures and may divert financial resources from other projects, such as the development of additional drug candidates. If we are unable to effectively manage our expected growth, our expenses may increase more than expected, our ability to generate revenues could be reduced and we may not be able to implement our business strategy, including the successful commercialization of our drug candidates.

Risks Related to Regulatory Approval and Marketing of Our Drug Candidates and Other Legal Compliance Matters

Even if we complete the necessary preclinical studies and clinical trials, the marketing approval process is expensive, time-consuming and uncertain and may prevent us from obtaining approvals for the commercialization of some or all of our drug candidates. If we or our collaborators are not able to obtain, or if there are delays in obtaining, required regulatory approvals, we or they will not be able to commercialize our drug candidates, and our ability to generate revenue will be materially impaired.

Our drug candidates and the activities associated with their development and commercialization, including their design, testing, manufacture, safety, efficacy, recordkeeping, labeling, storage, approval, advertising, promotion, sale and distribution, export and import, are subject to comprehensive regulation by the FDA and other regulatory agencies in the United States and by the European Medicines Agency and comparable regulatory authorities in other countries. Failure to obtain marketing approval for a drug candidate will prevent us from commercializing the drug candidate. We and our collaborators have not received approval to market any of our drug candidates from regulatory authorities in any jurisdiction. We have only limited experience in filing and supporting the applications necessary to gain marketing approvals and expect to rely on third-party contract research organizations to assist us in this process.

Securing marketing approval requires the submission of extensive preclinical and clinical data and supporting information to the various regulatory authorities for each therapeutic indication to establish the drug candidate's safety and efficacy. Securing regulatory approval also requires the submission of information about the product manufacturing process to, and inspection of manufacturing facilities by, the relevant regulatory authority. Our drug candidates may not be effective, may be only moderately effective or may prove to have undesirable or unintended side effects, toxicities or other characteristics that may preclude our obtaining marketing approval or prevent or limit commercial use.

The process of obtaining marketing approvals, both in the United States and abroad, is expensive, may take many years if additional clinical trials are required, if approval is obtained at all, and can vary substantially based upon a variety of factors, including the type, complexity and novelty of the drug candidates involved. Changes in marketing approval policies during the development period, changes in or the enactment of additional statutes or regulations, or changes in regulatory review for each submitted product application, may cause delays in the approval or rejection of an application. The FDA and comparable authorities in other countries have substantial discretion in the approval process and may refuse to accept any application or may decide that our data is insufficient for approval and require additional preclinical, clinical or other studies. In addition, varying interpretations of the data obtained from preclinical and clinical testing could delay, limit or prevent marketing

approval of a drug candidate. Any marketing approval we or our collaborators ultimately obtain may be limited or subject to restrictions or post-approval commitments that render the approved product not commercially viable.

Accordingly, if we or our collaborators experience delays in obtaining approval or if we or they fail to obtain approval of our drug candidates, the commercial prospects for our drug candidates may be harmed and our ability to generate revenues will be materially impaired.

Failure to obtain marketing approval in foreign jurisdictions would prevent our drug candidates from being marketed in such jurisdictions.

In order to market and sell our medicines in the European Union and many other jurisdictions, we or our third party collaborators must obtain separate marketing approvals and comply with numerous and varying regulatory requirements. The approval procedure varies among countries and can involve additional testing. The time required to obtain approval may differ substantially from that required to obtain FDA approval. The regulatory approval process outside the United States generally includes all of the risks associated with obtaining FDA approval. In addition, in many countries outside the United States, a product must be approved for reimbursement before the product can be approved for sale in that country. We or our third party collaborators may not obtain approvals from regulatory authorities outside the United States on a timely basis, if at all. Approval by the FDA does not ensure approval by regulatory authorities in other countries or jurisdictions, and approval by one regulatory authority outside the United States does not ensure approval by regulatory authorities in other countries or jurisdictions or by the FDA. We may not be able to file for marketing approvals and may not receive necessary approvals to commercialize our products in any market.

We, or any future collaborators, may not be able to obtain orphan drug designation or orphan drug exclusivity for our drug candidates in United States, European Union or other markets and, even if we do, that exclusivity may not prevent the FDA, EMA or other regulatory authorities from approving other competing products.

Regulatory authorities in some jurisdictions, including the United States and Europe, may designate drugs for relatively small patient populations as orphan drugs. Under the Orphan Drug Act, the FDA may designate a product as an orphan drug if it is a drug intended to treat a rare disease or condition, which is generally defined as a patient population of fewer than 200,000 individuals annually in the United States. We, or any future collaborators, may seek orphan drug designations for other drug candidates and may be unable to obtain such designations.

Even if we, or any future collaborators, obtain orphan drug designation for a drug candidate, we, or they, may not be able to obtain orphan drug exclusivity for that drug candidate. Generally, a product with orphan drug designation only becomes entitled to orphan drug exclusivity if it receives the first marketing approval for the indication for which it has such designation, in which case the FDA or the EMA will be precluded from approving another marketing application for the same drug for that indication for the applicable exclusivity period. The applicable exclusivity period is seven years in the United States and 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. Additionally, in the European Union, the orphan designation for a drug is reevaluated at the time of request for marketing authorization to verify whether it can maintain its status as an orphan drug and there is a risk that any orphan designation may not be maintained. Orphan drug exclusivity may be lost if the FDA or the EMA determines that the request for designation was materially defective or if the manufacturer is unable to assure sufficient quantity of the drug to meet the needs of patients with the rare disease or condition.

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 can be approved for the same

condition. Even after an orphan drug is approved, the FDA can subsequently approve the same drug 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.

Fast track designation by the FDA or other regulatory acceleration options may not actually lead to a faster development or regulatory review or approval process and does not assure approval.

If a drug is intended for the treatment of a serious or life threatening condition and the drug demonstrates the potential to address unmet medical need for this condition, the drug sponsor may apply for FDA fast track designation. However, fast track designation does not ensure that the drug sponsor will receive marketing approval or that approval will be granted within any particular timeframe. We may seek fast track designation for one or more of our drug candidates. If we do seek fast track designation, we may not experience a faster development process, review or approval compared to conventional FDA procedures. In addition, the FDA may withdraw fast track designation if it believes that the designation is no longer supported by data from our clinical development program. Fast track designation alone does not guarantee qualification for the FDA's priority review procedures.

Priority review designation by the FDA or similar classifications by other regulatory authorities may not lead to a faster regulatory review or approval process and, in any event, does not assure approval.

If the FDA determines that a drug candidate offers major advances in treatment or provides a treatment where no adequate therapy exists, the FDA may designate the drug candidate for priority review. For all new molecular entity (NME) new drug applications, a priority review designation means that the goal for the FDA to act on the NDA is 8 months from the date of submission, rather than the standard 12 months. For subsequent applications (e.g., sNDAs), a priority review designation means that the goal for the FDA to review an application is six months, rather than the standard review period of ten months. We may request priority review for our drug candidates. The FDA has broad discretion with respect to whether or not to grant priority review status to a drug candidate, so even if we believe a particular drug candidate is eligible for such designation or status, the FDA may decide not to grant it. Moreover, a priority review designation does not necessarily mean a faster regulatory review process or necessarily confer any advantage with respect to approval compared to conventional FDA procedures. Receiving priority review from the FDA does not guarantee approval within the eight-month or six-month clock or thereafter.

Even if we, or any current or future collaborators, obtain marketing approvals for our drug candidates, the terms of approvals and ongoing regulation of our products may limit how we, or they, manufacture and market our products, which could materially impair our ability to generate revenue.

Once marketing approval has been granted, an approved product and its manufacturer and marketer are subject to ongoing review and extensive regulation. We, and any current or future collaborators, must therefore comply with requirements concerning advertising and promotion for any of our drug candidates for which we or they obtain marketing approval. Promotional communications with respect to prescription drugs are subject to a variety of legal and regulatory restrictions and must be consistent with the information in the product's approved labeling. Thus, we and any current or future collaborators will not be able to promote any products we develop for indications or uses for which they are not approved.

In addition, manufacturers of approved products and those manufacturers' facilities are required to comply with extensive FDA requirements, including ensuring that quality control and manufacturing procedures conform to cGMPs, which include requirements relating to quality control and quality assurance as well as the corresponding maintenance of records and documentation and reporting requirements. We, our contract manufacturers, any current or future collaborators and their contract manufacturers could be subject to periodic unannounced inspections by the FDA to monitor and ensure compliance with cGMPs.

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Accordingly, assuming we, or any current or future collaborators, receive marketing approval for one or more of our drug candidates, we, and any current or future collaborators, and our and their contract manufacturers will continue to expend time, money and effort in all areas of regulatory compliance, including manufacturing, production, product surveillance and quality control.

If we, and any current or future collaborators, are not able to comply with post-approval regulatory requirements, we, and any current or future collaborators, could have the marketing approvals for our products withdrawn by regulatory authorities and our, or any current or future collaborators', ability to market any products could be limited, which could adversely affect our ability to achieve or sustain profitability. Further, the cost of compliance with post-approval regulations may have a negative effect on our operating results and financial condition.

Any drug candidate for which we or our collaborators obtain marketing approval could be subject to restrictions or withdrawal from the market and we may be subject to substantial penalties if we fail to comply with regulatory requirements or if we experience unanticipated problems with our drug candidates, when and if any of them are approved.

Any drug candidate for which we or our collaborators obtain marketing approval, along with the manufacturing processes, post-approval clinical data, labeling, advertising and promotional activities for such product, will be subject to continual requirements of and review by the FDA and other regulatory authorities. These requirements include submissions of safety and other post-marketing information and reports, registration and listing requirements, cGMP requirements relating to quality control and manufacturing, quality assurance and corresponding maintenance of records and documents, and requirements regarding the distribution of samples to physicians and recordkeeping. Even if marketing approval of a drug candidate is granted, the approval may be subject to limitations on the indicated uses for which the product may be marketed or to the conditions of approval, or contain requirements for costly post-marketing testing and surveillance to monitor the safety or efficacy of the medicine, including the requirement to implement a risk evaluation and mitigation strategy.

The FDA and other agencies, including the Department of Justice, or the DOJ, closely regulate and monitor the post-approval marketing and promotion of products to ensure that they are marketed and distributed only for the approved indications and in accordance with the provisions of the approved labeling. The FDA and DOJ impose stringent restrictions on manufacturers' communications regarding off-label use and if we do not market our products for their approved indications, we may be subject to enforcement action for off-label marketing. Violations of the Federal Food, Drug, and Cosmetic Act and other statutes, including the False Claims Act, relating to the promotion and advertising of prescription drugs may lead to investigations and enforcement actions 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, or failure to comply with regulatory requirements, may yield various results, including:

- restrictions on such products, manufacturers or manufacturing processes;
- restrictions on the labeling or marketing of a product;
- restrictions on distribution or use of a product;
- requirements to conduct post-marketing studies or clinical trials;
- warning letters or untitled letters;
- withdrawal of the products from the market;
- refusal to approve pending applications or supplements to approved applications that we submit;

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- recall of products;
- damage to relationships with any potential collaborators;
- unfavorable press coverage and damage to our reputation;
- 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;
- injunctions or the imposition of civil or criminal penalties; and
- litigation involving patients using our products.

Non-compliance with U.S. and European Union requirements regarding safety monitoring or pharmacovigilance, and with requirements related to the development of products for the pediatric population, can also result in significant financial penalties. Similarly, failure to comply with the European Union's requirements regarding the protection of personal information can also lead to significant penalties and sanctions.

Our relationships with healthcare providers, physicians and third party payors will be subject to applicable anti-kickback, fraud and abuse and other healthcare laws and regulations, which, in the event of a violation, could expose us to criminal sanctions, civil penalties, contractual damages, reputational harm and diminished profits and future earnings.

Healthcare providers, physicians and third party payors will play a primary role in the recommendation and prescription of any drug candidates for which we obtain marketing approval. Our future arrangements with healthcare providers, physicians and third party payors may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we market, sell and distribute any products for which we obtain marketing approval. Restrictions under applicable federal and state healthcare laws and regulations include the following:

- the federal Anti-Kickback Statute prohibits, among other things, persons from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward, or in return for, either the referral of an individual for, or the purchase, order or recommendation or arranging of, any good or service, for which payment may be made under a federal healthcare program such as Medicare and Medicaid;
- the federal False Claims Act imposes criminal and civil penalties, including through civil whistleblower or qui tam actions, against individuals or entities for, among other things, knowingly presenting, or causing to be presented, false or fraudulent claims for payment by a federal healthcare program or making a false statement or record material to payment of a false claim or avoiding, decreasing or concealing an obligation to pay money to the federal government, with potential liability including mandatory treble damages and significant per-claim penalties, currently set at \$10,781 to \$21,563 per false claim;
- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, imposes criminal and civil liability for executing a scheme to defraud any healthcare benefit program or making false statements relating to healthcare matters;
- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act and its implementing regulations, also imposes obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information;

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- the federal Physician Payments Sunshine Act requires applicable manufacturers of covered drugs to annually report to CMS (i) payments and other transfers of value to physicians and teaching hospitals, and (ii) certain physician ownership or investment interests; and
- analogous state and foreign laws and regulations, such as state anti-kickback and false claims laws and transparency statutes, may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by third party payors, including private insurers.

Some state laws require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government and may require drug manufacturers to report information related to payments and other transfers of value to other healthcare providers and healthcare entities, or marketing expenditures. State and foreign laws also govern the privacy and security of health information in some circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

If our operations are found to be in violation of any of the laws described above or any governmental regulations that apply to us, we may be subject to penalties, including civil and criminal penalties, damages, fines, individual imprisonment, integrity obligations, and the curtailment or restructuring of our operations. Any penalties, damages, fines, individual imprisonment, integrity obligations, exclusion from funded healthcare programs, or curtailment or restructuring of our operations could adversely affect our financial results. We are developing and implementing a corporate compliance program designed to ensure that we will market and sell any future products that we successfully develop from our drug candidates in compliance with all applicable laws and regulations, but we cannot guarantee that this program will protect us from governmental investigations or other actions or lawsuits stemming from a failure to be in compliance with such laws or regulations. 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, including the imposition of significant fines or other sanctions.

Efforts to ensure that our business arrangements with third parties will comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities will conclude that our business practices may not comply with current or future statutes, regulations 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 these laws or any other governmental regulations that may apply to us, we may be subject to significant civil, criminal and administrative penalties, damages, fines, individual imprisonment, integrity obligations, exclusion from government funded healthcare programs, such as Medicare and Medicaid, and the curtailment or restructuring of our operations. If any of the physicians or other healthcare providers or entities with whom we expect to do business is found to be not in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusion from government funded healthcare programs.

Current and future legislation may increase the difficulty and cost for us and any collaborators to obtain marketing approval of our other drug candidates and affect the prices we, or they, may obtain.

In the United States and some foreign jurisdictions, there have been a number of legislative and regulatory changes and proposed changes regarding the healthcare system that could, among other things, prevent or delay marketing approval of our other drug candidates, restrict or regulate post-approval activities and affect our ability, or the ability of any collaborators, to profitably sell any products for which we, or they, obtain marketing approval. We expect that current laws, as well as other healthcare reform measures that may be adopted in the future, may result in more rigorous coverage criteria and in additional downward pressure on the price that we, or any collaborators, may receive for any approved products.

For example, in March 2010, President Obama signed into law the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act, or collectively the ACA. In January 2017, Congress voted to adopt a budget resolution for fiscal year 2017, or the Budget Resolution, that

authorizes the implementation of legislation that would repeal portions of the ACA. The Budget Resolution is not a law, however, it is widely viewed as the first step toward the passage of legislation that would repeal certain aspects of the ACA. Further, on January 20, 2017, President Trump signed an Executive Order directing federal agencies with authorities and responsibilities under the ACA to waive, defer, grant exemptions from, or delay the implementation of any provision of the ACA that would impose a fiscal or regulatory burden on states, individuals, healthcare providers, health insurers, or manufacturers of pharmaceuticals or medical devices. Congress also could consider subsequent legislation to replace elements of the ACA that are repealed.

Other legislative changes have been proposed and adopted since the ACA was enacted. These changes include the Budget Control Act of 2011, which, among other things, led to aggregate reductions to Medicare payments to providers of up to 2% per fiscal year that started in 2013 and, due to subsequent legislation, will continue until 2025. In addition, the American Taxpayer Relief Act of 2012, among other things, reduced Medicare payments to several providers and increased the statute of limitations period for the government to recover overpayments to providers from three to five years. These new laws may result in additional reductions in Medicare and other healthcare funding and otherwise affect the prices we may obtain for any of our drug candidates for which regulatory approval is obtained.

We expect that other healthcare reform measures that may be adopted in the future, may result in additional reductions in Medicare and other healthcare funding, more rigorous coverage criteria, new payment methodologies and in additional downward pressure on the price that we receive for any approved product. Any reduction in reimbursement from Medicare or other government programs may result in a similar reduction in payments from private payors. The implementation of cost containment measures or other healthcare reforms may prevent us from being able to generate revenue, attain profitability, or commercialize our products.

In addition, with the new Administration and Congress, there will likely be additional legislative changes, including repeal and replacement of certain provisions of the ACA. It remains to be seen, however, precisely what the new legislation will provide, when it will be enacted and what impact it will have on the availability of healthcare and containing or lowering the cost of healthcare. Such reforms could have an adverse effect on anticipated revenue from product candidates that we may successfully develop and for which we may obtain marketing approval and may affect our overall financial condition and ability to develop product candidates.

Moreover, legislative and regulatory proposals have been made to expand post-approval requirements and restrict sales and promotional activities for pharmaceutical products. We cannot be sure whether additional legislative changes will be enacted, or whether the FDA regulations, guidance or interpretations will be changed, or what the impact of such changes on the marketing approvals of our drug candidates, if any, may be. In addition, increased scrutiny by the United States Congress of the FDA's approval process may significantly delay or prevent marketing approval, as well as subject us and any collaborators to more stringent product labeling and post-marketing testing and other requirements.

Laws and regulations governing any international operations we may have in the future may preclude us from developing, manufacturing and selling certain products outside of the United States and require us to develop and implement costly compliance programs.

If we expand our operations outside of the United States, we must dedicate additional resources to comply with numerous laws and regulations in each jurisdiction in which we plan to operate. The Foreign Corrupt Practices Act, or FCPA, prohibits any U.S. individual or business from paying, offering, authorizing payment or offering of anything of value, directly or indirectly, to any foreign official, political party or candidate for the purpose of influencing any act or decision of the foreign entity in order to assist the individual or business in obtaining or retaining business. The FCPA also obligates companies whose securities are listed in the United States to comply with certain accounting provisions requiring the company to maintain books and records that accurately and fairly reflect all transactions of the corporation, including international subsidiaries, and to devise and maintain an adequate system of internal accounting controls for international operations.

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Compliance with the FCPA is expensive and difficult, particularly in countries in which corruption is a recognized problem. In addition, the FCPA presents particular challenges in the pharmaceutical industry, because, in many countries, hospitals are operated by the government, and doctors and other hospital employees are considered foreign officials. Certain payments to hospitals in connection with clinical trials and other work have been deemed to be improper payments to government officials and have led to FCPA enforcement actions.

Various laws, regulations and executive orders also restrict the use and dissemination outside of the United States, or the sharing with certain non-U.S. nationals, of information classified for national security purposes, as well as certain products and technical data relating to those products. If we expand our presence outside of the United States, it will require us to dedicate additional resources to comply with these laws, and these laws may preclude us from developing, manufacturing, or selling certain products and drug candidates outside of the United States, which could limit our growth potential and increase our development costs.

The failure to comply with laws governing international business practices may result in substantial civil and criminal penalties and suspension or debarment from government contracting. The Securities and Exchange Commission, or SEC, also may suspend or bar issuers from trading securities on U.S. exchanges for violations of the FCPA's accounting provisions.

If we fail to comply with environmental, health and safety laws and regulations, we could become subject to fines or penalties or incur costs that could have a material adverse effect on our business.

We are subject to numerous environmental, health and safety laws and regulations, including those governing laboratory procedures and the handling, use, storage, treatment and disposal of hazardous materials and wastes. From time to time and in the future, our operations may involve the use of hazardous and flammable materials, including chemicals and biological materials, and may also produce hazardous waste products. Even if we contract with third parties for the disposal of these materials and waste products, we cannot completely eliminate the risk of contamination or injury resulting from these materials. In the event of contamination or injury resulting from the use or disposal of our hazardous materials, we could be held liable for any resulting damages, and any liability could exceed our resources. We also could incur significant costs associated with civil or criminal fines and penalties for failure to comply with such laws and regulations.

We maintain workers' compensation insurance to cover us for costs and expenses we may incur due to injuries to our employees resulting from the use of hazardous materials, but this insurance may not provide adequate coverage against potential liabilities. However, we do not maintain insurance for environmental liability or toxic tort claims that may be asserted against us.

In addition, we may incur substantial costs in order to comply with current or future environmental, health and safety laws and regulations. Current or future environmental laws and regulations may impair our research, development or production efforts, which could adversely affect our business, financial condition, results of operations or prospects. In addition, failure to comply with these laws and regulations may result in substantial fines, penalties or other sanctions.

Governments outside the United States tend to impose strict price controls, which may adversely affect our revenues, if any.

In some countries, such as the countries of the European Union, the pricing of prescription pharmaceuticals is subject to governmental control and access. In these countries, pricing negotiations with governmental authorities can take considerable time after the receipt of marketing approval for a product. To obtain reimbursement or pricing approval in some countries, we, or any current or future collaborators, may be required to conduct a clinical trial that compares the cost-effectiveness of our product to other available therapies. If reimbursement of our products is unavailable or limited in scope or amount, or if pricing is set at unsatisfactory levels, our business could be materially harmed.

Our employees may engage in misconduct or other improper activities, including non-compliance with regulatory standards and requirements, which could cause significant liability for us and harm our reputation.

We are exposed to the risk of employee fraud or other misconduct, including intentional failures to comply with FDA regulations or similar regulations of comparable non-U.S. regulatory authorities, provide accurate information to the FDA or comparable non-U.S. regulatory authorities, comply with manufacturing standards we have established, comply with federal and state healthcare fraud and abuse laws and regulations and similar laws and regulations established and enforced by comparable non-U.S. regulatory authorities, report financial information or data accurately or disclose unauthorized activities to us. Employee misconduct could also involve the improper use of information obtained in the course of clinical trials, which could result in regulatory sanctions and serious harm to our reputation. It is not always possible to identify and deter employee misconduct, 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 be in compliance with such laws, standards or regulations. 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 fines or other sanctions.

Risks Related to Our Common Stock

Our executive officers, directors and principal stockholders have the ability to control all matters submitted to our stockholders for approval, which could have the effect of delaying, deferring or preventing a change in control of us and entrenching our management or board of directors.

As of February 20, 2017, our directors, executive officers and stockholders who own more than 5% of our outstanding common stock, together with their affiliates and related persons, beneficially owned, in the aggregate, greater than approximately 50% of our outstanding common stock. As a result, if these stockholders were to choose to act together, they would be able to control all matters submitted to our stockholders for approval, including the election and removal of directors and any merger, consolidation, sale of all or substantially all of our assets or similar transaction, as well as our management and affairs. The interests of this group of stockholders may not always coincide with our corporate interests or the interest of other stockholders, and they may act in a manner with which you may not agree or that may not be in the best interests of other stockholders. This concentration of voting power may have the effect of delaying, deferring or preventing a change in control of our company on terms that other stockholders may desire and entrenching our management or board or directors.

Our stock price has been and may in the future be volatile, and the market price of our common stock may decline in value in the future.

The market price of our common stock has fluctuated in the past and is likely to fluctuate in the future. During the period from January 1, 2009 to December 31, 2016, our stock price has ranged from a low of \$0.70 to a high of \$16.87. Market prices for securities of early stage pharmaceutical, biotechnology and other life sciences companies have historically been particularly volatile. Some of the factors that may cause the market price of our common stock to fluctuate include:

- the results of current and planned clinical trials of our drug candidates including our complement factor D drug candidates and our HCV drug candidates being developed by Janssen under an exclusive license of our entire HCV program to Janssen;
- the timing and amount of proceeds received from milestones achieved and royalties earned, if any, by us under the Janssen Agreement;
- the results of clinical trials conducted by others on drugs that would compete with our drug candidates;

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- the announcements of those data, particularly at high profile medical meetings, and the investment community’s perception of and reaction to those data;
- the entry into, modification of, or termination of key agreements, or any new collaboration agreement we may enter;
- market expectations about the timeliness of our entry into, or failure to enter, collaboration arrangements with third parties;
- the results of regulatory reviews and actions relating to the approval of our drug candidates;
- our failure to obtain patent protection for any of our drug candidates or the issuance of third-party patents that cover our drug candidates;
- the initiation of, material developments in, or conclusion of litigation;
- failure of any of our drug candidates, if approved, to achieve commercial success;
- general and industry-specific economic conditions that may affect our business, financial condition and operations, including without limitation research and development expenditures;
- the launch of drugs by others that would compete with our drug candidates;
- the failure or discontinuation of any of our research programs;
- issues in manufacturing our drug candidates or any approved products;
- the introduction of technological innovations or new commercial products by us or our competitors;
- changes in estimates or recommendations by securities analysts, if any, who cover our common stock;
- future sales of our common stock by us, our insiders or other stockholders;
- changes in the structure of health care payment systems;
- period-to-period fluctuations in our financial results;
- low trading volume of our common stock; and
- the other factors described in this “Risk Factors” section.

In addition, if we fail to reach an important research, development or commercialization milestone or result by a publicly expected deadline, even if by only a small margin, there could be significant impact on the market price of our common stock. Additionally, as we approach the announcement of important clinical data or other significant information and as we announce such results and information, we expect the price of our common stock to be particularly volatile, and negative results would have a substantial negative impact on the price of our common stock.

The stock markets in general have experienced substantial volatility that has often been unrelated to the operating performance of individual companies. These broad market fluctuations may adversely affect the trading price of our common stock. In the past, following periods of volatility in the market price of a company’s securities, stockholders have often instituted class action securities litigation against those companies. Such litigation, if instituted, could result in substantial costs and diversion of management attention and resources, which could significantly harm our business operations and reputation. For example, we, and certain of our current and former officers, were named as defendants in a consolidated class action lawsuit following our announcements regarding the FDA’s clinical hold related to sovalprevir, our clinical-stage drug candidate for the treatment of chronic hepatitis C viral infection. On May 5, 2014, without any settlement payment by us, any individual defendant or any third party on their behalf, the lead plaintiffs in the consolidated class action lawsuit voluntarily dismissed all of their claims without prejudice.

Sales of a substantial number of shares of our common stock in the public market could cause the market price of our common stock to drop significantly.

Certain stockholders hold a substantial number of shares of our common stock. If such stockholders sell, or indicate an intention to sell, substantial amounts of our common stock in the public market, the trading price of our common stock could decline. JJDC, which owns, as of February 20, 2017, approximately 13% of our common stock, has the right, until July 1, 2023, to require us, under specified conditions, to file a registration statement in order to register all or a portion of the shares held by JJDC. We have also agreed to provide JJDC with certain “piggyback” registration rights such that at any time prior to July 1, 2023, subject to specified conditions, whenever we propose to register shares of our common stock for our own account, JJDC will have the right to include some or all of its shares in such registration. Immediately following the filing of this Form 10-K, we anticipate filing a registration statement with the SEC to register all of the shares of our common stock held by JJDC. We have entered into a lock-up agreement with JJDC pursuant to which JJDC has agreed that, subject to certain exceptions, it will not, and will also cause its affiliates not to, without our prior approval, sell, transfer or otherwise dispose of the shares of our common stock owned by it until the earlier of (1) January 31, 2018, or (2) such date that is 60 days after the first public announcement of top-line clinical results from Janssen’s on-going OMEGA-1 phase 2b clinical trial. Any waiver by us of the restrictions set forth in this lock-up agreement; any sales of our common stock by JJDC after this lock-up agreement lapses; or any other sale of a substantial number of shares of our common stock by any of our other stockholders, none of whom are subject to a lock-up agreement, could have a material adverse effect on the trading price of our common stock.

Unstable market and economic conditions may have serious adverse consequences on our business.

Our general business strategy may be adversely affected by economic downturns and volatile business environments and continued unpredictable and unstable market conditions. If the current equity and credit markets deteriorate further, or do not improve, it may make any necessary debt or equity financing more difficult, more costly, and more dilutive. Failure to secure any necessary financing in a timely manner and on favorable terms could have a material adverse effect on our growth strategy, financial performance and stock price and could require us to delay or abandon clinical development plans. In addition, there is a risk that one or more of our current service providers, manufacturers and other partners may not survive these difficult economic times, which would directly affect our ability to attain our operating goals on schedule and on budget.

Our management is required to devote substantial time and incur additional expense to comply with public company regulations. Our failure to comply with such regulations could subject us to public investigations, fines, enforcement actions and other sanctions by regulatory agencies and authorities and, as a result, our stock price could decline in value.

As a public company, the Sarbanes-Oxley Act of 2002 and the related rules and regulations of the SEC, as well as the rules of the NASDAQ Global Select Market, have required us to implement additional corporate governance practices and adhere to a variety of reporting requirements and complex accounting rules. Compliance with these public company obligations places significant additional demands on our limited number of finance and accounting staff and on our financial, accounting and information systems.

In particular, as a public company, our management is required to conduct an annual evaluation of our internal controls over financial reporting and include a report of management on our internal controls in our Annual Reports on Form 10-K. If we are unable to continue to conclude that we have effective internal controls over financial reporting or, if our independent registered public accounting firm are unable to provide us with an attestation and an unqualified report as to the effectiveness of our internal controls over financial reporting, investors could lose confidence in the reliability of our financial statements, which could result in a decrease in the value of our common stock.

Because we do not anticipate paying any cash dividends on our capital stock in the foreseeable future, capital appreciation, if any, will be stockholders' sole source of gain.

We have never declared or paid cash dividends on our capital stock. We anticipate that we will retain our earnings, if any, for future growth and therefore do not anticipate paying cash dividends in the future. As a result, only appreciation of the price of our common stock will provide a return to stockholders.

Provisions in our corporate charter documents and under Delaware law could make an acquisition of us, 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 corporate charter and our bylaws may discourage, delay or prevent a merger, acquisition or other change in control of us that stockholders may consider favorable, including transactions in which a stockholder might otherwise receive a premium for his or her 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:

- establish a classified board of directors such that all members of the board are not elected at one time;
- allow the authorized number of our directors to be changed only by resolution of our board of directors;
- limit the manner in which stockholders can remove directors from the board;
- establish advance notice requirements for nominations for election to the board of directors or for proposing matters that can be acted on at stockholder meetings;
- require that stockholder actions must be effected at a duly called stockholder meeting and prohibit actions by our stockholders by written consent;
- limit who may call a special meeting of stockholder meetings;
- authorize our board of directors to issue preferred stock without stockholder approval, which could be used to institute a "poison pill" that would work to dilute the stock ownership of a potential hostile acquirer, effectively preventing acquisitions that have not been approved by our board of directors; and
- require the approval of the holders of at least 75% of the votes that all our stockholders would be entitled to cast to amend or repeal certain provisions of our charter or bylaws.

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. This could discourage, delay or prevent someone from acquiring us or merging with us, whether or not it is desired by, or beneficial to, our stockholders.

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ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We currently lease approximately 41,509 square feet of laboratory and office space in New Haven, Connecticut, which we occupy under a lease expiring in March 2020. We believe our existing facilities are adequate for our current needs and that additional space will be available in the future on commercially reasonable terms as needed.

ITEM 3. LEGAL PROCEEDINGS

None.

ITEM 4. MINE SAFETY DISCLOSURES

None.

PART II

ITEM 5. MARKET FOR REGISTRANT’S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Market Information

Our common stock trades on the NASDAQ Global Select Market under the symbol “ACHN”. The following table sets forth the high and low sale prices per share for our common stock, as reported on the NASDAQ Global Select Market for the periods indicated:

	<u>High</u>	<u>Low</u>
2015		
First Quarter	\$ 16.54	\$9.75
Second Quarter	\$ 11.05	\$8.13
Third Quarter	\$ 9.62	\$6.46
Fourth Quarter	\$ 10.95	\$6.41
2016		
First Quarter	\$ 10.66	\$5.57
Second Quarter	\$ 10.06	\$7.48
Third Quarter	\$ 9.49	\$7.36
Fourth Quarter	\$ 8.25	\$3.78

Information regarding our equity compensation plans and the securities authorized for issuance thereunder is set forth in Item 12 below.

Holders of record

As of the close of business on February 15, 2017, there were approximately 68 holders of record of our common stock. The number of record holders may not be representative of the number of beneficial owners because many of the shares of our common stock are held by depositories, brokers or other nominees.

Dividends

We have never paid or declared any cash dividends on our common stock. We currently intend to retain any earnings for future growth and, therefore, do not expect to pay cash dividends in the foreseeable future.

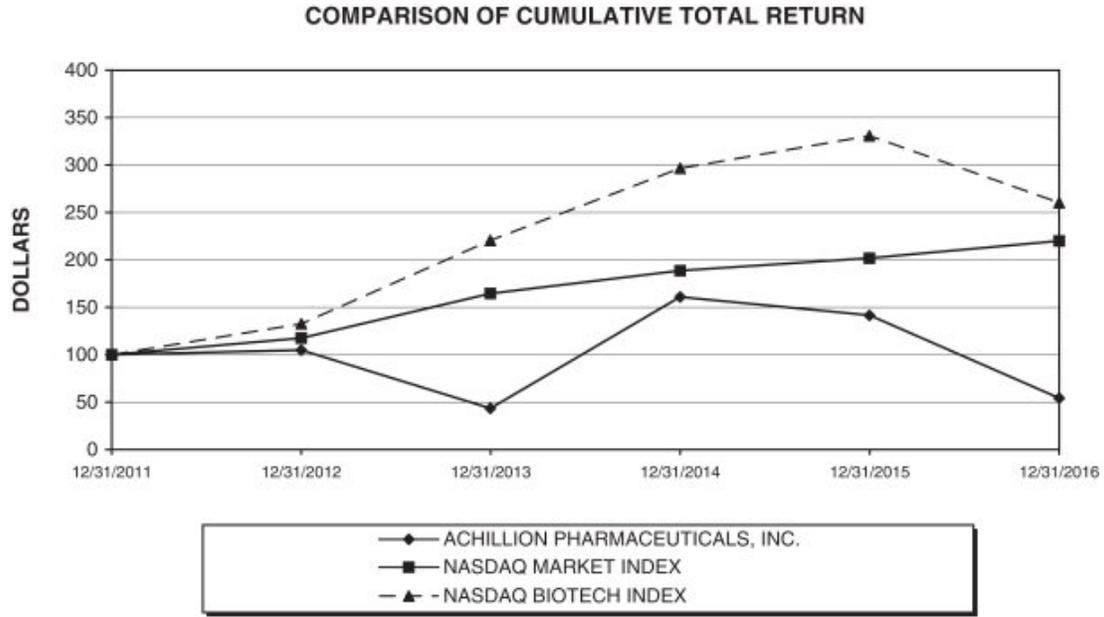
Issuer Purchases of Equity Securities

Neither we nor any affiliated purchaser or anyone acting on behalf of us or an affiliated purchaser made any purchases of shares of our common stock in the fourth quarter of 2016.

Comparative Stock Performance

The following graph and related information should not be deemed “soliciting material” or to be “filed” with the SEC for purposes of Section 18 of the Exchange Act, nor shall such information be incorporated by reference into any future filing under the Securities Act or Exchange Act, except to the extent that we specifically incorporate it by reference into such filing.

The following graph compares the cumulative total stockholder return on our common stock from December 31, 2011 to December 31, 2016 with the cumulative total return of (i) the NASDAQ Market Index and (ii) the NASDAQ Biotechnology Index. This graph assumes the investment of \$100.00 after the market closed on December 31, 2011 in our common stock, and in the NASDAQ Market Index and the NASDAQ Biotechnology Index, and it assumes any dividends are reinvested. The stock price performance included in this graph is not necessarily indicative of future stock price performance.



ASSUMES \$100 INVESTED ON JAN. 01, 2012
ASSUMES DIVIDEND REINVESTED
FISCAL YEAR ENDING DEC. 31, 2016

ITEM 6. SELECTED FINANCIAL DATA

The following selected financial data should be read together with the information under “Management’s Discussion and Analysis of Financial Condition and Results of Operations” and our financial statements and the notes to those financial statements included elsewhere in this Annual Report on Form 10-K. The selected statement of comprehensive loss data for the years ended December 31, 2016, 2015 and 2014 and balance sheet data as of December 31, 2016 and 2015 set forth below have been derived from our audited financial statements included elsewhere in this Annual Report on Form 10-K. The selected statement of comprehensive loss data for the years ended December 31, 2013 and 2012 and balance sheet data as of December 31, 2014, 2013 and 2012 set forth below have been derived from the audited financial statements for such years not included in this Annual Report on Form 10-K. The historical results presented here are not necessarily indicative of future results.

	Years Ended December 31,				
	2016	2015	2014	2013	2012
	(in thousands, except per share amounts)				
Statement of Comprehensive Loss Data:					
Total revenue (1)	\$ 15,000	\$ 66,122	\$ —	\$ —	\$ 2,607
Research and development	59,162	56,553	53,515	46,736	38,999
General and administrative	20,703	24,676	15,911	12,741	10,901
Total operating expenses	79,865	81,229	69,426	59,477	49,900
Loss from operations	(64,865)	(15,107)	(69,426)	(59,477)	(47,293)
Interest income (expense), net	3,159	1,188	418	530	166
Net loss	(61,706)	(5,030)	(69,008)	(58,947)	(47,127)
Net loss per share—basic and diluted	\$ (0.45)	\$ (0.04)	\$ (0.70)	\$ (0.63)	\$ (0.64)
Weighted average number of shares outstanding—basic and diluted	136,667	125,592	98,367	93,983	73,965
	As of December 31,				
	2016	2015	2014	2013	2012
Balance Sheet Data:					
Cash and cash equivalents (1)(2)	\$ 77,261	\$ 81,725	\$ 73,664	\$ 33,457	\$ 18,526
Short-term marketable securities (1)(2)	286,558	377,616	79,215	88,393	46,884
Long-term marketable securities	27,657	—	—	36,139	12,008
Working capital	368,564	447,930	141,816	115,379	58,731
Total assets	413,875	464,525	156,807	162,417	81,530
Long-term liabilities	450	231	279	56	347
Total liabilities	14,421	14,889	13,338	9,459	9,483
Total stockholders’ equity	399,454	449,636	143,469	152,958	72,047

In addition to the following notes, see “Item 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations” and the Consolidated Financial Statements and accompanying notes and previously filed Annual Reports on Form 10-K for further information regarding our results of operations and financial position for periods reported therein.

(1) In May 2015, we entered into an exclusive collaboration and license agreement with Janssen, and its affiliate, Johnson & Johnson Innovation-JJDC, Inc., or JJDC, which we refer to as the Janssen Agreement, for the further clinical advancement of a portfolio of antivirals we discovered and developed for the treatment of HCV. In addition, upon the closing of the transactions contemplated by the Janssen Agreement, we entered into a stock purchase agreement with JJDC. Pursuant to the JJDC Stock Purchase Agreement, on July 1, 2015, we issued 18,367,346 shares of common stock to JJDC at a price of \$12.25 per share for an aggregate purchase price of \$225 million. We recorded revenue of \$66.1 million during the year ended December 31, 2015 associated with this transaction. We also recorded revenue of \$15.0 million during the year ended December 31, 2016 related to

the achievement of a clinical enrollment milestone under the Janssen Agreement. Also refer to footnote 5 in our Notes to the Financial Statements.

(2) In February 2015, we entered into an underwriting agreement with Leerink Partners LLC and Deutsche Bank Securities Inc., as representatives of the several underwriters named therein (collectively, the “Underwriters”), relating to a public offering of shares of our common stock, par value \$0.001 per share, at a price of \$10.25 per share less underwriting discounts and commissions (the “Offering”). We issued and sold to the Underwriters an aggregate of 13,800,000 shares of common stock in connection with the Offering. The Offering resulted in net proceeds to us of \$132.5 million. Also refer to footnote 3 in our Notes to the Financial Statements.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The following discussion of our financial condition and results of operations should be read in conjunction with our financial statements and the notes to those financial statements appearing elsewhere in this Annual Report on Form 10-K. This discussion contains forward-looking statements that involve significant risks and uncertainties. As a result of many important factors, such as those set forth in Part I, Item 1A. "Risk Factors" of this Annual Report on Form 10-K, our actual results may differ materially from those anticipated in these forward-looking statements.

Overview

We are a science-driven, patient-focused biopharmaceutical company seeking to leverage our believed strengths across the continuum from discovery through commercialization by discovering and developing small molecule therapeutics to meet the needs of patients with infectious and complement-mediated diseases.

Our current focus is on our complement inhibitor platform, directed at advancing small molecule compounds that have the potential to be used in the treatment of immune-related diseases associated with the alternative pathway of the complement system. The complement system is a part of the human innate immune system and is believed to comprise three pathways, the alternative pathway, the lectin pathway and the classical pathway. We are advancing novel small molecules from this platform which will initially target complement factor D, an essential protein within the amplification loop of the alternative pathway. The alternative pathway is thought to play a critical role in a number of disease conditions including rare orphan conditions such as paroxysmal nocturnal hemoglobinuria, or PNH, a blood disorder, and C3 glomerulopathy, or C3G, a kidney disease, as well as more prevalent indications such as dry age-related macular degeneration, or dry AMD, an ophthalmologic disease.

We have generated a platform of potent and specific orally-administered compounds that, in preclinical studies, bind to factor D with high affinity, resulting in alternative pathway inhibition. Our lead drug candidate has demonstrated complete suppression of alternative pathway complement activity after oral dosing in healthy volunteers in a phase I clinical trial. We believe that our alternative pathway factor D inhibitor compounds may have a pharmacological advantage in addressing extravascular hemolysis, or red blood cell destruction outside of blood vessels, that affects patients with PNH, including those whose intravascular hemolysis, or red blood cell destruction within blood vessels, is successfully treated with currently approved treatments. In addition, we believe we may be able to treat the proportion of patients with PNH who have suboptimal response to, or who fail to respond to, currently approved treatments for PNH. Further, because C3G is a disease resulting from alternative pathway over-activation, we believe our factor D inhibitors may be effective in treating patients with C3G. In addition, we are advancing other small molecule compounds with characteristics appropriate for treatment of dry AMD. We may also advance other factor D inhibitors for oral systemic administration to treat PNH, C3G, or other diseases.

We also have a collaboration with Janssen Pharmaceuticals, Inc., or Janssen, the pharmaceutical subsidiary of Johnson & Johnson Inc., under which we have granted to Janssen exclusive worldwide rights to develop and commercialize a portfolio of antiviral drug candidates we discovered and developed for the treatment of chronic hepatitis C virus, or HCV, infection in exchange for specified milestone payments, royalties, and an equity investment in us.

We also intend to continue to leverage our extensive expertise in structural biology and synthetic chemistry to discover and develop additional small molecule compounds to meet other significant unmet medical needs. We believe our drug discovery capabilities will allow us to further expand our drug candidate portfolio, providing us with strong growth potential and, over time, reducing our reliance on the success of any single drug candidate. Our research team has successfully discovered and advanced multiple compounds into clinical

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development including sovalprevir, odalasvir, and ACH-3422 in our HCV program, all of which we have licensed to Janssen, and ACH-4471, a first-generation complement factor D inhibitor from our broad alternative pathway complement inhibitor platform.

We were incorporated on August 17, 1998 in Delaware. Since our inception, we have spent substantial research and development funds to develop our drug candidate pipeline and expect to continue to do so for the foreseeable future. We have incurred losses of \$503.6 million from inception through December 31, 2016 and had an accumulated deficit of \$517.4 million as of December 31, 2016, which includes preferred stock dividends recognized until our initial public offering in 2006. Our net losses were \$61.7 million, \$5.0 million, and \$69.0 million for the years ended December 31, 2016, 2015, and 2014, respectively.

We have funded our operations primarily through proceeds from the sale of equity securities. Through December 31, 2016, we have received approximately \$932.4 million in aggregate gross proceeds from stock issuances, including convertible preferred stock, our initial public offering, private placements of our common stock, registered offerings of our common stock and an equity investment by Johnson & Johnson Innovation, Inc., or JJDC.

We expect to incur substantial and increasing losses for at least the next several years as we seek to continue preclinical and clinical development of certain complement inhibitors and identify and progress any drug candidates.

We may need substantial additional financing to obtain regulatory approvals, fund operating losses, and, if deemed appropriate, establish manufacturing and sales and marketing capabilities for our complement inhibitor program, which we will seek to raise through public or private equity or debt financings, collaborative or other arrangements with third parties or through other sources of financing. There can be no assurance that such funds will be available on terms favorable to us, if at all.

In addition to the risks associated with being an early-stage drug development company, there can be no assurance that we or our current or future collaborators will successfully advance or complete our research and development programs, obtain adequate patent protection for our technology, obtain necessary government regulatory approval for drug candidates we develop, find and maintain appropriate collaboration partners or that any approved drug candidates will be commercially viable. In addition, we may not be profitable even if we or our current or future collaborators succeed in commercializing any of our drug candidates.

Collaboration with Janssen Pharmaceuticals, Inc.

In May 2015, we entered into an exclusive collaboration and license agreement with Janssen, and its affiliate, JJDC, which we refer to as the Janssen Agreement. Under the Janssen Agreement, we granted Janssen exclusive worldwide rights to develop and commercialize products that contain one or more of our drug candidates for the treatment of HCV, namely odalasvir, a second-generation NS5A inhibitor, ACH-3422, a NS5B HCV polymerase inhibitor, and sovalprevir, a NS3/4A HCV protease inhibitor. We completed the transfer of our portfolio of drug candidates for the treatment of chronic HCV to Janssen in December 2015.

Under the terms of the Janssen Agreement, we are eligible to receive (1) up to \$115.0 million of milestone payments based upon achievement of clinical enrollment and dosing in specified studies, substantially all of which is related to dosing in one study, (2) up to an additional \$290.0 million of milestone payments based upon regulatory approvals and first commercial sale in specified territories, the majority of which relates to regulatory approval and the first commercial sale in the U.S., and (3) up to an additional \$500.0 million of milestone payments based upon achieving worldwide sales targets. We recognized revenue of \$15.0 million in December 2016 related to the achievement of a clinical enrollment milestone under the Janssen Agreement.

We are also eligible to receive royalties on worldwide annual net sales of licensed products, if any, at tiered royalty rate percentages beginning in the mid-teens and rising to the low-twenties, subject to customary

reductions. The royalty term is determined on a licensed-product-by-licensed-product and country-by-country basis and begins on the first commercial sale of a licensed product in a country and ends on the expiration of the last to expire of specified patents or regulatory exclusivity covering such licensed product in such country or, with a customary royalty reduction, ten years after such first commercial sale if there is no such exclusivity. Janssen will bear the future costs of worldwide development and commercialization of licensed products.

In addition, effective on July 1, 2015, we entered into a stock purchase agreement with JJDC, which we refer to as the JJDC Stock Purchase Agreement. Pursuant to the JJDC Stock Purchase Agreement, we issued 18,367,346 shares of common stock to JJDC at a price of \$12.25 per share for an aggregate purchase price of \$225.0 million.

Financial Operations Overview

Revenue

To date, we have not generated any revenue from the commercial sale of any drugs. During the years ended December 31, 2016 and 2015, we recognized revenue of \$15.0 million and \$66.1 million, respectively, under the Janssen Agreement. We did not recognize any revenue during the year ended December 31, 2014.

Pursuant to the terms of the Janssen Agreement, we were required to provide technology transfer services related to the chemistry, manufacturing and know-how to Janssen for up to 180 days after the effective date of the Janssen Agreement. We completed this transfer in December 2015. We determined that the amount received in excess of the fair value of our common stock upon issuance to JJDC of \$66.1 million of our common stock was attributed to the license and technology services and straight-line attribution of the license and technology services revenues would be used to recognize revenue. As such, revenue of \$66.1 million was recorded during the year ended December 31, 2015 associated with this transaction.

The development, regulatory and sales milestones represent non-refundable amounts that would be paid by Janssen to us if certain milestones are achieved in the future. These milestones, if achieved, are substantive as they relate solely to past performance and are commensurate with estimated enhancement of value associated with the achievement of each milestone. However, there can be no assurance that Janssen will achieve the milestones or that we will receive the related revenue. During the year ended December 31, 2016, we recognized revenue of \$15.0 million under the Janssen Agreement due to the achievement of a clinical enrollment milestone.

Research and Development

Our research and development expenses reflect costs incurred for our proprietary research and development projects which consist primarily of salaries and benefits for our research and development personnel; costs of services by clinical research organizations; other outsourced research; materials used during research and development activities; facility-related costs, such as rent and utilities associated with our laboratories; and clinical development space and operating supplies.

Complement Factor D Inhibitor Program

Our current focus is on our complement inhibitor platform, directed at advancing small molecule compounds that have the potential to be used in the treatment of immune-related diseases associated with the alternative pathway of the complement system. The complement system is a part of the human innate immune system and is believed to comprise three pathways, the alternative pathway, the lectin pathway and the classical pathway. We are advancing novel small molecules from this platform which will initially target complement factor D, an essential protein within the amplification loop of the alternative pathway. The alternative pathway is thought to play a critical role in a number of disease conditions including rare orphan conditions such as PNH and C3G, as well as more prevalent indications such as dry AMD.

We have generated a platform of potent and specific orally-administered inhibitors of the alternative pathway. These compounds bind to factor D with high affinity, resulting in alternative pathway inhibition. They have demonstrated complete suppression of alternative pathway complement activity after oral dosing in healthy volunteers. We believe that our alternative pathway factor D inhibitor compounds may have a pharmacological advantage in addressing extravascular hemolysis, or red blood cell destruction outside of blood vessels, that affects patients with PNH, even those whose intravascular hemolysis, or red blood cell destruction within blood vessels, is successfully treated with currently approved treatments. In addition, we believe we may be able to treat the proportion of patients who have suboptimal response to, or who fail to respond to, currently approved treatments for PNH. Further, because C3G is a disease specific to alternative pathway over-activation, we believe our factor D inhibitors may be effective in treating patients with C3G. In addition, we are advancing other small molecule compounds with characteristics appropriate for treatment of dry AMD. We may also advance other factor D inhibitors for oral systemic administration to treat other diseases after further characterization.

HCV Program

We established our HCV drug candidate pipeline entirely through our internal discovery capabilities. Through these efforts, we identified and developed a portfolio of drug candidates including odalasvir, ACH-3422 and sovalprevir. Prior to entering into the Janssen Agreement, we were focused on the development of the following HCV drug candidates:

- **Odalasvir, a NS5A Inhibitor.** We completed three phase IIa clinical trials with odalasvir including the -007 trial with sovalprevir, the -005 study, which examined the use of odalasvir with ribavirin alone, and the Proxy Doublet study which examined the use of odalasvir in combination with sofosbuvir, a nucleotide NS5B polymerase inhibitor marketed by Gilead Sciences, Inc., or Gilead, under the brand name Sovaldi[®]. HCV patients treated for both eight weeks and six weeks with the combination of odalasvir and sofosbuvir achieved 100% SVR24, or sustained viral response 24 weeks after cessation of therapy, demonstrating the differentiation of odalasvir within the NS5A class.
- **ACH-3422, a NS5B Nucleotide Polymerase Inhibitor.** ACH-3422 has demonstrated excellent potency and was well-tolerated in a phase Ib proof of concept study in which HCV patients receiving a once-daily 700mg dose of ACH-3422 for 14 days demonstrated mean maximal viral load reduction of 4.6 log₁₀.
- **Sovalprevir, a NS3 Protease Inhibitor.** We completed a phase II clinical trial that evaluated 12 weeks of treatment consisting of sovalprevir and our NS5A inhibitor, odalasvir, with ribavirin for the treatment of genotype 1 HCV (the -007 trial). In this trial, genotype 1b patients achieved 100% SVR24; however, in genotype 1a patients, the combination regimen results were suboptimal.

ACH-3422 and sovalprevir are not currently in clinical development under the Janssen Agreement.

In September 2016, we announced clinical trial results from the first triple combination regimen under the collaboration. Initiated in October 2015, the phase IIa clinical trial tested a combination regimen consisting of Olysio[®] (simeprevir), a protease inhibitor marketed by Janssen, AL-335, a nucleotide polymerase inhibitor in clinical development by Janssen, and odalasvir. This study was designed to determine the safety, pharmacokinetics, and efficacy of different dosing regimens containing odalasvir and AL-335, with or without simeprevir, in treatment-naïve patients with genotype 1 HCV infection for treatment durations of eight or six weeks.

Of patients who received the triple combination of odalasvir, AL-335, and simeprevir, the combination now denoted as JNJ-4178, 100% had percent had undetectable levels of HCV infection at SVR12 and all patients in cohort 1 achieved SVR24 (i.e., cohorts 1, 3, and 4; N=60,20/cohort). Cohort 1 evaluated the triple combination of odalasvir (50mg QD), AL-335 (400 mg QD) and simeprevir (100mg QD) for eight weeks, while cohorts 3 and 4 assessed odalasvir (50 mg QOD), AL-335 (800 mg QD), and simeprevir (75 mg QD) for eight and six weeks,

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respectively. In cohort 2, which assessed the dual combination of odalasvir (50 mg QOD) and AL-335 (800 mg QD) for eight weeks, 90% of patients achieved SVR12 (N=20). In all of these cohorts, the dosing regimens were generally well-tolerated. The majority of adverse events were mild and the most commonly reported events were headache, fatigue, and upper respiratory tract infection. There was also one serious adverse event in cohort 1 that resulted in premature discontinuation of all study drugs. This consisted of a Mobitz Type 1 2nd degree atrioventricular block and was deemed probably related to odalasvir and possibly related to AL-335 and simeprevir. The event was not associated with clinical or echocardiographic abnormalities, did not require any therapeutic intervention, resolved following treatment discontinuation, and the patient went on to achieve SVR24. Other than the one serious adverse event, no clinically significant laboratory, echocardiography, or ECG abnormalities were reported.

In November 2016, we announced that Janssen had initiated OMEGA-1, a phase IIb clinical trial of JNJ-4178 in patients with genotypes 1, 2, 4, 5 and 6 HCV, including both treatment-naïve and treatment-experienced patients. This clinical trial is ongoing.

All costs associated with internal research and development, and research and development services for which we have externally contracted, are expensed as incurred. The costs of obtaining patents for our drug candidates are expensed as incurred as indirect costs. Our research and development expenses for the years ended December 31, 2016, 2015 and 2014 were as follows:

	For the Years Ended December 31,		
	2016	2015	2014
	(in thousands)		
Direct external costs:			
Complement factor D compounds	\$32,623	\$13,320	\$ 2,676
HCV compounds and combination trials	326	20,956	31,959
Other	—	47	205
	<u>32,949</u>	<u>34,323</u>	<u>34,840</u>
Direct internal personnel costs	<u>19,514</u>	<u>17,605</u>	<u>14,607</u>
Sub-total direct costs	<u>52,463</u>	<u>51,928</u>	<u>49,447</u>
Indirect costs and overhead	7,110	5,265	4,746
Connecticut research and development tax credit	(411)	(640)	(678)
Total research and development	<u>\$59,162</u>	<u>\$56,553</u>	<u>\$53,515</u>

The State of Connecticut provides companies with the opportunity to exchange certain research and development credit carryforwards for cash in exchange for foregoing the carryforward of the research and development credit. The program provides for such exchange of the research and development credit at a rate of 65% of the annual research and development credit. The benefit for such exchange is recorded as a reduction of research and development expenditures.

Janssen will bear the future costs of worldwide development and commercialization of products under the Janssen Agreement. Accordingly, we do not expect to incur research and development costs associated with our HCV compounds or combination trials in the future.

We expect research and development expenses associated with our complement inhibitor program and the development of other preclinical programs that we may initiate to be substantial and to increase over time. There are numerous existing factors associated with the development and commercialization, if any, of our complement inhibitor program, including future trial design and various regulatory requirements, many of which cannot be determined with accuracy at this time based on our stage of development. Additionally, future commercial and regulatory factors beyond our control will evolve and therefore impact the development of our complement inhibitor program and plans over time.

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The successful development of our drug candidates is highly uncertain. At this time, we cannot reasonably estimate or know the nature, timing and estimated costs of the efforts that will be necessary to complete the remainder of the development of our drug candidates. This is due to the numerous risks and uncertainties associated with developing drugs, including the uncertainty of:

- the scope, rate of progress and expense of our clinical trials and other research and development activities;
- the potential benefits of our drug candidates over other therapies;
- our ability to market, commercialize and achieve market acceptance for any of our drug candidates that we are developing or may develop in the future;
- results of future clinical trials that we may conduct;
- results of clinical trials conducted by our competitors;
- the terms and timing of any collaborative, licensing and other arrangements that we may establish;
- the expense and timing of regulatory 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 any of our drug candidates would significantly change the costs and timing associated with the development of that drug candidate. For example, if the FDA or another regulatory authority were to require us to conduct clinical trials beyond those which we currently anticipate will be required to complete clinical development of a drug candidate, or if we experience significant delays in enrollment in any of our clinical trials, we would be required to expend significant additional financial resources and time on the completion of clinical development.

General and Administrative

Our general and administrative expenses consist primarily of salaries and benefits for management and administrative personnel, professional fees for legal, accounting and other services, travel costs and facility-related costs such as rent, utilities and other general office expenses.

Critical Accounting Policies and Estimates

The discussion and analysis of our financial condition and results of operations set forth below are based on our financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States, or U.S. GAAP. The preparation of these financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. On an ongoing basis, we evaluate our estimates and assumptions, including those described below. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances. These estimates and assumptions form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Management makes estimates and exercises judgment in revenue recognition, research and development costs, stock-based compensation and accrued expenses. Actual results may differ from these estimates under different assumptions or conditions.

We believe the following critical accounting policies affect management's more significant judgments and estimates used in the preparation of our financial statements:

Revenue Recognition

We recognize revenue from contract research and development and research progress payments in accordance with Accounting Standards Codification 605, or ASC 605, *Revenue Recognition*. Revenue-generating research and development collaborations are often multiple element arrangements, providing for a license as well as research and development services. In order to account for these arrangements, we must identify the deliverable included within the arrangement and evaluate which deliverables represent separate units of accounting based on whether certain criteria are met, including whether the delivered element has stand-alone value to the collaborator. The consideration received is allocated among the separate units of accounting and the applicable revenue recognition criteria are applied to each of the separate units.

When we determine that an arrangement should be accounted for as a single unit of accounting, we must determine the period over which the performance obligations will be performed and revenue related to upfront license payments will be recognized. Revenue will be recognized using either a proportionate performance or straight-line method. We recognize revenue using the proportionate performance method provided that we can reasonably estimate the level of effort required to complete our performance obligations under an arrangement and such performance obligations are provided on a best-efforts basis. Under the proportionate performance method, periodic revenue related to up-front license payments is recognized as the percentage of actual effort expended in that period to total effort expected for all of our performance obligations under the arrangement. Actual effort is generally determined based upon actual direct labor hours, or FTEs, incurred and include research and development activities performed by internal scientists. Total expected effort is generally based upon the total projected direct labor hours. Significant management judgment is required in determining the level of effort required under an arrangement and the period over which we expect to complete the related performance obligations. In the event that a change in estimate occurs, the change will be accounted for using the cumulative catch-up method which provides for an adjustment to revenue in the current period. Estimates of our level of effort may change in the future, resulting in a material change in the amount of revenue recognized in future periods, including negative revenue in some periods. Generally under collaboration arrangements, payments received during the period of performance may include up-front payments, time-or performance-based milestones and reimbursement of internal and external costs. The proportion of actual performance to total expected performance is applied to these payments in determining periodic revenue, but will be limited by the aggregate cash received or receivable to date.

Substantive milestone payments are recognized upon achievement of the milestone. Determining whether a milestone is substantive requires judgment that should be made at the inception of the arrangement. To meet the definition of a substantive milestone, the consideration earned by achieving the milestone (1) would have to be commensurate with either the level of effort required to achieve the milestone or the enhancement in the value of the item delivered, (2) would have to relate solely to past performance, and (3) should be reasonable relative to all deliverables and payment terms in the arrangement. No bifurcation of an individual milestone is allowed and there can be more than one milestone in an arrangement.

Pursuant to the terms of the Janssen Agreement, we were required to provide technology transfer services related to the chemistry, manufacturing and know-how to Janssen for up to 180 days after the effective date of the agreement. In accordance with ASC 605-25, which provides guidance on accounting for multiple-element arrangements, including the determination of the units of accounting and allocation of total arrangement consideration, we identified all of the obligations at the inception of the Janssen Agreement. The significant obligations were determined to be the license and the technology transfer services. We determined that license and technology transfer services represent a single unit of accounting because they were not viewed to have standalone value. The Janssen Agreement entered into by us and Janssen, the JJDC Stock Purchase Agreement, and the Investor Agreement were entered into by us and Janssen's affiliate in contemplation of each other. The

only upfront amount received by us in exchange for the license and technology transfer services and the issuance of our common stock was the \$225.0 million. We determined that the amount received in excess of the fair value of the shares upon issuance of \$66.1 million was attributed to the license and technology services. We also determined that there was no discernable pattern in which the technology services would be provided during the 180 day period after the effective date. In accordance with ASC 605-10, we determined that straight-line attribution of the license and technology services revenues would be used to recognize revenue. As such, revenue of \$66.1 million was recorded during the year ended December 31, 2015 associated with this transaction.

The development, regulatory and sales milestones represent non-refundable amounts that would be paid by Janssen to us if certain milestones are achieved in the future. We have elected to apply the guidance in ASC 605-28 to the milestones. These milestones, if achieved, are substantive as they relate solely to past performance and are commensurate with estimated enhancement of value associated with the achievement of each milestone as a result of our performance; however, there can be no assurance that Janssen will achieve the milestones or that we will receive the related revenue. During the year ended December 31, 2016, we recognized revenue of \$15.0 million under the Janssen agreement due to the achievement of a clinical enrollment milestone.

Stock-Based Compensation—Employee Stock-Based Awards

We apply ASC 718, *Stock Compensation*, which requires measurement and recognition of compensation expense for all stock-based awards made to employees and directors, including employee stock options and employee stock purchases under our 2006 ESPP Plan, based on estimated fair values.

We primarily grant stock options for a fixed number of shares to employees with an exercise price equal to the market value of the shares at the date of grant. To the extent that the amount of the aggregate fair market value of qualified stock options that become exercisable for an individual exceeds \$100,000 during any tax year, those stock options are treated as non-qualified stock options. Under the fair value recognition provisions, stock-based compensation cost is based on the value of the portion of stock-based awards that is ultimately expected to vest.

We utilize the Black-Scholes option pricing model for determining the estimated fair value for stock-based awards. The Black-Scholes model requires the use of assumptions which determine the fair value of the stock-based awards. Determining the fair value of stock-based awards at the grant date requires judgment, including estimating the expected term of stock options, the expected volatility of our stock and expected dividends.

For the years ended December 31, 2016, 2015 and 2014, we based our estimate of the expected term of historical data for similar stock option grants and we calculated volatility based on actual volatility for the expected term of the option. We are also required to estimate forfeitures at the grant date and recognize compensation costs for only those awards that are expected to vest.

If factors change and we employ different assumptions in future periods, or if we experience significant fluctuations in our stock price, the compensation expense that we record may differ significantly from what we have recorded in the current period. Therefore, we believe it is important for investors to be aware of the degree of subjectivity involved when using option pricing models to estimate stock-based compensation. There is risk that our estimates of the fair values of our stock-based compensation awards on the grant dates may differ from the actual values realized upon the exercise, expiration, early termination or forfeiture of those share-based payments in the future. Certain stock-based payments, such as employee stock options, may expire worthless or otherwise result in zero intrinsic value as compared to the fair values originally estimated on the grant date and reported in our financial statements. Alternatively, value may be realized from these instruments that is significantly in excess of the fair values originally estimated on the grant date and reported in our financial statements. Although the fair value of employee share-based awards is determined using an option pricing model, that value may not be indicative of the fair value observed in a willing buyer/willing seller market transaction.

Accrued Expenses

As part of the process of preparing financial statements, we are required to estimate accrued expenses. This process involves identifying services which have been performed on our behalf and estimating the level of service performed and the associated cost incurred for such service as of each balance sheet date in our financial statements.

In accruing service fees, we estimate the time period over which services will be provided and the level of effort in each period. If the actual timing of the provision of services or the level of effort varies from the estimate, we will adjust the accrual accordingly. The majority of our service providers invoice us monthly in arrears for services performed. Some of our service providers require upfront or milestone payments. If our estimate of services performed is less than the upfront or milestone payments, the difference is accounted for as a prepaid expense. In the event that we do not identify costs that have been incurred or we underestimate or overestimate the level of services performed or the costs of such services, our actual expenses could differ from such estimates. The date on which some services commence, the level of services performed on or before a given date and the cost of such services are often subjective determinations.

Income Taxes

We use an asset and liability approach for financial accounting and reporting of income taxes. Deferred tax assets and liabilities are determined based on temporary differences between financial reporting and tax basis assets and liabilities and are measured by applying enacted rates and laws to taxable years in which differences are expected to be recovered or settled. Further, the effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that the rate changes. A valuation allowance is required when it is “more likely than not” that all or a portion of deferred tax assets will not be realized.

We apply the provisions of ASC 740, *Income Taxes*, which prescribes a comprehensive model for how a company should recognize, measure, present and disclose in its financial statements uncertain tax positions that the company has taken or expects to take on a tax return, including a decision whether to file or not file a return in a particular jurisdiction. Our financial statements reflect expected future tax consequences of such positions presuming the taxing authorities’ full knowledge of the position and all relevant facts.

We do not have any unrecognized tax benefits as of December 31, 2016. We review all tax positions to ensure the tax treatment selected is sustainable based on its technical merits and that the position would be sustained if challenged.

Results of Operations

Results of operations may vary from period to period depending on numerous factors, including the progress of our research and development projects, technological advances, determinations as to the commercial potential of proposed products, and the timing of payments received under existing or future collaborations, strategic alliances, joint ventures or financings, if any.

Revenues:

During the years ended December 31, 2016 and 2015 we recognized revenue of \$15.0 million and \$66.1 million, respectively, under the Janssen Agreement. We did not recognize any revenue during the year ended December 31, 2014.

Comparison of the Years Ended December 31, 2016 and 2015

The decrease in collaboration revenue in 2016 is related to the recognition of revenue under the Janssen Agreement. During the year ended December 31, 2016, we recognized \$15.0 million of revenue under the

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Janssen Agreement due to the achievement of a clinical enrollment milestone. During the year ended December 31, 2015, we recognized \$66.1 million of revenue under the Janssen Agreement related to the upfront payment received by us in exchange for the license and technology transfer services and the issuance of our common stock to an affiliate of Janssen's.

Comparison of the Years Ended December 31, 2015 and 2014

The increase in collaboration revenue in 2015 was related to the \$66.1 million recognition of revenue under the Janssen Agreement related to the upfront payment received by us in exchange for the license and technology transfer services and the issuance of our common stock to an affiliate of Janssen's.

Research and Development Expenses:

Our research and development expenses consist primarily of salaries and benefits for our research and development personnel, costs of services by clinical research organizations, other outsourced research, materials used during research and development activities, facility-related costs such as rent and utilities associated with our laboratories and clinical development space, operating supplies and other costs associated with our research and development activities. Research and development expenses consisted of the following:

	For the Years Ended			Change			
	2016	2015	2014	2016 vs. 2015		2015 vs. 2014	
	(in thousands)						
Personnel costs	\$14,824	\$13,130	\$11,894	\$ 1,694	13%	\$ 1,236	10%
Stock based compensation	4,695	4,500	2,713	195	4%	1,787	66%
Outsourced research and supplies	30,062	31,214	31,706	(1,152)	(4)%	(492)	(2)%
Professional and consulting fees	5,501	5,287	5,263	214	4%	24	0%
Facilities costs	3,320	2,505	2,083	815	33%	422	20%
Travel and other costs	1,171	557	534	614	110%	23	4%
Research and development tax credit	(411)	(640)	(678)	229	(36)%	38	(6)%
Total	<u>\$59,162</u>	<u>\$56,553</u>	<u>\$53,515</u>	<u>\$ 2,609</u>	<u>5%</u>	<u>\$3,038</u>	<u>6%</u>

Comparison of the Years Ended December 31, 2016 and 2015

The increase in research and development costs from 2015 to 2016 was primarily due to increased manufacturing, clinical trial and consulting costs related to the advancement of ACH-4471, partially offset by decreased manufacturing, clinical trial and consulting costs related to our HCV compounds, which were licensed to Janssen in 2015. Personnel costs also increased due to the addition of personnel in our discovery and development groups.

We expect research and development expenses over the next year will generally be consistent with 2016 expenses as we continue to advance clinical compounds from our alternative pathway platform, continue to manufacture and formulate ACH-4471 and our other complement factor D inhibitors, and pursue additional discovery opportunities for creating small molecule therapies that address significant patient needs.

Comparison of the Years Ended December 31, 2015 and 2014

The increase in research and development costs from 2014 to 2015 was primarily due to increased preclinical and manufacturing costs related to the advancement of our complement inhibitor program. These amounts were partially offset by decreased clinical trial costs related to our ACH-3422 clinical trials, our odalasvir and sofosbuvir combination trial and ACH-2684 clinical and manufacturing costs. Personnel and non-cash stock-based compensation costs also increased in 2015 due to the addition of personnel in our drug development group.

General and Administrative Expenses:

General and administrative expenses consist primarily of salaries and benefits for management and administrative personnel, professional and consulting fees for legal, business development, accounting and other services, travel costs and facility-related costs such as rent, utilities and other general office expenses. General and administrative expenses consisted of the following:

	For the Years Ended			Change			
	2016	2015	2014	2016 vs. 2015		2015 vs. 2014	
	(in thousands)						
Personnel costs	\$ 6,136	\$ 5,099	\$ 4,339	\$ 1,037	20%	\$ 760	18%
Stock based compensation	6,311	5,572	4,560	739	13%	1,012	22%
Professional and consulting fees	4,771	11,038	4,983	(6,267)	(57)%	6,055	122%
Facilities costs	1,114	875	729	239	207%	146	20%
Travel and other costs	2,371	2,092	1,300	279	13%	792	61%
Total	<u>\$20,703</u>	<u>\$24,676</u>	<u>\$15,911</u>	<u>\$(3,973)</u>	<u>(16)%</u>	<u>\$8,765</u>	<u>55%</u>

Comparison of the Years Ended December 31, 2016 and 2015

The decrease in general and administrative costs from 2015 to 2016 was primarily due to decreased business development consulting fees and corporate legal fees that were incurred in 2015 related to the Janssen Agreement, partially offset by increased personnel and non-cash stock compensation largely related to the addition of personnel.

We expect that general and administrative costs during the next year will be generally consistent with 2016 costs.

Comparison of the Years Ended December 31, 2015 and 2014

The increase in general and administrative costs from 2014 to 2015 was primarily due to increased business consulting and corporate legal fees in 2015 related to the Janssen Agreement, increased corporate fees and taxes, and increased personnel and non-cash stock-based compensation costs due to the addition of personnel.

Other Income and Expense:**Comparison of the Years Ended December 31, 2016 and 2015**

Other income was \$0 and \$8.9 million for the years ended December 31, 2016 and 2015, respectively. The \$8.9 million decrease was due to the nonrecurring receipt of an \$8.9 million payment by a stockholder representing the disgorgement of short swing profits under Section 16(b) of the Securities Exchange Act in 2015.

Interest income was \$3.2 million and \$1.2 million for the years ended December 31, 2016 and 2015, respectively. The \$2.0 million, or 172%, increase from 2015 to 2016 was primarily due to increased average cash balances.

Interest expense was \$68,000 and \$55,000 for the years ended December 31, 2016 and 2015, respectively. The increase of \$13,000, or 24%, was primarily due to higher average debt balances outstanding in 2016.

Comparison of the Years Ended December 31, 2015 and 2014

Other income was \$8.9 million and \$0 for the years ended December 31, 2015 and 2014, respectively. The \$8.9 million increase was due to the receipt of a payment by a stockholder representing the disgorgement of short swing profits under Section 16(b) of the Securities Exchange Act in 2015.

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Interest income was \$1.2 million and \$455,000 for the years ended December 31, 2015 and 2014, respectively. The \$733,000, or 161%, increase from 2014 to 2015 was primarily due to increased average cash balances.

Interest expense was \$55,000 and \$37,000 for the years ended December 31, 2015 and 2014, respectively. The increase of \$18,000, or 49%, was primarily due to higher average debt balances outstanding in 2015.

Liquidity and Capital Resources

Since our inception, we have financed our operations primarily through proceeds from the sale of equity securities. Through December 31, 2016, we have received approximately \$932.4 million in aggregate gross proceeds from stock issuances, including convertible preferred stock, our initial public offering, private placements of our common stock, registered offerings of our common stock and the equity investment by JJDC.

In October 2014, we entered into a Master Security Agreement for a \$1.0 million Capital Expenditure Line of Credit, or the 2014 Credit Facility, with Webster Bank, National Association, or Webster. Under the 2014 Credit Facility, we were entitled to draw down equipment loan advances for the purchase of new laboratory equipment through October 3, 2015. Each advance under the 2014 Credit Facility is payable over a three year term and bear interest at a fixed rate, determined at the time of each advance, equal to the three year Federal Home Loan Bank of Boston Classic Advance rate plus 4.75%. In October 2014 and March 2015, Webster advanced \$440,000 and \$229,000, respectively, to us under the 2014 Credit Facility.

In May 2016, we entered into an amendment to the Master Security Agreement. The amendment provides for a line of credit for equipment loan advances of \$1.4 million, of which approximately \$400,000 reflected the outstanding balance as of the date of the amendment, under the Master Security Agreement, dated October 2014, or the 2016 Credit Facility. We can utilize the 2016 Credit Facility in connection with the purchase of new laboratory equipment through May 26, 2017. The purchased equipment will serve as collateral for any advances. Each drawdown under the 2016 Credit Facility will be payable over a three-year term and will bear interest at a fixed rate, determined at the time of each borrowing, equal to the Three Year Federal Home Loan Bank of Boston Classic Advance rate plus 4.75%. In October 2016, Webster advanced \$443,000 to us under the 2016 Credit Facility.

As of December 31, 2016, our debt balance due to borrowings was \$652,000 with a weighted average interest rate of 6.10%. As of December 31, 2016, the following amounts remained outstanding under the 2014 Credit Facility and the 2016 Credit Facility:

<u>Lender</u>	<u>Date</u>	<u>Interest Rate (per annum)</u>	<u>Principal Amount</u>	<u>Outstanding Balance</u>	<u>Maturity Date</u>
Webster Bank	October 2014	6.30%	\$ 440,000	\$ 131,681	October 2017
Webster Bank	March 2015	6.20%	\$ 228,962	\$ 100,659	March 2018
Webster Bank	October 2016	6.01%	\$ 443,000	\$ 420,007	October 2019

In February 2017, we expect to file a universal shelf registration on Form S-3 to register for sale from time to time up to \$250.0 million of common stock, preferred stock, warrants and/or units in one or more offerings. Further, in February 2017, we entered into a sales agreement with Cantor Fitzgerald & Co., or Cantor, pursuant to which, from time to time, we may offer and sell shares of our common stock having an aggregate offering price of up to \$75.0 million through Cantor pursuant to such universal shelf registration statement, after such time as the registration statement is declared effective by the SEC.

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We had \$391.5 million and \$459.3 million in cash, cash equivalents and marketable securities as of December 31, 2016 and 2015, respectively. We regularly review our investments and monitor the financial markets. As of December 31, 2016, our cash, cash equivalents and marketable securities included high-quality financial instruments, primarily money market funds, government sponsored bond obligations and other corporate debt securities which we believe are subject to limited credit risk.

Cash used in operating activities was \$65.7 million for the year ended December 31, 2016 and was primarily attributable to our net loss during the period of \$61.7 million, combined with an increase in other receivables of \$14.8 million and a decrease in accrued expenses of \$3.7 million. This amount was partially offset by \$12.9 million in non-cash charges related to depreciation, amortization of premiums on marketable securities and stock-based compensation combined with a \$2.7 million increase in accounts payable. Cash provided by operating activities was \$5.6 million for the year ended December 31, 2015 and was primarily attributable to our net loss during the period of \$5.0 million, adjusted for \$12.8 million in non-cash charges related to depreciation, amortization of premiums on marketable securities and stock-based compensation combined with a \$3.9 million increase in accrued expenses. This amount was partially offset by our \$5.0 million net loss combined with \$2.5 million in premiums paid on the purchase of investments and a \$2.3 million decrease in accounts payable. Cash used in operating activities was \$55.5 million for the year ended December 31, 2014 and was primarily attributable to our \$69.0 million net loss primarily offset by \$9.7 million non-cash charges related to depreciation, amortization of premiums on marketable securities and stock-based compensation combined with a \$3.8 million increase in accounts payable and accrued expenses.

Cash provided by investing activities was \$60.7 million for the year ended December 31, 2016 and was primarily attributable to maturities of marketable securities and was partially offset by purchases of marketable securities. Cash used in investing activities was \$298.7 million for the year ended December 31, 2015 and was primarily attributable to purchase of marketable securities and partially offset by maturities of marketable securities. Cash provided by investing activities was \$43.3 million for the year ended December 31, 2014 and was primarily attributable to maturities of marketable securities and partially offset by purchases of marketable securities.

Cash provided by financing activities was \$0.5 million for the year ended December 31, 2016 and was primarily attributable to borrowings of debt under the 2016 Credit Facility combined with proceeds from our employee stock purchase plan and the exercise of stock options, partially offset by repayments of debt. Cash provided by financing activities was \$301.1 million for the year ended December 31, 2015 and was primarily attributable to \$158.9 million in proceeds related to the JJDC Stock Purchase Agreement, \$132.6 million in net proceeds from our February 2015 public offering of common stock combined with \$5.6 million in net proceeds from the issuance of stock under an at-the-market sales agreement with Cantor Fitzgerald. Cash provided by financing activities was \$52.4 million for the year ended December 31, 2014 and was primarily attributable to \$42.6 million in net proceeds from the sale of 3,236,497 shares of our common stock pursuant to our at-the-market sales agreement with Cantor Fitzgerald, combined with \$9.4 million in proceeds from the exercise of stock options and warrants.

We expect to incur substantial and increasing losses for at least the next several years as we seek to continue preclinical and clinical development of our complement inhibitor compounds and drug candidates.

We do not expect our existing capital resources to be sufficient to fund the completion of the development of our complement inhibitor program. As a result, we may need to raise additional funds prior to, among other things, being able to further the development of our complement inhibitor program, market any drug candidates associated with that program, obtain regulatory approvals, fund operating losses, and if deemed appropriate, establish manufacturing and sales and marketing capabilities. We may need to raise such additional financing through a combination of public or private equity or debt financings, collaborations, partnerships or other arrangements with third parties or other sources of financing.

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We believe that our existing cash, cash equivalents and marketable securities will be sufficient to meet our current projected operating requirements for at least the next 12 months. However, our future capital requirements may change and will depend upon numerous factors, including but not limited to:

- the scope, progress, results and costs of drug discovery, preclinical development, laboratory testing and clinical trials for our drug candidates;
- our ability to enter into and the terms and timing of any collaborations, licensing or other arrangements that we may establish;
- the number of future drug candidates that we pursue and their development requirements;
- the outcome, timing and costs of seeking regulatory approvals;
- the costs of commercialization activities for any of our drug candidates that receive marketing approval to the extent such costs are not the responsibility of any current or future collaborators, including the costs and timing of establishing product sales, marketing, distribution and manufacturing capabilities;
- subject to receipt of marketing approval, revenue, if any, received from commercial sales of our drug candidates;
- our headcount growth and associated costs as we seek to expand our research and development and establish a commercial infrastructure;
- the costs involved in preparing, filing, prosecuting, maintaining, enforcing and defending patent and other intellectual property rights and defending against intellectual property-related claims;
- the timing and amount of proceeds received from milestones achieved and royalties earned, if any, by us under the Janssen Agreement;
- our ability to raise debt or equity capital, including any changes in the credit or equity markets that may impact our ability to obtain capital in the future;
- the costs associated with, and the outcome of, lawsuits against us, if any;
- our acquisition and development of new technologies and drug candidates; and
- competing technological and market developments currently unknown to us.

We may augment our cash balance through financing transactions, including through a combination of public and private equity offerings, debt financings and collaboration, strategic alliance and licensing arrangements. For example, in February 2017, we entered into an agreement with Cantor Fitzgerald & Co., or Cantor, pursuant to which, from time to time, we may offer and sell up to \$75.0 million of shares of our common stock “at the market” through Cantor pursuant to a universal shelf registration statement that we expect to file in February 2017, after such time as the registration statement is declared effective by the SEC. In connection with capital raising activities, we may be required to dilute the ownership interests of our existing stockholders substantially. There can be no assurance that we will be able to obtain adequate levels of additional funding on favorable terms, if at all, or that we will earn milestone-based or royalty payments pursuant to the Janssen Agreement. If we are unable to obtain adequate levels of additional funding or if we do not earn the milestone-based or royalty payments pursuant to the Janssen Agreement, in whole or in part, we may be required to:

- delay, reduce the scope of or eliminate research and development programs, including our complement inhibitor program;
- obtain funds through arrangements with collaborators or others on terms that may be unfavorable to us or that may require us to relinquish rights to certain drug candidates that we might otherwise seek to develop or commercialize independently; and/or
- pursue merger or acquisition strategies.

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If our operating plan changes, we may need additional funds sooner than planned. Such additional financing may not be available when we need it or may not be available on terms that are favorable to us. In addition, we may seek additional capital due to favorable market conditions or strategic considerations, even if we believe we have sufficient funds for our current or future operating plans. If adequate funds are not available to us on a timely basis, or at all, we may be required to terminate or delay preclinical studies, clinical trials or other development activities for one or more of our drug candidates. We may seek additional financing through a combination of private and public equity offerings, debt financings and collaboration, strategic alliance and licensing arrangements. To the extent that we raise additional capital through the sale of equity or convertible debt securities, ownership interest will be diluted, and the terms may include adverse liquidation or other preferences that adversely affect stockholders' rights.

Contractual Obligations and Commitments

The following table sets forth a summary of our commitments as of December 31, 2016:

	Payment Due by Period				
	Total	Less Than 1 Year	1-3 Years (in thousands)	3-5 Years	More than 5 Years
Debt, including interest	\$ 698	\$ 380	\$ 318	\$ —	\$ —
Operating lease obligations	2,930	912	2,018	—	—
Clinical research obligations	20,375	17,309	3,028	38	—
Other professional obligations	1,275	1,275	—	—	—
Total	<u>\$25,278</u>	<u>\$ 19,876</u>	<u>\$ 5,364</u>	<u>\$ 38</u>	<u>\$ —</u>

Clinical research obligations consists of costs of services by clinical organizations, other outsourced research and materials used in research and development activities. Other professional obligations consist mainly of general and administrative consulting obligations.

Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements as of December 31, 2016.

Recently Issued Accounting Standards

In May 2014, the Financial Accounting Standards Board, or FASB, issued Accounting Standards Update, or ASU, No. 2014-09, "Revenue from Contracts with Customers (Topic 606)," which supersedes all existing revenue recognition requirements, including most industry-specific guidance. ASU No. 2014-09 requires a company to recognize revenue when it transfers goods or services to customers in an amount that reflects the consideration that the company expects to receive for those goods or services. In August 2015, the FASB issued ASU No. 2015-14, "Revenue from Contracts with Customers (Topic 606): Deferral of the Effective Date," which delays the effective date of ASU No. 2014-09 by one year. The new standard is effective for reporting periods beginning after December 15, 2017. We are not planning to early adopt and are currently evaluating certain aspects of the impact ASU No. 2014-09 will have on our financial position and results of operations. Certain aspects of our arrangement with Janssen may be impacted, particularly as it relates to timing of the revenue recognition.

In August 2014, FASB issued ASU No. 2014-15, "Presentation of Financial Statements—Going Concern." ASU No. 2014-15 provides guidance regarding management's responsibility to evaluate whether there exists substantial doubt about an organization's ability to continue as a going concern and to provide related footnote disclosures in certain circumstances. ASU No. 2014-15 was effective for us in the fourth quarter of 2016. The adoption of ASU No. 2014-15 did not have a material effect on our financial position and results of operations or disclosures.

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In February 2016, FASB issued ASU No. 2016-02 “Leases—Topic 842.” ASU No. 2016-02 requires the recognition of lease assets and lease liabilities by lessees for all leases greater than one year in duration and classified as operating leases under previous GAAP. ASU No. 2016-02 is effective for fiscal years beginning after December 15, 2018, and for interim periods within that fiscal year. We are currently evaluating the impact ASU No. 2016-02 will have on our financial position and results of operations.

In March 2016, FASB issued ASU No. 2016-09, “Compensation—Stock Compensation (Topic 718).” The new guidance simplifies certain aspects related to income taxes, statement of cash flows, and forfeitures when accounting for share-based payment transactions. ASU No. 2016-09 is effective for annual periods beginning after December 15, 2017, and interim periods within annual periods beginning after December 15, 2018. Early adoption is permitted. We are currently evaluating the impact ASU No 2016-09 will have on our financial position and results of operations.

In March 2016, FASB issued ASU No. 2016-08, “Revenue from Contracts with Customers (Topic 606): Principal versus Agent Considerations” which clarifies the implementation guidance on principal versus agent considerations. Further, in April 2016, the FASB issued ASU No. 2016-10, “Revenue from Contracts with Customers (Topic 606): Identifying Performance Obligations and Licensing” which clarifies the implementation guidance on identifying performance obligations and licensing. We are currently evaluating the method of adoption and the potential impact that Topic 606 may have on our financial position and results of operations.

In August 2016, FASB issued ASU No. 2016-15 , “ Classification of Certain Cash Receipts and Cash Payments. ” ASU No. 2016-15 eliminates the diversity in practice related to the classification of certain cash receipts and payments in the statement of cash flows by adding or clarifying guidance on eight specific cash flow issues. ASU No. 2016-15 is effective for fiscal years beginning after December 15, 2017, and for interim periods within that fiscal year. We do not believe ASU No. 2016-15 will have a material effect on our financial position and results of operations.

In November 2016, FASB issued ASU No. 2016-18, “Statement of Cash Flows (Topic 230): Restricted Cash,” which requires that the statement of cash flows explain the change during the period in the total of cash, cash equivalents, and restricted cash. As a result, restricted cash will 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. The new guidance is effective for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years. Early adoption is permitted, and the new guidance is to be applied retrospectively. We do not believe ASU 2016-18 will have a material effect on our financial position and results of operations.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Interest Rate Risk. Our exposure to market risk is confined to our cash, cash equivalents and marketable securities. We regularly review our investments and monitor the financial markets. We invest in high-quality financial instruments, primarily money market funds, U.S. government and agency securities, government-sponsored bond obligations and certain other corporate debt securities, with the effective duration of the portfolio less than twelve months and no security with an effective duration in excess of twenty-four months, which we believe are subject to limited credit risk. We currently do not hedge interest rate exposure. Due to the short-term duration of our investment portfolio and the low risk profile of our investments, we believe that an immediate 10% change in interest rates would not have a material effect on the fair market value of our portfolio. We do not believe that we have any material exposure to interest rate risk or changes in credit ratings arising from our investments.

Capital Market Risk . We currently have no product revenues and depend on funds raised through other sources. One source of funding is through future debt or equity offerings. Our ability to raise funds in this manner depends upon, among other things, capital market forces affecting our stock price.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

The information required by this Item is included in our Financial Statements and Supplementary Data listed in Item 15 of Part IV of this Annual Report on Form 10-K.

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our chief executive officer and chief financial officer, evaluated the effectiveness of our disclosure controls and procedures as of December 31, 2016. The term “disclosure controls and procedures,” as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, means controls and other procedures of a company that are designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the SEC’s rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the company’s management, including its principal executive and principal financial officers, as appropriate to allow timely decisions regarding required disclosure. Management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving their objectives and management necessarily applies its judgment in evaluating the cost-benefit relationship of possible controls and procedures. Based on the evaluation of our disclosure controls and procedures as of December 31, 2016, our chief executive officer and chief financial officer concluded that, as of such date, our disclosure controls and procedures were effective at the reasonable assurance level.

Management’s Annual Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is defined in Rule 13a-15(f) and 15d-15(f) promulgated under the Securities Exchange Act of 1934 as a process designed by, or under the supervision of, the company’s principal executive and principal financial officers and effected by its board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles and includes those policies and procedures that:

- Pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of the assets of the company;
- Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and
- Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the company’s assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

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Our management assessed the effectiveness of our internal control over financial reporting as of December 31, 2016. In making this assessment, our management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in *Internal Control Integrated Framework* (2013).

Based on its assessment, management concluded that, as of December 31, 2016, our internal control over financial reporting is effective based on those criteria.

The effectiveness of our internal control over financial reporting as of December 31, 2016 has been audited by PricewaterhouseCoopers LLP, an independent registered public accounting firm, as stated in their report which is included herein.

Changes in Internal Control over Financial Reporting

No change in our internal control over financial reporting occurred during the fiscal quarter ended December 31, 2016 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

ITEM 9B. OTHER INFORMATION

Lock-up Agreement

On February 23, 2017, we entered into a lock-up agreement with Johnson & Johnson Innovation-JJDC, Inc., or JJDC, pursuant to which JJDC agreed that, subject to certain exceptions, it will not, and will also cause its affiliates not to, without our prior approval, sell, transfer or otherwise dispose of the shares of our common stock owned by it until the earlier of (1) January 31, 2018, or (ii) such date that is 60 days after the first public announcement of top-line clinical results from Janssen Pharmaceuticals, Inc.'s, or Janssen, on-going OMEGA-1 phase 2b clinical trial.

In May 2015, we entered into parallel transactions with JJDC and its affiliate, Janssen, comprising (1) an exclusive collaboration and license agreement with Janssen and (2) a stock purchase agreement with JJDC pursuant to which JJDC purchased shares of our common stock. See "Business—Collaboration with Janssen Pharmaceuticals, Inc." for more information.

Sales Agreement

On February 23, 2017, we entered into a Controlled Equity Offering SM Sales Agreement, or the sales agreement, with Cantor Fitzgerald & Co., or Cantor, as agent, pursuant to which we may offer and sell shares of our common stock having an aggregate offering price of up to \$75,000,000 from time to time through Cantor. The shares to be sold under the sales agreement, if any, may be issued and sold pursuant to a universal shelf registration statement on Form S-3 that we expect to file with the Securities and Exchange Commission, or SEC, after such time as the registration statement is declared effective by the SEC.

Once the registration statement is declared effective by the SEC, upon delivery of a placement notice and subject to the terms and conditions of the sales agreement, Cantor may sell such shares by any method deemed to be an "at the market offering" as defined in Rule 415(a)(4) promulgated under the Securities Act of 1933, as amended.

We or Cantor may suspend or terminate the offering of our shares upon notice to the other party, subject to certain conditions. Cantor will act as sales agent on a reasonable efforts basis consistent with its normal trading and sales practices and applicable state and federal law, rules and regulations and the rules of NASDAQ.

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We have agreed to pay Cantor commissions for its services of acting as agent of up to 3.0% of the gross proceeds from the sale of our shares pursuant to the sales agreement. We have also agreed to provide Cantor with customary indemnification and contribution rights.

A copy of the sales agreement is attached as Exhibit 10.27 to this Annual Report on Form 10-K and is incorporated herein by reference. The foregoing description of the material terms of the sales agreement does not purport to be complete and is qualified in its entirety by reference to such exhibit.

This Annual Report on Form 10-K shall not constitute an offer to sell or the solicitation of an offer to buy shares of our common stock nor shall there be any sale of shares of our common stock in any state in which such offer, solicitation or sale would be unlawful prior to registration or qualification under the securities laws of any such state or jurisdiction.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

We intend to file with the Securities and Exchange Commission a definitive Proxy Statement, which we refer to herein as the Proxy Statement, not later than 120 days after the close of the fiscal year ended December 31, 2016. The information required by this item is incorporated herein by reference to the information contained under the sections captioned “Election of Directors,” “Section 16(a) Beneficial Ownership Reporting Compliance” and “Corporate Governance” of the Proxy Statement. The information required by this item relating to executive officers is included in “Part I, Item 1—Business—Executive Officers of the Registrant” of this Annual Report on Form 10-K on page 29 and is incorporated by reference.

We have adopted a written code of business conduct and ethics, which applies to our principal executive officer, principal financial or accounting officer or person serving similar functions and all of our other employees and members of our board of directors. The text of our code of ethics is available on our website at www.achillion.com. We did not waive any provisions of the code of business ethics during the year ended December 31, 2016. If we amend, or grant a waiver under, our code of business ethics that applies to our principal executive officer, principal financial or accounting officer, or persons performing similar functions, we intend to post information about such amendment or waiver on our website at www.achillion.com.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item is incorporated herein by reference to the information contained under the sections captioned “Information About Executive and Director Compensation” of the Proxy Statement.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by this item is incorporated herein by reference to the information contained under the sections captioned “Security Ownership of Certain Beneficial Owners and Management” and “Equity Compensation Plan Information” of the Proxy Statement.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item is incorporated herein by reference to the information contained under the sections captioned “Certain Relationships and Related Transactions” of the Proxy Statement.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by this item is incorporated herein by reference to the information contained under the sections captioned “Auditor’s Fees” and “Pre-Approval Policies and Procedures” of the Proxy Statement.

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PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a)(1) Financial Statements

The following documents are included on pages F-1 through F-29 attached hereto and are filed as part of this Annual Report on Form 10-K.

[Report of Independent Registered Public Accounting Firm](#)

F-2

[Balance Sheets as of December 31, 2016 and 2015](#)

F-3

[Statements of Comprehensive Loss for the Years Ended December 31, 2016, 2015 and 2014](#)

F-4

[Statements of Stockholders' Equity for the Years Ended December 31, 2016, 2015 and 2014](#)

F-5

[Statements of Cash Flows for the Years Ended December 31, 2016, 2015 and 2014](#)

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[Notes to Financial Statements](#)

F-7

(a)(2) Financial Statement Schedules

Not applicable

(a)(3) List of Exhibits

The exhibits which are filed with this report or which are incorporated herein by reference are set forth in the Exhibit Index hereto.

ITEM 16. FORM 10-K SUMMARY

None.

INDEX TO FINANCIAL STATEMENTS

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Financial Statements:	
Balance Sheets as of December 31, 2016 and 2015	F-3
Statements of Comprehensive Loss for the Years Ended December 31, 2016, 2015 and 2014	F-4
Statements of Stockholders' Equity for the Years Ended December 31, 2016, 2015 and 2014	F-5
Statements of Cash Flows for the Years Ended December 31, 2016, 2015 and 2014	F-6
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To the Board of Directors and Shareholders of
Achillion Pharmaceuticals, Inc.:

In our opinion, the accompanying balance sheets and the related statements of comprehensive loss, of stockholders' equity and of cash flows present fairly, in all material respects, the financial position of Achillion Pharmaceuticals, Inc. at December 31, 2016 and December 31, 2015, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2016 in conformity with accounting principles generally accepted in the United States of America. Also in our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on criteria established in *Internal Control—Integrated Framework* (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). The Company's management is responsible for these financial statements, for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in Management's Annual Report on Internal Control Over Financial Reporting appearing under Item 9A. Our responsibility is to express opinions on these financial statements and on the Company's internal control over financial reporting based on our integrated audits. We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement and whether effective internal control over financial reporting was maintained in all material respects. Our audits of the financial statements included examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audits also included performing such other procedures as we considered necessary in the circumstances. We believe that our audits provide a reasonable basis for our opinions.

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (ii) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ PricewaterhouseCoopers LLP

Hartford, Connecticut
February 23, 2017

Achillion Pharmaceuticals, Inc.
Balance Sheets
(in thousands, except per share amounts)

	<u>As of December 31,</u>	
	<u>2016</u>	<u>2015</u>
Assets		
Current assets:		
Cash and cash equivalents	\$ 77,261	\$ 81,725
Marketable securities	286,558	377,616
Accounts and other receivables	15,256	506
Prepaid expenses and other current assets	3,460	2,741
Total current assets	<u>382,535</u>	<u>462,588</u>
Marketable securities	27,657	—
Fixed assets, net	3,479	1,735
Other assets	52	50
Restricted cash	152	152
Total assets	<u>\$ 413,875</u>	<u>\$ 464,525</u>
Liabilities and Stockholders' Equity		
Current liabilities:		
Accounts payable	\$ 7,002	\$ 4,133
Accrued expenses	6,618	10,302
Current portion of long-term debt	351	223
Total current liabilities	<u>13,971</u>	<u>14,658</u>
Other long-term liabilities	149	—
Long-term debt	301	231
Total liabilities	<u>14,421</u>	<u>14,889</u>
Commitments and contingencies (Note 14)		
Stockholders' Equity:		
Common Stock, \$0.001 par value; 200,000 shares authorized at December 31, 2016 and 2015; 136,722 and 136,640 shares issued and outstanding at December 31, 2016 and 2015, respectively	137	137
Additional paid-in capital	916,584	905,256
Accumulated deficit	(517,418)	(455,712)
Accumulated other comprehensive income (loss)	151	(45)
Total stockholders' equity	<u>399,454</u>	<u>449,636</u>
Total liabilities and stockholders' equity	<u>\$ 413,875</u>	<u>\$ 464,525</u>

The accompanying notes are an integral part of these financial statements.

Achillion Pharmaceuticals, Inc.
Statements of Comprehensive Loss
(in thousands, except per share amounts)

	Years Ended December 31,		
	2016	2015	2014
Revenue	\$ 15,000	\$ 66,122	\$ —
Operating expenses			
Research and development	59,162	56,553	53,515
General and administrative	20,703	24,676	15,911
Total operating expenses	79,865	81,229	69,426
Loss from operations	(64,865)	(15,107)	(69,426)
Other income (expense)			
Interest income	3,227	1,188	455
Interest expense	(68)	(55)	(37)
Other income	—	8,944	—
Net loss	\$ (61,706)	\$ (5,030)	\$ (69,008)
Unrealized income (loss) on marketable securities	196	(33)	(18)
Total other comprehensive income (loss)	196	(33)	(18)
Total comprehensive income (loss)	\$ (61,510)	\$ (5,063)	\$ (69,026)
Basic and diluted net loss per share attributable to common stockholders (Note 4)	\$ (0.45)	\$ (0.04)	\$ (0.70)
Weighted average shares used in computing basic and diluted net loss per share attributable to common stockholders	136,667	125,592	98,367

The accompanying notes are an integral part of these financial statements.

Achillion Pharmaceuticals, Inc.
Statements of Stockholders' Equity for the Years Ended December 31, 2014, 2015 and 2016
(in thousands)

	<u>Common Stock</u>		<u>Additional Paid-In Capital</u>	<u>Accumulated Deficit</u>	<u>Stock Subscription Receivable</u>	<u>Accumulated Other Comprehensive Income (Loss)</u>	<u>Total Stockholders' Equity</u>
	<u>Shares</u>	<u>Amount</u>					
Balances at December 31, 2013	96,792	\$ 97	\$534,529	\$ (381,674)	—	\$ 6	\$ 152,958
Net loss	—	—	—	(69,008)	—	—	(69,008)
Other comprehensive income (loss)	—	—	—	—	—	(18)	(18)
Stock compensation	—	—	7,273	—	—	—	7,273
Issuance of common stock upon exercise of warrants	2,099	2	5,249	—	—	—	5,251
Issuance of common stock upon exercise of stock options	1,364	1	4,192	—	(126)	—	4,067
Issuance of common stock under the Employee Stock Purchase Plan	102	1	240	—	—	—	241
Issuance of common stock in connection with the public offering, net of issuance costs	3,237	3	48,313	—	(5,611)	—	42,705
Balances at December 31, 2014	103,594	\$ 104	\$599,796	\$ (450,682)	(5,737)	\$ (12)	\$ 143,469
Net loss	—	—	—	(5,030)	—	—	(5,030)
Other comprehensive income (loss)	—	—	—	—	—	(33)	(33)
Stock compensation	—	—	10,072	—	—	—	10,072
Issuance of common stock upon exercise of warrants	8	—	—	—	—	—	—
Issuance of common stock upon exercise of stock options	835	1	3,730	—	126	—	3,857
Issuance of common stock under the Employee Stock Purchase Plan	36	—	290	—	—	—	290
Issuance of common stock in connection with public offerings, net of issuance costs	13,800	14	132,509	—	5,611	—	138,134
Issuance of common stock in connection with the JJDC Stock Purchase Agreement	18,367	18	158,859	—	—	—	158,877
Balances at December 31, 2015	136,640	\$ 137	\$905,256	\$ (455,712)	\$ —	\$ (45)	\$ 449,636
Net loss	—	—	—	(61,706)	—	—	(61,706)
Other comprehensive income (loss)	—	—	—	—	—	196	196
Stock compensation	—	—	11,006	—	—	—	11,006
Issuance of common stock upon exercise of stock options	41	—	108	—	—	—	108
Issuance of common stock under the Employee Stock Purchase Plan	41	—	214	—	—	—	214
Balances at December 31, 2016	<u>136,722</u>	<u>\$ 137</u>	<u>\$916,584</u>	<u>\$ (517,418)</u>	<u>\$ —</u>	<u>\$ 151</u>	<u>\$ 399,454</u>

The accompanying notes are an integral part of these financial statements.

Achillion Pharmaceuticals, Inc.
Statements of Cash Flows
(in thousands)

	Years Ended December 31,		
	2016	2015	2014
Cash flows from operating activities			
Net loss	\$ (61,706)	\$ (5,030)	\$ (69,008)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:			
Depreciation and amortization	955	694	489
Noncash stock-based compensation	11,006	10,072	7,273
(Gain)/loss on disposal of equipment	8	2	(2)
Premium on purchases of marketable securities	(565)	(2,486)	(947)
Amortization of premium on marketable securities	985	2,002	1,959
Changes in operating assets and liabilities:			
Accounts and other receivables	(14,750)	(411)	385
Prepaid expenses and other current assets	(721)	(837)	575
Accounts payable	2,693	(2,285)	1,827
Accrued expenses	(3,707)	3,856	1,925
Other long-term liabilities	149	—	—
Net cash provided by (used in) operating activities	<u>(65,653)</u>	<u>5,577</u>	<u>(55,524)</u>
Cash flows from investing activities			
Purchase of fixed assets	(2,508)	(704)	(947)
Purchase of marketable securities	(499,115)	(692,525)	(79,338)
Maturities of marketable securities	562,292	394,575	123,625
Net cash provided by (used in) investing activities	<u>60,669</u>	<u>(298,654)</u>	<u>43,340</u>
Cash flows from financing activities			
Proceeds from issuance of common stock in connection with public offerings, net of issuance costs	—	138,260	42,705
Proceeds from issuance of common stock in connection with the JJDC Stock Purchase Agreement	—	158,877	—
Proceeds from exercise of stock options	108	3,730	4,067
Proceeds from exercise of warrants	—	—	5,251
Proceeds from sale of stock under the Employee Stock Purchase Plan	214	290	241
Borrowings of debt	444	229	440
Repayments of debt	(246)	(248)	(313)
Net cash provided by financing activities	<u>520</u>	<u>301,138</u>	<u>52,391</u>
Net increase (decrease) in cash and cash equivalents	(4,464)	8,061	40,207
Cash and cash equivalents, beginning of period	81,725	73,664	33,457
Cash and cash equivalents, end of period	<u>\$ 77,261</u>	<u>\$ 81,725</u>	<u>\$ 73,664</u>
Supplemental disclosure of cash flow information			
Cash paid for interest	\$ 46	\$ 50	\$ 35
Supplemental disclosure of noncash financing activities			
Cashless exercise of warrants	\$ —	\$ 53	\$ 2,848
Purchases of equipment in accounts payable or accrued expenses	\$ 199	—	—

The accompanying notes are an integral part of these financial statements.

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements
(in thousands, except per share amounts)

1. Nature of the Business

Achillion Pharmaceuticals, Inc. (the “Company”) was incorporated on August 17, 1998 in Delaware. The Company is a science-driven, patient-focused biopharmaceutical company seeking to leverage its believed strengths across the continuum from discovery through commercialization by discovering and developing small molecule therapeutics to meet the needs of patients with infectious and complement-mediated diseases. The Company is devoting substantially all of its efforts towards product research and development.

The Company incurred losses of \$503,557 from inception through December 31, 2016 and had an accumulated deficit of \$517,418 at December 31, 2016, which includes preferred stock dividends recognized until the Company’s initial public offering in 2006. The Company has funded its operations primarily through the sale of equity securities.

Based on the Company’s current development plan, the Company believes that its existing cash, cash equivalents and marketable securities will be sufficient to meet its current projected operating requirements for at least the next 12 months. However, the Company’s future capital requirements may change and will depend upon numerous factors, including but not limited to:

- the scope, progress, results and costs of drug discovery, preclinical development, laboratory testing and clinical trials for the Company’s drug candidates;
- the Company’s ability to enter into and the terms and timing of any collaborations, licensing or other arrangements that it may establish;
- the number of future drug candidates that the Company pursues and their development requirements;
- the outcome, timing and costs of seeking regulatory approvals;
- the costs of commercialization activities for any of the Company’s drug candidates that receive marketing approval to the extent such costs are not the responsibility of any current or future collaborators, including the costs and timing of establishing product sales, marketing, distribution and manufacturing capabilities;
- subject to receipt of marketing approval, revenue, if any, received from commercial sales of the Company’s drug candidates;
- the Company’s headcount growth and associated costs as it seeks to expand its research and development and establish a commercial infrastructure;
- the costs involved in preparing, filing, prosecuting, maintaining, enforcing and defending patent and other intellectual property rights and defending against intellectual property-related claims;
- the timing and amount of proceeds received from milestones achieved and royalties earned, if any, by the Company under its exclusive collaboration and license agreement with Janssen Pharmaceuticals, Inc., the pharmaceutical subsidiary of Johnson and Johnson, Inc. (“Janssen”);
- the Company’s ability to raise debt or equity capital, including any changes in the credit or equity markets that may impact its ability to obtain capital in the future;
- the costs associated with, and the outcome of, lawsuits against the Company, if any;
- the Company’s acquisition and development of new technologies and drug candidates; and
- competing technological and market developments, including those currently unknown to the Company.

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

2. Summary of Significant Accounting Policies

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States (“GAAP”) requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

Revenue Recognition

The Company recognizes revenue from contract research and development and research progress payments in accordance with Accounting Standards Codification (“ASC”) 605, *Revenue Recognition*. Revenue-generating research and development collaborations are often multiple element arrangements, providing for a license as well as research and development services. In order to account for these arrangements, the Company must identify the deliverables included within the arrangement and evaluate which deliverables represent separate units of accounting based on if certain criteria are met, including whether the delivered element has stand-alone value to the collaborator. The consideration received is allocated among the separate units of accounting and the applicable revenue recognition criteria are applied to each of the separate units.

When the Company determines that an arrangement should be accounted for as a single unit of accounting, it must determine the period over which the performance obligations will be performed and revenue related to upfront license payments will be recognized. Revenue will be recognized using either a proportionate performance or straight-line method. The Company recognizes revenue using the proportionate performance method provided that it can reasonably estimate the level of effort required to complete its performance obligations under an arrangement and such performance obligations are provided on a best-efforts basis. Under the proportionate performance method, periodic revenue related to up-front license payments is recognized as the percentage of actual effort expended in that period to total effort expected for all of its performance obligations under the arrangement. Actual effort is generally determined based upon actual direct labor hours or full-time equivalents (“FTE”) incurred and include research and development activities performed by internal scientists. Total expected effort is generally based upon the total direct labor hours of FTEs incorporated into the detailed budget and project plan that is agreed to by both parties to the collaboration. 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 the related performance obligations. In the event that a change in estimate occurs, the change will be accounted for using the cumulative catch-up method which provides for an adjustment to revenue in the current period. Estimates of the Company’s level of effort may change in the future, resulting in a material change in the amount of revenue recognized in future periods, including negative revenue in some periods. Generally under collaboration arrangements, payments received during the period of performance may include up-front payments, time-or performance-based milestones and reimbursement of internal and external costs. The proportion of actual performance to total expected performance is applied to these payments in determining periodic revenue, but will be limited by the aggregate cash received or receivable to date.

Substantive milestone payments are recognized upon achievement of the milestone. Determining whether a milestone is substantive requires judgment that should be made at the inception of the arrangement. To meet the definition of a substantive milestone, the consideration earned by achieving the milestone (1) would have to be commensurate with either the level of effort required to achieve the milestone or the enhancement in the value of the item delivered, (2) would have to relate solely to past performance, and (3) should be reasonable relative to

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

all deliverables and payment terms in the arrangement. No bifurcation of an individual milestone is allowed and there can be more than one milestone in an arrangement.

In May 2015, the Company entered into parallel transactions with Janssen and its affiliate, Johnson & Johnson Innovation-JJDC, Inc. (“JJDC”), consisting of (i) an exclusive collaboration and license agreement with Janssen (the “Janssen Agreement”) pursuant to which, upon the closing of the transactions contemplated by the Janssen Agreement on June 29, 2015, the Company granted Janssen exclusive worldwide rights to develop and commercialize products that contain one or more of the Company’s drug candidates for the treatment of chronic hepatitis C virus (“HCV”) infection, namely odalasvir, a second-generation NS5A inhibitor, ACH-3422, a NS5B HCV polymerase inhibitor, and sovalprevir, a NS3/4A HCV protease inhibitor, and (ii) a stock purchase agreement with JJDC (the “JJDC Stock Purchase Agreement”) pursuant to which, upon the closing of the transactions contemplated by the JJDC Stock Purchase Agreement, JJDC purchased 18,367 shares of the Company’s common stock (the “Shares”) at a price of \$12.25 per share, for an aggregate purchase price of \$225,000. The Janssen Agreement became effective on June 29, 2015 upon the early termination of applicable waiting periods under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended (the “HSR Act”). The JJDC Stock Purchase Agreement became effective July 1, 2015. In connection with the closing of the transactions contemplated by the JJDC Stock Purchase Agreement, the Company and JJDC entered into an Investor Agreement (the “Investor Agreement”) on July 1, 2015.

Pursuant to the terms of the Janssen Agreement, the Company was required to provide technology transfer services related to the chemistry, manufacturing and know-how to Janssen for up to 180 days after the effective date of the agreement. In accordance with ASC 605-25, which provides guidance on accounting for multiple-element arrangements, including the determination of the units of accounting and allocation of total arrangement consideration, the Company identified all of the obligations at the inception of the Janssen Agreement. The significant obligations were determined to be the license and the technology transfer services. The Company determined that license and technology transfer services represent a single unit of accounting because they were not viewed to have standalone value. The Janssen Agreement entered into by the Company and Janssen, the JJDC Stock Purchase Agreement, and the Investor Agreement were entered into by the Company and Janssen’s affiliate in contemplation of each other. The only upfront amount received by the Company in exchange for the license and technology transfer services and the issuance of the Shares was the \$225,000. The Company determined that the amount received in excess of the fair value of the Shares upon issuance of \$66,122 was attributed to the license and technology services. The Company also determined that there was no discernable pattern in which the technology services would be provided during the 180 day period after the effective date. In accordance with ASC 605-10, the Company determined that straight-line attribution of the license and technology services revenues would be used to recognize revenue. As such, revenue of \$66,122 was recorded during the year ended December 31, 2015 associated with this transaction.

The development, regulatory and sales milestones represent non-refundable amounts that would be paid by Janssen to the Company if certain milestones are achieved in the future. The Company has elected to apply the guidance in ASC 605-28 to the milestones. These milestones, if achieved, are substantive as they relate solely to past performance and are commensurate with estimated enhancement of value associated with the achievement of each milestone as a result of the Company’s performance; however, there can be no assurance that Janssen will achieve the milestones or that the Company will receive the related revenue. During the year ended December 31, 2016, the Company recognized revenue of \$15,000 related to the achievement of a clinical enrollment milestone under the Janssen Agreement.

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

Stock-Based Compensation—Employee Stock-Based Awards

The Company applies the provisions of ASC 718, *Stock Compensation*, which requires measurement and recognition of compensation expense for all stock-based awards made to employees and directors, including employee stock options and employee stock purchases under the Company's 2006 ESPP Plan based on estimated fair values.

The Company primarily grants qualified stock options for a fixed number of shares to employees with an exercise price equal to the market value of the shares at the date of grant. To the extent that the amount of the aggregate fair market value of qualified stock options that become exercisable for an individual exceeds \$100 during any tax year, those stock options are treated as non-qualified stock options. Under the fair value recognition provisions, stock-based compensation cost is based on the fair value of the portion of stock-based awards that is ultimately expected to vest.

The Company utilizes the Black-Scholes option pricing model for determining the estimated fair value for stock-based awards. The Black-Scholes model requires the use of assumptions which determine the fair value of the stock-based awards. Determining the fair value of stock-based awards at the grant date requires judgment, including estimating the expected term of stock options, the expected volatility of our stock and expected dividends.

For the years ended December 31, 2016, 2015 and 2014, the Company based its estimate of the expected term on historical data for similar stock option grants and the Company calculated volatility based on actual volatility for the expected term of the option. The Company estimates forfeitures at the grant date and recognizes compensation costs for only those awards that are expected to vest.

Accrued Expenses

As part of the process of preparing financial statements, the Company is required to estimate accrued expenses. This process involves identifying services which have been performed on its behalf and estimating the level of service performed and the associated cost incurred for such service as of each balance sheet date in its financial statements.

In accruing service fees, the Company estimates the time period over which services will be provided and the level of effort in each period. If the actual timing of the provision of services or the level of effort varies from the estimate, the Company will adjust the accrual accordingly. The majority of service providers invoice the Company monthly in arrears for services performed. Some service providers require upfront or milestone payments. If the estimate of services performed is less than the upfront or milestone payments, the difference is accounted for as a prepaid expense. In the event that the Company does not identify costs that have begun to be incurred or the Company underestimates or overestimates the level of services performed or the costs of such services, actual expenses could differ from such estimates. The date on which some services commence, the level of services performed on or before a given date and the cost of such services are often subjective determinations. The Company makes judgments based upon facts and circumstances known to it in accordance with GAAP.

Cash, Cash Equivalents and Restricted Cash

Cash and cash equivalents are stated at cost, which approximates fair value, and include short-term, highly-liquid investments with original maturities of less than three months. The Company also holds certificates of deposit, which collateralize the Company's facility lease which are classified as restricted cash in the

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

accompanying balance sheets. The restricted cash will be released from restriction in 2020. At December 31, 2016 and 2015, the Company had \$77,261 and \$81,725, respectively, of cash and cash equivalents.

Marketable Securities and Equity Investments

The Company applies the provisions of ASC 820, *Fair Value Measurements and Disclosures*, for financial assets and liabilities measured on a recurring basis which requires disclosure that establishes a framework for measuring fair value. The guidance requires that fair value measurements be classified and disclosed in one of three categories:

- Level 1: Quoted prices in active markets for identical assets and liabilities that the reporting entity has the ability to access at the measurement date;
- Level 2: Inputs other than quoted prices in active markets, that are observable either directly or indirectly, such as quoted prices for similar assets or liabilities, quoted in markets that are not active, or other inputs that are observable; or
- Level 3: Unobservable inputs.

The fair value of the Company's marketable securities of \$314,215 and \$377,616 as of December 31, 2016 and 2015, respectively, was valued based on level 2 inputs. The Company's investments consist mainly of corporate debt securities and government sponsored bond obligations. Fair value is determined by taking into consideration valuations obtained from third-party pricing services. The third-party pricing services utilize industry standard valuation models, for which all significant inputs are observable, either directly or indirectly, to estimate fair value. These inputs include reported trades of and broker/dealer quotes on the same or similar securities; issuer credit spreads; benchmark securities; and other observable inputs. The Company has assessed these as level 2 within the fair value hierarchy of ASC 820. The Company classifies its entire investment portfolio as available for sale as defined in ASC 320, "*Debt and Equity Securities* ." Securities are carried at fair value with the unrealized gains (losses) reported as a separate component of stockholders' equity within accumulated other comprehensive income.

Fair Value of Financial Instruments

The Company's financial instruments, including cash, cash equivalents, accounts receivable, and accounts payable are carried at cost, which approximates their fair value because of the short-term maturity of these instruments.

The Company believes that the carrying value of its debt balance outstanding approximates fair value. Fair value is determined using a discounted cash flow model based on current interest rates.

Concentration of Risk

Concentration of credit risk exists with respect to cash and cash equivalents and investments. The Company maintains its cash and cash equivalents and investments with high quality financial institutions. At times, amounts may exceed federally insured deposit limits.

For the years ended December 31, 2016, 2015, and 2014, 100%, 100% and 0%, respectively, of the Company's revenue was generated from the Janssen Agreement. At December 31, 2016 and 2015, 99% and 79%, respectively, of the Company's accounts receivable was from one collaboration partner.

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

Fixed Assets

Property and equipment are recorded at cost and are depreciated and amortized over the shorter of their remaining lease term or their estimated useful lives on a straight-line basis as follows:

Laboratory equipment	4-7 years
Office equipment	3-5 years
Leasehold improvements	Lesser of life of improvement or lease term

Expenditures for maintenance and repairs, which do not improve or extend the useful lives of the respective assets, are expensed as incurred. When assets are sold or retired, the related cost and accumulated depreciation are removed from their respective accounts and any resulting gain or loss is included in income (loss) from operations.

Long-lived Assets

ASC 360, *Property, Plant and Equipment*, addresses the financial accounting and reporting for impairment or disposal of long-lived assets. The Company reviews the recorded values of long-lived assets for impairment whenever events or changes in business circumstance indicate that the carrying amount of an asset or group of assets may not be fully recoverable.

Research and Development Expenses

All costs associated with internal research and development, research and development services for which the Company has externally contracted and licensed technology are expensed as incurred. Research and development expense includes direct and indirect costs for salaries, employee benefits, subcontractors, including clinical research organizations (“CROs”), operating supplies, facility-related expenses and depreciation.

Patent Costs

The Company expenses the costs of obtaining and maintaining patents.

Income Taxes

The Company uses an asset and liability approach for financial accounting and reporting of income taxes. Deferred tax assets and liabilities are determined based on temporary differences between financial reporting and tax basis of assets and liabilities and are measured by applying enacted rates and laws to taxable years in which differences are expected to be recovered or settled. Further, the effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that the rate change is enacted. A valuation allowance is required when it is “more likely than not” that all or a portion of deferred tax assets will not be realized.

The Company applies the provisions of ASC 740, *Income Taxes*, which prescribes a comprehensive model for how a company should recognize, measure, present, and disclose in its financial statements uncertain tax positions that the company has taken or expects to take on a tax return (including a decision whether to file or not file a return in a particular jurisdiction). The financial statements reflect expected future tax consequences of such positions presuming the taxing authorities’ full knowledge of the position and all relevant facts.

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

The Company did not have any unrecognized tax benefits as of December 31, 2016. The Company reviews all tax positions to ensure the tax treatment selected is sustainable based on its technical merits and that the position would be sustained if challenged.

Segment Information

The Company is engaged solely in the discovery and development of innovative small molecule drug therapies. Accordingly, the Company has determined that it operates in one operating segment.

Accounting Standards Updates

In May 2014, the Financial Accounting Standards Board (“FASB”) issued Accounting Standards Update (“ASU”) No. 2014-09, “Revenue from Contracts with Customers (Topic 606),” which supersedes all existing revenue recognition requirements, including most industry-specific guidance. ASU No. 2014-09 requires a company to recognize revenue when it transfers goods or services to customers in an amount that reflects the consideration that the company expects to receive for those goods or services. In August 2015, the FASB issued ASU No. 2015-14, “Revenue from Contracts with Customers (Topic 606): Deferral of the Effective Date,” which delays the effective date of ASU No. 2014-09 by one year. The new standard is effective for reporting periods beginning after December 15, 2017. The Company is not planning to early adopt and is currently evaluating certain aspects of the impact ASU No. 2014-09 will have on its financial position and results of operations. Certain aspects of the Company’s arrangement with Janssen may be impacted, particularly as it relates to timing of the revenue recognition.

In August 2014, FASB issued ASU No. 2014-15, “Presentation of Financial Statements—Going Concern.” ASU No. 2014-15 provides guidance regarding management’s responsibility to evaluate whether there exists substantial doubt about an organization’s ability to continue as a going concern and to provide related footnote disclosures in certain circumstances. ASU No. 2014-15 was effective for us in the fourth quarter of 2016. The adoption of ASU No. 2014-15 did not have a material effect on the Company’s financial position and results of operations or disclosures.

In February 2016, FASB issued ASU No. 2016-02 “Leases—Topic 842.” ASU No. 2016-02 requires the recognition of lease assets and lease liabilities by lessees for all leases greater than one year in duration and classified as operating leases under previous GAAP. ASU No. 2016-02 is effective for fiscal years beginning after December 15, 2018, and for interim periods within that fiscal year. The Company is currently evaluating the impact ASU No. 2016-02 will have on its financial position and results of operations.

In March 2016, FASB issued ASU No. 2016-09, “Compensation—Stock Compensation (Topic 718).” The new guidance simplifies certain aspects related to income taxes, statement of cash flows, and forfeitures when accounting for share-based payment transactions. ASU No. 2016-09 is effective for annual periods beginning after December 15, 2017, and interim periods within annual periods beginning after December 15, 2018. Early adoption is permitted. The Company is currently evaluating the impact ASU No 2016-09 will have on its financial position and results of operations.

In March 2016, FASB issued ASU No. 2016-08, “Revenue from Contracts with Customers (Topic 606): Principal versus Agent Considerations” which clarifies the implementation guidance on principal versus agent considerations. Further, in April 2016, FASB issued ASU No. 2016-10, “Revenue from Contracts with Customers (Topic 606): Identifying Performance Obligations and Licensing” which clarifies the implementation

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

guidance on identifying performance obligations and licensing. The Company is currently evaluating the method of adoption and the potential impact that Topic 606 may have on its financial position and results of operations.

In August 2016, FASB issued ASU No. 2016-15, “Classification of Certain Cash Receipts and Cash Payments.” ASU No. 2016-15 eliminates the diversity in practice related to the classification of certain cash receipts and payments in the statement of cash flows by adding or clarifying guidance on eight specific cash flow issues. ASU No. 2016-15 is effective for fiscal years beginning after December 15, 2017, and for interim periods within that fiscal year. The Company does not believe ASU No. 2016-15 will have a material effect on its financial position and results of operations.

In November 2016, FASB issued ASU No. 2016-18, “Statement of Cash Flows (Topic 230): Restricted Cash.” ASU No. 2016-18 requires that the statement of cash flows explain the change during the period in the total of cash, cash equivalents, and restricted cash. As a result, restricted cash will 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. The new guidance is effective for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years. Early adoption is permitted, and the new guidance is to be applied retrospectively. The Company does not believe ASU 2016-18 will have a material effect on its financial position and results of operations.

3. Financing Activities

Public Offerings

In February 2015, the Company entered into an underwriting agreement (the “Underwriting Agreement”) with Leerink Partners LLC and Deutsche Bank Securities Inc., as representatives of the several underwriters named therein (collectively, the “Underwriters”), relating to a public offering of shares of the Company’s common stock, par value \$0.001 per share, at a price of \$10.25 per share less underwriting discounts and commissions (the “Offering”). The Company issued and sold to the Underwriters an aggregate of 13,800 shares of common stock in connection with the Offering. The Offering resulted in net proceeds to the Company of \$132,558.

Between December 22, 2014 and December 31, 2014, the Company sold 3,236 shares of its common stock pursuant to the Sales Agreement, dated November 8, 2012, between the Company and Cantor Fitzgerald & Co. (the “Cantor Sales Agreement”). In connection with these sales, the Company received \$48,316 in net proceeds. As of December 31, 2014, the Company had \$5,611 in subscriptions receivable, as a portion of the sales under the Cantor Sales Agreement closed in January 2015. In January 2015, the Company received the remaining \$5,611 in net proceeds from the portion of the sales that closed in January 2015.

4. Earnings (Loss) Per Share

Basic earnings (loss) per share (“EPS”) is calculated in accordance with Accounting Standards Codification (“ASC”) 260, *Earnings Per Share*, by dividing net income or loss attributable to common stockholders by the weighted average common stock outstanding. Diluted EPS is calculated by adjusting weighted average common shares outstanding for the dilutive effect of common stock options and warrants. In periods in which a net loss is recorded, no effect is given to potentially dilutive securities, since the effect would be antidilutive. Securities that

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

could potentially dilute basic EPS in the future were not included in the computation of diluted EPS because to do so would have been antidilutive. The calculations of basic and diluted net loss per share are as follows:

	Years Ended December 31,		
	2016	2015	2014
	(in thousands)		
Net loss (numerator)	\$ (61,706)	\$ (5,030)	\$ (69,008)
Weighted-average shares, in thousands (denominator)	136,667	125,592	98,367
Basic and diluted net loss per share	\$ (0.45)	\$ (0.04)	\$ (0.70)

Potentially dilutive securities outstanding as of December 31, 2016, 2015 and 2014 are as follows:

	Years Ended December 31,		
	2016	2015	2014
	(in thousands)		
Stock Options	10,394	8,501	9,493
Warrants	2,833	2,833	2,844

5. Collaboration Arrangements

Janssen Pharmaceuticals, Inc.

In May 2015, the Company entered into parallel transactions with Janssen and its affiliate, JJDC, Inc., consisting of (i) an exclusive collaboration and license agreement with Janssen (the “Janssen Agreement”) pursuant to which, upon the closing of the transactions contemplated by the Janssen Agreement on June 29, 2015, the Company granted Janssen exclusive worldwide rights to develop and commercialize products that contain one or more of the Company’s drug candidates for the treatment of chronic hepatitis C virus, (“HCV”), namely odalasvir, a second-generation NS5A inhibitor, ACH-3422, a NS5B HCV polymerase inhibitor, and sovalprevir, a NS3/4A HCV protease inhibitor, and (ii) a stock purchase agreement (the “JJDC Stock Purchase Agreement”) pursuant to which, upon the closing of the transactions contemplated by the JJDC Stock Purchase Agreement, JJDC purchased 18,367 shares (the “Shares”) of the Company’s common stock at a price of \$12.25 per share, for an aggregate purchase price of \$225,000. The Janssen Agreement became effective on June 29, 2015 upon the early termination of applicable waiting periods under the HSR Act. The JJDC Stock Purchase Agreement became effective July 1, 2015. In connection with the closing of the transactions contemplated by the JJDC Stock Purchase Agreement, the Company and JJDC entered into an investor agreement on July 1, 2015 (the “Investor Agreement”), governing specified rights and obligations of JJDC with respect to its ownership of the Shares. In December 2016, the Company entered into an amendment to the Janssen Agreement which amended the Clinical Milestone Event under the Janssen Agreement and provided for a \$15,000 payment by Janssen to the Company upon dosing of the first patient in the OMEGA-1 Phase 2b study of JNJ-4178.

Under the terms of the Janssen Agreement, the Company is eligible to receive (1) up to \$115,000 of milestone payments based upon achievement of clinical enrollment and dosing in specified studies, substantially all of which is related to dosing in one study, (2) up to an additional \$290,000 of milestone payments based upon regulatory approvals and first commercial sale in specified territories, the majority of which relates to regulatory approval and the first commercial sale in the U.S., and (3) up to an additional \$500,000 of milestone payments based upon achieving worldwide sales targets. The Company is also eligible to receive royalties on worldwide annual net sales of licensed products, if any, at tiered royalty rate percentages beginning in the mid-teens and rising to the low-twenties, subject to customary reductions. The royalty term is determined on a licensed-product-

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

by-licensed-product and country-by-country basis and begins on the first commercial sale of a licensed product in a country and ends on the expiration of the last to expire of specified patents or regulatory exclusivity covering such licensed product in such country or, with a customary royalty reduction, ten years after such first commercial sale if there is no such exclusivity. Janssen will bear the future costs of worldwide development and commercialization of licensed products.

The term of the Janssen Agreement will continue, unless earlier terminated, until expiration of the royalty term for licensed products or all payment obligations under the Janssen Agreement. Janssen may terminate the Janssen Agreement upon 60 days' written notice to the Company at any time prior to submission of the first application for marketing approval for a licensed product in any of the specified major market countries. Janssen may also terminate the Janssen Agreement under specified circumstances relating to the safety or regulatory approvability of a licensed product. Either the Company or Janssen may terminate the Janssen Agreement if the other party is in material breach of the agreement and fails to cure such breach within specified cure periods. Either the Company or Janssen may terminate the Janssen Agreement in the event of specified insolvency events involving the other party. Upon any early termination, rights to the Company's licensed drug candidates will revert to the Company.

Pursuant to the terms of the Janssen Agreement, the Company was required to provide technology transfer services related to the chemistry, manufacturing and know-how to Janssen for up to 180 days after the effective date. In accordance with ASC 605-25, "Revenue Recognition—Multiple-element arrangements," which provides guidance on accounting for multiple-element arrangements, including the determination of the units of accounting and allocation of total arrangement consideration, the Company identified all of the obligations at the inception of the Janssen Agreement. The significant obligations were determined to be the license and the technology transfer services. The Company has determined that license and technology transfer services represent a single unit of accounting because they were not viewed to have standalone value. The Janssen Agreement entered into by the Company and Janssen, and the JJDC Stock Purchase Agreement and the Investor Agreement entered into by the Company and Janssen's affiliate were entered into in contemplation of each other. The only upfront amount received by the Company in exchange for the license and technology transfer services and the issuance of the Company's common stock was the \$225,000. The Company determined that the amount received in excess of the fair value of the Company's common stock upon issuance of \$66,122 was attributed to the license and technology services. The Company also determined that there was no discernable pattern in which the technology services would be provided during the 180 day period after the effective date. In accordance with ASC 605-10, "Revenue Recognition—Overall," the Company determined that straight-line attribution of the license and technology services revenues would be used to recognize revenue. As such, revenue of \$66,122 was recorded during the year ended December 31, 2015 associated with this transaction.

The development, regulatory and sales milestones represent non-refundable amounts that would be paid by Janssen to the Company if certain milestones are achieved in the future. The Company has elected to apply the guidance in ASC 605-28, "Revenue Recognition—Milestone Method," to the milestones. These milestones, if achieved, are substantive as they relate solely to past performance and are commensurate with estimated enhancement of value associated with the achievement of each milestone as a result of the Company's performance; however, there can be no assurance that Janssen will achieve the milestones or that the Company will receive the related revenue. During the year ended December 31, 2016, the Company recognized \$15,000 of revenue related to the achievement of a clinical enrollment milestone under the Janssen Agreement.

Pursuant to the terms of the Janssen Agreement, a joint steering committee, ("JSC") consisting of three members from each of Janssen and the Company has been formed. The JSC will provide strategic guidance for

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Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

the joint HCV program. If the JSC fails to reach a unanimous decision on a matter within its authority, the matter shall be referred to the applicable executive officers of Janssen and the Company who shall attempt to reach a mutual decision. If the executive officers cannot reach a mutual decision, then Janssen has the deciding vote with regard to such matter.

Pursuant to the terms of the Investor Agreement, the Shares were subject to a lock-up restriction, voting covenants and a standstill agreement, each of which expired on July 1, 2016. In addition, until July 1, 2023, JJDC has the right to require, under specified conditions, that the Company file a registration statement in order to register all or a portion of the Shares. The Company will not be required to effect more than two such demand registrations for JJDC in the aggregate and is not required to effect more than one such demand registration in any 12 month period. The Company has also agreed to provide JJDC with certain “piggyback” registration rights such that at any time prior to July 1, 2023, subject to specified conditions, whenever the Company proposes to register shares of its common stock for its account, JJDC will have the right to include some or all of its Shares in such registration. The Investor Agreement also contains other customary terms and conditions of the parties with respect to the registration of the Shares.

Other Arrangements.

The Company also has license agreements with GCA Therapeutics, Ltd (“GCAT”), for elvucitabine, its nucleoside reverse transcriptase inhibitor for the treatment of both hepatitis B infection and human immunodeficiency virus infection and with Ora, Inc. (“ORA”), for the development and commercialization of ACH-702 delivered topically or locally. The Company does not believe that the milestones specified under these agreements are substantive as achievement of the milestones is based solely on the performance of GCAT and ORA and does not relate to any past or future performance by the Company. Because the Company has no performance obligations under these agreements, it intends to recognize revenue related to any milestone payment upon achievement of a milestone by GCAT or Ora.

6. Marketable Securities

The fair value of the Company’s marketable securities of \$314,215 and \$377,616 as of December 31, 2016 and 2015, respectively, is valued based on level 2 inputs. The Company’s investments consist mainly of corporate debt securities and government sponsored bond obligations. Fair value is determined by taking into consideration valuations obtained from third-party pricing services. The third-party pricing services utilize industry standard valuation models, for which all significant inputs are observable, either directly or indirectly, to estimate fair value. These inputs include reported trades of and broker/dealer quotes on the same or similar securities; issuer credit spreads; benchmark securities; and other observable inputs. There were no transfers between levels within the hierarchy during the years ended December 31, 2016 and 2015. The Company has assessed these as level 2 within the fair value hierarchy of ASC 820. The Company classifies its entire investment portfolio as available for sale as defined in ASC 320, *Debt and Equity Securities*. Securities are carried at fair value with the unrealized gains (losses) reported in other comprehensive income.

The unrealized (loss) gain from marketable securities was \$151, \$(45) and \$(12) at December 31, 2016, 2015 and 2014, respectively.

As of December 31, 2016, none of the Company’s investments were determined to be other than temporarily impaired.

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

The following table summarizes the Company's investments:

	December 31, 2016				December 31, 2015			
	Amortized Cost	Unrealized Gain	Unrealized (Loss)	Estimated Fair Value	Amortized Cost	Unrealized Gain	Unrealized (Loss)	Estimated Fair Value
Commercial Paper	\$ 96,891	\$ 267	—	\$ 97,158	\$ 137,483	\$ 158	(6)	\$ 137,635
Corporate Debt Securities	163,286	4	(129)	163,161	164,884	—	(205)	164,679
Government and Agency Securities	53,887	19	(10)	53,896	75,294	16	(8)	75,302
Total	<u>\$314,064</u>	<u>\$ 290</u>	<u>(139)</u>	<u>\$314,215</u>	<u>\$377,661</u>	<u>\$ 174</u>	<u>(219)</u>	<u>\$377,616</u>

The following additional table summarizes, by industry, the fair value of investments:

	As of December 31,	
	2016	2015
Government	53,896	75,301
Banking	86,844	93,040
Industrial	173,475	209,275
Total	<u>\$ 314,215</u>	<u>\$ 377,616</u>

The following table summarizes the contractual maturities of the Company's investments:

	December 31, 2016	December 31, 2015
Mature in less than one year	\$ 286,558	\$ 377,616
Mature in one to five years	27,657	—
Total	<u>\$ 314,215</u>	<u>\$ 377,616</u>

7. Prepaid Expenses and Other Current Assets

A summary of prepaid expenses and other current assets is as follows:

	As of December 31,	
	2016	2015
Prepaid research and development costs	\$ 1,228	\$ 487
Tax credit receivable	410	640
Software and maintenance agreements	416	269
Interest receivable	1,010	1,199
Other prepaid expenses	396	146
Total	<u>\$3,460</u>	<u>\$2,741</u>

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

8. Fixed Assets, net

A summary of property and equipment is as follows:

	<u>As of December 31,</u>	
	<u>2016</u>	<u>2015</u>
Laboratory equipment	\$ 4,252	\$ 3,642
Office equipment	1,729	1,302
Leasehold improvements	4,598	3,083
Construction in process	33	6
	<u>10,612</u>	<u>8,033</u>
Less—accumulated depreciation and amortization	(7,133)	(6,298)
Total	<u>\$ 3,479</u>	<u>\$ 1,735</u>

Depreciation expense was \$955, \$693 and \$488 for the years ended December 31, 2016, 2015 and 2014, respectively.

9. Accrued Expenses and Other Long-Term Liabilities

Accrued expenses consist of the following:

	<u>As of December 31,</u>	
	<u>2016</u>	<u>2015</u>
Accrued compensation	\$3,810	\$ 4,326
Accrued research and development expenses	1,441	4,743
Accrued professional expenses	972	846
Other accrued expenses	544	387
Total	<u>\$6,767</u>	<u>\$10,302</u>

Accrued research and development expenses are comprised of amounts owed to third-party contract research organizations, (“CROs”), clinical investigators, laboratories and data managers for research and development work performed on behalf of the Company.

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Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

10. Debt

Debt consists of the following:

	<u>As of December 31,</u>	
	<u>2016</u>	<u>2015</u>
2014 Credit Facility, payable in equal monthly installments through October 2017, with fixed interest of 6.30% per annum	\$ 131	\$ 279
2014 Credit Facility, payable in equal monthly installments through March 2018, with fixed interest of 6.20% per annum	101	175
2016 Credit Facility, payable in equal monthly installments through October 2019, with fixed interest of 6.01% per annum	420	—
Total long-term debt	652	454
Less: current portion	(351)	(223)
Total long-term debt, net of current portion	<u>\$ 301</u>	<u>\$ 231</u>

In October 2014, the Company entered into a Master Security Agreement for a \$1,000 Capital Expenditure Line of Credit (the “2014 Credit Facility”) with Webster Bank (“Webster”). Under the 2014 Credit Facility, the Company could draw down equipment loan advances for the purchase of new laboratory equipment through October 2015. In connection with the Master Security Agreement, the Company granted Webster a security interest in equipment to be purchased under the Credit Facility. In October 2014 and March 2015, Webster advanced \$440 and \$229, respectively, to the Company under the 2014 Credit Facility.

In May 2016, the Company entered into an amendment to the Master Security Agreement. The amendment provides for a line of credit for equipment loan advances of \$1,400, of which approximately \$400 reflected the outstanding balance as of the date of the amendment, under the Master Security Agreement, dated October 2014 (the “2016 Credit Facility”). The Company can utilize the 2016 Credit Facility in connection with the purchase of new laboratory equipment through May 26, 2017. The purchased equipment will serve as collateral for any advances. Each drawdown under the 2016 Credit Facility will be payable over a three-year term and will bear interest at a fixed rate, determined at the time of each borrowing, equal to the Three Year Federal Home Loan Bank of Boston Classic Advance rate plus 4.75%. In October 2016, Webster advanced \$443 to the Company under the 2016 Credit Facility.

The fair value for this debt is classified as a level 2 measurement. Fair value is computed using a discounted cash flow model based on current interest rates. As of December 31, 2016, the carrying value approximates fair value.

11. Capital Structure***Preferred Stock***

At December 31, 2016, the Company had 5,000 authorized shares of undesignated preferred stock of which no shares were issued and outstanding.

Common Stock

At December 31, 2016, the Company had 200,000 authorized shares of \$0.001 par value common stock of which 136,722 shares were issued and outstanding and 21,731 shares were reserved for future issuance.

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

Warrants

At December 31, 2016, there were 2,833 warrants outstanding with a weighted average exercise price of \$3.12 and a weighted average remaining contractual life of 0.6 years.

12. Stock-Based Compensation

2006 Stock Incentive Plan

The Company's 2006 Stock Incentive Plan ("the 2006 Plan") was adopted by the Company's board of directors in May 2006, amended by its board of directors in September 2006, approved by its stockholders in September 2006 and became effective in October 2006, upon the closing of the Company's initial public offering. The Company originally reserved for issuance 750 shares of common stock under the 2006 Plan. In addition, the Plan contained an "evergreen" provision, which allowed for an annual increase in the number of shares available for issuance under the Plan on the first day of each fiscal year during the period beginning on the first day of fiscal year 2007 and ending on the second day of fiscal year 2010. Under the evergreen provision, the Company registered an additional 2,673 shares of common stock to be issued under the 2006 Plan.

On June 10, 2010, stockholders of the Company approved an amendment to the 2006 Plan to increase by 3,000 shares the number of shares of common stock reserved for issuance under the 2006 Plan from 3,423 shares to 6,423 shares.

On June 5, 2012, stockholders of the Company approved an amendment to the 2006 Plan to increase by 7,000 shares the number of shares of common stock reserved for issuance under the 2006 Plan from 6,423 shares to 13,423 shares.

The 2006 Plan provided for the grant of incentive stock options, nonstatutory stock options, restricted stock, restricted stock units, stock appreciation rights and other stock-based awards. The Company's officers, employees, consultants, advisors and directors, and those of any subsidiaries, were eligible to receive awards under the 2006 Plan. The Company's board of directors administered the 2006 Plan.

Following the adoption of the 2015 Stock Incentive Plan, the Company no longer grants stock options or other awards under the 2006 Plan.

2015 Stock Incentive Plan

The Company's 2015 Stock Incentive Plan ("the 2015 Plan") was approved by the Company's stockholders in June 2015. The 2015 Plan replaced the Company's 2006 Plan. Upon the approval of the 2015 Plan by stockholders, the 2006 Plan terminated, and all then outstanding awards under the 2006 Plan remained in effect, but no additional awards will be made under the 2006 Plan. However, the terms of the 2006 Plan will continue to apply to awards previously granted under the 2006 Plan.

The 2015 Plan allows for the issuance of 6,900 new shares of common stock plus up to 1,894 shares of common stock that remained available for issuance under the previously approved 2006 Plan immediately prior to the effectiveness of the 2015 Plan, all of which shares rolled over and became available for issuance under the 2015 Plan upon its effectiveness. Solely to the extent that any of the 8,727 shares of common stock subject to awards that were issued and outstanding under the 2006 Plan immediately prior to the effectiveness of the 2015 Plan expire, terminate, are surrendered, cancelled or forfeited, such shares also will become available for the

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

future grant of awards under the 2015 Plan. All of the foregoing share numbers are subject, in the case of incentive stock options, to any limitations under the Internal Revenue Code of 1986, as amended (the “Code”), and are also subject to adjustment upon stock splits, stock dividends, and other specified events. Certain sub-limitations apply to the shares available for issuance under the 2015 Plan. The 2015 Plan allows for the issuance of incentive stock options intended to qualify under Section 422 of the Code, nonstatutory stock options, stock appreciation rights, restricted stock awards, restricted stock units and other stock-based awards. The maximum number of shares with respect to which awards may be granted to any participant under the 2015 Plan may not exceed 1,500 shares per fiscal year (subject to adjustment upon stock splits, stock dividends, and other specified events). The maximum aggregate number of shares with respect to which awards may be granted to directors who are not employees of the Company at the time of grant will be 10% of the maximum number of shares authorized for issuance under the 2015 Plan.

The 2015 Plan is administered by the Company’s Board of Directors. The Company’s officers, employees, consultants, advisors and directors are eligible to receive awards under the 2015 Plan; however, incentive stock options may only be granted to employees.

Options granted under the Company’s 2006 Stock Incentive Plan and the 2015 Stock Incentive Plan (the “Plans”), are exercisable for a period determined by the Company, but in no event longer than ten years from the date of the grant. Options generally vest ratably over four years.

As of December 31, 2016, there were 6,839 shares available to be granted under the 2015 Plan.

A summary of the status of the Company’s stock option activity for the year ended December 31, 2016 is presented in the table and narrative below:

	<u>2016</u>	<u>Weighted Average Exercise Price</u>
	<u>Options</u>	<u>Price</u>
Outstanding at January 1, 2016	8,501	\$ 7.08
Granted	2,406	7.85
Exercised	(41)	2.64
Forfeited	(160)	7.75
Cancelled	(312)	14.72
Outstanding at December 31, 2016	<u>10,394</u>	<u>\$ 7.04</u>
Options exercisable at December 31, 2016	<u>6,770</u>	<u>\$ 6.32</u>
Options vested and expected to vest at December 31, 2016	<u>9,950</u>	<u>\$ 6.99</u>

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

The following table summarizes information about stock options outstanding at December 31, 2016:

Range of Exercise Prices	Options Outstanding			Options Vested	
	Number Outstanding	Weighted Average Remaining Contractual Life (Years)	Weighted Average Exercise Price	Number Vested	Weighted Average Exercise Price
\$0.00 – \$2.00	132	2.0	\$ 1.05	132	\$ 1.05
\$2.01 – \$4.00	3,218	5.6	3.07	2,756	3.08
\$4.01 – \$6.00	377	1.4	5.13	367	5.16
\$6.01 – \$8.00	3,676	7.5	7.49	1,699	7.45
\$8.01 – \$10.00	1,135	6.6	8.71	966	8.69
\$10.01 – \$12.00	384	8.6	10.40	69	10.60
\$12.01 – \$14.00	1,469	7.9	13.44	778	13.43
\$14.01 – \$20.00	3	0.1	19.00	3	19.00
	<u>10,394</u>	<u>6.6</u>	<u>\$ 7.04</u>	<u>6,770</u>	<u>\$ 6.32</u>

As of December 31, 2016, the intrinsic value of the options outstanding was \$3,809, of which \$3,310 related to vested stock options and \$499 related to unvested stock options. The intrinsic value for stock options is calculated based on the difference between the exercise prices of the underlying awards and the quoted stock price of the Company's common stock as of the reporting date.

The total intrinsic value of stock options exercised for the years ended December 31, 2016, 2015 and 2014 was \$193, \$5,302 and \$7,855, respectively.

The weighted-average, grant-date fair value of options granted during the years ended December 31, 2016, 2015 and 2014 was \$5.56, \$6.66 and \$8.50, respectively. The weighted-average, grant-date fair value of options vested at December 31, 2016, 2015 and 2014 was \$4.67, \$4.64 and \$4.13, respectively.

The weighted average remaining contractual life is 5.6 years for options exercisable and 6.6 years for options vested and expected to vest.

Stock -Based Compensation

Under the provisions of ASC 718, stock-based compensation cost is based on the fair value of the portion of stock-based awards that is ultimately expected to vest during the period. The Company utilizes the Black-Scholes option pricing model for determining the estimated fair value for stock-based awards. The Black-Scholes model requires the use of assumptions which determine the fair value of the stock-based awards. Determining the fair value of stock-based awards at the grant date requires judgment, including estimating the expected term of stock options, the expected volatility of our stock and expected dividends. The Company is also required to estimate forfeitures at the grant date and recognize compensation costs for only those awards that are expected to vest. Judgment is required in estimating the amount of stock-based awards that are expected to be forfeited. For the years ended December 31, 2016, 2015 and 2014, the Company based its estimate of the expected term on historical data for similar stock option grants, and the Company calculated volatility based on actual volatility for the expected term of the option.

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

The assumptions used to value options granted are as follows:

	For the Years Ended December 31,		
	2016	2015	2014
Expected term of option	6.0 – 6.25 years	6.25 years	5.0 – 6.25 years
Expected volatility	81% – 84%	84% – 91%	92% – 96%
Risk free interest rate	1.15 – 2.09%	1.54 – 1.93%	1.81 – 2.02%
Expected dividend yield	0%	0%	0%

Total compensation expense recorded in the accompanying statements of comprehensive loss associated with option grants made to employees for the years ended December 31, 2016, 2015 and 2014 was \$10,900, \$9,887 and \$7,177, respectively. Total compensation expense recorded in the accompanying statements of comprehensive loss associated with option grants made to consultants for the years ended December 31, 2016, 2015 and 2014 was \$5, \$25 and \$0, respectively.

The Company recorded no tax benefit related to these options as the Company is currently in a net operating loss position and maintains a full valuation allowance.

As of December 31, 2016, the total compensation cost related to options not yet recognized in the financial statements is approximately \$16,679, net of estimated forfeitures, and the weighted average period over which it is expected to be recognized is 1.3 years.

Compensation expense related to option grants made to employees and consultants is included in research and development and general and administrative expense as follows:

	For the Years Ended December 31,		
	2016	2015	2014
Research and development	\$ 4,601	\$ 4,346	\$ 2,713
General and administrative	6,304	5,567	4,464
Total	\$ 10,905	\$ 9,913	\$ 7,177

2006 Employee Stock Purchase Plan

The Company established an Employee Stock Purchase Plan effective December 1, 2006 (the “2006 ESPP Plan”). Eligible employees can purchase common stock pursuant to payroll deductions at a price equal to 85% of the lower of the fair market value of the common stock at the beginning or end of each six-month offering period. The Company originally reserved for issuance 250 shares of common stock under the 2006 ESPP Plan. On June 10, 2010, stockholders of the Company approved an amendment to the 2006 ESPP Plan to increase by 250 shares the number of shares of common stock reserved for issuance under the 2006 ESPP Plan from 250 shares to 500 shares. On June 2, 2015, stockholders of the Company approved an amendment to the 2006 ESPP Plan to increase by 1,700 shares the number of shares of common stock reserved for issuance under the 2006 ESPP Plan from 500 to 2,200 shares.

The Company measures the fair value of issuances under the 2006 ESPP Plan using the Black-Scholes option pricing model at the end of each reporting period. The compensation cost for the 2006 ESPP Plan consists of the 15% of the grant date stock price discount and the fair value of the option features.

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

The Company recorded compensation cost related to 2006 ESPP Plan of \$100, \$160 and \$96 for the years ended December 31, 2016, 2015 and 2014, respectively. As of December 31, 2016, there were 1,665 shares available for future issuance under the 2006 ESPP Plan.

The assumptions used to value options granted under the 2006 ESPP Plan are as follows:

	For the Years Ended December 31,		
	2016	2015	2014
Expected term of option	6 months	6 months	6 months
Expected volatility	55% – 66%	57% – 88%	67% – 130%
Risk free interest rate	0.05 – 0.06%	0.07 – 0.08%	0.06 – 0.08%
Expected dividend yield	0%	0%	0%

13. Other Income

In August 2015, a stockholder of the Company paid \$8,944 to the Company relating to the disgorgement of short swing profits under Section 16(b) of the Securities Exchange Act.

14. Commitments and Contingencies

401(k) Retirement Plan

The Company has a 401(k) defined contribution retirement plan covering substantially all full-time employees. The Company currently matches employee contributions at a rate of \$0.50 cents for each dollar contribution, up to 6% of salary deferrals. However, the decision to match any employee contributions is at the sole discretion of the Company. The Company made matching contributions of \$406, \$296 and \$262 for the years ended December 31, 2016, 2015 and 2014, respectively.

Operating Leases

The Company's commitments consist of obligations under operating leases for its facilities and office equipment. The Company leases its operating facility located in New Haven, Connecticut. The lease agreement requires monthly lease payments through March 2020. The Company is recording the expense associated with the lease on a straight-line basis over the expected term of the lease and, as a result, has accrued \$216 and \$72 at December 31, 2016 and 2015, respectively.

The future minimum annual lease payments under these operating leases at December 31, 2016 are as follows:

<u>Year Ended December 31,</u>	
2017	\$ 912
2018	\$ 912
2019	\$ 887
2020	\$ 219
Total	<u>\$2,930</u>

Rent expense under operating leases was \$801, \$629 and \$617 for the years ended December 31, 2016, 2015 and 2014, respectively.

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

From time to time, in the ordinary course of business, the Company is subject to litigation and regulatory examinations as well as information gathering requests, inquiries and investigations. As of December 31, 2016, there were no active matters.

15. Income Taxes

The Company uses an asset and liability approach for financial accounting and reporting of income taxes. Deferred tax assets and liabilities are determined based on temporary differences between financial reporting and tax basis of assets and liabilities and are measured by applying enacted rates and laws to taxable years in which differences are expected to be recovered or settled. Further, the effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that the rate changes.

The Company applies the provisions of ASC 740, *Income Taxes*, which prescribes a comprehensive model for how a company should recognize, measure, present, and disclose in its financial statements uncertain tax positions that the company has taken or expects to take on a tax return (including a decision whether to file or not file a return in a particular jurisdiction). The Company's financial statements reflect expected future tax consequences of such positions presuming the taxing authorities' full knowledge of the position and all relevant facts.

The Company does not have any interest or penalties accrued related to uncertain tax positions as it does not have any unrecognized tax benefits. In the event the Company determines that accrual of interest or penalties is necessary in the future, the amount will be presented as a component of income taxes.

The income tax provision (benefit) consists of the following:

	As of December 31,		
	2016	2015	2014
Deferred:			
Federal and state	\$(23,232)	\$ 699	\$ 29,287
Valuation allowance	23,232	(699)	(29,287)
Total deferred	<u>\$ —</u>	<u>\$ —</u>	<u>\$ —</u>

A reconciliation of the statutory tax rates to the effective tax rates is as follows:

	Years Ended December 31,		
	2016	2015	2014
Federal statutory rate	(34.0)%	(34.0)%	(34.0)%
State tax, net of federal benefit	(5.0)	(5.0)	(5.0)
Other	0.06	0.52	0.07
Share-based compensation	0.80	2.84	(0.56)
Valuation allowance	38.14	35.64	39.49
	<u>0%</u>	<u>0%</u>	<u>0%</u>

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

Future tax benefits (deferred tax assets) related to temporary differences are as follows:

	As of December 31,	
	2016	2015
Gross deferred tax assets:		
Net operating losses	\$ 127,376	\$ 151,076
Tax credits (federal and state)	10,758	12,977
Share-based compensation	10,725	7,643
Other	24	419
	<u>\$ 148,883</u>	<u>\$ 172,115</u>
Less—valuation allowance	(148,883)	(172,115)
Net deferred tax asset	<u>\$ —</u>	<u>\$ —</u>

At December 31, 2016 and 2015, the Company had gross deferred income tax assets of approximately \$148,883 and \$172,115, respectively, which result primarily from net operating loss and tax credit carryforwards. ASC 740 requires that a valuation allowance be established when it is “more likely than not” that all or a portion of deferred tax assets will not be realized. A review of all positive and negative evidence is required when measuring the need for a valuation allowance. The Company’s cumulative loss from inception represents sufficient negative evidence to require a valuation allowance. The Company concluded that it is appropriate to maintain a full valuation allowance for its net deferred tax assets. Additionally, the Company intends to maintain a valuation allowance until sufficient positive evidence exists to support its reversal.

At December 31, 2016 and 2015, the Company had available the following net operating loss and credit carryforwards:

	As of December 31,	
	2016	2015
Federal net operating loss carryforwards	\$ 284,166	\$ 351,977
State net operating loss carryforwards	410,119	418,720
Federal research and development credit carryforwards	5,827	8,337
State research and development credit carryforwards	4,932	4,640

The Company’s federal net operating loss carryforwards expire commencing in 2018 through 2036 and state net operating loss carryforwards which expire commencing in 2020 through 2036. The Company’s federal research and development credit carryforwards expire commencing in 2028 through 2035. The Connecticut research and development carryforwards have no expiration period.

Deferred tax assets relating to tax benefits of employee stock options have been reduced to reflect exercises. Some exercises resulted in tax deductions in excess of previously recorded benefits based on the option value at the time of grant (“windfalls”). Although these windfalls are reflected in net operating loss carryforwards, the additional tax benefit associated with the windfall is not recognized until the deduction reduces taxes payable. Accordingly, approximately \$14,579 of the net operating loss carryforwards available, if realized, would be credited to additional paid-in capital.

Utilization of the net operating losses and research and development credit carryforwards may be subject to a substantial annual limitation under Section 382 of the Internal Revenue Code of 1986, or Section 382, due to

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

changes in ownership of the Company that have occurred previously or that could occur in the future. These ownership changes may limit the amount of net operating losses and research and development credit carryforwards that can be utilized annually to offset future taxable income and tax. In general, an ownership change, as defined by Section 382, results from transactions increasing the ownership of certain shareholders or public groups in the stock of a corporation by more than 50 percentage points over a three-year period. The Company completed a review of its changes in ownership through December 31, 2015, and determined that it had four ownership changes since inception. The changes of ownership will result in approximately \$174,035 of net operating loss carryforwards that the Company expects to expire unutilized and approximately \$8,211 of research and development credit carryforwards that the Company expects to expire unutilized. The Company had historically recorded a valuation allowance against the net operating losses and research and development carryforwards. This resulted in no change to the income statement, with a change to footnote disclosure only. The Company will continue to update its analysis of ownership changes and the potential limitations on its deferred tax assets.

The federal and state tax authorities could challenge tax positions taken by the Company for the periods for which there are open tax years. Years subject to audit are years in which unused net operating losses were generated that remain open by the statute of limitations. The Company is open to challenge for the periods of 2005 through 2015 in federal and the State of Connecticut jurisdictions.

The Company did not have any unrecognized tax benefits as of December 31, 2015 and 2016.

The State of Connecticut provides companies with the opportunity to exchange certain research and development credit carryforwards for cash in exchange for foregoing the carryforward of the research and development credit. The program provides for such exchange of the research and development credits at a rate of 65% of the annual research and development credit, as defined. During the years ended December 31, 2016, 2015 and 2014, the Company recorded a benefit of approximately \$411, \$640 and \$678, respectively, for the estimated proceeds from this exchange. This benefit is recorded as a reduction of research and development expenditures.

16. Related Party Transactions

Nicole Vitullo

In connection with Domain Associates, LLC's ("Domain") agreement to invest in the Company, the board of directors of the Company elected Nicole Vitullo of Domain as a Class II member of the board of directors on September 30, 2010 to serve until her successor is duly elected and qualified. Ms. Vitullo is a partner at Domain.

In August 2010, Domain purchased 8,032 shares of common stock and warrants to purchase 2,811 shares of common stock for an aggregate purchase price of \$20.4 million.

As of December 31, 2016, Domain was the beneficial owner of approximately 4% of the Company's total issued and outstanding shares of common stock.

Achillion Pharmaceuticals, Inc.
Notes to Financial Statements—(Continued)
(in thousands, except per share amounts)

17. Unaudited Quarterly Results

The following tables summarize unaudited quarterly financial data for the years ended December 31, 2016 and 2015. This data has been derived from unaudited financial statements that, in the Company's opinion, include all adjustments necessary for a fair statement of such information. The operating results for any quarter are not necessarily indicative of results for any future period.

	2016 Quarters			
	First	Second	Third	Fourth (1)
Total operating revenue	\$ —	\$ —	\$ —	\$ 15,000
Total operating expenses	18,718	19,309	21,549	20,289
Net income (loss)	(18,054)	(18,493)	(20,730)	(4,429)
Net income (loss) per share—basic and diluted	\$ (0.13)	\$ (0.14)	\$ (0.15)	\$ (0.03)
Weighted average number of shares outstanding—basic	136,640	136,680	136,681	136,693
Weighted average number of shares outstanding—diluted	136,640	136,680	136,681	136,693

	2015 Quarters			
	First	Second	Third (1)	Fourth (1)
Total operating revenue	\$ —	\$ 711	\$ 33,820	\$ 31,591
Total operating expenses	19,399	29,899	16,839	15,092
Net income (loss)	(19,263)	(28,978)	26,259	16,952
Net income (loss) per share—basic and diluted	\$ (0.17)	\$ (0.25)	\$ 0.19	\$ 0.12
Weighted average number of shares outstanding—basic	111,202	117,770	136,438	136,558
Weighted average number of shares outstanding—diluted	111,202	117,770	140,024	140,475

(1) In May 2015, the Company entered into an exclusive collaboration and license agreement with Janssen, and its affiliate, Johnson & Johnson Innovation-JJDC, Inc., or JJDC, which we refer to as the Janssen Agreement for the further clinical advancement of a portfolio of antivirals the Company discovered and developed for the treatment of HCV. In addition, upon the closing of the transactions contemplated by the Janssen Agreement, the Company entered into a stock purchase agreement with JJDC. Pursuant to the JJDC Stock Purchase Agreement, on July 1, 2015, the Company issued 18,367 shares of common stock to JJDC at a price of \$12.25 per share for an aggregate purchase price of \$225,000. The Company recorded revenue of \$66,122 during the year ended December 31, 2015 associated with this transaction. The Company also recorded revenue of \$15,000 during the year ended December 31, 2016 related to the achievement of a clinical enrollment milestone under the Janssen Agreement. Also refer to footnote 5.

EXHIBIT INDEX

<u>Exhibit No.</u>	<u>Description</u>	<u>Incorporated by Reference</u>			
		<u>Form</u>	<u>SEC Filing date</u>	<u>Exhibit Number</u>	<u>Filed with this 10-K</u>
3.1	Amended and Restated Certificate of Incorporation of the Registrant, as amended.	10-K	03/08/12	3.1	
3.2	Amended and Restated Bylaws of the Registrant.	10-K	03/29/07	3.2	
4.1	Specimen Certificate evidencing shares of common stock.	S-1/A	09/22/06	4.1	
† 10.1	Collaboration and License Agreement, dated May 19, 2015, between the Registrant and Janssen Pharmaceuticals, Inc.	10-Q	08/10/15	10.2	
10.2	Third Amendment to Collaboration and License Agreement, dated December 23, 2016, between the Registrant and Janssen Pharmaceuticals, Inc.	8-K	12/28/2016	10.1	
10.3	Stock Purchase Agreement, dated May 19, 2015, between the Registrant and Johnson & Johnson Innovation-JJDC, Inc.	10-Q	08/10/15	10.3	
† 10.4	Investor Agreement, dated July 1, 2015, between the Registrant and Johnson & Johnson Innovation-JJDC, Inc.	10-Q	08/10/15	10.4	
10.5	Form of Common Warrant issued by the Registrant pursuant to the Securities Purchase Agreement dated as of August 18, 2010.	S-3	09/17/10	10.2	
10.6	Form of Common Stock Warrant issued by the Registrant pursuant to the Loan and Security Agreement of GE Capital Corporation and Oxford Finance Corporation.	10-K	03/05/08	10.14	
10.7	Master Security Agreement between the Registrant and Webster Bank, National Association, dated as of October 3, 2014.	8-K	10/03/14	10.1	
10.8	First Amendment to Master Security Agreement between the Registrant and Webster Bank, National Association, dated as of May 26, 2016.	8-K	05/26/2016	10.1	
10.9	Lease Agreement by and between the Registrant and WE George Street LLC for Suite 202, dated as of March 6, 2002.	S-1	03/31/06	10.14	
10.10	Amendment No. 2 to Lease, dated as of March 31, 2010, by and between the Registrant and WE George Street, LLC.	8-K	04/06/10	10.1	
10.11	Amendment No. 3 to Lease, dated as of August 20, 2015, by and between the Registrant and WE George Street, LLC.	8-K	08/24/15	10.1	
10.12	Amendment No. 4 to Lease, dated as of April 7, 2016, by and between the Registrant and WE George Street, LLC.	8-K	04/07/2016	10.1	

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	<u>Exhibit No.</u>	<u>Description</u>	<u>Incorporated by Reference</u>			
			<u>Form</u>	<u>SEC Filing date</u>	<u>Exhibit Number</u>	<u>Filed with this 10-K</u>
#	10.13	2006 Stock Incentive Plan as amended September 18, 2006, March 9, 2010, June 10, 2010, April 11, 2012 and June 5, 2012.	8-K	06/11/12	99.3	
#	10.14	Form of Nonstatutory Stock Option Agreement under the 2006 Stock Incentive Plan.	8-K	12/22/10	99.1	
#	10.15	Form of Incentive Stock Option Agreement under the 2006 Stock Incentive Plan.	8-K	12/22/10	99.2	
#	10.16	2015 Stock Incentive Plan, dated June 2, 2015.	8-K	06/08/15	10.1	
#	10.17	Form of Incentive Stock Option Agreement under the 2015 Stock Incentive Plan.	10-K	02/25/2016	10.16	
#	10.18	Form of Nonstatutory Stock Option Agreement under the 2015 Stock Incentive Plan.	10-K	02/25/2016	10.17	
#	10.19	Second Amended and restated Employment Agreement and Supplemental Severance Agreement, dated March 9, 2010, and Supplemental Terms of Compensation, dated April 5, 2011, between the Registrant and Mary Kay Fenton.	8-K	04/08/11	10.2	
#	10.20	Employment Agreement, dated April 5, 2011, between the Registrant and Joseph Truitt.	8-K	04/08/11	10.6	
#	10.21	Employment Agreement, dated May 6, 2013 between the Registrant and David Apelian.	8-K	05/30/13	10.1	
#	10.22	Employment Agreement, dated May 28, 2013 between the Registrant and Milind Deshpande.	8-K	05/30/13	10.2	
#	10.23	Letter Agreement, dated May 23, 2014, between the Registrant and Milind Deshpande.	10-Q	08/07/14	10.1	
#	10.24	Employment Agreement, dated January 2, 2016 between the Registrant and Joel Barrish.	10-K	02/25/2016	10.23	
#	10.25	Employment Agreement, dated February 1, 2016 between the Registrant and Martha Manning.	10-K	02/25/2016	10.24	
#	10.26	Non-Executive Directors Compensation Policy, dated January 23, 2016.	10-K	02/25/2016	10.25	
	10.27	Controlled Equity Offering SM Sales Agreement, dated as of February 23, 2017, by and between the Registrant and Cantor Fitzgerald & Co.				X
	10.28	Letter Agreement, dated February 23, 2017, by and between the Registrant and Johnson & Johnson Innovation-JJDC, Inc.				X
	23.1	Consent of PricewaterhouseCoopers LLP, Independent Registered Public Accounting Firm.				X
	31.1	Certification of Chief Executive Officer pursuant to Rule 13a-14(a)/Rule 15d-14(a) of the Securities Exchange Act of 1934				X
	31.2	Certification of Chief Financial Officer pursuant to Rule 13a-14(a)/Rule 15d-14(a) of the Securities Exchange Act of 1934				X

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<u>Exhibit No.</u>	<u>Description</u>	<u>Incorporated by Reference</u>			
		<u>Form</u>	<u>SEC Filing date</u>	<u>Exhibit Number</u>	<u>Filed with this 10-K</u>
32.1	Certification of Chief Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.				X
32.2	Certification of Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.				X
101.CAL	XBRL Taxonomy Calculation Linkbase Document				X
101.INS	XBRL Instance Document				X
101.SCH	XBRL Taxonomy Extension Schema Document				X
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document				X
101.LAB	XBRL Taxonomy Label Linkbase Document				X
101.PRE	XBRL Taxonomy Presentation Linkbase Document				X

Management contracts or compensatory plans or arrangement

† Indicates confidential treatment requested as to certain portions, which portions were omitted and filed separately with the Securities and Exchange Commission pursuant to a Confidential Treatment Request.

Attached as Exhibit 101 to this report are the following formatted in XBRL (Extensible Business Reporting Language): (i) Balance Sheets at December 31, 2016 and December 31, 2015, (ii) Statements of Comprehensive Loss for the years ended December 31, 2016, 2015 and 2014, (iii) Statements of Stockholders' Equity and Comprehensive Loss for the years ended December 31, 2016, 2015 and 2014, (iv) Statements of Cash Flows for the years ended December 31, 2016, 2015 and 2014 and (v) Notes to Financial Statements.

ACHILLION PHARMACEUTICALS, INC.

\$75,000,000 of
Shares of Common Stock
(par value \$0.001 per share)

Controlled Equity Offering SM

Sales Agreement

February 23, 2017

Cantor Fitzgerald & Co.
499 Park Avenue
New York, NY 10022

Ladies and Gentlemen:

Achillion Pharmaceuticals, Inc., a Delaware corporation (the “**Company**”), confirms its agreement (this “**Agreement**”) with Cantor Fitzgerald & Co. (the “**Agent**”), as follows:

1. **Issuance and Sale of Shares.** The Company agrees that, from time to time during the term of this Agreement, on the terms and subject to the conditions set forth herein, it may issue and sell through the Agent, shares of common stock (the “**Placement Shares**”) of the Company, par value \$0.001 per share (the “**Common Stock**”) up to an aggregate offering price of \$75,000,000; *provided, however*, that in no event shall the Company issue or sell through the Agent such number or dollar amount of Placement Shares that would (a) exceed the number or dollar amount of shares of Common Stock registered on the effective Registration Statement (defined below) pursuant to which the offering is being made, (b) exceed the number of authorized but unissued shares of Common Stock (less shares of Common Stock issuable upon exercise, conversion or exchange of any outstanding securities of the Company or otherwise reserved from the Company’s authorized capital stock), (c) exceed the number or dollar amount of shares of Common Stock permitted to be sold under Form S-3 (including General Instruction I.B.6 thereof, if applicable) or (d) exceed the number or dollar amount of shares of Common Stock for which the Company has filed a Prospectus Supplement (defined below) (the lesser of (a), (b), (c) and (d), the “**Maximum Amount**”). Notwithstanding anything to the contrary contained herein, the parties hereto agree that compliance with the limitations set forth in this **Section 1** on the amount of Placement Shares issued and sold under this Agreement shall be the sole responsibility of the Company and that the Agent shall have no obligation in connection with such compliance. The offer and sale of Placement Shares through the Agent will be effected pursuant to the Registration Statement (as defined below) filed by the Company and which will be declared effective by the Securities and Exchange Commission (the “**Commission**”), although nothing in this Agreement shall be construed as requiring the Company to use the Registration Statement to issue Common Stock.

The Company has filed or will file, in accordance with the provisions of the Securities Act of 1933, as amended and the rules and regulations thereunder (the “**Securities Act**”), with the Commission a registration statement on Form S-3, including a base prospectus, relating to certain securities, including the Placement Shares to be issued from time to time by the

Company, and which incorporates by reference documents that the Company has filed or will file in accordance with the provisions of the Securities Exchange Act of 1934, as amended, and the rules and regulations thereunder (the “**Exchange Act**”). The Company has prepared a prospectus included as part of the registration statement, which prospectus relates to the Placement Shares to be issued from time to time by the Company (the “**Prospectus Supplement**”). The Company will furnish to the Agent, for use by the Agent, copies of the prospectus included as part of such registration statement, relating to the Placement Shares to be issued from time to time by the Company. The Company may file one or more additional registration statements from time to time that will contain a base prospectus and related prospectus or prospectus supplement, if applicable (which shall be a Prospectus Supplement), with respect to the Placement Shares. Except where the context otherwise requires, such registration statement(s), including all documents filed as part thereof or incorporated by reference therein, and including any information contained in a Prospectus (as defined below) subsequently filed with the Commission pursuant to Rule 424(b) or deemed to be a part of such registration statement pursuant to Rule 430B of the Securities Act, is herein called the “**Registration Statement**.” The base prospectus or base prospectuses, including all documents incorporated therein by reference, included in the Registration Statement, as it may be supplemented, if necessary, by the Prospectus Supplement, in the form in which such prospectus or prospectuses and/or Prospectus Supplement have most recently been filed by the Company with the Commission pursuant to Rule 424(b), together with the then issued Issuer Free Writing Prospectus(es) (as defined below), is herein called the “**Prospectus**.”

Any reference herein to the Registration Statement, any Prospectus Supplement, Prospectus or any Issuer Free Writing Prospectus shall be deemed to refer to and include the documents, if any, incorporated by reference therein (the “**Incorporated Documents**”), including, unless the context otherwise requires, the documents, if any, filed as exhibits to such Incorporated Documents. Any reference herein to the terms “amend,” “amendment” or “supplement” with respect to the Registration Statement, any Prospectus Supplement, the Prospectus or any Issuer Free Writing Prospectus shall be deemed to refer to and include the filing of any document under the Exchange Act on or after the most-recent effective date of the Registration Statement, or the date of the Prospectus Supplement, Prospectus or such Issuer Free Writing Prospectus, as the case may be, and incorporated therein by reference. For purposes of this Agreement, all references to the Registration Statement, the Prospectus or to any amendment or supplement thereto shall be deemed to include the most recent copy filed with the Commission pursuant to its Electronic Data Gathering, Analysis, and Retrieval system, or if applicable, the Interactive Data Electronic Applications system when used by the Commission (collectively, “**EDGAR**”).

2. **Placements**. Each time that the Company wishes to issue and sell Placement Shares hereunder (each, a “**Placement**”), it will notify the Agent by email notice (or other method mutually agreed to in writing by the parties) of the number of Placement Shares to be issued, the time period during which sales are requested to be made, any limitation on the number of Placement Shares that may be sold in any one Trading Day (as defined below) and any minimum price below which sales may not be made (a “**Placement Notice**”), the form of which is attached hereto as Schedule 1. The Placement Notice shall originate from any of the individuals from the Company set forth on Schedule 3 (with a copy to each of the other individuals from the Company listed on such schedule), and shall be addressed to each of the

individuals from the Agent set forth on Schedule 3, as such Schedule 3 may be amended from time to time. The Placement Notice shall be effective unless and until (i) the Agent declines to accept the terms contained therein for any reason, in its sole discretion, within two (2) Trading Days from the time the Placement Notice was received, (ii) the entire amount of the Placement Shares thereunder have been sold, (iii) the Company suspends or terminates the Placement Notice or (iv) this Agreement has been terminated under the provisions of Section 13. The amount of any discount, commission or other compensation to be paid by the Company to Agent in connection with the sale of the Placement Shares shall be calculated in accordance with the terms set forth in Schedule 2. It is expressly acknowledged and agreed that neither the Company nor the Agent will have any obligation whatsoever with respect to a Placement or any Placement Shares unless and until the Company delivers a Placement Notice to the Agent and the Agent does not decline such Placement Notice pursuant to the terms set forth above, and then only upon the terms specified therein and herein. In the event of a conflict between the terms of this Agreement and the terms of a Placement Notice, the terms of the Placement Notice will control.

3. Sale of Placement Shares by Agent.

(a) Subject to the terms and provisions of Section 5(a), the Agent, for the period specified in the Placement Notice, will use its commercially reasonable efforts consistent with its normal trading and sales practices and applicable state and federal laws, rules and regulations and the rules of the NASDAQ Global Select Market (the "Exchange"), to sell the Placement Shares up to the amount specified in, and otherwise in accordance with the terms of such Placement Notice. The Agent will provide written confirmation to the Company no later than the opening of the Trading Day immediately following the Trading Day on which it has made sales of Placement Shares hereunder setting forth the number of Placement Shares sold on such day, the compensation payable by the Company to the Agent pursuant to Section 2 with respect to such sales, and the Net Proceeds (as defined below) payable to the Company, with an itemization of the deductions made by the Agent (as set forth in Section 5(b)) from the gross proceeds that it receives from such sales. Subject to the terms of the Placement Notice, the Agent may sell Placement Shares by any method permitted by law deemed to be an "at the market offering" as defined in Rule 415(a)(4) of the Securities Act, including sales made directly on or through the Exchange or any other existing trading market for the Common Stock, in negotiated transactions at market prices prevailing at the time of sale or at prices related to such prevailing market prices and/or any other method permitted by law. "Trading Day" means any day on which Common Stock is traded on the Exchange.

(b) During the term of this Agreement, neither the Agent nor an affiliated purchaser (as such term is defined in Regulation M) shall directly or indirectly engage in (i) any short sale of any security of the Company, as defined in Regulation SHO, (ii) any sale of any security of the Company that Agent does not own or any sale which is consummated by the delivery of a security of the Company borrowed by, or for the account of, Agent or (iii) any market making, bidding, stabilization or other trading activity with regard to the Common Stock or related derivative securities, in each case if such activity would be prohibited under Regulation M or other anti-manipulation rules under the Securities Act or any other law applicable to the Company.

4. Suspension of Sales. The Company or the Agent may, upon notice to the other party in writing (including by email correspondence to each of the individuals of the other party

set forth on Schedule 3, if receipt of such correspondence is actually acknowledged by any of the individuals to whom the notice is sent, other than via auto-reply) or by telephone (confirmed immediately by verifiable facsimile transmission or email correspondence to each of the individuals of the other party set forth on Schedule 3), suspend any sale of Placement Shares (a “**Suspension**”); provided, however, that such Suspension shall not affect or impair any party’s obligations with respect to any Placement Shares sold hereunder prior to the receipt of such notice. While a Suspension is in effect any obligation under Sections 7(l), 7(m), and 7(n) with respect to the delivery of certificates, opinions, or comfort letters to the Agent, shall be waived, provided, however, that such waiver shall not apply for the Representation Date (defined below) occurring on the date that the Company files its annual report on Form 10-K. Each of the parties agrees that no such notice under this Section 4 shall be effective against any other party unless it is made to one of the individuals named on Schedule 3 hereto, as such Schedule may be amended from time to time.

5. Sale and Delivery to the Agent: Settlement.

(a) Sale of Placement Shares. On the basis of the representations and warranties herein contained and subject to the terms and conditions herein set forth, upon the Agent’s acceptance of the terms of a Placement Notice, and unless the sale of the Placement Shares described therein has been declined, suspended, or otherwise terminated in accordance with the terms of this Agreement, the Agent, for the period specified in the Placement Notice, will use its commercially reasonable efforts consistent with its normal trading and sales practices and applicable law and regulations to sell such Placement Shares up to the amount specified in, and otherwise in accordance with the terms of such Placement Notice. The Company acknowledges and agrees that (i) there can be no assurance that the Agent will be successful in selling Placement Shares, (ii) the Agent will incur no liability or obligation to the Company or any other person or entity if it does not sell Placement Shares for any reason other than a failure by the Agent to use its commercially reasonable efforts consistent with its normal trading and sales practices and applicable law and regulations to sell such Placement Shares as required under this Agreement and (iii) the Agent shall be under no obligation to purchase Placement Shares on a principal basis pursuant to this Agreement, except as otherwise agreed by the Agent and the Company.

(b) Settlement of Placement Shares. Unless otherwise specified in the applicable Placement Notice, settlement for sales of Placement Shares will occur on the third (3rd) Trading Day (or such earlier day as is industry practice for regular-way trading) following the date on which such sales are made (each, a “**Settlement Date**”). The Agent shall provide written confirmation to the Company of each sale of Placement Shares as set forth in Section 3(a). The amount of proceeds to be delivered to the Company on a Settlement Date against receipt of the Placement Shares sold (the “**Net Proceeds**”) will be equal to the aggregate sales price received by the Agent, after deduction for (i) the Agent’s compensation for such sales payable by the Company pursuant to Section 2 hereof, and (ii) any transaction fees imposed by any governmental or self-regulatory organization in respect of such sales.

(c) Delivery of Placement Shares. On or before each Settlement Date, the Company will, or will cause its transfer agent to, electronically transfer the Placement Shares being sold by crediting the Agent’s or its designee’s account (provided the Agent shall have given the Company written notice of such designee at least one Trading Day prior to the

Settlement Date) at The Depository Trust Company through its Deposit and Withdrawal at Custodian System or by such other means of delivery as may be mutually agreed upon by the parties hereto which in all cases shall be freely tradable, transferable, registered shares in good deliverable form. On each Settlement Date, the Agent will deliver the related Net Proceeds in same day funds to an account designated by the Company on, or prior to, the Settlement Date. The Company agrees that if the Company, or its transfer agent (if applicable), defaults in its obligation to deliver Placement Shares on a Settlement Date through no fault of the Agent, the Company agrees that in addition to and in no way limiting the rights and obligations set forth in Section 11(a) hereto, it will (i) hold the Agent harmless against any loss, claim, damage, and reasonable and documented expense (including reasonable and documented legal fees and expenses), as incurred, arising out of or in connection with such default by the Company or its transfer agent (if applicable) and (ii) pay to the Agent (without duplication) any commission, discount, or other compensation to which it would otherwise have been entitled absent such default.

(d) Limitations on Offering Size. Under no circumstances shall the Company cause or request the offer or sale of any Placement Shares if, after giving effect to the sale of such Placement Shares, the aggregate gross sales proceeds of Placement Shares sold pursuant to this Agreement would exceed the lesser of: (A) together with all sales of Placement Shares under this Agreement, the Maximum Amount; (B) the amount available for offer and sale under the currently effective Registration Statement; and (C) the amount authorized from time to time to be issued and sold under this Agreement by the Company's board of directors, a duly authorized committee thereof or a duly authorized executive committee, and notified to the Agent in writing. Under no circumstances shall the Company cause or request the offer or sale of any Placement Shares pursuant to this Agreement at a price lower than the minimum price authorized from time to time by the Company's board of directors, a duly authorized committee thereof or a duly authorized executive committee, and notified to the Agent in writing. Further, under no circumstances shall the Company cause or permit the aggregate offering amount of Placement Shares sold pursuant to this Agreement to exceed the Maximum Amount.

6. Representations and Warranties of the Company. The Company represents and warrants to, and agrees with Agent that as of the date of this Agreement and as of each Applicable Time (as defined below), unless such representation, warranty or agreement specifies a different time:

(a) Registration Statement and Prospectus. The Company and the transactions contemplated by this Agreement meet the requirements for and comply with the applicable conditions set forth in Form S-3 under the Securities Act. The Registration Statement has been or will be filed with the Commission and will be declared effective by the Commission under the Securities Act prior to the issuance of any Placement Notices by the Company. The Prospectus Supplement will name the Agent as the agent in the section entitled "Plan of Distribution." The Company has not received, and has no notice of, any order of the Commission preventing or suspending the use of the Registration Statement, or threatening or instituting proceedings for that purpose. The Registration Statement and the offer and sale of Placement Shares as contemplated hereby meet the requirements of Rule 415 under the Securities Act and comply in all material respects with said Rule. Any statutes, regulations, contracts or other documents that are required to be described in the Registration Statement or the Prospectus or to

be filed as exhibits to the Registration Statement have been so described or filed. Copies of the Registration Statement, the Prospectus, and any such amendments or supplements and all documents incorporated by reference therein that were filed with the Commission on or prior to the date of this Agreement have been delivered, or are available through EDGAR, to Agent and its counsel. The Company has not distributed and, prior to the later to occur of each Settlement Date and completion of the distribution of the Placement Shares, will not distribute any offering material in connection with the offering or sale of the Placement Shares other than the Registration Statement and the Prospectus and any Issuer Free Writing Prospectus (as defined below) to which the Agent has consented, any such consent not to be unreasonably withheld, conditioned or delayed. The Common Stock is registered pursuant to Section 12(b) of the Exchange Act and is currently listed on the Exchange under the trading symbol "ACHN." The Company has taken no action designed to, or likely to have the effect of, terminating the registration of the Common Stock under the Exchange Act or delisting the Common Stock from the Exchange, nor has the Company received any notification that the Commission or the Exchange is contemplating terminating such registration or listing. To the Company's knowledge, it is in compliance with all applicable listing requirements of the Exchange.

(b) No Misstatement or Omission. The Registration Statement, when it became or becomes effective, and the Prospectus, and any amendment or supplement thereto, on the date of such Prospectus or amendment or supplement, conformed and will conform in all material respects with the requirements of the Securities Act. At each Settlement Date, the Registration Statement and the Prospectus, as of such date, will conform in all material respects with the requirements of the Securities Act. The Registration Statement, when it became or becomes effective, did not, and will not, contain an untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary to make the statements therein not misleading. The Prospectus and any amendment or supplement thereto, on the date thereof and at each Applicable Time (defined below), did not or will not include an untrue statement of a material fact or omit to state a material fact necessary to make the statements therein, in light of the circumstances under which they were made, not misleading. The documents incorporated by reference in the Prospectus or any Prospectus Supplement did not, and any further documents filed and incorporated by reference therein will not, when filed with the Commission, contain an untrue statement of a material fact or omit to state a material fact required to be stated in such document or necessary to make the statements in such document, in light of the circumstances under which they were made, not misleading. The foregoing shall not apply to statements in, or omissions from, any such document made in reliance upon, and in conformity with, information furnished to the Company by Agent specifically for use in the preparation thereof.

(c) Conformity with Securities Act and Exchange Act. The Registration Statement, the Prospectus, any Issuer Free Writing Prospectus or any amendment or supplement thereto, and the documents incorporated by reference in the Registration Statement, the Prospectus or any amendment or supplement thereto, when such documents were or are filed with the Commission under the Securities Act or the Exchange Act or became or become effective under the Securities Act, as the case may be, conformed or will conform in all material respects with the requirements of the Securities Act and the Exchange Act, as applicable.

(d) Financial Information. The financial statements of the Company included or incorporated by reference in the Registration Statement, the Prospectus and the Issuer Free

Writing Prospectuses, if any, together with the related notes and schedules, present fairly, in all material respects, the financial position of the Company as of the dates indicated and the results of operations, cash flows and changes in stockholders' equity of the Company for the periods specified (subject, in the case of unaudited statements, to normal year-end audit adjustments) and have been prepared in compliance with the requirements of the Securities Act and Exchange Act, as applicable, and in conformity with GAAP (as defined below) applied on a consistent basis (except for such adjustments to accounting standards and practices as are noted therein) during the periods involved. The financial data with respect to the Company contained or incorporated by reference in the Registration Statement, the Prospectus and the Issuer Free Writing Prospectuses, if any, fairly present in all material respects the information shown therein as at the respective dates and for the respective periods specified and are derived from the financial statements set forth in the Registration Statement and the Prospectus and the other books and records of the Company. No other schedules or financial statements are required to be included or incorporated by reference in the Registration Statement or the Prospectus. The Company does not have any material liabilities or obligations, direct or contingent (including any off-balance sheet obligations), not described in the Registration Statement (excluding the exhibits thereto), and the Prospectus. All disclosures contained or incorporated by reference in the Registration Statement, the Prospectus and the Issuer Free Writing Prospectuses, if any, regarding "non-GAAP financial measures" (as such term is defined by the rules and regulations of the Commission) comply in all material respects with Regulation G of the Exchange Act and Item 10 of Regulation S-K under the Securities Act, to the extent applicable. The interactive data in the eXtensible Business Reporting Language incorporated by reference in the Registration Statement fairly presents the information called for in all material respects and has been prepared in accordance with the Commission's rules and guidelines applicable thereto.

(e) Conformity with EDGAR Filing. The Prospectus delivered to the Agent for use in connection with the sale of the Placement Shares pursuant to this Agreement will be identical to the versions of the Prospectus created to be transmitted to the Commission for filing via EDGAR, except to the extent permitted by Regulation S-T.

(f) Organization. The Company is duly organized, validly existing as a corporation and in good standing under the laws of its jurisdiction of organization. The Company is duly licensed or qualified as a foreign corporation for transaction of business and in good standing under the laws of each other jurisdiction in which its ownership or lease of property or the conduct of its business requires such license or qualification, and has all corporate power and authority necessary to own or hold its properties and to conduct its business as described in the Registration Statement and the Prospectus, except where the failure to be so qualified or in good standing or have such power or authority would not, individually or in the aggregate, reasonably be expected to have a material adverse effect on the assets, business, operations, earnings, properties, condition (financial or otherwise), prospects, stockholders' equity or results of operations of the Company, or prevent or materially interfere with consummation of the transactions contemplated hereby (a "**Material Adverse Effect**").

(g) Subsidiaries. The Company has no subsidiaries.

(h) No Violation or Default. The Company is not (i) in violation of its charter or by-laws or similar organizational documents; (ii) in default, and no event has occurred that, with notice or lapse of time or both, would constitute such a default, in the due performance or

observance of any term, covenant or condition contained in any indenture, mortgage, deed of trust, loan agreement or other agreement or instrument to which the Company is a party or by which the Company is bound or to which any of the property or assets of the Company is subject; or (iii) in violation of any law or statute or any judgment, order, rule or regulation of any court or arbitrator or governmental or regulatory authority, except, in the case of each of clauses (ii) and (iii) above, for any such violation or default that would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect. To the Company's knowledge, no other party under any material contract or other agreement to which it is a party is in default in any respect thereunder where such default would reasonably be expected to have a Material Adverse Effect.

(i) No Material Adverse Change. Subsequent to the respective dates as of which information is given in the Registration Statement, the Prospectus and the Issuer Free Writing Prospectuses, if any (including any document deemed incorporated by reference therein), there has not been (i) any Material Adverse Effect or the occurrence of any development that the Company reasonably expects will result in a Material Adverse Effect, (ii) other than as contemplated by this Agreement, any transaction which is material to the Company, (iii) any obligation or liability, direct or contingent (including any off-balance sheet obligations), incurred by the Company, which is material to the Company, (iv) any material change in the capital stock or outstanding long-term indebtedness of the Company (other than (a) as a result of the sale of Placement Shares, (b) as described in a proxy statement filed on Schedule 14A or a Registration Statement on Form S-4 and otherwise publicly announced, or (c) changes in the number of shares of outstanding Common Stock of the Company due to the issuance of shares upon the exercise or conversion of securities exercisable for, or convertible into, shares of Common Stock outstanding on the date hereof, or the vesting of restricted stock units outstanding on the date hereof) or (v) any dividend or distribution of any kind declared, paid or made on the capital stock of the Company, other than, in each case above, (A) in the ordinary course of business or (B) as otherwise disclosed in the Registration Statement or Prospectus (including any document deemed incorporated by reference therein).

(j) Capitalization. The issued and outstanding shares of capital stock of the Company have been validly issued, are fully paid and nonassessable and, other than as disclosed in the Registration Statement or the Prospectus, are not subject to any preemptive rights, rights of first refusal or similar rights. The Company has an authorized, issued and outstanding capitalization as set forth in the Registration Statement and the Prospectus as of the dates referred to therein (other than the grant of additional options, stock appreciation rights, restricted stock units and other stock-based awards under the Company's existing stock option plans; changes in the number of outstanding shares of Common Stock of the Company due to the issuance of shares upon the exercise or conversion of securities exercisable for, or convertible into, Common Stock outstanding on the date hereof; as a result of the issuance of the Placement Shares; or any repurchases of capital stock of the Company) and such authorized capital stock conforms in all material respects to the description thereof set forth in the Registration Statement and the Prospectus. The description of the securities of the Company in the Registration Statement and the Prospectus is complete and accurate in all material respects. Except as disclosed in or contemplated by the Registration Statement or the Prospectus, as of the date referred to therein, the Company does not have outstanding any options to purchase, or any rights or warrants to subscribe for, or any securities or obligations convertible into, or exchangeable for, or any contracts or commitments to issue or sell, any shares of capital stock or other securities.

(k) Authorization: Enforceability. The Company has full legal right, power and authority to enter into this Agreement and perform the transactions contemplated hereby. This Agreement has been duly authorized, executed and delivered by the Company and is a legal, valid and binding agreement of the Company enforceable against the Company in accordance with its terms, except as rights to indemnification or contribution hereunder may be limited by federal or state securities laws and public policy considerations thereof and except to the extent that enforceability may be limited by bankruptcy, insolvency, reorganization, moratorium or similar laws affecting creditors' rights generally and by general equitable principles.

(l) Authorization of Placement Shares. The Placement Shares, when issued and delivered pursuant to the terms approved by the board of directors of the Company or a duly authorized committee thereof, or a duly authorized executive committee, against payment therefor as provided herein, will be duly authorized, validly issued, fully paid and nonassessable, free and clear of any pledge, lien, encumbrance, security interest or other claim (other than any pledge, lien, encumbrance, security interest or other claim arising from an act or omission of the Agent or a purchaser), including any statutory or contractual preemptive rights, resale rights, rights of first refusal or other similar rights, and will be registered pursuant to Section 12 of the Exchange Act. The Placement Shares, when issued, will conform to the description thereof set forth in or incorporated into the Prospectus.

(m) No Consents Required. No consent, approval, authorization, order, registration or qualification of or with any Governmental Authority having jurisdiction over the Company is required for the execution, delivery and performance by the Company of this Agreement and the issuance and sale by the Company of the Placement Shares as contemplated hereby, except for such consents, approvals, authorizations, orders and registrations or qualifications as may be required under applicable state securities laws or by the by-laws and rules of the Financial Industry Regulatory Authority ("FINRA") or the Exchange, including any notices that may be required by the Exchange, in connection with the sale of the Placement Shares by the Agent, and except for any consents, approvals, authorizations, orders and registrations or qualifications that have been obtained prior to the date of this Agreement or the issuance and sale by the Company of the Placement Shares, as applicable.

(n) No Preferential Rights. Except as set forth in the Registration Statement and the Prospectus, (i) no person, as such term is defined in Rule 1-02 of Regulation S-X promulgated under the Securities Act (each, a "Person"), has the right, contractual or otherwise, to cause the Company to issue or sell to such Person any Common Stock or shares of any other capital stock or other securities of the Company (other than upon the exercise of options or warrants to purchase Common Stock or upon the exercise of options or vesting of stock appreciation rights, restricted stock, restricted stock units or other stock-based awards that may be granted from time to time under the Company's stock option plans and which are disclosed in the Registration Statement and Prospectus), (ii) no Person has any preemptive rights, resale rights, rights of first refusal, rights of co-sale, or any other rights (whether pursuant to a "poison pill" provision or otherwise) to purchase any Common Stock or shares of any other capital stock or other securities of the Company which have not been duly waived with respect to the

transactions contemplated hereby on or prior to the date hereof, (iii) no Person has the right to act as an underwriter or as a financial advisor to the Company in connection with the offer and sale of the Placement Shares, and (iv) no Person has the right, contractual or otherwise, to require the Company to register under the Securities Act any Common Stock or shares of any other capital stock or other securities of the Company, or to include any such shares or other securities in the Registration Statement or the offering contemplated thereby, whether as a result of the filing or effectiveness of the Registration Statement or the sale of the Placement Shares as contemplated thereby or otherwise, except for such rights as have been duly waived with respect to the transactions contemplated hereby on or prior to the date hereof.

(o) Independent Registered Public Accounting Firm. PricewaterhouseCoopers LLP (the “**Accountant**”), whose report on the financial statements of the Company is filed with the Commission as part of the Company’s most recent Annual Report on Form 10-K filed with the Commission and incorporated by reference into the Registration Statement and the Prospectus, are and, during the periods covered by their report, were an independent registered public accounting firm within the meaning of the Securities Act and the Public Company Accounting Oversight Board (United States). To the Company’s knowledge, the Accountant is not in violation of the auditor independence requirements of the Sarbanes-Oxley Act of 2002 (the “**Sarbanes-Oxley Act**”) with respect to the Company.

(p) Enforceability of Agreements. To the Company’s knowledge, all agreements between the Company and third parties expressly referenced in the Prospectus, other than such agreements that have expired by their terms or the termination of which is disclosed in documents filed by the Company on EDGAR, are legal, valid and binding obligations of the Company enforceable against the Company in accordance with their respective terms, except to the extent that (i) enforceability may be limited by bankruptcy, insolvency, reorganization, moratorium or similar laws affecting creditors’ rights generally and by general equitable principles and (ii) the indemnification provisions of certain agreements may be limited by federal or state securities laws or public policy considerations in respect thereof and except for any unenforceability that, individually or in the aggregate, would not reasonably be expected to have a Material Adverse Effect.

(q) No Litigation. Except as set forth in the Registration Statement or the Prospectus, there are no actions, suits, proceedings by or before any Governmental Authority pending, nor, to the Company’s knowledge, any audits or investigations by or before any Governmental Authority, to which the Company is a party or to which any property of the Company is the subject that, individually or in the aggregate, if determined adversely to the Company, would reasonably be expected to have a Material Adverse Effect and to the Company’s knowledge, no such actions, suits, proceedings, audits or investigations are threatened or contemplated by any Governmental Authority or threatened by others that, individually or in the aggregate, if determined adversely to the Company would reasonably be expected to have a Material Adverse Effect; and (i) there are no current or pending audits, investigations, actions, suits or proceedings by or before any Governmental Authority that are required under the Securities Act to be described in the Prospectus that are not so described; and (ii) there are no contracts or other documents that are required under the Securities Act to be filed as exhibits to the Registration Statement that are not so filed.

(r) Consents and Permits. Except as disclosed in the Registration Statement and the Prospectus, the Company has made all filings, applications and submissions required by, and possesses all approvals, licenses, certificates, certifications, clearances, consents, grants, exemptions, marks, notifications, orders, permits and other authorizations issued by, the appropriate federal, state or foreign governmental or regulatory authorities (including, without limitation, the United States Food and Drug Administration (the “**FDA**”), and any other foreign, federal, state, provincial, court or local government or regulatory authorities performing functions similar to those performed by the FDA) necessary for the ownership or lease of its properties or to conduct its business as described in the Registration Statement and the Prospectus (collectively, “**Permits**”), except for such Permits the failure of which to possess, obtain or make the same would not reasonably be expected to have a Material Adverse Effect; the Company is in compliance with the terms and conditions of all such Permits, except where the failure to be in compliance would not reasonably be expected to have a Material Adverse Effect; all of the Permits are valid and in full force and effect, except where any invalidity, individually or in the aggregate, would not reasonably be expected to have a Material Adverse Effect; and the Company has not received any written notice of proceedings relating to the limitation, revocation, cancellation, suspension, modification or non-renewal of any such Permit which, singly or in the aggregate, if the subject of an unfavorable decision, ruling or finding, would have a Material Adverse Effect, or has any reason to believe that any such license, certificate, permit or authorization will not be renewed in the ordinary course to the extent required. To the extent required by applicable laws and regulations of the FDA, the Company has submitted to the FDA an Investigational New Drug Application or amendment or supplement thereto for each clinical trial it has conducted or sponsored or is conducting or sponsoring; all such submissions were in material compliance with applicable laws and rules and regulations when submitted and no material deficiencies have been asserted by the FDA with respect to any such submissions.

(s) Regulatory Filings. Except as disclosed in the Registration Statement and the Prospectus, all such filings, declarations, listings, registrations, reports or submissions were in compliance with applicable laws when filed and no deficiencies have been asserted by any applicable Governmental Authority with respect to any such filings, declarations, listings, registrations, reports or submissions, except for any deficiencies that, individually or in the aggregate, would not reasonably be expected to have a Material Adverse Effect. The Company has operated and currently is, in all material respects, in compliance with the United States Federal Food, Drug, and Cosmetic Act, all applicable rules and regulations of the FDA and other federal, state, local and foreign governmental bodies exercising comparable authority. The Company has no knowledge of any studies or tests performed by or on behalf of the Company not described in the Prospectus the aggregate results of which reasonably call into question in any material respect the results of the clinical trials described in the Prospectus.

(t) Intellectual Property. Except as disclosed in the Registration Statement or the Prospectus, the Company owns, possesses, licenses or has other enforceable rights to use all foreign and domestic patents, patent applications, trademarks (both registered and unregistered), service marks, trade names, trademark registrations, service mark registrations, copyrights, licenses, inventions and know-how (including trade secrets and other unpatented and/or unpatentable proprietary or confidential information, systems or procedures) (collectively, the “**Intellectual Property**”), necessary for the conduct of its business as conducted as of the date

hereof, except to the extent that the failure to own or possess or acquire adequate rights to use such Intellectual Property would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect; except as disclosed in writing to the Agent, to the Company's knowledge, there is no infringement by third parties of any such Intellectual Property; the Company has not received any written notice of any claim of infringement or conflict which asserted Intellectual Property rights of others, which infringement or conflict, if the subject of an unfavorable decision, would result in a Material Adverse Effect; there are no pending, or to the Company's knowledge, threatened judicial proceedings or interference proceedings against the Company challenging the Company's rights in or to or the validity of the scope of any of the Company's patents, patent applications or proprietary information except such proceedings that have been disclosed in writing to the Agent or would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect; no other entity or individual has any right or claim in any of the Company's patents, patent applications or any patent to be issued therefrom by virtue of any contract, license or other agreement entered into between such entity or individual and the Company or by any non-contractual obligation of the Company, other than by written licenses granted by the Company except for such right or claim that would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect; the Company has not received any written notice of any claim challenging the rights of the Company in or to any Intellectual Property owned, licensed or optioned by the Company which claim, if the subject of an unfavorable decision would reasonably be expected to result in a Material Adverse Effect.

(u) Clinical Studies. To the Company's knowledge, the clinical, pre-clinical and other studies and tests described in the Prospectus conducted by or, to the knowledge of the Company, on behalf of the Company were, and, if still pending, are being, to the Company's knowledge, conducted in all material respects in accordance with all statutes, laws, rules and regulations, as applicable (including, without limitation, those administered by the FDA or by any foreign, federal, state or local Governmental Authority performing functions similar to those performed by the FDA), except where such noncompliance would not reasonably be expected to have a Material Adverse Effect. Except as set forth in the Registration Statement and Prospectus, the Company has not received any written notices or other written correspondence from the FDA or any other foreign, federal, state or local Governmental Authority performing functions similar to those performed by the FDA requiring the Company to terminate or suspend any ongoing clinical or pre-clinical studies or tests.

(v) Market Capitalization. At the time the Registration Statement was or will be originally declared effective, and at the time the Company's most recent Annual Report on Form 10-K was filed with the Commission, the Company met or will meet the then applicable requirements for the use of Form S-3 under the Securities Act, including, but not limited to, General Instruction I.B.1 of Form S-3. The Company satisfies the pre-1992 eligibility requirements for the use of a registration statement on Form S-3 in connection with this offering (the pre-1992 eligibility requirements for the use of the registration statement on Form S-3 include (i) having a non-affiliate, public common equity float of at least \$150 million or a non-affiliate, public common equity float of at least \$100 million and annual trading volume of at least three million shares and (ii) having been subject to the Exchange Act reporting requirements for a period of 36 months). The Company is not a shell company (as defined in Rule 405 under the Securities Act) and has not been a shell company for at least 12 calendar months previously.

(w) No Material Defaults. The Company has not defaulted on any installment on indebtedness for borrowed money or on any rental on one or more long-term leases, which defaults, individually or in the aggregate, would reasonably be expected to have a Material Adverse Effect. The Company has not filed a report pursuant to Section 13(a) or 15(d) of the Exchange Act since the filing of its last Annual Report on Form 10-K, indicating that it (i) has failed to pay any dividend or sinking fund installment on preferred stock or (ii) has defaulted on any installment on indebtedness for borrowed money or on any rental on one or more long-term leases, which defaults, individually or in the aggregate, would reasonably be expected to have a Material Adverse Effect.

(x) Certain Market Activities. Neither the Company nor, to the Company's knowledge, any of its directors, officers or controlling persons has taken, directly or indirectly, any action designed, or that has constituted or would reasonably be expected to cause or result in, under the Exchange Act or otherwise, the stabilization or manipulation of the price of any security of the Company to facilitate the sale or resale of the Placement Shares.

(y) Broker/Dealer Relationships. Neither the Company nor any related entities (i) is required to register as a "broker" or "dealer" in accordance with the provisions of the Exchange Act or (ii) directly or indirectly through one or more intermediaries, controls or is a "person associated with a member" or "associated person of a member" (within the meaning set forth in the FINRA Manual).

(z) No Reliance. The Company has not relied upon the Agent or legal counsel for the Agent for any legal, tax or accounting advice in connection with the offering and sale of the Placement Shares.

(aa) Taxes. The Company has filed all federal, state, local and foreign income, franchise and other tax returns which have been required to be filed, or has properly requested extensions thereof, and paid all taxes shown thereon through the date hereof, to the extent that such taxes have become due and are not being contested in good faith, except where the failure to so file or pay would not reasonably be expected to have a Material Adverse Effect. Except as otherwise disclosed in or contemplated by the Registration Statement or the Prospectus, no tax deficiency has been determined adversely to the Company which has had, or would reasonably be expected to have, individually or in the aggregate, a Material Adverse Effect. The Company has no knowledge of any federal, state or other governmental tax deficiency, penalty or assessment which has been asserted or threatened against it, in writing, which would reasonably be expected to have a Material Adverse Effect.

(bb) Title to Real and Personal Property. Except as set forth in the Registration Statement or the Prospectus, the Company has good and marketable title to all items of real property owned by it, good and valid title to all personal property (except Intellectual Property, which is discussed in Section 6(t) above) described in the Registration Statement or Prospectus as being owned by it, in each case free and clear of all liens, encumbrances and claims, except those matters that (i) do not materially interfere with the use made and proposed to be made of such property by the Company or (ii) would not individually or in the aggregate, reasonably be

expected to have a Material Adverse Effect. Any real or tangible personal property described in the Registration Statement or Prospectus as being leased by the Company is held by the Company under valid, existing and enforceable leases, except those that (A) do not materially interfere with the use made or proposed to be made of such property by the Company or (B) would not reasonably be expected, individually or in the aggregate, to have a Material Adverse Effect. The Company has not received from any Governmental Authorities any notice of any condemnation of, or zoning change affecting, the properties of the Company, and the Company knows of no such condemnation or zoning change which is threatened, except for such that would not reasonably be expected to interfere in any material respect with the use made and proposed to be made of such property by the Company or otherwise have a Material Adverse Effect, individually or in the aggregate.

(cc) Environmental Laws. Except as set forth in the Registration Statement or the Prospectus, the Company (i) is in compliance with any and all applicable federal, state, local and foreign laws, rules, regulations, decisions and orders relating to the protection of human health and safety, the environment or hazardous or toxic substances or wastes, pollutants or contaminants (collectively, “Environmental Laws”); (ii) has received and is in compliance with all permits, licenses or other approvals required of it under applicable Environmental Laws to conduct its business as described in the Registration Statement and the Prospectus; and (iii) has not received notice of any actual or potential liability for the investigation or remediation of any disposal or release of hazardous or toxic substances or wastes, pollutants or contaminants, except, in the case of any of clauses (i), (ii) or (iii) above, for any such failure to comply or failure to receive required permits, licenses, other approvals or liability as would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

(dd) Disclosure Controls. The Company maintains systems of internal accounting controls designed to provide reasonable assurance that (i) transactions are executed in accordance with management’s general or specific authorizations; (ii) transactions are recorded as necessary to permit preparation of financial statements in conformity with U.S. generally accepted accounting principles and to maintain asset accountability; (iii) access to assets is permitted only in accordance with management’s general or specific authorization; and (iv) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences. The Company’s internal control over financial reporting is effective at the reasonable assurance level and the Company is not aware of any material weaknesses in its internal control over financial reporting (other than as set forth in the Prospectus). Since the date of the latest audited financial statements of the Company included in the Prospectus, there has been no change in the Company’s internal control over financial reporting that has materially affected, or is reasonably likely to materially affect, the Company’s internal control over financial reporting (other than as set forth in the Registration Statement or the Prospectus). The Company has established disclosure controls and procedures (as defined in Exchange Act Rules 13a-15 and 15d-15) for the Company and designed such disclosure controls and procedures to provide reasonable assurance that material information relating to the Company is made known to the certifying officers by others within those entities, particularly during the period in which the Company’s Annual Report on Form 10-K or Quarterly Report on Form 10-Q, as the case may be, is being prepared. The Company’s certifying officers have evaluated the effectiveness of the Company’s disclosure controls and procedures as of a date within 90 days prior to the filing date of the Form 10-K for the fiscal year

most recently ended (such date, the “**Evaluation Date**”). The Company presented in its Form 10-K for the fiscal year most recently ended the conclusions of the certifying officers about the effectiveness of the disclosure controls and procedures based on their evaluations as of the Evaluation Date and the disclosure controls and procedures are effective at the reasonable assurance level. Since the Evaluation Date, there have been no significant changes in the Company’s internal controls (as such term is defined in Item 307(b) of Regulation S-K under the Securities Act) or, to the Company’s knowledge, in other factors that could significantly affect the Company’s internal controls.

(ee) Sarbanes-Oxley. There is and has been no failure on the part of the Company or, to the knowledge of the Company, any of the Company’s directors or officers, in their capacities as such, to comply in all material respects with any applicable provisions of the Sarbanes-Oxley Act and the rules and regulations promulgated thereunder. Each of the principal executive officer and the principal financial officer of the Company (or each former principal executive officer of the Company and each former principal financial officer of the Company as applicable) has made all certifications required by Sections 302 and 906 of the Sarbanes-Oxley Act with respect to all reports, schedules, forms, statements and other documents required to be filed by it or furnished by it to the Commission during the twelve (12) months immediately preceding the date of this Agreement. For purposes of the preceding sentence, “principal executive officer” and “principal financial officer” shall have the meanings given to such terms in the Sarbanes-Oxley Act.

(ff) Finder’s Fees. The Company has not incurred any liability for any finder’s fees, brokerage commissions or similar payments in connection with the transactions herein contemplated, except as may otherwise exist with respect to Agent pursuant to this Agreement.

(gg) Labor Disputes. No labor disturbance by or dispute with employees of the Company exists or, to the knowledge of the Company, is threatened which would reasonably be expected to result in a Material Adverse Effect.

(hh) Investment Company Act. The Company is not and, after giving effect to the offering and sale of the Placement Shares, will not be an “investment company” or an entity “controlled” by an “investment company,” as such terms are defined in the Investment Company Act of 1940, as amended (the “**Investment Company Act**”).

(ii) Operations. The operations of the Company are and have been conducted at all times in compliance with applicable financial record keeping and reporting requirements of the Currency and Foreign Transactions Reporting Act of 1970, as amended, the money laundering statutes of all jurisdictions to which the Company is subject, the rules and regulations thereunder and any related or similar rules, regulations or guidelines, issued, administered or enforced by any Governmental Authority (collectively, the “**Money Laundering Laws**”), except as would not reasonably be expected to result in a Material Adverse Effect; and no action, suit or proceeding by or before any Governmental Authority involving the Company with respect to the Money Laundering Laws is pending or, to the knowledge of the Company, threatened.

(jj) Off-Balance Sheet Arrangements. There are no transactions, arrangements and other relationships between and/or among the Company and/or, to the

knowledge of the Company, any of its affiliates and any unconsolidated entity, including, but not limited to, any structural finance, special purpose or limited purpose entity (each, an “**Off-Balance Sheet Transaction**”) that would reasonably be expected to affect materially the Company’s liquidity or the availability of or requirements for its capital resources, including those Off-Balance Sheet Transactions described in the Commission’s Statement about Management’s Discussion and Analysis of Financial Conditions and Results of Operations (Release Nos. 33-8056; 34-45321; FR-61), required to be described in the Registration Statement or the Prospectus which have not been described as required.

(kk) **Underwriter Agreements**. The Company is not a party to any agreement with an agent or underwriter for any other “at-the-market” or continuous equity transaction.

(ll) **ERISA**. To the knowledge of the Company, (i) each material employee benefit plan, within the meaning of Section 3(3) of the Employee Retirement Income Security Act of 1974, as amended (“**ERISA**”), that is maintained, administered or contributed to by the Company (other than a Multiemployer Plan, within the meaning of Section 3(37) of ERISA) or any of its affiliates for employees or former employees of the Company has been maintained in material compliance with its terms and the requirements of any applicable statutes, orders, rules and regulations, including but not limited to ERISA and the Internal Revenue Code of 1986, as amended (the “**Code**”) (except to the extent where any non-compliance would not result in material liability to the Company); during the last six (6) plan years, (ii) no prohibited transaction, within the meaning of Section 406 of ERISA or Section 4975 of the Code, has occurred which would result in a material liability to the Company with respect to any such plan excluding transactions effected pursuant to a statutory or administrative exemption; and (iii) for each such plan that is subject to the funding rules of Section 412 of the Code or Section 302 of ERISA, no “accumulated funding deficiency” as defined in Section 412 of the Code has been incurred, whether or not waived, and the fair market value of the assets of each such plan (excluding for these purposes accrued but unpaid contributions) equals or exceeds the present value of all benefits accrued under such plan determined using reasonable actuarial assumptions.

(mm) **Forward-Looking Statements**. No forward-looking statement (within the meaning of Section 27A of the Securities Act and Section 21E of the Exchange Act) (a “**Forward-Looking Statement**”) contained or incorporated by reference in the Registration Statement and the Prospectus has been made or reaffirmed without a reasonable basis or has been disclosed other than in good faith.

(nn) **Agent Purchases**. The Company acknowledges and agrees that Agent has informed the Company that the Agent may, to the extent permitted under the Securities Act and the Exchange Act, purchase and sell Common Stock for its own account while this Agreement is in effect, provided, that (i) no such purchase or sales shall take place while a Placement Notice is in effect (except to the extent the Agent may engage in sales of Placement Shares purchased or deemed purchased from the Company as a “riskless principal” or in a similar capacity) and (ii) the Company shall not be deemed to have authorized or consented to any such purchases or sales by the Agent.

(oo) **Margin Rules**. Neither the issuance, sale and delivery of the Placement Shares nor the application of the proceeds thereof by the Company as described in the Registration Statement and the Prospectus will violate Regulation T, U or X of the Board of Governors of the Federal Reserve System or any other regulation of such Board of Governors.

(pp) Insurance. The Company carries, or is covered by, insurance in such amounts and covering such risks as the Company reasonably believes are adequate for the conduct of its properties and as is customary for companies of similar size engaged in similar businesses in similar industries.

(qq) No Improper Practices. (i) Neither the Company nor, to the Company's knowledge, any of its executive officers has, in the past five years, made any unlawful contributions to any candidate for any political office (or failed fully to disclose any contribution in violation of law) or made any contribution or other payment to any official of, or candidate for, any federal, state, municipal, or foreign office or other person charged with similar public or quasi-public duty in violation of any law or of the character required to be disclosed in the Prospectus; (ii) no relationship, direct or indirect, exists between or among the Company or, to the Company's knowledge, any affiliate of the Company, on the one hand, and the directors, officers and stockholders of the Company, on the other hand, that is required by the Securities Act to be described in the Registration Statement and the Prospectus that is not so described; (iii) no relationship, direct or indirect, exists between or among the Company or, to the Company's knowledge, any of its affiliates, on the one hand, and the directors, officers, or stockholders of the Company, on the other hand, that is required by the rules of FINRA to be described in the Registration Statement and the Prospectus that is not so described; (iv) except as described in the Registration Statement and the Prospectus, there are no material outstanding loans or advances or material guarantees of indebtedness by the Company to or for the benefit of any of its officers or directors or any of the members of the families of any of them; and (v) the Company has not offered, or caused any placement agent to offer, Common Stock to any person with the intent to influence unlawfully (A) a customer or supplier of the Company to alter the customer's or supplier's level or type of business with the Company or (B) a trade journalist or publication to write or publish favorable information about the Company or any of its products or services, and, (vi) neither the Company nor, to the Company's knowledge, any employee or agent of the Company has made any payment of funds of the Company or received or retained any funds in violation of any law, rule or regulation (including, without limitation, the Foreign Corrupt Practices Act of 1977), which payment, receipt or retention of funds is of a character required to be disclosed in the Registration Statement or the Prospectus.

(rr) Status Under the Securities Act. The Company was not and is not an ineligible issuer as defined in Rule 405 under the Securities Act at the times specified in Rules 164 and 433 under the Securities Act in connection with the offering of the Placement Shares.

(ss) No Misstatement or Omission in an Issuer Free Writing Prospectus. Each Issuer Free Writing Prospectus, as of its issue date and as of each Applicable Time (as defined in Section 25 below), did not, does not and will not, through the completion of the Placement for which such Issuer Free Writing Prospectus is used or deemed used, include any information that conflicted, conflicts or will conflict with the information contained in the Registration Statement or the Prospectus, including any incorporated document deemed to be a part thereof that has not been superseded or modified. The foregoing sentence does not apply to statements in or omissions from any Issuer Free Writing Prospectus based upon and in conformity with written information furnished to the Company by the Agent specifically for use therein.

(tt) No Conflicts. Neither the execution of this Agreement by the Company, nor the issuance, offering or sale of the Placement Shares, nor the consummation of any of the transactions contemplated herein, nor the compliance by the Company with the terms and provisions hereof will conflict with, or will result in a breach of, any of the terms and provisions of, or has constituted or will constitute a default under, or has resulted in or will result in the creation or imposition of any lien, charge or encumbrance upon any property or assets of the Company pursuant to the terms of any contract or other agreement to which the Company may be bound or to which any of the property or assets of the Company is subject, except (i) such conflicts, breaches or defaults as may have been waived and (ii) such conflicts, breaches and defaults that would not reasonably be expected to have a Material Adverse Effect; nor will such action result (x) in any violation of the provisions of the organizational or governing documents of the Company, or (y) in any violation of the provisions of any statute or any order, rule or regulation applicable to the Company or of any court or of any federal, state or other Governmental Authority having jurisdiction over the Company, except, with respect to clause (y) only, where such violation would not be reasonably expected to have a Material Adverse Effect.

(uu) Sanctions.

(i) The Company represents that neither the Company nor, to the Company's knowledge, any director, officer, employee, agent, affiliate or representative of the Company, is a government, individual, or entity (in this paragraph (uu), "Person") that is, or is owned or controlled by a Person that is:

(A) the subject of any applicable sanctions administered or enforced by the U.S. Department of Treasury's Office of Foreign Assets Control ("OFAC"), the United Nations Security Council, the European Union, Her Majesty's Treasury, or other relevant sanctions authority (as amended, collectively, "Sanctions"), nor

(B) located, organized or resident in a country or territory that is the subject of Sanctions (including, without limitation, Burma/Myanmar, Cuba, Iran, North Korea, Sudan and Syria).

(ii) The Company represents and covenants that it will not, directly or indirectly, knowingly use the proceeds of the offering, or lend, contribute or otherwise make available such proceeds to any subsidiary, joint venture partner or other Person:

(A) to fund or facilitate any activities or business of or with any Person or in any country or territory in violation of any applicable Sanctions; or

(B) in any other manner that will result in a violation of Sanctions by any Person (including any Person participating in the offering, whether as underwriter, advisor, investor or otherwise).

(iii) The Company represents and covenants that, except as detailed in the Registration Statement and the Prospectus, for the past 5 years, it has not knowingly engaged in, is not knowingly now engaging in, and will not knowingly engage in, any dealings or transactions with any Person, or in any country or territory, that at the time of the dealing or transaction is or was the subject of Sanctions.

(vv) Stock Transfer Taxes. On each Settlement Date, all stock transfer or other taxes (other than income taxes) which are required to be paid in connection with the sale and transfer of the Placement Shares to be sold hereunder will be, or will have been, fully paid or provided for by the Company and all laws imposing such taxes will be or will have been fully complied with in all material respects.

(ww) Statistical and Market-Related Data. Any statistical and market-related data included in the Registration Statement or the Prospectus are based on or derived from sources that the Company believes, after reasonable inquiry, to be reliable and accurate and, to the extent required, the Company has obtained the written consent to the use of such data from such sources.

Any certificate signed by an officer of the Company and delivered to the Agent or to counsel for the Agent pursuant to or in connection with this Agreement shall be deemed to be a representation and warranty by the Company, as applicable, to the Agent as to the matters set forth therein.

7. Covenants of the Company. The Company covenants and agrees with Agent that:

(a) Registration Statement Amendments. After the date of this Agreement and during any period in which a Prospectus relating to any Placement Shares is required to be delivered by Agent under the Securities Act (including in circumstances where such requirement may be satisfied pursuant to Rule 172 under the Securities Act or similar rule), (i) the Company will notify the Agent promptly of the time when any subsequent amendment to the Registration Statement, other than documents incorporated by reference or amendments or supplements that do not name the Agent or do not relate to the transactions contemplated by this Agreement, has been filed with the Commission and/or has become effective or any subsequent supplement to the Prospectus has been filed and of any request by the Commission for any amendment or supplement to the Registration Statement or Prospectus related to the transactions contemplated by this Agreement or for additional information related to the transactions contemplated by this Agreement, (ii) the Company will prepare and file with the Commission, promptly upon the Agent's request, any amendments or supplements to the Registration Statement or Prospectus that, in such Agent's reasonable opinion, may be necessary or advisable in connection with the distribution of the Placement Shares by the Agent (provided, however, that the failure of the Agent to make such request shall not relieve the Company of any obligation or liability hereunder, or affect the Agent's right to rely on the representations and warranties made by the Company in this Agreement and provided, further, that the only remedy the Agent shall have with respect to the failure to make such filing shall be to cease making sales under this Agreement until such amendment or supplement is filed); (iii) the Company will not file any amendment or supplement to the Registration Statement or Prospectus relating to the Placement Shares unless a copy thereof has been submitted to Agent within a reasonable period of time before the filing and the Agent has not reasonably objected in writing thereto within two (2) Business Days (provided, however, that the failure of the Agent to make such objection shall not relieve the Company of any obligation or liability hereunder, or affect the Agent's right to rely on the representations and warranties made by the Company in this Agreement and provided,

further, that the only remedy the Agent shall have with respect to the failure by the Company to obtain such consent shall be to cease making sales under this Agreement) and the Company will furnish to the Agent at the time of filing thereof a copy of any document that upon filing is deemed to be incorporated by reference into the Registration Statement or Prospectus, except for those documents available via EDGAR; and (iv) the Company will cause each amendment or supplement to the Prospectus that relates to the transactions contemplated by this Agreement to be filed with the Commission as required pursuant to the applicable paragraph of Rule 424(b) of the Securities Act or, in the case of any document to be incorporated therein by reference, to be filed with the Commission as required pursuant to the Exchange Act, within the time period prescribed (the determination to file or not file any amendment or supplement with the Commission under this Section 7(a), based on the Company's reasonable opinion or reasonable objections, shall be made exclusively by the Company).

(b) Notice of Commission Stop Orders. The Company will advise the Agent, promptly after it receives notice or obtains knowledge thereof, of the issuance or threatened issuance by the Commission of any stop order suspending the effectiveness of the Registration Statement, of the suspension of the qualification of the Placement Shares for offering or sale in any jurisdiction, or of the initiation or threatening of any proceeding for any such purpose; and it will promptly use its commercially reasonable efforts to prevent the issuance of any stop order or to obtain its withdrawal if such a stop order should be issued. The Company will advise the Agent promptly after it receives any request by the Commission for any amendments to the Registration Statement or any amendment or supplements to the Prospectus or any Issuer Free Writing Prospectus or for additional information related to the offering of the Placement Shares or for additional information related to the Registration Statement, the Prospectus or any Issuer Free Writing Prospectus.

(c) Delivery of Prospectus; Subsequent Changes. During any period in which a Prospectus relating to the Placement Shares is required to be delivered by the Agent under the Securities Act with respect to the offer and sale of the Placement Shares, (including in circumstances where such requirement may be satisfied pursuant to Rule 172 under the Securities Act or similar rule), the Company will use commercially reasonable efforts to comply with all requirements imposed upon it by the Securities Act, as from time to time in force, and to file on or before their respective due dates all reports and any definitive proxy or information statements required to be filed by the Company with the Commission pursuant to Sections 13(a), 13(c), 14, 15(d) or any other provision of or under the Exchange Act. If the Company has omitted any information from the Registration Statement pursuant to Rule 430B under the Securities Act, it will use its best efforts to comply with the provisions of and make all requisite filings with the Commission pursuant to said Rule 430B and to notify the Agent promptly of all such filings. If during such period any event occurs as a result of which the Prospectus as then amended or supplemented would include an untrue statement of a material fact or omit to state a material fact necessary to make the statements therein, in the light of the circumstances then existing, not misleading, or if during such period it is necessary to amend or supplement the Registration Statement or Prospectus to comply with the Securities Act, the Company will promptly notify Agent to suspend the offering of Placement Shares during such period and the Company will promptly amend or supplement the Registration Statement or Prospectus (at the expense of the Company) so as to correct such statement or omission or effect such compliance; *provided, however*, that the Company may delay any such amendment or supplement if, in the

reasonable judgment of the Company, it is in the best interests of the Company to do so. Until such time as the Company shall have corrected such statement or omission or effected such compliance, the Company shall not notify the Agent to resume the offering of Placement Shares.

(d) Listing of Placement Shares. Prior to the date of the first Placement Notice, the Company will use its reasonable best efforts to cause the Placement Shares to be listed on the Exchange.

(e) Delivery of Registration Statement and Prospectus. The Company will furnish to the Agent and its counsel (at the expense of the Company) copies of the Registration Statement, the Prospectus (including all documents incorporated by reference therein) and all amendments and supplements to the Registration Statement or Prospectus that are filed with the Commission during any period in which a Prospectus relating to the Placement Shares is required to be delivered under the Securities Act (including all documents filed with the Commission during such period that are deemed to be incorporated by reference therein), in each case as soon as reasonably practicable and in such quantities as the Agent may from time to time reasonably request and, at the Agent's reasonable request, will also furnish copies of the Prospectus to each exchange or market on which sales of the Placement Shares may be made; provided, however, that the Company shall not be required to furnish any document (other than the Prospectus) to the Agent to the extent such document is available on EDGAR.

(f) Earnings Statement. The Company will make generally available to its security holders as soon as practicable, but in any event not later than 15 months after the end of the Company's current fiscal quarter, an earnings statement covering a 12-month period that satisfies the provisions of Section 11(a) and Rule 158 of the Securities Act.

(g) Use of Proceeds. The Company will use the Net Proceeds as described in the Prospectus in the section entitled "Use of Proceeds."

(h) Notice of Other Sales. Without the prior written consent of the Agent, the Company will not, directly or indirectly, offer to sell, sell, contract to sell, grant any option to sell or otherwise dispose of any Common Stock (other than the Placement Shares offered pursuant to this Agreement) or securities convertible into or exchangeable for Common Stock, warrants or any rights to purchase or acquire, Common Stock during the period beginning on the fifth (5th) Trading Day immediately prior to the date on which any Placement Notice is delivered to Agent hereunder and ending on the fifth (5th) Trading Day immediately following the final Settlement Date with respect to Placement Shares sold pursuant to such Placement Notice (or, if the Placement Notice has been terminated or suspended prior to the sale of all Placement Shares covered by a Placement Notice, the date of such suspension or termination); and will not directly or indirectly in any other "at-the-market" or continuous equity transaction offer to sell, sell, contract to sell, grant any option to sell or otherwise dispose of any Common Stock (other than the Placement Shares offered pursuant to this Agreement) or securities convertible into or exchangeable for Common Stock, warrants or any rights to purchase or acquire, Common Stock prior to the later of the termination of this Agreement and the sixtieth (60th) day immediately following the final Settlement Date with respect to Placement Shares sold pursuant to such Placement Notice; provided, however, that such restrictions will not apply in connection with the Company's issuance or sale of (i) Common Stock, options to purchase Common Stock, stock appreciation rights, restricted stock units or other stock-based awards or Common Stock issuable

upon the exercise of options, or the vesting of any of the foregoing, pursuant to any employee or director stock option or benefits plan, stock ownership plan or dividend reinvestment plan (but not Common Stock subject to a waiver to exceed plan limits in its dividend reinvestment plan) of the Company whether now in effect or hereafter implemented, (ii) Common Stock issuable upon conversion of securities or the exercise of warrants, options or other rights in effect or outstanding, and disclosed in filings by the Company available on EDGAR or otherwise in writing to the Agent and (iii) Common Stock or securities convertible into or exchangeable for shares of Common Stock as consideration for mergers, acquisitions, other business combinations or strategic alliances or offered and sold in privately negotiated transactions with vendors, customers, strategic partners or potential strategic partners, joint ventures, marketing or distribution arrangements, collaboration agreements, co-promotion agreements or intellectual property license agreements occurring after the date of this Agreement which are not issued for capital raising purposes and connected in a manner so as not to be integrated with the offering of Placement Shares hereby.

(i) Change of Circumstances. The Company will, at any time during the pendency of a Placement Notice, advise the Agent promptly after it shall have received notice, or obtained knowledge thereof, of any information or fact that would alter or affect in any material respect any opinion, certificate, letter or other document required to be provided to the Agent pursuant to this Agreement.

(j) Due Diligence Cooperation. The Company will cooperate with any reasonable due diligence review conducted by the Agent or its representatives in connection with the transactions contemplated hereby, including, without limitation, providing information and making available documents and senior corporate officers, during regular business hours and at the Company's principal offices, as the Agent may reasonably request.

(k) Required Filings Relating to Placement of Placement Shares. To the extent that the filing of a prospectus supplement with the Commission with respect to a placement of Placement Shares becomes required under the Securities Act, the Company agrees that on such dates as the Securities Act shall require, the Company will (i) file a prospectus supplement with the Commission under the applicable paragraph of Rule 424(b) under the Securities Act (each and every filing date under Rule 424(b), a "**Filing Date**"), which prospectus supplement will set forth, within the relevant period, the amount of Placement Shares sold through the Agent, the Net Proceeds to the Company and the compensation payable by the Company to the Agent with respect to such Placement Shares, and (ii) deliver such number of copies of each such prospectus supplement to each exchange or market on which such sales were effected as may be required by the rules or regulations of such exchange or market.

(l) Representation Dates; Certificate. (1) Prior to the date of the first Placement Notice given hereunder and (2) each time the Company: (i) files the Prospectus relating to the Placement Shares (other than as part of any filing prior to the time of initial effectiveness of the Registration Statement) or amends or supplements the Registration Statement (other than a prospectus supplement relating solely to an offering of securities other than the Placement Shares) or the Prospectus relating to the Placement Shares by means of a post-effective amendment, sticker, or supplement but not by means of incorporation of documents by reference into the Registration Statement or the Prospectus relating to the Placement Shares;

(ii) files an annual report on Form 10-K under the Exchange Act (including any Form 10-K/A containing amended financial information or a material amendment to the previously filed Form 10-K);

(iii) files its quarterly reports on Form 10-Q under the Exchange Act; or

(iv) files a current report on Form 8-K containing amended financial information (other than information “furnished” pursuant to Items 2.02 or 7.01 of Form 8-K or to provide disclosure pursuant to Item 8.01 of Form 8-K relating to the reclassification of certain properties as discontinued operations in accordance with Statement of Financial Accounting Standards No. 144) under the Exchange Act (each date of filing of one or more of the documents referred to in clauses (i) through (iv) shall be a “**Representation Date**”);

the Company shall furnish the Agent (but in the case of clause (iv) above only if the Agent reasonably determines that the information contained in such Form 8-K is material) with a certificate, in the form and substance reasonably satisfactory to the Agent and its counsel, substantially similar to the form previously provided to the Agent and its counsel, modified, as necessary, to relate to the Registration Statement and the Prospectus as amended or supplemented. The requirement to provide a certificate under this Section 7(l) shall be waived for any Representation Date occurring at a time when no Placement Notice is pending, which waiver shall continue until the earlier to occur of the date the Company delivers instructions for the sale of Placement Shares hereunder (which for such calendar quarter shall be considered a Representation Date) and the next occurring Representation Date. Notwithstanding the foregoing, if the Company subsequently decides to sell Placement Shares following a Representation Date when the Company relied on such waiver and did not provide the Agent with a certificate under this Section 7(l), then before the Company delivers the instructions for the sale of Placement Shares or the Agent sells any Placement Shares pursuant to such instructions, the Company shall provide the Agent with a certificate in conformity with this Section 7(l) dated as of the date that the instructions for the sale of Placement Shares are issued.

(m) **Legal Opinion.** (1) On or prior to the date of the first Placement Notice given hereunder and (2) within five (5) Trading Days of each Representation Date with respect to which the Company is obligated to deliver a certificate pursuant to Section 7(l) for which no waiver is applicable, the Company shall cause to be furnished to the Agent a written opinion of Wilmer Cutler Pickering Hale and Dorr LLP (“**Company Counsel**”), or other counsel reasonably satisfactory to the Agent, in form and substance satisfactory to the Agent and its counsel, substantially similar to the form previously provided to the Agent and its counsel. Thereafter, within five (5) Trading Days of each Representation Date with respect to which the Company is obligated to deliver a certificate pursuant to Section 7(l) for which no waiver is applicable, the Company shall cause to be furnished to the Agent a written letter of Company Counsel, or other counsel satisfactory to the Agent, in form and substance satisfactory to the Agent and its counsel, substantially similar to the form previously provided to the Agent and its counsel, modified, as necessary, to relate to the Registration Statement and the Prospectus as then amended or supplemented; provided, however, the Company shall be required to furnish to Agent no more than one opinion hereunder per calendar quarter.

(n) Comfort Letter. (1) On or prior to the date of the first Placement Notice given hereunder and (2) within five (5) Trading Days of each Representation Date with respect to which the Company is obligated to deliver a certificate pursuant to Section 7(l) for which no waiver is applicable and excluding the date of this Agreement, the Company shall cause its independent registered public accounting firm to furnish the Agent letters (the “**Comfort Letters**”), dated the date the Comfort Letter is delivered, which shall meet the requirements set forth in this Section 7(n), provided, that if requested by the Agent, the Company shall cause a Comfort Letter to be furnished to the Agent within ten (10) Trading Days of the date of occurrence of any material transaction or event which necessitates the filing of additional or revised financial statements, including the restatement of the Company’s financial statements. The Comfort Letter from the Company’s independent registered public accounting firm shall be in a form and substance reasonably satisfactory to the Agent, (i) confirming that they are an independent registered public accounting firm within the meaning of the Securities Act and the PCAOB, (ii) stating, as of such date, the conclusions and findings of such firm with respect to the financial information and other matters ordinarily covered by accountants’ “comfort letters” to underwriters in connection with registered public offerings (the first such letter, the “**Initial Comfort Letter**”) and (iii) updating the Initial Comfort Letter with any information that would have been included in the Initial Comfort Letter had it been given on such date and modified as necessary to relate to the Registration Statement and the Prospectus, as amended and supplemented to the date of such letter.

(o) Market Activities. The Company will not, directly or indirectly, (i) take any action designed to cause or result in, or that constitutes or would reasonably be expected to constitute, the stabilization or manipulation of the price of any security of the Company to facilitate the sale or resale of Common Stock or (ii) sell, bid for, or purchase Common Stock in violation of Regulation M, or pay anyone any compensation for soliciting purchases of the Placement Shares other than the Agent.

(p) Investment Company Act. The Company will conduct its affairs in such a manner so as to reasonably ensure that it will not be or become, at any time prior to the termination of this Agreement, required to register as an “investment company,” as such term is defined in the Investment Company Act.

(q) No Offer to Sell. Other than an Issuer Free Writing Prospectus approved in advance by the Company and the Agent in its capacity as agent hereunder, neither the Agent nor the Company (including its agents and representatives, other than the Agent in its capacity as such) will make, use, prepare, authorize, approve or refer to any written communication (as defined in Rule 405 under the Securities Act), required to be filed with the Commission, that constitutes an offer to sell or solicitation of an offer to buy Placement Shares hereunder.

(r) Blue Sky and Other Qualifications. The Company will use its commercially reasonable efforts, in cooperation with the Agent, to qualify the Placement Shares for offering and sale, or to obtain an exemption for the Placement Shares to be offered and sold, under the applicable securities laws of such states and other domestic jurisdictions or, with the Company’s prior written consent, foreign jurisdictions as the Agent may designate and to

maintain such qualifications and exemptions in effect for so long as required for the distribution of the Placement Shares (but in no event for less than one year from the date of this Agreement); *provided, however*, that the Company shall not be obligated to file any general consent to service of process or to qualify as a foreign corporation or as a dealer in securities in any jurisdiction in which it is not so qualified or to subject itself to taxation in respect of doing business in any jurisdiction in which it is not otherwise so subject. In each jurisdiction in which the Placement Shares have been so qualified or exempt, the Company will file such statements and reports as may be required by the laws of such jurisdiction to continue such qualification or exemption, as the case may be, in effect for so long as required for the distribution of the Placement Shares (but in no event for less than one year from the date of this Agreement).

(s) Sarbanes-Oxley Act. The Company will maintain and keep accurate books and records reflecting its assets and maintain internal accounting controls in a manner designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles and including those policies and procedures that (i) pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of the assets of the Company, (ii) provide reasonable assurance that transactions are recorded as necessary to permit the preparation of the Company's financial statements in accordance with generally accepted accounting principles, (iii) that receipts and expenditures of the Company are being made only in accordance with management's and the Company's directors' authorization, and (iv) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the Company's assets that could have a material effect on its financial statements. The Company will maintain such controls and other procedures, including, without limitation, those required by Sections 302 and 906 of the Sarbanes-Oxley Act, and the applicable regulations thereunder that are designed to ensure that information required to be disclosed by the Company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Commission's rules and forms, including, without limitation, controls and procedures designed to ensure that information required to be disclosed by the Company in the reports that it files or submits under the Exchange Act is accumulated and communicated to the Company's management, including its principal executive officer and principal financial officer, or persons performing similar functions, as appropriate to allow timely decisions regarding required disclosure and to ensure that material information relating to the Company is made known to it by others within the organization, particularly during the period in which such periodic reports are being prepared.

(t) Secretary's Certificate: Further Documentation. On or prior to the date of the first Placement Notice given hereunder, the Company shall deliver to the Agent a certificate of the Secretary of the Company and attested to by an executive officer of the Company, dated as of such date, certifying as to (i) the Certificate of Incorporation of the Company, (ii) the By-laws of the Company, (iii) the resolutions of the Board of Directors of the Company, or a duly authorized committee thereof, authorizing the execution, delivery and performance of this Agreement and the issuance of the Placement Shares and (iv) the incumbency of the officers duly authorized to execute this Agreement and the other documents contemplated by this Agreement. Within five (5) Trading Days of each Representation Date, the Company shall have furnished to the Agent, upon the Agent's request, such further information, certificates and documents as are customarily provided in similar transactions.

8. Payment of Expenses. The Company will pay all expenses incident to the performance of its obligations under this Agreement, including (i) the preparation and filing of the Registration Statement, including any fees required by the Commission, and the printing or electronic delivery of the Prospectus as originally filed and of each amendment and supplement thereto, in such number as the Agent shall reasonably deem necessary, (ii) the printing and delivery to the Agent of this Agreement and such other documents as may be required in connection with the offering, purchase, sale, issuance or delivery of the Placement Shares, (iii) the preparation, issuance and delivery of the certificates, if any, for the Placement Shares to the Agent, including any stock or other transfer taxes and any capital duties, stamp duties or other duties or taxes payable upon the sale, issuance or delivery of the Placement Shares to the Agent, (iv) the fees and disbursements of the counsel, accountants and other advisors to the Company, (v) the reasonable and documented fees and disbursements of the counsel to the Agent, payable upon the execution of this Agreement, in an amount not to exceed \$50,000, (vi) the qualification or exemption of the Placement Shares under state securities laws in accordance with the provisions of Section 7(r) hereof, including filing fees, but excluding fees of the Agent's counsel, (vii) the printing and delivery to the Agent of copies of any Permitted Issuer Free Writing Prospectus and the Prospectus and any amendments or supplements thereto in such number as the Agent shall reasonably deem necessary, (viii) the preparation, printing and delivery to the Agent of copies of the blue sky survey, (ix) the fees and expenses of the transfer agent and registrar for the Common Stock, (x) the filing and other fees incident to any review by FINRA of the terms of the sale of the Placement Shares including the fees of the Agent's counsel (subject to the cap, set forth in clause (v) above), and (xi) the fees and expenses incurred in connection with the listing of the Placement Shares on the Exchange.

9. Representations and Covenants of Agent. The Agent represents and warrants that it is duly registered as a broker-dealer under FINRA, the Exchange Act and the applicable statutes and regulations of each state in which the Placement Shares will be offered and sold, except such states in which Agent is exempt from registration or such registration is not otherwise required. Agent shall continue, for the term of this Agreement, to be duly registered as a broker-dealer under FINRA, the Exchange Act and the applicable statutes and regulations of each state in which the Placement Shares will be offered and sold, except such states in which Agent is exempt from registration or such registration is not otherwise required, during the term of this Agreement. The Agent shall comply in all material respects with all applicable laws and regulations in connection with the Placement Shares, including, but not limited to, Regulation M.

10. Conditions to Agent's Obligations. The obligations of the Agent hereunder with respect to a Placement will be subject to the continuing accuracy and completeness of the representations and warranties made by the Company herein, to the due performance by the Company of its obligations hereunder, to the completion by the Agent of a due diligence review satisfactory to it in its reasonable judgment, and to the continuing satisfaction (or waiver by the Agent in its sole discretion) of the following additional conditions:

(a) Registration Statement Effective. The Registration Statement shall have become effective and shall be available for the (i) resale of all Placement Shares issued to the Agent and not yet sold by the Agent and (ii) sale of all Placement Shares contemplated to be issued by any Placement Notice.

(b) No Material Notices. None of the following events shall have occurred and be continuing: (i) receipt by the Company of any request for additional information from the Commission or any other federal or state Governmental Authority during the period of effectiveness of the Registration Statement, the response to which would require any post-effective amendments or supplements to the Registration Statement or the Prospectus if such post-effective amendments or supplements have not been made and become effective; (ii) the issuance by the Commission or any other federal or state Governmental Authority of any stop order suspending the effectiveness of the Registration Statement or the initiation of any proceedings for that purpose; (iii) receipt by the Company of any notification with respect to the suspension of the qualification or exemption from qualification of any of the Placement Shares for sale in any jurisdiction or the initiation or threatening of any proceeding for such purpose; or (iv) the occurrence of any event that makes any material statement made in the Registration Statement or the Prospectus or any material document incorporated or deemed to be incorporated therein by reference untrue in any material respect or that requires the making of any changes in the Registration Statement, the Prospectus or material incorporated documents so that, in the case of the Registration Statement, it will not contain an untrue statement of a material fact or omit to state any material fact required to be stated therein or necessary to make the statements therein not misleading and, that in the case of the Prospectus, it will not contain an untrue statement of a material fact or omit to state any material fact required to be stated therein or necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading.

(c) No Misstatement or Material Omission. Agent shall not have advised the Company that the Registration Statement or Prospectus, or any amendment or supplement thereto, contains an untrue statement of fact that in the Agent's reasonable opinion is material, or omits to state a fact that in the Agent's reasonable opinion is material and is required to be stated therein or is necessary to make the statements therein not misleading.

(d) Material Changes. Except as contemplated in the Prospectus, or disclosed in the Company's reports filed with the Commission, there shall not have been any material adverse change in the authorized capital stock of the Company or any Material Adverse Effect or any development that would reasonably be expected to cause a Material Adverse Effect, or a downgrading in or withdrawal of the rating assigned to any of the Company's securities (other than asset backed securities) by any rating organization or a public announcement by any rating organization that it has under surveillance or review its rating of any of the Company's securities (other than asset backed securities), the effect of which, in the case of any such action by a rating organization described above, in the reasonable judgment of the Agent (without relieving the Company of any obligation or liability it may otherwise have), is so material as to make it impracticable or inadvisable to proceed with the offering of the Placement Shares on the terms and in the manner contemplated in the Prospectus.

(e) Legal Opinion. The Agent shall have received the opinion of Company Counsel required to be delivered pursuant to Section 7(m) on or before the date on which such delivery of such opinion is required pursuant to Section 7(m).

(f) Comfort Letter. The Agent shall have received the Comfort Letter required to be delivered pursuant to Section 7(n) on or before the date on which such delivery of such Comfort Letter is required pursuant to Section 7(n).

(g) Representation Certificate. The Agent shall have received the certificate required to be delivered pursuant to Section 7(l) on or before the date on which delivery of such certificate is required pursuant to Section 7(l).

(h) No Suspension. Trading in the Common Stock shall not have been suspended on the Exchange and the Common Stock shall not have been delisted from the Exchange.

(i) Other Materials. On each date on which the Company is required to deliver a certificate pursuant to Section 7(l), the Company shall have furnished to the Agent, upon the Agent's request, such appropriate further opinions, certificates, letters and other documents as the Agent may reasonably request and which are customarily furnished by an issuer of securities in connection with a securities offering. All such opinions, certificates, letters and other documents will be in compliance with the provisions hereof.

(j) Securities Act Filings Made. All filings with the Commission required by Rule 424 with respect to the Placement Shares under the Securities Act to have been filed prior to the issuance of any Placement Notice hereunder shall have been made within the applicable time period prescribed for such filing by Rule 424.

(k) Approval for Listing. The Placement Shares shall either have been (i) approved for listing on the Exchange, subject only to notice of issuance, or (ii) the Company shall have filed an application for listing of the Placement Shares on the Exchange at, or prior to, the issuance of any Placement Notice and the Exchange shall have reviewed such application and not provided any objections thereto.

(l) FINRA. If applicable, FINRA shall have raised no objection to the terms of this offering and the amount of compensation allowable or payable to the Agent as described in the Prospectus.

(m) No Termination Event. There shall not have occurred any event that would permit the Agent to terminate this Agreement pursuant to Section 13(a).

11. Indemnification and Contribution.

(a) Company Indemnification. The Company agrees to indemnify and hold harmless the Agent, its affiliates and their respective partners, members, directors, officers, employees and agents and each person, if any, who controls the Agent or any affiliate within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act as follows:

(i) against any and all loss, liability, claim, damage and expense whatsoever, as incurred, joint or several, arising out of or based upon any untrue statement or alleged untrue statement of a material fact contained in the Registration Statement (or any amendment thereto), or the omission or alleged omission therefrom of a material fact required to

be stated therein or necessary to make the statements therein not misleading, or arising out of any untrue statement or alleged untrue statement of a material fact included in any related Issuer Free Writing Prospectus or the Prospectus (or any amendment or supplement thereto), or the omission or alleged omission therefrom of a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading;

(ii) against any and all loss, liability, claim, damage and expense whatsoever, as incurred, joint or several, to the extent of the aggregate amount paid in settlement of any litigation, or any investigation or proceeding by any governmental agency or body, commenced or threatened, or of any claim whatsoever based upon any such untrue statement or omission, or any such alleged untrue statement or omission; provided that any such settlement is effected with the written consent of the Company, which consent shall not unreasonably be delayed or withheld; and

(iii) against any and all expense whatsoever, as incurred (including the fees and disbursements of counsel), reasonably incurred in investigating, preparing or defending against any litigation, or any investigation or proceeding by any governmental agency or body, commenced or threatened, or any claim whatsoever based upon any such untrue statement or omission, or any such alleged untrue statement or omission (whether or not a party), to the extent that any such expense is not paid under (i) or (ii) above,

provided, however, that this indemnity agreement shall not apply to any loss, liability, claim, damage or expense to the extent arising out of any untrue statement or omission or alleged untrue statement or omission made solely in reliance upon and in conformity with the Agent Information (as defined below).

(b) Agent Indemnification. Agent agrees to indemnify and hold harmless the Company and its directors and each officer of the Company who signed the Registration Statement, and each person, if any, who controls the Company within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act against any and all loss, liability, claim, damage and expense described in the indemnity contained in Section 11(a), as incurred, but only with respect to untrue statements or omissions, or alleged untrue statements or omissions, made in the Registration Statement (or any amendments thereto), the Prospectus (or any amendment or supplement thereto) or any Issuer Free Writing Prospectus (or any amendment or supplement thereto) in reliance upon and in conformity with information relating to the Agent and furnished to the Company in writing by the Agent expressly for use therein. The Company hereby acknowledges that the only information that the Agent has furnished to the Company expressly for use in the Registration Statement, the Prospectus or any Issuer Free Writing Prospectus (or any amendment or supplement thereto) are the statements set forth in the seventh and eighth paragraphs under the caption “Plan of Distribution” in the Prospectus (the “Agent Information”).

(c) Procedure. Any party that proposes to assert the right to be indemnified under this Section 11 will, promptly after receipt of notice of commencement of any action against such party in respect of which a claim is to be made against an indemnifying party or parties under this Section 11, notify each such indemnifying party of the commencement of such action, enclosing a copy of all papers served, but the omission so to notify such indemnifying party will not relieve the indemnifying party from (i) any liability that it might have to any

indemnified party otherwise than under this Section 11 and (ii) any liability that it may have to any indemnified party under the foregoing provision of this Section 11 unless, and only to the extent that, such omission results in the forfeiture of substantive rights or defenses by the indemnifying party. If any such action is brought against any indemnified party and it notifies the indemnifying party of its commencement, the indemnifying party will be entitled to participate in and, to the extent that it elects by delivering written notice to the indemnified party promptly after receiving notice of the commencement of the action from the indemnified party, jointly with any other indemnifying party similarly notified, to assume the defense of the action, with counsel reasonably satisfactory to the indemnified party, and after notice from the indemnifying party to the indemnified party of its election to assume the defense, the indemnifying party will not be liable to the indemnified party for any other legal expenses except as provided below and except for the reasonable costs of investigation subsequently incurred by the indemnified party in connection with the defense. The indemnified party will have the right to employ its own counsel in any such action, but the fees, expenses and other charges of such counsel will be at the expense of such indemnified party unless (1) the employment of counsel by the indemnified party has been authorized in writing by the indemnifying party, (2) the indemnified party has reasonably concluded (based on advice of counsel) that there may be legal defenses available to it or other indemnified parties that are different from or in addition to those available to the indemnifying party, (3) a conflict or potential conflict exists (based on advice of counsel to the indemnified party) between the indemnified party and the indemnifying party (in which case the indemnifying party will not have the right to direct the defense of such action on behalf of the indemnified party) or (4) the indemnifying party has not in fact employed counsel to assume the defense of such action or counsel reasonably satisfactory to the indemnified party, in each case, within a reasonable time after receiving notice of the commencement of the action, in each of which cases the reasonable fees, disbursements and other charges of counsel will be at the expense of the indemnifying party or parties. It is understood that the indemnifying party or parties shall not, in connection with any proceeding or related proceedings in the same jurisdiction, be liable for the reasonable fees, disbursements and other charges of more than one separate firm (plus local counsel) admitted to practice in such jurisdiction at any one time for all such indemnified party or parties. All such fees, disbursements and other charges will be reimbursed by the indemnifying party after the indemnifying party receives a written notice relating to the fees, disbursements and other charges in reasonable detail. An indemnifying party will not, in any event, be liable for any settlement of any action or claim effected without its written consent. No indemnifying party shall, without the prior written consent of each indemnified party, settle or compromise or consent to the entry of any judgment in any pending or threatened claim, action or proceeding relating to the matters contemplated by this Section 11 (whether or not any indemnified party is a party thereto), unless such settlement, compromise or consent (1) includes an express and unconditional release of each indemnified party, in form and substance reasonably satisfactory to such indemnified party, from all liability arising out of such litigation, investigation, proceeding or claim and (2) does not include a statement as to or an admission of fault, culpability or a failure to act by or on behalf of any indemnified party.

(d) Contribution. In order to provide for just and equitable contribution in circumstances in which the indemnification provided for in the foregoing paragraphs of this Section 11 is applicable in accordance with its terms but for any reason is held to be unavailable from the Company or the Agent, the Company and the Agent will contribute to the total losses, claims, liabilities, expenses and damages (including any investigative, legal and other expenses

reasonably incurred in connection with, and any amount paid in settlement of, any action, suit or proceeding or any claim asserted) to which the Company and the Agent may be subject in such proportion as shall be appropriate to reflect the relative benefits received by the Company on the one hand and the Agent on the other hand. The relative benefits received by the Company on the one hand and the Agent on the other hand shall be deemed to be in the same proportion as the total net proceeds from the sale of the Placement Shares (before deducting expenses) received by the Company bear to the total compensation received by the Agent (before deducting expenses) from the sale of Placement Shares on behalf of the Company. If, but only if, the allocation provided by the foregoing sentence is not permitted by applicable law, the allocation of contribution shall be made in such proportion as is appropriate to reflect not only the relative benefits referred to in the foregoing sentence but also the relative fault of the Company, on the one hand, and the Agent, on the other hand, with respect to the statements or omission that resulted in such loss, claim, liability, expense or damage, or action in respect thereof, as well as any other relevant equitable considerations with respect to such offering. Such relative fault shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or omission or alleged omission to state a material fact relates to information supplied by the Company or the Agent, the intent of the parties and their relative knowledge, access to information and opportunity to correct or prevent such statement or omission. The Company and the Agent agree that it would not be just and equitable if contributions pursuant to this Section 11(d) were to be determined by pro rata allocation or by any other method of allocation that does not take into account the equitable considerations referred to herein. The amount paid or payable by an indemnified party as a result of the loss, claim, liability, expense, or damage, or action in respect thereof, referred to above in this Section 11(d) shall be deemed to include, for the purpose of this Section 11(d), any legal or other expenses reasonably incurred by such indemnified party in connection with investigating or defending any such action or claim to the extent consistent with Section 11(c) hereof. Notwithstanding the foregoing provisions of this Section 11(d), the Agent shall not be required to contribute any amount in excess of the commissions received by it under this Agreement and no person found 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. For purposes of this Section 11(d), any person who controls a party to this Agreement within the meaning of the Securities Act, any affiliates of the Agent and any officers, directors, partners, employees or agents of the Agent or any of its affiliates, will have the same rights to contribution as that party, and each director of the Company and each officer of the Company who signed the Registration Statement will have the same rights to contribution as the Company, subject in each case to the provisions hereof. Any party entitled to contribution, promptly after receipt of notice of commencement of any action against such party in respect of which a claim for contribution may be made under this Section 11(d), will notify any such party or parties from whom contribution may be sought, but the omission to so notify will not relieve that party or parties from whom contribution may be sought from any other obligation it or they may have under this Section 11(d) except to the extent that the failure to so notify such other party materially prejudiced the substantive rights or defenses of the party from whom contribution is sought. Except for a settlement entered into pursuant to the last sentence of Section 11(c) hereof, no party will be liable for contribution with respect to any action or claim settled without its written consent if such consent is required pursuant to Section 11(c) hereof.

12. Representations and Agreements to Survive Delivery. The indemnity and contribution agreements contained in Section 11 of this Agreement and all representations and warranties of the Company herein or in certificates delivered pursuant hereto shall survive, as of their respective dates, regardless of (i) any investigation made by or on behalf of the Agent, any controlling persons, or the Company (or any of their respective officers, directors, employees or controlling persons), (ii) delivery and acceptance of the Placement Shares and payment therefor or (iii) any termination of this Agreement.

13. Termination.

(a) The Agent may terminate this Agreement, by notice to the Company, as hereinafter specified at any time (1) if there has been, since the time of execution of this Agreement or since the date as of which information is given in the Prospectus, any change, or any development or event involving a prospective change, in the condition, financial or otherwise, or in the business, properties, earnings, results of operations or prospects of the Company, whether or not arising in the ordinary course of business, which individually or in the aggregate, in the sole judgment of the Agent is material and adverse and makes it impractical or inadvisable to market the Placement Shares or to enforce contracts for the sale of the Placement Shares, (2) if there has occurred any material adverse change in the financial markets in the United States or the international financial markets, any outbreak of hostilities or escalation thereof or other calamity or crisis or any change or development involving a prospective change in national or international political, financial or economic conditions, in each case the effect of which is such as to make it, in the judgment of the Agent, impracticable or inadvisable to market the Placement Shares or to enforce contracts for the sale of the Placement Shares, (3) if trading in the Common Stock has been suspended or limited by the Commission or the Exchange, or if trading generally on the Exchange has been suspended or limited, or minimum prices for trading have been fixed on the Exchange, (4) if any suspension of trading of any securities of the Company on any exchange or in the over-the-counter market shall have occurred and be continuing, (5) if a major disruption of securities settlements or clearance services in the United States shall have occurred and be continuing, or (6) if a banking moratorium has been declared by either U.S. Federal or New York authorities. Any such termination shall be without liability of any party to any other party except that the provisions of Section 8 (Payment of Expenses), Section 11 (Indemnification and Contribution), Section 12 (Representations and Agreements to Survive Delivery), Section 18 (Governing Law and Time; Waiver of Jury Trial) and Section 19 (Consent to Jurisdiction) hereof shall remain in full force and effect notwithstanding such termination. If the Agent elects to terminate this Agreement as provided in this Section 13(a), the Agent shall provide the required notice as specified in Section 14 (Notices).

(b) The Company shall have the right, by giving ten (10) days notice as hereinafter specified to terminate this Agreement in its sole discretion at any time after the date of this Agreement. Any such termination shall be without liability of any party to any other party except that the provisions of Section 8, Section 11, Section 12, Section 18 and Section 19 hereof shall remain in full force and effect notwithstanding such termination.

(c) The Agent shall have the right, by giving ten (10) days notice as hereinafter specified to terminate this Agreement in its sole discretion at any time after the date of this Agreement. Any such termination shall be without liability of any party to any other party except that the provisions of Section 8, Section 11, Section 12, Section 18 and Section 19 hereof shall remain in full force and effect notwithstanding such termination.

(d) Unless earlier terminated pursuant to this Section 13, this Agreement shall automatically terminate upon the issuance and sale of all of the Placement Shares through the Agent on the terms and subject to the conditions set forth herein; provided that the provisions of Section 8, Section 11, Section 12, Section 18 and Section 19 hereof shall remain in full force and effect notwithstanding such termination.

(e) This Agreement shall remain in full force and effect unless terminated pursuant to Sections 13(a), (b) or (c) above or otherwise by mutual agreement of the parties; provided, however, that any such termination by mutual agreement shall in all cases be deemed to provide that Section 8, Section 11, Section 12, Section 18 and Section 19 shall remain in full force and effect.

(f) Any termination of this Agreement shall be effective on the date specified in such notice of termination; provided, however, that such termination shall not be effective until the close of business on the date of receipt of such notice by the Agent or the Company, as the case may be. If such termination shall occur prior to the Settlement Date for any sale of Placement Shares, such Placement Shares shall settle in accordance with the provisions of this Agreement.

14. Notices. All notices or other communications required or permitted to be given by any party to any other party pursuant to the terms of this Agreement shall be in writing, unless otherwise specified, and if sent to the Agent, shall be delivered to:

Cantor Fitzgerald & Co.
499 Park Avenue
New York, NY 10022
Attention: Capital Markets/Jeffrey Lumby
Facsimile: (212) 307-3730

and:

Cantor Fitzgerald & Co.
499 Park Avenue
New York, NY 10022
Attention: General Counsel
Facsimile: (212) 829-4708

with a copy to:

Cooley LLP
1114 Avenue of the Americas
New York, NY 10036
Attention: Daniel I. Goldberg, Esq.
Facsimile: (212) 479-6275

and if to the Company, shall be delivered to:

Achillion Pharmaceuticals, Inc.
300 George Street
New Haven, CT 06511
Attention: Mary Kay Fenton, Executive Vice President and Chief Financial Officer
Facsimile: (203) 624-7003

with a copy to:

Wilmer Cutler Pickering Hale and Dorr LLP
60 State Street
Boston, MA 02109
Attention: Steven D. Singer, Esq.
Cynthia T. Mazareas, Esq.
Facsimile: (617) 526-5000

Each party to this Agreement may change such address for notices by sending to the parties to this Agreement written notice of a new address for such purpose. Each such notice or other communication shall be deemed given (i) when delivered personally or by verifiable facsimile transmission (with an original to follow) on or before 4:30 p.m., New York City time, on a Business Day or, if such day is not a Business Day, on the next succeeding Business Day, (ii) on the next Business Day after timely delivery to a nationally-recognized overnight courier and (iii) on the Business Day actually received if deposited in the U.S. mail (certified or registered mail, return receipt requested, postage prepaid). For purposes of this Agreement, “**Business Day**” shall mean any day on which the Exchange and commercial banks in the City of New York are open for business.

An electronic communication (“**Electronic Notice**”) shall be deemed written notice for purposes of this Section 14 if sent to the electronic mail address specified by the receiving party under separate cover. Electronic Notice shall be deemed received at the time the party sending Electronic Notice receives verification of receipt by the receiving party. Any party receiving Electronic Notice may request and shall be entitled to receive the notice on paper, in a nonelectronic form (“**Nonelectronic Notice**”) which shall be sent to the requesting party within ten (10) days of receipt of the written request for Nonelectronic Notice.

15. Successors and Assigns. This Agreement shall inure to the benefit of and be binding upon the Company and the Agent and their respective successors and the affiliates, controlling persons, officers, employees, agents and directors referred to in Section 11 hereof.

References to any of the parties contained in this Agreement shall be deemed to include the successors and permitted assigns of such party. 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 assigns any rights, remedies, obligations or liabilities under or by reason of this Agreement, except as expressly provided in this Agreement. Neither party may assign its rights or obligations under this Agreement without the prior written consent of the other party; provided, however, that, without obtaining the Company's consent, the Agent may assign its rights and obligations hereunder to an affiliate thereof so long as such affiliate is a registered broker-dealer.

16. Adjustments for Stock Splits. The parties acknowledge and agree that all share-related numbers contained in this Agreement shall be adjusted to take into account any share consolidation, stock split, stock dividend or similar event effected with respect to the Placement Shares.

17. Entire Agreement; Amendment; Severability; Waiver. This Agreement (including all schedules and exhibits attached hereto and Placement Notices issued pursuant hereto) constitutes the entire agreement and supersedes all other prior and contemporaneous agreements and undertakings, both written and oral, among the parties hereto with regard to the subject matter hereof. Neither this Agreement nor any term hereof may be amended except pursuant to a written instrument executed by the Company and the Agent. In the event that any one or more of the provisions contained herein, or the application thereof in any circumstance, is held invalid, illegal or unenforceable as written by a court of competent jurisdiction, then such provision shall be given full force and effect to the fullest possible extent that it is valid, legal and enforceable, and the remainder of the terms and provisions herein shall be construed as if such invalid, illegal or unenforceable term or provision was not contained herein, but only to the extent that giving effect to such provision and the remainder of the terms and provisions hereof shall be in accordance with the intent of the parties as reflected in this Agreement. No implied waiver by a party shall arise in the absence of a waiver in writing signed by such party. No failure or delay in exercising any right, power, or privilege hereunder shall operate as a waiver thereof, nor shall any single or partial exercise thereof preclude any other or further exercise thereof or the exercise of any right, power, or privilege hereunder.

18. **GOVERNING LAW AND TIME; WAIVER OF JURY TRIAL**. **THIS AGREEMENT SHALL BE GOVERNED BY AND CONSTRUED IN ACCORDANCE WITH THE LAWS OF THE STATE OF NEW YORK WITHOUT REGARD TO THE PRINCIPLES OF CONFLICTS OF LAWS. SPECIFIED TIMES OF DAY REFER TO NEW YORK CITY TIME. EACH PARTY HEREBY IRREVOCABLY WAIVES, TO THE FULLEST EXTENT PERMITTED BY APPLICABLE LAW, ANY AND ALL RIGHT TO TRIAL BY JURY IN ANY LEGAL PROCEEDING ARISING OUT OF OR RELATING TO THIS AGREEMENT OR THE TRANSACTIONS CONTEMPLATED HEREBY.**

19. **CONSENT TO JURISDICTION**. **EACH PARTY HEREBY IRREVOCABLY SUBMITS TO THE EXCLUSIVE JURISDICTION OF THE STATE AND FEDERAL COURTS SITTING IN THE CITY OF NEW YORK, BOROUGH OF MANHATTAN, FOR THE ADJUDICATION OF ANY DISPUTE HEREUNDER OR IN CONNECTION WITH ANY TRANSACTION CONTEMPLATED HEREBY, AND**

HEREBY IRREVOCABLY WAIVES, AND AGREES NOT TO ASSERT IN ANY SUIT, ACTION OR PROCEEDING, ANY CLAIM THAT IT IS NOT PERSONALLY SUBJECT TO THE JURISDICTION OF ANY SUCH COURT, THAT SUCH SUIT, ACTION OR PROCEEDING IS BROUGHT IN AN INCONVENIENT FORUM OR THAT THE VENUE OF SUCH SUIT, ACTION OR PROCEEDING IS IMPROPER. EACH PARTY HEREBY IRREVOCABLY WAIVES PERSONAL SERVICE OF PROCESS AND CONSENTS TO PROCESS BEING SERVED IN ANY SUCH SUIT, ACTION OR PROCEEDING BY MAILING A COPY THEREOF (CERTIFIED OR REGISTERED MAIL, RETURN RECEIPT REQUESTED) TO SUCH PARTY AT THE ADDRESS IN EFFECT FOR NOTICES TO IT UNDER THIS AGREEMENT AND AGREES THAT SUCH SERVICE SHALL CONSTITUTE GOOD AND SUFFICIENT SERVICE OF PROCESS AND NOTICE THEREOF. NOTHING CONTAINED HEREIN SHALL BE DEEMED TO LIMIT IN ANY WAY ANY RIGHT TO SERVE PROCESS IN ANY MANNER PERMITTED BY LAW.

20. Counterparts. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Delivery of an executed Agreement by one party to the other may be made by facsimile or electronic transmission.

21. Construction.

- (a) The section and exhibit headings herein are for convenience only and shall not affect the construction hereof.
- (b) Words defined in the singular shall have a comparable meaning when used in the plural, and vice versa;
- (c) The words “hereof,” “hereto,” “herein” and “hereunder” and words of similar import, when used in this Agreement, shall refer to this Agreement as a whole and not to any particular provision of this Agreement;
- (d) wherever the word “include,” “includes” or “including” is used in this Agreement, it shall be deemed to be followed by the words “without limitation”;
- (e) references herein to any gender shall include each other gender;
- (f) references herein to any law, statute, ordinance, code, regulation, rule or other requirement of any Governmental Authority shall be deemed to refer to such law, statute, ordinance, code, regulation, rule or other requirement of any Governmental Authority as amended, reenacted, supplemented or superseded in whole or in part and in effect from time to time and also to all rules and regulations promulgated thereunder; and
- (g) if the last day for the giving of any notice or the performance of any act required or permitted under this Agreement is a day that is not a Trading Day, then the time for the giving of such notice or the performance of such action shall be extended to the next succeeding Trading Day.

22. Permitted Free Writing Prospectuses. The Company represents, warrants and agrees that, unless it obtains the prior written consent of the Agent, which consent shall not be unreasonably withheld, conditioned or delayed, and the Agent represents, warrants and agrees that, unless it obtains the prior written consent of the Company, which consent shall not be unreasonably withheld, conditioned or delayed, it has not made and will not make any offer relating to the Placement Shares that would constitute an Issuer Free Writing Prospectus, or that would otherwise constitute a “free writing prospectus,” as defined in Rule 405, required to be filed with the Commission. Any such free writing prospectus consented to by the Agent or by the Company, as the case may be, is hereinafter referred to as a “Permitted Free Writing Prospectus.” The Company represents and warrants that it has treated and agrees that it will treat each Permitted Free Writing Prospectus as an “issuer free writing prospectus,” as defined in Rule 433, and has complied and will comply with the requirements of Rule 433 applicable to any Permitted Free Writing Prospectus, including timely filing with the Commission where required, legending and record keeping. For the purposes of clarity, the parties hereto agree that all free writing prospectuses, if any, listed in Exhibit 22 hereto are Permitted Free Writing Prospectuses.

23. Absence of Fiduciary Relationship. The Company acknowledges and agrees that:

(a) the Agent is acting solely as agent in connection with the public offering of the Placement Shares and in connection with each transaction contemplated by this Agreement and the process leading to such transactions, and no fiduciary or advisory relationship between the Company or any of its respective affiliates, stockholders (or other equity holders), creditors or employees or any other party, on the one hand, and the Agent, on the other hand, has been or will be created in respect of any of the transactions contemplated by this Agreement, irrespective of whether or not the Agent has advised or is advising the Company on other matters, and the Agent has no obligation to the Company with respect to the transactions contemplated by this Agreement except the obligations expressly set forth in this Agreement;

(b) it is capable of evaluating and understanding, and understands and accepts, the terms, risks and conditions of the transactions contemplated by this Agreement;

(c) neither the Agent nor its affiliates have provided any legal, accounting, regulatory or tax advice with respect to the transactions contemplated by this Agreement and it has consulted its own legal, accounting, regulatory and tax advisors to the extent it has deemed appropriate;

(d) it is aware that the Agent and its affiliates are engaged in a broad range of transactions which may involve interests that differ from those of the Company and the Agent and its affiliates have no obligation to disclose such interests and transactions to the Company by virtue of any fiduciary, advisory or agency relationship or otherwise; and

(e) it waives, to the fullest extent permitted by law, any claims it may have against the Agent or its affiliates for breach of fiduciary duty or alleged breach of fiduciary duty in connection with the sale of Placement Shares under this Agreement and agrees that the Agent and its affiliates shall not have any liability (whether direct or indirect, in contract, tort or otherwise) to it in respect of such a fiduciary duty claim or to any person asserting a fiduciary duty claim on its behalf or in right of it or the Company, employees or creditors of Company, other than in respect of the Agent’s obligations under this Agreement.

24. Definitions.

As used in this Agreement, the following terms have the respective meanings set forth below:

“**Applicable Time**” means (i) each Representation Date, (ii) the time of each sale of any Placement Shares pursuant to this Agreement and (iii) each Settlement Date.

“**Governmental Authority**” means (i) any federal, provincial, state, local, municipal, national or international government or governmental authority, regulatory or administrative agency, governmental commission, department, board, bureau, agency or instrumentality, court, tribunal, arbitrator or arbitral body (public or private); (ii) any self-regulatory organization; or (iii) any political subdivision of any of the foregoing.

“**Issuer Free Writing Prospectus**” means any “issuer free writing prospectus,” as defined in Rule 433, relating to the Placement Shares that (1) is required to be filed with the Commission by the Company, (2) is a “road show” that is a “written communication” within the meaning of Rule 433(d)(8)(i) whether or not required to be filed with the Commission, or (3) is exempt from filing pursuant to Rule 433(d)(5)(i) because it contains a description of the Placement Shares or of the offering that does not reflect the final terms, in each case in the form filed or required to be filed with the Commission or, if not required to be filed, in the form retained in the Company’s records pursuant to Rule 433(g) under the Securities Act.

“**Rule 164**,” “**Rule 172**,” “**Rule 405**,” “**Rule 415**,” “**Rule 424**,” “**Rule 424(b)**,” “**Rule 430B**,” and “**Rule 433**” refer to such rules under the Securities Act.

All references in this Agreement to financial statements and schedules and other information that is “contained,” “included” or “stated” in the Registration Statement or the Prospectus (and all other references of like import) shall be deemed to mean and include all such financial statements and schedules and other information that is incorporated by reference in the Registration Statement or the Prospectus, as the case may be.

All references in this Agreement to the Registration Statement, the Prospectus or any amendment or supplement to any of the foregoing shall be deemed to include the copy filed with the Commission pursuant to EDGAR; all references in this Agreement to any Issuer Free Writing Prospectus (other than any Issuer Free Writing Prospectuses that, pursuant to Rule 433, are not required to be filed with the Commission) shall be deemed to include the copy thereof filed with the Commission pursuant to EDGAR; and all references in this Agreement to “supplements” to the Prospectus shall include, without limitation, any supplements, “wrappers” or similar materials prepared in connection with any offering, sale or private placement of any Placement Shares by the Agent outside of the United States.

[*Signature Page Follows*]

If the foregoing correctly sets forth the understanding between the Company and the Agent, please so indicate in the space provided below for that purpose, whereupon this letter shall constitute a binding agreement between the Company and the Agent.

Very truly yours,

ACHILLION PHARMACEUTICALS, INC.

By: /s/ Mary Kay Fenton

Name: Mary Kay Fenton

Title: Executive Vice Present and Chief Financial Officer

ACCEPTED as of the date first-above written:

CANTOR FITZGERALD & CO.

By: /s/ Jeffrey Lumby

Name: Jeffrey Lumby

Title: Senior Managing Director

SCHEDULE 1

Form of Placement Notice

From: Achillion Pharmaceuticals, Inc.

To: Cantor Fitzgerald & Co.
Attention: [●]

Subject: Placement Notice

Date: [●], 201[7]

Ladies and Gentlemen:

Pursuant to the terms and subject to the conditions contained in the Sales Agreement between Achillion Pharmaceuticals, Inc., a Delaware corporation (the “Company”), and Cantor Fitzgerald & Co. (“Agent”), dated February 23, 2017, the Company hereby requests that the Agent sell up to [●] of the Company’s common stock, par value \$0.001 per share, at a minimum market price of \$[●] per share, during the time period beginning [month, day, time] and ending [month, day, time].

SCHEDULE 2

Compensation

The Company shall pay to the Agent in cash, upon each sale of Placement Shares pursuant to this Agreement, an amount equal to 3.0% of the aggregate gross proceeds from each sale of Placement Shares.

SCHEDULE 3

Notice Parties

The Company

Milind Deshpande

Mary Kay Fenton

The Agent

Jeffrey Lumby (jlumby@cantor.com)

Joshua Feldman (jfeldman@cantor.com)

Sameer Vasudev (svasudev@cantor.com)

With copies to:

CFControlledEquityOffering@cantor.com

SCHEDULE 4

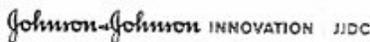
Subsidiaries

None.

Exhibit 22

Permitted Free Writing Prospectus

None.



February 23, 2017

Ladies and Gentlemen:

The undersigned, Johnson & Johnson Innovation-JJDC, Inc. (the “Investor”), understands that Achillion Pharmaceuticals, Inc. (the “Company”) plans to file a shelf registration statement on Form S-3 (the “Shelf Registration Statement”) with the U.S. Securities and Exchange Commission (the “SEC”). The Shelf Registration Statement is contemplated to register (a) certain equity securities of the Company having an aggregate value of up to \$250.0 million, including up to \$75.0 million (the “ATM Company Securities”) of shares of common stock, par value \$0.001 per share (“Common Stock”), of the Company that may be sold by the Company through Cantor Fitzgerald & Co. (“Cantor”), as agent, from time to time, in sales deemed to be an “at-the-market offering,” pursuant to that certain Controlled Equity Offering SM Sales Agreement dated February 23, 2017 by and between the Company and Cantor and (b) certain equity securities of the Company held by the Investor, which the Company has agreed to register with the SEC pursuant to that certain Investor Agreement, dated as of July 1, 2015, by and between the Investor and the Company (the “Investor Agreement”). Capitalized terms used herein without definition shall have the respective meanings ascribed to them in Investor Agreement.

Now, therefore, in consideration of the premises and mutual agreements hereinafter set forth, and for other valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto agree as follows:

1. The Investor agrees that from the date hereof until the earlier of (i) January 31, 2018, or (ii) such date that is 60 days after the first public announcement of top-line clinical results from Janssen Pharmaceuticals, Inc.’s on-going OMEGA-1 phase 2b clinical trial, without the prior approval of the Company, the Investor shall not, and shall cause its Affiliates not to, Dispose of (x) any of the Purchased Shares, together with any shares of Common Stock issued in respect thereof as a result of any stock split, stock dividend, share exchange, merger, consolidation or similar recapitalization, and (y) any Common Stock issued as (or issuable upon the exercise of any warrant, right or other security that is issued as) a dividend or other distribution with respect to, or in exchange or in replacement of, the shares of Common Stock described in clause (x) of this sentence (collectively, the “Lock-Up Securities”); provided, however, that the foregoing shall not prohibit the Investor from transferring Lock-Up Securities to a Permitted Transferee.

2. Notwithstanding any other provision herein, this letter agreement shall not prohibit or restrict any Disposition of Shares of Then Outstanding Common Stock and/or Common Stock Equivalents by the Investor or its Affiliates (a) into a tender offer by a Third Party which is not opposed by the Company’s Board of Directors (but only after the Company’s filing of a Schedule 14D-9, or any amendment thereto, with the SEC disclosing the recommendation of the Company’s Board of Directors with respect to such tender offer), (b) into an issuer tender offer by the Company, or (c) except as provided in Section 3 below, in any underwritten public offering of shares of Common Stock that includes Common Stock sold by the Company.

3. The Investor hereby agrees (a) to relinquish and waive any and all piggyback rights under Section 2 of the Investor Agreement in connection with any offering or sale of ATM Company Securities made under the Shelf Registration Statement and (b) to waive any and all notice requirements under the Investor Agreement in connection with any offering or sale of ATM Company Securities made under the Shelf Registration Statement.

4. Notwithstanding anything contained herein to the contrary, the Company and Investor hereby agree that this letter agreement and all related restrictions shall terminate if (a) the Company does not file the Shelf Registration Statement with the SEC by March 31, 2017, (b) the Company withdraws the Shelf Registration Statement, or (c) the Company fails to use commercially reasonable efforts to cause the Shelf Registration Statement to be declared effective by the SEC.

5. This letter agreement may be executed in counterparts, each of which shall be deemed an original but which together shall constitute one and the same instrument.

6. This letter agreement shall be governed by and construed in accordance with the Laws of the State of Delaware, without regard to the conflict of laws principles thereof that would require the application of the Law of any other jurisdiction.

[Remainder of this page intentionally left blank]

IN WITNESS WHEREOF, each of the parties have executed this letter agreement as of the date first above written.

Very truly yours,

ACHILLION PHARMACEUTICALS, INC.

By: /s/ Milind S. Deshpande

Name: Milind S. Deshpande

Title: President and Chief Executive Officer

Accepted as of the date hereof:

JOHNSON & JOHNSON INNOVATION-JJDC, INC.

By: /s/ Steven M. Rosenberg

Name: Steven M. Rosenberg

Title: Secretary

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (Nos. 333-206276, 333-183152, 333-168902, 333-158241, 333-149729, 333-141661 and 333-138984) and Form S-3 (No. 333-194410) of Achillion Pharmaceuticals, Inc. of our report dated February 23, 2017 relating to the financial statements and the effectiveness of internal control over financial reporting, which appears in this Form 10-K.

/s/ PricewaterhouseCoopers LLP

Hartford, Connecticut
February 23, 2017

**Certification of Chief Executive Officer pursuant to Exchange Act Rules 13a-14(a)
and 15d-14(a), as adopted pursuant to Section 302 of Sarbanes-Oxley Act of 2002**

I, Milind S. Deshpande, certify that:

1. I have reviewed this Annual Report on Form 10-K of Achillion Pharmaceuticals, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

/s/ MILIND S. DESHPANDE

Milind S. Deshpande
President and Chief Executive Officer

Dated: February 23, 2017

**Certification of Chief Financial Officer pursuant to Exchange Act Rules 13a-14(a)
and 15d-14(a), as adopted pursuant to Section 302 of Sarbanes-Oxley Act of 2002**

I, Mary Kay Fenton certify that:

1. I have reviewed this Annual Report on Form 10-K of Achillion Pharmaceuticals, Inc.;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

/s/ MARY KAY FENTON

Mary Kay Fenton
Chief Financial Officer

Date: February 23, 2017

**CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report on Form 10-K of Achillion Pharmaceuticals, Inc. (the "Company") for the period ended December 31, 2016 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Milind S. Deshpande, President and Chief Executive Officer of the Company, hereby certifies, pursuant to 18 U.S.C. Section 1350 as adopted by Section 906 of the Sarbanes-Oxley Act of 2002, that:

- (1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- (2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 23, 2017

/s/ MILIND S. D ESHPANDE

Milind S. Deshpande
President and Chief Executive Officer

A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.

**CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350, AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report on Form 10-K of Achillion Pharmaceuticals, Inc. (the "Company") for the period ended December 31, 2016 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Mary Kay Fenton, Chief Financial Officer of the Company, hereby certifies, pursuant to 18 U.S.C. Section 1350 as adopted by Section 906 of the Sarbanes-Oxley Act of 2002, that:

- (1) the Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
- (2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 23, 2017

/s/ MARY KAY FENTON

**Mary Kay Fenton
Chief Financial Officer**

A signed original of this written statement required by Section 906 has been provided to the Company and will be retained by the Company and furnished to the Securities and Exchange Commission or its staff upon request.