UNITED STATES
SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Form 10-K

(Mark One)

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2017

OR

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

For the transition period from_____to _____

Commission file number 001-36620

NOVUS THERAPEUTICS, INC.

(Exact name of registrant as specified in its charter)

Delaware **(State or other jurisdiction of incorporation or organization)**	**20-1000967** **(I.R.S. Employer Identification No.)**
19900 MacArthur Boulevard, Suite 550 **Irvine, California** **(Address of principal executive offices)**	**92612** **(Zip code)**

(949) 238-8090

(Registrant's telephone number, including area code)

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

Title of Class	**Name of Exchange on Which Registered**
Common Stock, $0.001 par value	**Nasdaq Capital 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 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, smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

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

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☒

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

As of June 30, 2017, the last business day of the registrant's most recently completed second fiscal quarter, the aggregate market value of the registrant's common stock held by non-affiliates was $40,621,417, based on the last reported sale price of such stock on the Nasdaq Global Market as of such date.

As of March 23, 2018, the registrant had 9,407,024 shares of Common Stock, $0.001 par value per share, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive proxy statement for its 2018 Annual Meeting of Stockholders, which the registrant intends to file pursuant to Regulation 14A with the Securities and Exchange Commission not later than 120 days after the registrant's fiscal year end December 31, 2017, are incorporated by reference into Items 10, 11, 12, 13 and 14 of Part III of this Annual Report on Form 10-K.

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In this Annual Report on Form 10-K, Annual Report, unless the context requires otherwise, "Novus Therapeutics", "Novus", the "Company", the "combined company", "we", "our", and "us" means Otic Pharma, Ltd. prior to the consummation of the Reverse Merger, and Novus Therapeutics, Inc., upon the consummation of the Reverse Merger described herein. The term "Tokai" refers to Tokai Pharmaceuticals, Inc., and its subsidiaries prior to the Reverse Merger.

The market data and certain other statistical information used in this Annual Report are based on independent industry publications, governmental publications, reports by market research firms or other independent sources. Some data are also based on our good faith estimates. Information that is based on estimates, forecasts, projections, market research or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances reflected in this information.

Forward-Looking Statements

This Annual Report on Form 10-K contains forward-looking statements that involve substantial risks and uncertainties. Any statements in this Annual Report on Form 10-K about the company's future expectations, plans and prospects, including statements about its strategy, future operations, development of its product candidates, the review of strategic alternatives and the outcome of such review and other statements containing the words "believes," "anticipates," "plans," "expects," "estimates," "intends," "predicts," "projects," "targets," "could," "may," and similar expressions, constitute forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, although not all forward-looking statements include such identifying words. Forward-looking statements include, but are not limited to statements regarding:

- expectations regarding the timing for the commencement and completion of product development or clinical trials;
- the rate and degree of market acceptance and clinical utility of the company's products;
- the company's commercialization, marketing and manufacturing capabilities and strategy;
- the company's intellectual property position and strategy;
- the company's ability to identify additional products or product candidates with significant commercial potential;
- the company's estimates regarding expenses, future revenue, capital requirements and needs for additional financing;
- developments relating to the company's competitors and industry; and
- the impact of government laws and regulations.

Actual results may differ materially from those indicated by such forward-looking statements as a result of various important factors, including: the ability to develop commercially viable product formulations; the sufficiency of the company's cash resources; the ability to obtain necessary regulatory and ethics approvals to commence additional clinical trials; whether data from early clinical trials will be indicative of the data that will be obtained from future clinical trials; whether the results of clinical trials will warrant submission for regulatory approval of any investigational product; whether any such submission will receive approval from the United States Food and Drug Administration or equivalent foreign regulatory agencies and, if we are able to obtain such approval for an investigational product, whether it will be successfully distributed and marketed. These risks and uncertainties, as well as other risks and uncertainties that could cause the company's actual results to differ significantly from the forward-looking statements contained herein, are described in greater detail in Part I, Item 1A. *Risk Factors* in this Annual Report on Form 10-K. Any forward-looking statements contained in this Annual Report on Form 10-K speak only as of the date hereof and not of any future date, and the company expressly disclaims any intent to update any forward-looking statements, whether as a result of new information, future events or otherwise.

PART I

Item 1. Business.

Overview

Novus Therapeutics is a specialty pharmaceutical company focused on developing products for disorders of the ear, nose, and throat (ENT). Novus has two technologies, each that has the potential to be developed for multiple ENT indications. The company's lead product (OP-02) is a surfactant-based, combination drug product being developed as a potential first-in-class treatment option for patients at risk for, or with, otitis media (OM) (middle ear inflammation with or without infection). Globally, OM affects more than 700 million adults and children every year. OM is a common disorder seen in pediatric practice, and in the United States is the most frequent reason children are prescribed antibiotics and undergo surgery. Novus also has a foam-based drug delivery technology (OP-01), which may be developed in the future to deliver drugs into the ear, nasal, and sinus cavities.

OP-02 Surfactant Program

OP-02 is being developed as a potential first-in-class treatment option for otitis media (OM), which is often caused by Eustachian tube dysfunction (ETD). OP-02 is a drug-device combination product comprised of a novel formulation of a surfactant (dipalmitoylphosphatidylcholine [DPPC]) and a spreading agent (cholesteryl palmitate [CP]) suspended in propellant. The product is administered intranasally via a metered- dose inhaler and is intended to be used to restore the normal physiologic activity of the Eustachian tube (ET), which is a small tube that connects from the chamber of the middle ear to the back of the nasopharynx. Together DPPC and CP effectively absorb to the air-liquid interface of the mucosa and reduce the interfacial surface tension of the ET, which reduces passive pressure required for the ET to open. In other words, OP-02 promotes 'de-sticking' of the ET so that ventilation and drainage of the middle ear may occur. Novus expects to initiate a phase 1 clinical program of OP-02 in 2018. The phase 1 program will include a single study to evaluate repeated intranasal doses of OP-02 in healthy subjects plus additional phase 1 studies to explore safety and efficacy in patients with OM. Upon completion of the phase 1 program, Novus intends to initiate phase 2 and 3 studies of OP-02, with an initial focus on a development program that, if successful, will lead to registration of OP-02 in North America and key European markets as a product to treat OM and prevent OM in children. Additional development activities to support registration in other countries and/or for other OM/ETD disorders, or in other patient populations, may occur in the future.

OP-01 Foam Platform

OP-01 is a foam-based product intended to be used as a delivery vehicle for drugs to be administered into the ears, as well as the nasal and sinus cavities. Specifically, OP-01 was initially developed as an improved treatment option for AOE, a common medical condition of the outer ear canal that affects tens of millions of adults and children each year (frequently called "swimmer's ear"). Novus completed four clinical trials of OP-01 in 353 adult and pediatric subjects, including a successful phase 2b study with a steroid-free, antibiotic-only formulation of OP-01 that performed similarly to standard of care, but with a favorable dosing regimen.

In 2016, Novus began development of a second-generation formulation of OP-01 designed to rapidly relieve ear pain (an unmet need in AOE) and eradicate infection with less than seven days of treatment. Novus subsequently paused the OP-01 development program to focus resources on OP-02.

OP-02 for Otitis Media

Inflammation of the middle ear and the presence of effusion (fluid) in the middle ear is referred to as otitis media (OM), which is a generic term without reference to a specific etiology or pathogenesis and best regarded as a spectrum of diseases. In developed countries, OM is a very common condition and a leading cause of healthcare visits and the prescribing of antibiotics. Common forms of OM are acute OM (AOM) and otitis media with effusion (OME). Both AOM and OME can re-occur episodically or persist for long periods of time. If reoccurrence is frequent (i.e., three episodes within six months), the patient is diagnosed with recurrent OM. If fluid persists in the middle ear for longer than three months, then the patient is diagnosed with chronic OM.

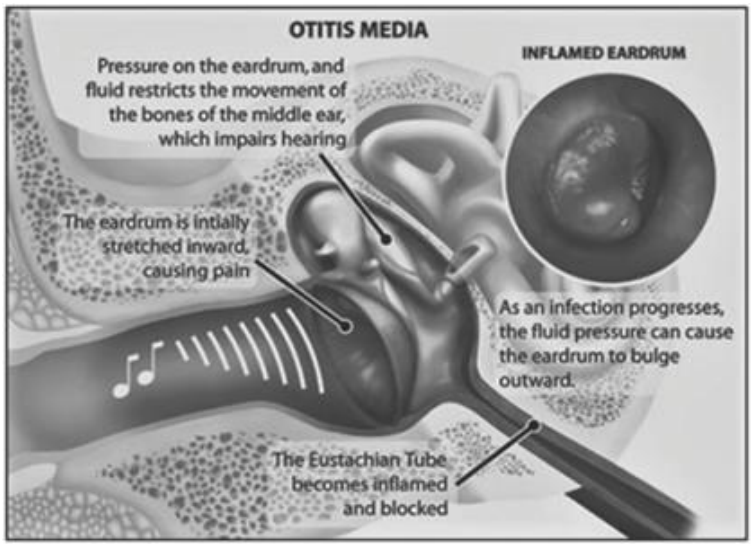
AOM is usually a short-term inflammation of the middle ear, characterized by the sudden onset of one or more signs or symptoms of acute middle ear inflammation (e.g., ear pain, tugging at the ear, fever or irritability) in the presence of middle ear effusion. AOM is often preceded by upper respiratory symptoms including cough and rhinorrhea. Micro-organisms (viral or bacterial) in the nasopharynx may reflux into the middle ear, where they adhere and colonize resulting in an ear infection.

AOM is extremely common in young children, many of whom will have multiple AOM episodes (recurrent AOM) over the course of months or even years.

OME is also very common and can affect both children and adults. OME is characterized by a non-purulent (non-infected) effusion of the middle ear without sudden onset of signs or symptoms of an acute ear infection. Symptoms usually involve conductive hearing loss or aural fullness caused by impaired transduction of sound waves through the fluid-filled middle ear, but typically without pain or fever. OME often follows an AOM episode and can last for several months or up to a year, which can result in speech and learning delays in children and other morbidities in both children and adults. There are several predisposing factors that have been associated with OME including environmental (e.g., bottle feeding, day-care setting, allergies to common environmental entities, cigarette smoke), age (higher incidence in pre-school age children), and Eustachian tube dysfunction (ETD). Like AOM, patients can experience multiple OME episodes over the course of months or years.

An important component of middle ear health is a normally functioning Eustachian tube. The Eustachian tube is a small cilia-lined passageway that connects the middle ear to the back of the nasal cavity (nasopharynx). Its primary functions are to protect, drain, and ventilate the middle ear. Normally, it is collapsed, preventing material from entering the middle ear. The Eustachian tube opens periodically upon swallowing, chewing, yawning, or when a pressure differential exists between the middle ear and the external environment. When the Eustachian tube becomes blocked or does not open normally, Eustachian tube dysfunction (ETD) occurs.

Pathophysiology of Otitis Media:



The pathophysiology of OM and ETD are closely related. Both conditions can arise as a result of upper respiratory tract infections, allergies, and other inflammatory mediators and one condition can perpetuate the other condition. There are more than 700 million cases of OM and ETD around the world every year, half of which occur in children under 5 years of age. In the U.S. alone, there were more than 18 million visits to physicians during 2010 related to OM and ETD. It is one of the most common diseases seen in Pediatric and ENT practices and is the most frequent reason children consume antibiotics or undergo surgery.

To date, no drug product has been approved for OM. Antibiotics are commonly used to treat AOM patients who present with signs and symptoms of infection, but antibiotics have no effect on viral infections or OME which is a non-infectious condition. More importantly, antibiotics do not prevent recurrent AOM, recurrent OME or chronic OME. Topical steroids, antihistamines, and decongestants have not been shown to be effective, particularly in OME and as such, the American Academy of Otolaryngology—Head and Neck Surgery recommend against use of these drugs in patients. The only option today to treat and possibly prevent recurrent or chronic OM, is to perform a surgery where the tympanic membrane is perforated to improve drainage and ventilation of the middle ear (myringotomy or tympanostomy tube insertions). However, surgery is not always an effective solution for all patients as many continue to suffer with OM or its complications and sometimes can require repeat surgeries. Managing recurrent and chronic OM drives billions of dollars in healthcare costs and

results in millions of surgical procedures in children and adults around the world. There is a clear unmet need for a non-antibiotic, non-surgical option for patients.

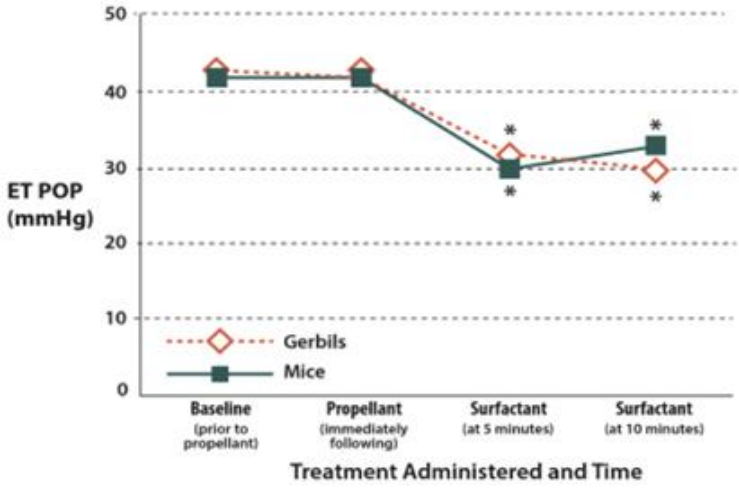
In 2016, the U.S. Food and Drug Administration (FDA) permitted marketing of a medical device that uses a small intranasal balloon inserted into the Eustachian tube to treat persistent ETD in adults. However, like OM, no drug product has been approved for the prevention of ETD.

OP-02 is a novel combination drug product, comprised of two active ingredients, the surfactant dipalmitoylphosphatidylcholine (DPPC) and a spreading agent cholesteryl palmitate (CP), and formulated with a propellant for easy administration. The product is sprayed through the nostrils towards the opening of the Eustachian tube at the lower back of the nasal cavity. The surfactant and spreading agent act to lower the surface tension at the opening and along the Eustachian tube, causing a “de-sticking” of the tissue and restoration of normal Eustachian tube function. Avanti Polar Lipids, Inc. is our sole supplier of DPPC and CP, the active pharmaceutical ingredients used in OP-02. Other manufacturers of DPPC and CP exist, but we have not yet qualified a secondary supplier.

Surfactants are ubiquitous and well-understood endogenous compounds present in human nasal passages, the Eustachian tube, and lung tissues, as well as in human milk and amniotic fluid. Surfactants have been evaluated under the hypothesis that exogenous administration of surfactant to a mucosal lined lumen such as the alveoli would result in de-sticking of the tissue and allowance of oxygen exchange in the lungs. In the case of the Eustachian tube, it is known that the quantity of surfactants along the Eustachian tube of children with OM is significantly reduced when compared to otologically healthy children. Also, the Eustachian tube surface tension in patients with OM is higher than reported for patients with healthy Eustachian tubes, causing the luminal surfaces to stick together. Indeed, reduction in Eustachian tube luminal surface tension and passive opening pressure (“POP”), as well as improved Eustachian tube function was demonstrated in a study of six cynomologous monkeys who received injections of the calf lung surfactant extract INFASURF ® directly into the Eustachian tube lumen.

The positive effects of OP-02 on Eustachian tube function have been observed in preclinical animal studies. Meaningful reductions in POP of healthy Eustachian tube, as well as meaningful reduction in severity and duration of OM episodes in three animal species after treatment with OP-02 have been observed. In two separate animal-model experiments, the investigators studied the effects of intranasal administration of an early formulation of OP-02 on Eustachian tube POP of the left ear as compared to propellant in healthy Mongolian gerbils and albino mice. In both animal species, administration of OP-02 resulted in significant ($p<0.001$) reductions in mean Eustachian tube POP measurements at both the 5 and 10-minute assessment times compared to baseline and immediately following propellant alone administration (Figures 1, 2 and 3). Among the gerbils, the mean (standard error [SE]) Eustachian tube POP values (in millimeters of mercury [mmHg]) were 42.8 (2.29) at baseline, 42.43 (2.36) after propellant, 31.76 (1.74) at 5 minutes after surfactant, and 29.3 (1.51) at 10 minutes after surfactant. Similar findings were noted in the mice: mean (SE) Eustachian tube POP values were 42.02 (1.22) at baseline, 42.02 (1.22) after propellant, 29.77 (1.69) at 5 minutes after surfactant, and 32.79 (1.77) at 10 minutes after surfactant.

Figure 1: Mean Passive Opening Pressures in Gerbil and Mice at Baseline, Immediately after Propellant, and at 5 and 10 Minutes after Surfactant Administration (Experiment 1)



* p<0.05 for surfactant treatment (each timepoint and animal group) compared to baseline and following propellant administration.

In a study of experimentally induced AOM in chinchillas, the use of OP-02 was associated with a marked reduction in the severity and duration of AOM. Furthermore, quantitative cultures of middle ear fluid showed dramatic decreases in bacterial colonization with intranasal surfactant treatment alone (i.e., no antibiotics were administered in this study). Based on these findings, Novus believes that resolution of effusion may occur significantly earlier with surfactant treatment than with placebo. The data suggest that enhancement/restoration of Eustachian tube function is beneficial in acute bacterial OM.

Prior to licensing rights to OP-02, nine humans with various OM and ETD conditions were treated with OP-02 by the inventors. This human experience was captured as case studies and reported to the FDA. Based on these case studies, in conjunction with the preclinical animal data, Novus believes that a product of this type may have utility in the treatment and prevention of OM and ETD in children and adults.

Novus expects to initiate its planned OP-02 phase 1 clinical program in 2018. The phase 1 program will include a single study to evaluate repeated intranasal doses of OP-02 in healthy subjects plus additional phase 1 studies to explore safety and efficacy in patients with OM. Upon completion of the phase 1 program, Novus intends to initiate phase 2 and 3 studies of OP-02, with an initial focus on a development program that will lead to registration of OP-02 in North America and key European markets as a product to treat OM and prevent OM in children. Additional development activities to support registration in other countries and/or for other OM/ETD disorders, or in other patient populations, may occur in the future.

OP-01 for Acute Otitis Externa (AOE)

AOE (or “swimmer’s ear”) is a generalized inflammation of the epithelium of the external ear canal that may also involve the pinna and/or the tympanic membrane (eardrum). The vast majority of AOE cases are due to bacterial infections, with *Pseudomonas aeruginosa* and *Staphylococcus aureus* being the most common pathogens. The condition is commonly associated with pain and characterized by redness of the ear canal (erythema), swelling of the tissue (edema), increased secretion of fluid, and shedding or peeling of the skin (desquamation of the epithelium). AOE occurs in all age groups and is more frequently observed in the summer months as well as in hot and humid environments. The most common treatment for AOE is antibiotics, with or without steroids, analgesics and avoiding ears being immersed underwater (e.g., swimming). Ear treatments are generally supplied in the form of liquids with several drops administered into each infected ear multiple times per day for a week or longer. In the U.S. alone, more than 5 million prescriptions for ear anti-infective products are prescribed every year, mostly for the treatment of AOE.

The current market leader in the ear anti-infective market is CIPRODEX®, marketed by Alcon, which according to IMS Health generated over $400 million in sales in the United States in 2015. It is a liquid suspension containing the antibiotic

ciprofloxacin and the steroid dexamethasone. It is administered as four drops per infected ear, twice-daily over seven days for a total of 14 doses (56 drops placed into the ear canal over the course of a week). There are numerous other branded and generic ear anti-infectives, but none of these are clinically differentiated from CIPRODEX. Although effective when administered properly, liquid drops like these anti-infectives can be a challenge to administer into the ear, particularly in children. Proper administration requires the patient to lie down with the infected ear pointed upward, careful placement of multiple drops into the infected ear, manipulation of the ear lobe to move the liquid down into the ear canal, and the patient should remain still with the infected ear pointed upwards after applying the product for a period of time to prevent the medication from draining out of the ear. In addition, rapid resolution of otalgia (ear pain) is not achieved with any of the currently approved anti-infective products, even those that also contain an anti-inflammatory (e.g., steroid) in the formulation, like CIPRODEX.

Foam formulations such as OP-01 are becoming a prominent delivery system for topical drugs due to the intrinsic advantages of the platform: easy and fast administration, visibility of product during and after the administration, and complete coverage of large and variable surface areas as the product expands and molds to the shape of the cavity. In addition, foam formulations can remain in place for longer periods of time, increasing residence time of drugs at target sites. Finally, foam-based ear products can be administered while the patient is standing or sitting and do not require holding the head in any special orientation for a period of time.

Novus conducted four clinical trials of its first generation (antibiotic only) formulation of OP-O1 that it believes supported the utility of OP-01. Data from the most recent clinical trial was announced in January 2015. The study was a 220 patient, phase 2, randomized, multicenter, parallel, active comparator trial in 220 AOE patients ages six months and older. During this trial, OP-01 which contains 0.3% ciprofloxacin was administered once-daily for 7 days (7 doses) while the active comparator (CIPRODEX), which contains 0.3% ciprofloxacin and 0.1% dexamethasone was administered twice-daily for 7 days (14 doses). The primary endpoint of the study was clinical cure, defined as score = 0 for erythema, edema, tenderness, ear discharge (otorrhea), and no further antibiotic required. Safety and efficacy of OP-01 was found to be similar (non-inferior) to CIPRODEX, even though OP-01 contained no steroid and utilized 50% fewer doses over the week-long course of therapy.

In 2016, Novus began development of a second-generation formulation of OP-01 designed to rapidly relieve ear pain (an unmet need in AOE) and eradicate infection with less than seven days of treatment. Novus subsequently paused the OP-01 development program to focus resources on OP-02.

Intellectual Property

Novus's success depends in part on its ability to obtain and maintain proprietary protection for its product candidates, novel discoveries, product technologies and other know-how, to operate without infringing on the proprietary rights of others and to prevent others from infringing Novus's proprietary rights. Novus seeks to protect its product candidates by, among other methods, filing U.S. and foreign patent applications related to its proprietary technology, inventions and improvements that are important to the development and implementation of its business. Novus also relies on trademarks, trade secrets, know-how, continuing technological innovation and potential in-licensing opportunities to develop and maintain Novus's proprietary protection for Novus's product candidates.

Novus's intellectual property portfolio includes patents and patent applications with claims directed towards Novus's OP-01 and OP-02 product candidates and claiming pharmaceutical preparations with methods of use. For OP-01, Novus owns or has exclusive rights to three U.S. and seven foreign patents (Canada, France, Germany, Israel, Italy, Spain, and the United Kingdom). The last to expire issued patent in the U.S. will expire in September 2027, including patent term adjustment. In addition, Novus owns or has exclusive rights to two U.S. patent applications, one of which has recently been allowed, and three foreign patent applications (Canada, China, and Europe). The recently allowed U.S. patent application will expire in December 2033, absent any adjustments or extensions. For OP-02, Novus has exclusive rights to seven U.S. and three foreign patents (Canada, Mexico, and Europe). The last to expire patent in the U.S. will expire in November 2019. In addition, Novus owns or has exclusive rights to one U.S. patent application, one International (PCT) patent application, and two foreign patent applications. The pending U.S. patent application will expire in November 2036, absent any adjustments or extensions.

Patents extend for varying periods according to the date of patent filing or grant and the legal term of patents in various countries where patent protection is obtained. The actual protection afforded by a patent, which can vary from country to country, depends on the type of patent, the scope of its coverage and the availability of legal remedies in the country.

Novus also protects its proprietary information by requiring its employees, consultants, contractors and other advisors to execute nondisclosure and assignment of invention agreements upon commencement of their respective employment or engagement. In addition, Novus also requires confidentiality or service agreements from third parties that receive confidential information or materials.

License Agreement with Otodyne, Inc.

In November 2015, Novus entered into a license agreement with Scientific Development and Research, Inc. and Otodyne, Inc. granting Novus exclusive worldwide rights to develop and commercialize OP-02. Under the terms of the agreement, Novus is obligated to use commercially reasonable efforts to seek approval for and commercialize at least one product for otitis media in the U.S. and key European markets (France, Germany, Italy, Spain, and the United Kingdom). Novus is responsible for prosecuting, maintaining, and enforcing all intellectual property and will be the sole owner of improvements.

In January 2016, Otodyne completed transfer of all technology, including the active IND, to Novus. Novus is obligated to pay up to $42.1 million in development and regulatory milestones if OP-02 is approved for three indications in the U.S., two in Europe, and two in Japan. Novus is also obligated to pay up to $36 million in sales-based milestones, beginning with sales exceeding $1.0 billion in a calendar year. Novus is also obligated to pay a tiered royalty for a period up to eight years, on a country-by-country basis. The royalty ranges from low-single to mid-single percent of net sales.

Government Regulation

Government authorities in the United States, including federal, state, and local authorities, and in other countries, extensively regulate, among other things, the manufacturing, research and clinical development, marketing, labeling and packaging, storage, distribution, post-approval monitoring and reporting, advertising and promotion, and export and import of pharmaceutical and biological products, such as those we are developing. Pricing of such products is also subject to regulation in many countries. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local, and foreign statutes and regulations require the expenditure of substantial time and financial resources.

U.S. Government Regulation

In the United States, the FDA regulates drugs under the Federal Food, Drug, and Cosmetic Act, or FDCA, and its implementing regulations, and biologics under the FDCA and the Public Health Service Act, or PHSA, and its implementing regulations. FDA approval is required before any new unapproved drug or biologic or dosage form, including a new use of a previously approved drug, can be marketed in the United States. Drugs and biologics are also subject to other federal, state, and local statutes and regulations. If we fail to comply with applicable FDA or other requirements at any time during the product development process, clinical testing, approval process or after approval, we may become subject to administrative or judicial sanctions. These sanctions could include the FDA's refusal to approve pending applications, license suspension or revocation, withdrawal of an approval, untitled or warning letters, product recalls, product seizures, total or partial suspension of production or distribution, injunctions, fines, civil penalties or criminal prosecution. Any FDA enforcement action could have a material adverse effect on us.

The process required by the FDA before product candidates may be marketed in the United States generally involves the following:

- completion of extensive preclinical laboratory tests and preclinical animal studies, all performed in accordance with the Good Laboratory Practices, or GLP, regulations;
- submission to the FDA of an investigational new drug application, or IND, which must become effective before human clinical trials may begin and must be updated annually;
- approval by an independent institutional review board, or IRB, or ethics committee representing each clinical site before each clinical trial may be initiated;
- performance of adequate and well-controlled human clinical trials to establish the safety and efficacy of the product candidate for each proposed indication;
- preparation of and submission to the FDA of a biologics license application, or BLA, or a new drug application, or NDA, after completion of all pivotal clinical trials;
- potential review of the product application by an FDA advisory committee, where appropriate and if applicable;

- a determination by the FDA within 60 days of its receipt of a BLA or NDA to file the application for review;
- satisfactory completion of an FDA pre-approval inspection of the manufacturing facilities where the proposed product is produced to assess compliance with current Good Manufacturing Practices, or cGMP;
- potential FDA audit of the clinical trial sites that generated the data in support of the BLA or NDA; and
- FDA review and approval of a BLA or NDA prior to any commercial marketing or sale of the product in the United States.

The preclinical and clinical testing and approval process requires substantial time, effort, and financial resources, and we cannot be certain that any approvals for our product candidates will be granted on a timely basis, if at all.

An IND is a request for authorization from the FDA to administer an investigational new drug product to humans in clinical trials. The central focus of an IND submission is on the general investigational plan and the protocol(s) for human trials. The IND also includes results of animal and in vitro studies assessing the toxicology, pharmacokinetics, pharmacology, and pharmacodynamic characteristics of the product; chemistry, manufacturing, and controls information; and any available human data or literature to support the use of the investigational new drug. An IND must become effective before human clinical trials may begin. An IND will automatically become effective 30 days after receipt by the FDA, unless before that time the FDA raises concerns or questions related to the proposed clinical trials. In such a case, the IND may be placed on clinical hold and the IND sponsor and the FDA must resolve any outstanding concerns or questions before clinical trials can begin. Accordingly, submission of an IND may or may not result in the FDA allowing clinical trials to commence. The FDA may impose a clinical hold at any time during clinical trials and may impose a partial clinical hold that would limit trials, for example, to certain doses or for a certain length of time.

Clinical Trials

Clinical trials involve the administration of the investigational new drug to human subjects under the supervision of qualified investigators in accordance with Good Clinical Practices, or GCPs, which include the requirement that all research subjects provide their informed consent for their participation in any clinical trial. Clinical trials are conducted under protocols detailing, among other things, the objectives of the study, the parameters to be used in monitoring safety, and the efficacy criteria to be evaluated. A protocol for each clinical trial and any subsequent protocol amendments must be submitted to the FDA as part of the IND. Additionally, approval must also be obtained from each clinical trial site's IRB before the trials may be initiated, and the IRB must monitor the trial until completed. There are also requirements governing the reporting of ongoing clinical trials and clinical trial results to public registries.

The clinical investigation of a drug is generally divided into three phases. Although the phases are usually conducted sequentially, they may overlap or be combined.

- Phase 1. The drug is initially introduced into healthy human subjects or patients with the target disease or condition. These studies are designed to evaluate the safety, dosage tolerance, metabolism and pharmacologic actions of the investigational new drug in humans, the side effects associated with increasing doses, and if possible, to gain early evidence on effectiveness.
- Phase 2. The drug is administered to a limited patient population to evaluate dosage tolerance and optimal dosage, identify possible adverse side effects and safety risks, and preliminarily evaluate efficacy.
- Phase 3. The drug is administered to an expanded patient population, generally at geographically dispersed clinical trial sites to generate enough data to evaluate dosage, clinical effectiveness and safety, to establish the overall benefit-risk relationship of the investigational new drug product, and to provide an adequate basis for physician labeling.

In some cases, the FDA may condition approval of a BLA or NDA for a product candidate on the sponsor's agreement to conduct additional clinical trials after approval. In other cases, a sponsor may voluntarily conduct additional clinical trials after approval to gain more information about the drug. Such post-approval studies are typically referred to as Phase 4 clinical trials.

Sponsors must also report to the FDA, within certain timeframes, serious and unexpected adverse reactions, any clinically important increase in the rate of a serious suspected adverse reaction over that listed in the protocol or investigator's brochure, or any findings from other studies or animal or in vitro testing that suggest a significant risk in humans exposed to the product candidate. The FDA, the IRB, or the clinical trial sponsor 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. Additionally, some clinical trials are overseen by an independent group of qualified experts organized by the clinical trial sponsor, known as a data safety monitoring board or committee. This group provides authorization for whether or not a trial may move forward at designated check points based on access to certain data from the trial. We may also suspend or terminate a clinical trial based on evolving business objectives or competitive climate.

The clinical trial process can take three to ten years or more to complete, and there can be no assurance that the data collected will support FDA approval or licensure of the product. Results from one trial are not necessarily predictive of results from later trials.

A drug being studied in clinical trials may be made available to individual patients in certain circumstances. Pursuant to the 21st Century Cures Act, or Cures Act, which was signed into law in December 2016, the manufacturer of an investigational drug for a serious disease or condition is required to make available, such as by posting on its website, its policy on evaluating and responding to requests for individual patient access to such investigational drug. This requirement applies on the later of 60 calendar days after the date of enactment of the Cures Act or the first initiation of a Phase 2 or Phase 3 trial of the investigational drug.

Submission of a BLA or NDA to the FDA.

Assuming successful completion of all required testing in accordance with all applicable regulatory requirements, detailed investigational new drug product information is submitted to the FDA in the form of a BLA or NDA requesting approval to market the product for one or more indications. Under federal law, the submission of most BLAs and NDAs is subject to an application user fee. For fiscal year 2018, the application user fee is $2,421,495, and the sponsor of an approved BLA or NDA is also subject to annual program fees, set at $304,162 per program. These fees are typically increased annually. Applications for orphan drug products are exempted from the BLA and NDA user fees and may be exempted from product and establishment user fees, unless the application includes an indication for other than a rare disease or condition.

A BLA or NDA for a new molecular entity must include all relevant data available from pertinent preclinical studies and clinical trials, including negative or ambiguous results as well as positive findings, together with detailed information relating to the product's chemistry, manufacturing, controls, and proposed labeling, among other things. Data can come from company-sponsored clinical trials intended to test the safety and effectiveness of a use of a product, or from a number of alternative sources, including trials initiated by investigators. To support marketing approval, the data submitted must be sufficient in quality and quantity to establish the safety and effectiveness of the investigational new drug product to the satisfaction of the FDA.

Once a BLA or NDA for a new molecular entity has been submitted, the FDA's goal is to review the application within ten months after it accepts the application for filing, or, if the application relates to an unmet medical need in a serious or life-threatening indication, six months after the FDA accepts the application for filing. The review process is often significantly extended by the FDA's requests for additional information or clarification.

Before approving a BLA or NDA, the FDA typically will inspect the facility or facilities where the product is manufactured. 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 a BLA or NDA, the FDA will typically inspect one or more clinical sites to assure compliance with GCP.

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.

The FDA's Decision on a BLA or NDA

The FDA evaluates a BLA to determine whether the data demonstrate that the biologic is safe, pure, and potent, or effective, and an NDA to determine whether the drug is safe and effective. After the FDA evaluates the BLA or NDA and conducts inspections of manufacturing facilities where the product will be produced, it may issue an approval letter or a Complete Response Letter. An approval letter authorizes commercial marketing of the drug with specific prescribing

information for specific indications. A Complete Response Letter indicates that the review cycle of the application is complete, and the application is not ready for approval. A Complete Response Letter may require additional clinical data or an additional pivotal Phase 3 clinical trial(s), or other significant, expensive and time-consuming requirements related to clinical trials, preclinical studies or manufacturing. Even if such additional information is submitted, the FDA may ultimately decide that the BLA or NDA does not satisfy the criteria for approval and issue a denial. The FDA could also approve the BLA or NDA with a Risk Evaluation and Mitigation Strategy, or REMS, plan to mitigate risks, which could include medication guides, physician communication plans, or elements to assure safe use, such as restricted distribution methods, patient registries and other risk minimization tools. The FDA also may condition approval on, among other things, changes to proposed labeling, development of adequate controls and specifications, or a commitment to conduct one or more post-market studies or clinical trials. Such post-market testing may include Phase 4 clinical trials and surveillance to further assess and monitor the product's safety and effectiveness after commercialization. Also, new government requirements, including those resulting from new legislation, may be established, or the FDA's policies may change, which could delay or prevent regulatory approval of our products under development.

Post-Approval Requirements

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.

Drug manufacturers are subject to periodic unannounced inspections by the FDA and state agencies for compliance with cGMP requirements. Changes to the manufacturing process are strictly regulated, and, depending on the significance of the change, may 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 us and any third-party manufacturers that we may decide to use. Accordingly, manufacturers must continue to expend time, money and effort in the area of production and quality control to maintain compliance with cGMP and other aspects of regulatory compliance.

We rely, and expect to continue to rely, on third parties for the production of clinical quantities of our product candidates, and expect to rely in the future on third parties for the production of commercial quantities. Future FDA and state inspections may identify compliance issues at our facilities or at the facilities of our contract manufacturers that may disrupt production or distribution, or require substantial resources to correct. In addition, discovery of previously unknown problems with a product or the failure to comply with applicable requirements may result in restrictions on a product, manufacturer or holder of an approved BLA or NDA, including withdrawal or recall of the product from the market or other voluntary, FDA-initiated or judicial action that could delay or prohibit further marketing. Also, new government requirements, including those resulting from new legislation, may be established, or the FDA's policies may change, which could delay or prevent regulatory approval of our products under development.

The FDA may withdraw 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 restrictions or other restrictions under a REMS program. Other potential consequences include, among other things:

- restrictions on the marketing or manufacturing of the product, complete withdrawal of the product from the market or product recalls;
- fines, untitled or warning letters or holds on post-approval clinical trials;
- refusal of the FDA to approve pending BLAs or NDAs or supplements to approved BLAs or NDAs, or suspension or revocation of licenses or withdrawal of 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.

Orphan Designation and Exclusivity

The FDA may grant orphan drug designation to drugs intended to treat a rare disease or condition that affects fewer than 200,000 individuals in the United States, or if it affects more than 200,000 individuals in the United States, there is no reasonable expectation that the cost of developing and making the drug for this type of disease or condition will be recovered from sales in the United States.

Orphan drug designation entitles a party to financial incentives such as opportunities for grant funding towards clinical trial costs, tax advantages, and user-fee waivers. In addition, if a product is the first to receive FDA approval for the indication for which it has orphan designation, the product is entitled to orphan drug exclusivity, which means the FDA may not approve any other application to market the same drug for the same indication for a period of seven years, except in limited circumstances, such as a showing of clinical superiority over the product with orphan exclusivity.

Pediatric Trials and Exclusivity

Under the Pediatric Research Equity Act of 2003, or PREA, as amended, BLAs and NDAs must contain data to assess the safety and effectiveness of an investigational new drug product for the claimed indications in all relevant pediatric populations and to support dosing and administration for each pediatric subpopulation for which the drug is safe and effective. A sponsor who is planning to submit a marketing application for a drug product that includes a new active ingredient, new indication, new dosage form, new dosing regimen or new route of administration must submit an initial Pediatric Study Plan, or PSP, within sixty days of an end-of-phase 2 meeting or as may be agreed between the sponsor and the FDA. The initial PSP must include an outline of the pediatric study or studies that the sponsor plans to conduct, including study objectives and design, age groups, relevant endpoints and statistical approach, or a justification for not including such detailed information, and any request for a deferral of pediatric assessments or a full or partial waiver of the requirement to provide data from pediatric studies along with supporting information. 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 if certain criteria are met. The FDA and the sponsor must reach agreement on the PSP. A sponsor can submit amendments to an agreed-upon initial PSP at any time if changes to the pediatric plan need to be considered based on data collected from preclinical studies, early phase clinical trials, and/or other clinical development programs. The requirements for pediatric data do not apply to any drug for an indication for which orphan designation has been granted.

Pediatric exclusivity is another type of non-patent 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 five-year and three-year non-patent and orphan exclusivity. This six-month exclusivity may be granted if a BLA or NDA sponsor submits pediatric data that fairly respond to a written request from the FDA for such data. The data do not need to show the product to be effective in the pediatric population studied; rather, if the clinical trial is deemed to fairly respond to the FDA's request, the additional protection is granted. If reports of FDA-requested pediatric trials are submitted to and accepted by the FDA within the statutory time limits, whatever statutory or regulatory periods of exclusivity or patent protection covering 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 accept or approve another application relying on the BLA or NDA sponsor's data.

Patent Term Restoration

Depending upon the timing, duration, and specifics of the FDA approval of the use of our product candidates, some of our U.S. patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, commonly referred to as the Hatch-Waxman Amendments. The Hatch-Waxman Amendments permit a patent restoration term of up to five years as compensation for patent term lost during product development and the FDA regulatory review process. However, patent term restoration cannot extend the remaining term of a patent beyond a total of 14 years from the product's approval date. The patent term restoration period is generally one-half the time between the effective date of an IND and the submission date of a BLA or NDA, plus the time between the submission date and the approval of that application, except that the review period is reduced by any time during which the applicant failed to

exercise due diligence. Only one patent applicable to an approved product is eligible for the extension and the application for the extension must be submitted prior to the expiration of the patent and within 60 days of the product's approval. The U.S. Patent and Trademark Office, in consultation with the FDA, reviews and approves the application for any patent term extension or restoration. In the future, we may apply for restoration of the patent term for one of our currently owned or licensed patents to add patent life beyond its current expiration date, depending on the expected length of the clinical trials and other factors involved in the filing of the relevant BLA or NDA.

Abbreviated New Drug Applications for Generic Drugs

In 1984, with passage of the Hatch-Waxman Amendments, Congress authorized the FDA to approve generic drugs that are the same as drugs previously approved by the FDA under the NDA provisions of the statute. To obtain approval of a generic drug, an applicant must submit an abbreviated new drug application, or ANDA, to the agency. 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, and the strength 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 an RLD if "the rate and extent of absorption of the generic 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 that the generic product is "therapeutically equivalent" to the RLD and it assigns a therapeutic equivalence rating to the approved generic drug in its publication "Approved Drug Products with Therapeutic Equivalence Evaluations," also referred to as the "Orange Book." Physicians and pharmacists consider an "AB" therapeutic equivalence rating to mean that a generic drug is fully substitutable for the RLD. In addition, by operation of certain state laws and numerous health insurance programs, the FDA's designation of an "AB" rating often results in substitution of the generic drug without the knowledge or consent of either the prescribing physician or patient.

The FDCA provides a period of five years of non-patent exclusivity for a new drug containing a new chemical entity. 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, 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. This three-year exclusivity period often protects changes to a previously approved drug product, such as a new dosage form, route of administration, combination or indication.

Hatch-Waxman Patent Certification and the 30-Month Stay

Upon approval of an NDA or a supplement thereto, NDA sponsors are required to list with the FDA each patent with claims that cover the applicant's product or a method of using the product. Each of the patents listed by the NDA sponsor is published in the Orange Book. When an ANDA applicant files its application with the FDA, the applicant is required to certify to the FDA concerning any patents listed for the reference product in the Orange Book, except for patents covering methods of use for which the ANDA applicant is not seeking approval.

Specifically, the applicant must certify with respect to each patent that:

- the required patent information has not been filed;
- the listed patent has expired;
- the listed patent has not expired, but will expire on a particular date and approval is sought after patent expiration; or
- the listed patent is invalid, unenforceable or will not be infringed by the new product.

A certification that the new product will not infringe the already approved product's listed patents or that such patents are invalid or unenforceable is called a Paragraph IV certification. If the applicant does not challenge the listed patents or indicates that it is not seeking approval of a patented method of use, the ANDA application will not be approved until all the listed patents claiming the referenced product have expired.

If the ANDA applicant has provided a Paragraph IV certification to the FDA, the applicant must also send notice of the Paragraph IV certification to the NDA and patent holders once the ANDA has been accepted for filing by the FDA. The NDA and patent holders may then initiate a patent infringement lawsuit in response to the notice of the Paragraph IV certification. The filing of a patent infringement lawsuit within 45 days after the receipt of a Paragraph IV certification automatically prevents the FDA from approving the ANDA until the earlier of 30 months after the receipt of the Paragraph IV notice, expiration of the patent, or a decision in the infringement case that is favorable to the ANDA applicant.

European Union/Rest of World Government Regulation

In addition to regulations in the United States, we will be subject to a variety of regulations in other jurisdictions governing, among other things, clinical trials and any commercial sales and distribution of our products. The cost of establishing a regulatory compliance system for numerous varying jurisdictions can be very significant. Although many of the issues discussed above with respect to the United States apply similarly in the context of the European Union and in other jurisdictions, the approval process 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.

Whether or not we obtain FDA approval for a product, we must obtain the requisite approvals from regulatory authorities in foreign countries prior to the commencement of clinical trials or marketing of the product in those countries. Certain countries outside of the United States have a similar process that requires the submission of a clinical trial application much like the IND prior to the commencement of human clinical trials. In the European Union, for example, a clinical trial authorization application, or CTA, must be submitted for each clinical protocol to each country's national health authority and an independent ethics committee, much like the FDA and IRB, respectively. Once the CTA is accepted in accordance with a country's requirements, the clinical trial may proceed.

The requirements and process governing the conduct of clinical trials vary from country to country. In all cases, the clinical trials are conducted in accordance with good clinical practices, or GCP, the applicable regulatory requirements, and the ethical principles that have their origin in the Declaration of Helsinki.

To obtain regulatory approval of an investigational medicinal product under European Union regulatory systems, we must submit a marketing authorization application. The content of the BLA or NDA filed in the United States is similar to that required in the European Union, with the exception of, among other things, country-specific document requirements.

For other countries outside of the European Union, such as countries in Eastern Europe, Latin America or Asia, the requirements governing product licensing, pricing, and reimbursement vary from country to country.

Countries that are part of the European Union, as well as countries outside of the European Union, have their own governing bodies, requirements, and processes with respect to the approval of pharmaceutical and biologic products. If we fail to comply with applicable foreign regulatory requirements, we may be subject to, among other things, fines, suspension or withdrawal of regulatory approvals, product recalls, seizure of products, operating restrictions and criminal prosecution.

Authorization Procedures in the European Union

Medicines can be authorized in the European Union by using either the centralized authorization procedure or national authorization procedures.

- Centralized procedure. The EMA implemented the centralized procedure for the approval of human medicines to facilitate marketing authorizations that are valid throughout the European Economic Area, or EEA. This procedure results in a single marketing authorization issued by the EMA that is valid across the EEA. The centralized procedure is compulsory for human medicines that are: derived from biotechnology processes, such as genetic engineering, contain a new active substance indicated for the treatment of certain diseases, such as HIV/AIDS, cancer, diabetes, neurodegenerative disorders or autoimmune diseases and other immune dysfunctions, and officially designated orphan medicines.
- For medicines that do not fall within these categories, an applicant has the option of submitting an application for a centralized marketing authorization to the European Commission following a favorable opinion by the EMA, as

long as the medicine concerned is a significant therapeutic, scientific or technical innovation, or if its authorization would be in the interest of public health.

- National authorization procedures. There are also two other possible routes to authorize medicinal products in several European Union countries, which are available for investigational medicinal products that fall outside the scope of the centralized procedure:
- Decentralized procedure. Using the decentralized procedure, an applicant may apply for simultaneous authorization in more than one European Union country of medicinal products that have not yet been authorized in any European Union country and that do not fall within the mandatory scope of the centralized procedure.
- Mutual recognition procedure. In the mutual recognition procedure, a medicine is first authorized in one European Union Member State, in accordance with the national procedures of that country. Following this, further marketing authorizations can be sought from other European Union countries in a procedure whereby the countries concerned agree to recognize the validity of the original, national marketing authorization.

In some cases, a Pediatric Investigation Plan, or PIP, or a request for waiver or deferral, is required for submission prior to submitting a marketing authorization application. A PIP describes, among other things, proposed pediatric trials and their timing relative to clinical trials in adults.

New Chemical Entity Exclusivity

In the European Union, new chemical entities, sometimes referred to as new active substances, qualify for eight years of data exclusivity upon marketing authorization and an additional two years of market exclusivity. This data exclusivity, if granted, prevents regulatory authorities in the European Union from referencing the innovator's data to assess a generic (abbreviated) application for eight years, after which a generic application can be submitted, and the innovator's data may be referenced, but not approved for two years. The overall ten-year period will be extended to a maximum of eleven years if, during the first eight years of those ten years, the marketing authorization holder obtains an authorization for one or more new therapeutic indications which, during the scientific evaluation prior to their authorization, are held to bring a significant clinical benefit in comparison with existing therapies.

Exceptional Circumstances/Conditional Approval

Orphan drugs or drugs with unmet medical needs may be eligible for European Union approval under exceptional circumstances or with conditional approval. Approval under exceptional circumstances may be applicable to orphan products and is used when an applicant is unable to provide comprehensive data on the efficacy and safety under normal conditions of use because the indication for which the product is intended is encountered so rarely that the applicant cannot reasonably be expected to provide comprehensive evidence, when the present state of scientific knowledge does not allow comprehensive information to be provided, or when it is medically unethical to collect such information. Conditional marketing authorization may be applicable to orphan medicinal products, medicinal products for seriously debilitating or life-threatening diseases, or medicinal products to be used in emergency situations in response to recognized public threats. Conditional marketing authorization can be granted on the basis of less complete data than is normally required in order to meet unmet medical needs and in the interest of public health, provided the risk-benefit balance is positive, it is likely that the applicant will be able to provide the comprehensive clinical data, and unmet medical needs will be fulfilled. Conditional marketing authorization is subject to certain specific obligations to be reviewed annually.

Accelerated Review

Under the centralized procedure in the European Union, the maximum timeframe for the evaluation of a marketing authorization application 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 EMA's Committee for Medicinal Products for Human Use, or CHMP). Accelerated evaluation might be granted by the CHMP in exceptional cases, when a medicinal product is expected to be of a major public health interest, particularly from the point of view of therapeutic innovation. In this circumstance, EMA ensures that the opinion of the CHMP is given within 150 days, excluding clock stops.

Pharmaceutical Coverage, Pricing and Reimbursement

Significant uncertainty exists as to the coverage and reimbursement status of any products for which we obtain regulatory approval. In the United States and in other countries, sales of any products for which we receive regulatory

approval for commercial sale will depend in part on the availability of coverage and reimbursement from third-party payors. Third-party payors include government authorities, managed care providers, private health insurers and other organizations. The process for determining whether a payor will provide coverage for a product may be separate from the process for setting the reimbursement rate that the payor will pay for the product. Third-party payors may limit coverage to specific products on an approved list, or formulary, which might not include all of the FDA-approved products for a particular indication. Moreover, a payor's decision to provide coverage for a drug product does not imply that an adequate reimbursement rate will be approved. Adequate third-party reimbursement may not be available to enable us to maintain price levels sufficient to realize an appropriate return on our investment in product development.

Third-party payors are increasingly challenging the price and examining the medical necessity and cost-effectiveness of medical products and services, in addition to their safety and efficacy. In order to obtain coverage and reimbursement for any product that might be approved for sale, we may need to conduct expensive pharmacoeconomic studies in order to demonstrate the medical necessity and cost-effectiveness of our products, in addition to the costs required to obtain regulatory approvals. Our product candidates may not be considered medically necessary or cost-effective. If third-party payors do not consider a product to be cost-effective compared to other available therapies, they may not cover the product after approval as a benefit under their plans or, if they do, the level of payment may not be sufficient to allow a company to sell its products at a profit.

The U.S. government, state legislatures and foreign governments have shown significant interest in implementing cost containment programs to limit the growth of government-paid healthcare costs, including price controls, restrictions on reimbursement and requirements for substitution of generic products for branded prescription drugs. By way of example, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, collectively, the Affordable Care Act, contains provisions that may reduce the profitability of drug products, including, for example, increased rebates for drugs sold to Medicaid programs, extension of Medicaid rebates to Medicaid managed care plans, mandatory discounts for certain Medicare Part D beneficiaries and annual fees based on pharmaceutical companies' share of sales to federal healthcare programs. Some of the provisions of the Affordable Care Act have yet to be fully implemented, while certain provisions have been subject to judicial and congressional challenges. In January 2017, Congress voted to adopt a budget resolution for fiscal year 2017, that while not a law, is widely viewed as the first step toward the passage of legislation that would repeal certain aspects of the Affordable Care Act. Further, on January 20, 2017, President Trump signed an Executive Order directing federal agencies with authorities and responsibilities under the Affordable Care Act to waive, defer, grant exemptions from, or delay the implementation of any provision of the Affordable Care Act that would impose a fiscal burden on states or a cost, fee, tax, penalty or regulatory burden on individuals, healthcare providers, health insurers, or manufacturers of pharmaceuticals or medical devices. Congress also could consider subsequent legislation to replace elements of the Affordable Care Act that are repealed. Thus, the full impact of the Affordable Care Act, any law replacing elements of it, or the political uncertainty surrounding its repeal or replacement on our business remains unclear. Adoption of government controls and measures, and tightening of restrictive policies in jurisdictions with existing controls and measures, could limit payments for pharmaceuticals.

In European countries, governments influence the price of pharmaceutical products through their pricing and reimbursement rules and control of national healthcare systems that fund a large part of the cost of those products to consumers. Some jurisdictions operate positive and negative list systems under which products may only be marketed once a reimbursement price has been agreed to by the government. To obtain reimbursement or pricing approval, some of these countries may require the completion of clinical trials that compare the cost-effectiveness of a particular product candidate to currently available therapies. Other member states allow companies to fix their own prices for medicines, but monitor and control company profits. The downward pressure on healthcare costs in general, particularly prescription drugs, has become very intense. As a result, increasingly high barriers are being erected to the entry of new products. In addition, in some countries, cross-border imports from low-priced markets exert a commercial pressure on pricing within a country.

The marketability of any products for which we receive regulatory approval for commercial sale may suffer if the government and third-party payors fail to provide adequate coverage and reimbursement. In addition, the emphasis on cost containment measures in the United States and other countries has increased and we expect will continue to increase the pressure on pharmaceutical pricing. 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 we receive regulatory approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

Other Healthcare Laws and Compliance Requirements

If we obtain regulatory approval for any of our product candidates, we may be subject to various federal and state laws targeting fraud and abuse in the healthcare industry. These laws may impact, among other things, our proposed sales, marketing and education programs. In addition, we may be subject to patient privacy regulation by both the federal government and the states in which we conduct our business. The laws that may affect our ability to operate include:

- the federal Anti-Kickback Statute, which prohibits, among other things, persons from knowingly and willfully soliciting, receiving, offering or paying remuneration, directly or indirectly, to induce, or in return for, the purchase or recommendation of an item or service reimbursable under a federal healthcare program, such as the Medicare and Medicaid programs;
- federal civil and criminal false claims laws and civil monetary penalty laws, which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, claims for payment from Medicare, Medicaid, or other third-party payors that are false or fraudulent;
- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, which created new federal criminal statutes that prohibit executing a scheme to defraud any healthcare benefit program and making false statements relating to healthcare matters;
- the federal transparency laws, including the provision of the Affordable Care Act referred to as the federal Physician Payment Sunshine Act, that requires drug and biologics manufacturers to disclose payments and other transfers of value provided to physicians and teaching hospitals and ownership interests of physicians and their immediate family members;
- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act, or HITECH, and its implementing regulations, which imposes certain requirements relating to the privacy, security and transmission of individually identifiable health information; and
- state law equivalents of each of the above federal laws, such as anti-kickback and false claims laws that may apply to items or services reimbursed by any third-party payor, including commercial insurers, and state laws governing the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts.

The Affordable Care Act broadened the reach of the fraud and abuse laws by, among other things, amending the intent requirement of the federal Anti-Kickback Statute and the applicable criminal healthcare fraud statutes contained within 42 U.S.C. § 1320a-7b. Pursuant to the statutory amendment, a person or entity no longer needs to have actual knowledge of this statute or specific intent to violate it in order to have committed a violation. In addition, the Affordable Care Act provides that the government may assert that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the civil False Claims Act or the civil monetary penalties statute. Many states have adopted laws similar to the federal Anti-Kickback Statute, some of which apply to the referral of patients for healthcare items or services reimbursed by any source, not only the Medicare and Medicaid programs.

We are also subject to the U.S. Foreign Corrupt Practices Act, or FCPA, which prohibits improper payments or offers of payments to foreign governments and their officials for the purpose of obtaining or retaining business. Safeguards we implement to discourage improper payments or offers of payments by our employees, consultants, and others may be ineffective, and violations of the FCPA and similar laws may result in severe criminal or civil sanctions, or other liabilities or proceedings against us, any of which would likely harm our reputation, business, financial condition and result of operations.

If our operations are found to be in violation of any of the laws described above or any other governmental regulations that apply to us, we may be subject to penalties, including civil and criminal penalties, exclusion from participation in government healthcare programs, such as Medicare and Medicaid and imprisonment, damages, fines and the curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our results of operations.

Employees

As of March 23, 2018 we had seven full-time employees. None of our employees are represented by labor unions or covered by collective bargaining agreements. We consider our relationship with our employees to be good.

Financial Information about Segments

We operate in a single accounting segment in the United States of America.

Reverse Merger

On December 21, 2016, Tokai Pharmaceuticals, Inc. ("Tokai"), a Delaware corporation, Otic, and the stockholders of Otic (each a "Seller" and collectively, the "Sellers"), entered into a Share Purchase Agreement (the "Share Purchase Agreement"), pursuant to which, among other things, each Seller agreed to sell to Tokai, and Tokai agreed to purchase from each Seller, all of the common and preferred shares of Otic ("Otic Shares") owned by such Seller in exchange for the issuance of a certain number of shares of common stock of Tokai, as determined pursuant to the terms of the Share Purchase Agreement (the "Reverse Merger"). The parties amended and restated the Share Purchase Agreement on March 2, 2017.

On May 9, 2017, Tokai, Otic, and the Sellers closed the transaction contemplated by the Share Purchase Agreement, and subsequently effected a reverse stock-split of common stock at a ratio of one-for-nine (see *Reverse Stock-Split* below). On a post-split basis, Tokai issued to the Sellers an aggregate of 4,027,693 shares of Tokai's common stock in exchange for 840,115 Otic Shares. Following the completion of the Reverse Merger, the business being conducted by Tokai became primarily the business conducted by Otic. In connection with the Reverse Merger, the name of the surviving corporation was changed to "Novus Therapeutics, Inc."

Emerging Growth Company

We qualify as an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012, as amended, or the JOBS Act. As an emerging growth company, we may take advantage of specified reduced disclosure and other requirements that are otherwise applicable generally to public companies. We would cease to be an emerging growth company on the date that is the earliest of: (i) the last day of the fiscal year in which we have total annual gross revenues of $1 billion or more; (ii) December 31, 2020; (iii) the date on which we have issued more than $1 billion in nonconvertible debt during the previous three years; or (iv) the date on which we are deemed to be a large accelerated filer under the rules of the SEC.

Corporate Information

Otic Pharma, Ltd. (Otic) was founded in the State of Israel in 2008. In 2015, Otic established U.S. operations and moved its corporate headquarters to Irvine, California. In 2017, Otic consummated the Reverse Merger with Tokai Pharmaceuticals, Inc., a Delaware corporation that was incorporated on March 26, 2004 and subsequently changed its name to Novus Therapeutics, Inc. Our executive offices are located at 19900 MacArthur Boulevard, Suite 550, Irvine, California 92612. Our telephone number is (949) 238-8090 and our website is novustherapeutics.com. We do not incorporate the information on or accessible through our website into this Annual Report, and you should not consider any information on, or that can be accessed through, our website as part of this Annual Report on Form 10-K.

You are advised to read this Annual Report on Form 10-K in conjunction with other reports and documents that we file from time to time with the Securities and Exchange Commission, or the SEC. In particular, please read our definitive proxy statement, which will be filed with the SEC in connection with our 2018 annual meeting of stockholders, our quarterly reports on Form 10-Q and any current reports on Form 8-K that we may file from time to time. You may obtain copies of these reports after the date of this annual report directly from us or from the SEC at the SEC's Public Reference Room at 100 F Street, N.E. Washington, D.C. 20549. In addition, the SEC maintains information for electronic filers (including Novus) at its website at www.sec.gov. The public may obtain information regarding the operation of the Public Reference Room by calling the SEC at 1-800-SEC-0330. We make our periodic and current reports available on our internet website, free of charge, as soon as reasonably practicable after such material is electronically filed with, or furnished to, the SEC.

Item 1A. Risk Factors.

You should carefully consider the following risk factors, as well as the other information in this Annual Report on Form 10-K, and in our other public filings. The occurrence of any of these risks could harm our business, financial condition, results of operations and/or growth prospects or cause our actual results to differ materially from those contained in forward-looking statements we have made in this report and those we may make from time to time. You should consider all of the risk factors described in our public filings when evaluating our business.

Risks Related to Our Operations

We have incurred significant operating losses since our inception and expect that we will continue to incur losses over the next several years and may never achieve or maintain profitability.

Since inception, Otic, the accounting acquirer in the Reverse Merger, has incurred significant operating losses. Otic's net loss was $5.7 million for the year ended December 31, 2016. As of December 31, 2016, Otic had an accumulated deficit of $14.4 million. The Company's net loss for the year ended December 31, 2017 is $13.1 million and the Company has an accumulated deficit of $27.5 million.

We are focused primarily on developing OP-02 as a potential first-in-class treatment option for patients at risk for or with otitis media ("OM") (middle ear inflammation with or without infection). We have not manufactured a a current Good Manufacturing Procedures ("cGMP") batch of OP-02 suitable for clinical trials. Subject to successful completion of formulation development and manufacture of a cGMP batch, we expect to initiate a phase 1 clinical program in 2018 to explore the safety and tolerability of OP-02 in healthy subjects, plus additional phase 1 studies in patients. The phase 1 program will evaluate single and repeated intranasal doses of OP-02. Upon completion of the phase 1 program, Novus intends to initiate phase 2 studies of OP-02, with an initial focus on prevention of OM in children. We expect that it will be several years, if ever, before we have a product candidate ready for commercialization. If we are unable to successfully complete the formulation of OP-02 and begin to generate clinical data for this program, we may have greater difficulty raising additional capital on favorable terms, or at all.

We expect to continue to incur significant expenses and increasing operating losses for the foreseeable future. The net losses that we incur may fluctuate significantly from quarter to quarter. We anticipate that our expenses will increase substantially if and as we:

- continue formulation development of our product candidates;
- continue nonclinical and clinical development of our product candidates;
- seek to identify and acquire additional product candidates;
- acquire or in-license other products and technologies;
- enter into collaboration arrangements with regards to product discovery or development;
- develop manufacturing processes;
- seek marketing approvals for any of our product candidates that successfully complete clinical trials;
- establish a sales, marketing and distribution infrastructure to commercialize any products for which we may obtain marketing approval;
- maintain, expand and protect our intellectual property portfolio;
- hire additional personnel;
- add operational, financial and management information systems and personnel, including personnel to support our product development and planned future commercialization efforts; and
- operate as a public company.

To become and remain profitable, we must develop and eventually commercialize a product or products with significant market potential. This will require us to be successful in a range of challenging activities, including completing clinical trials of our product candidates, obtaining marketing approval for these product candidates and manufacturing, marketing and selling those products for which we obtain marketing approval. We may never succeed in these activities and, even if we do, may never generate revenues that are significant or large enough to achieve profitability. 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 the Company, could impair our ability to raise capital, maintain our nonclinical and clinical development efforts, and expand our business or continue our operations and may require us to raise additional capital that may dilute the ownership interest of common stockholders. A decline in the value of the Company could also cause stockholders to lose all or part of their investment.

We are early in our development efforts and have only two drug candidates, OP-02 and OP-01. If we are unable to successfully develop and commercialize any drug candidate, or if we experience significant delays in doing so, our business will be materially harmed.

We currently do not have any products that have gained regulatory approval. We have invested substantially all of our efforts and financial resources in product development, including funding our formulation development, nonclinical, and clinical studies. Our ability to generate product revenues, which we do not expect will occur for several years, if ever, will depend heavily on the successful development and eventual commercialization of one or more drug candidates. As a result, our business is substantially dependent on our ability to successfully complete the development of and obtain regulatory approval for our, or additional product candidates.

We have not yet demonstrated an ability to successfully overcome many of the risks and uncertainties frequently encountered by companies in new and rapidly evolving fields, particularly in the pharmaceutical area. For example, to execute our business plan, we will need to successfully:

- execute formulation, clinical, and nonclinical development activities;
- in-license or acquire other product candidates and advance them through clinical development;
- obtain required regulatory approvals for the development and commercialization of OP-02 or other product candidates;
- maintain, leverage and expand our intellectual property portfolio;
- build and maintain robust sales, distribution and marketing capabilities, either on our own or in collaboration with strategic partners;
- gain market acceptance for OP-02, OP-01 and other product candidates;
- obtain and maintain adequate product pricing and reimbursement;
- develop and maintain any strategic relationships we elect to enter into; and
- manage our spending as costs and expenses increase due to product manufacturing, nonclinical development, clinical trials, regulatory approvals, post-marketing commitments, and commercialization.

If we are unsuccessful in accomplishing these objectives, we may not be able to successfully develop and commercialize our or other product candidates, and our business will suffer.

Our short operating history may make it difficult to evaluate the success of our business to date and to assess our future viability.

We are an early development stage pharmaceutical company. Our ongoing operations to date have been limited to organizing and staffing the Company, business planning, raising capital, acquiring and developing technology, identifying potential product candidates, undertaking nonclinical studies, and, up until the consummation of the Reverse Merger, early stage clinical studies of our most advanced product candidate, OP-01. Subsequent to the completion of the Reverse Merger, we paused the OP-01 development program and began focusing substantially all of our resources on the advancement of our surfactant program (OP-02) for middle ear disease. Operations related to OP-02 include arranging for third party vendors to formulate and manufacture material using current Good Manufacturing Procedures (“cGMP”) and preparing for phase 1 clinical studies. We have not yet demonstrated our ability to successfully complete large-scale, pivotal clinical trials, obtain marketing approvals, manufacture a commercial scale product or arrange for a third party to do so on our behalf, or conduct sales and marketing activities necessary for successful product commercialization. It can take many years to develop a new medicine from the time it is discovered to when it is available for treating patients. Consequently, any predictions made about our future success or viability based on our short operating history to date may not be as accurate as they could be if we had a longer operating history.

In addition, as an early stage business, we may encounter unforeseen expenses, difficulties, complications, delays and other known and unknown factors. To successfully market any of our product candidates, we will need to transition from a company with a clinical development focus to a company capable of supporting commercial activities. We may not be successful in such a transition.

Drug development involves a lengthy and expensive process with an uncertain outcome, including failure to demonstrate safety and efficacy to the satisfaction of the FDA or similar regulatory authorities outside the United States. We may incur additional costs or experience delays in completing, or ultimately be unable to complete, the formulation and commercialization of our product candidates.

Reformulation work for OP-01 to explore adding a second active ingredient (anesthetic) to address immediate relief of ear pain associated with Acute Otitis Externa (infection/inflammation of the outer ear canal) commenced in 2016, but was subsequently put on hold until further funding is obtained. At such time as when we recommence development of OP-01, additional clinical studies with the new OP-01 combination formulation (antibiotic + anesthetic) will need to be conducted. There is a risk that additional nonclinical and/or clinical safety studies will be required by the FDA or similar regulatory authorities outside the United States and/or that subsequent studies will not match results seen in prior studies. We have not manufactured a cGMP batch of OP-02 suitable for clinical trials. Formulation development for OP-02 is ongoing. Subject to successful completion of formulation development and manufacture of a cGMP batch, we expect to initiate a phase 1 clinical program in 2018. Given the early stage of development for both products, the risk of failure for both of our product candidates is high. Before obtaining marketing approval from regulatory authorities for the sale of any product candidate, we must complete formulation development for our products, conduct nonclinical trials, and then conduct extensive clinical trials to demonstrate the safety and efficacy of our product candidates in humans. Formulation development, nonclinical and clinical testing are all expensive activities, difficult to design and implement, and can take years to complete. The outcome of nonclinical and clinical trials is inherently uncertain. Failure can occur at any time during the development program, including during the clinical trial process. Further, the results of nonclinical studies and early clinical trials of our product candidates, as well as earlier generation formulations may not be predictive of the results of later-stage clinical trials. Interim results of a clinical trial do not necessarily predict final results. For instance, the results of our studies with earlier generation formulations of OP-01 may not be predictive of the results of studies conducted with a different formulation of OP-01. Moreover, nonclinical and clinical data are often susceptible to varying interpretations and analyses, and many companies that have believed their product candidates performed satisfactorily in nonclinical and clinical trials have nonetheless failed to obtain marketing approval of their products. It is impossible to predict when or if any of our product candidates will prove effective and safe in humans, or will receive regulatory approval.

We may experience delays in our clinical trials, and we do not know whether planned clinical trials will begin or enroll subjects on time, need to be redesigned or be completed on schedule, if at all. There can be no assurance that the European Medicines Agency (the "EMA"), the Medicines & Healthcare Products Regulatory Agency (the "MHRA"), the UK regulatory authority, or the FDA will not put any of our product candidates on clinical hold in the future. We may experience numerous unforeseen events during, or as a result of, clinical trials that could delay or prevent our ability to receive marketing approval or commercialize our product candidates. Clinical trials may be delayed, suspended or prematurely terminated for a variety of reasons, such as:

- delay or failure in reaching agreement with the EMA, MHRA, FDA or a comparable foreign regulatory authority on a trial design that we want to execute;
- delay or failure in obtaining authorization to commence a trial or inability to comply with conditions imposed by a regulatory authority regarding the scope or design of a clinical study;
- delays in reaching, or failure to reach, agreement on acceptable clinical trial contracts or clinical trial protocols with prospective trial sites;
- delays in completing formulation work as a prerequisite to commencing clinical work on this program;
- inability, delay, or failure in identifying and maintaining a sufficient number of trial sites, many of which may already be engaged in other clinical programs;
- delay or failure in recruiting and enrolling suitable subjects to participate in a trial;
- delay or failure in having subjects complete a trial or return for post-treatment follow-up;
- clinical sites and investigators deviating from trial protocol, failing to conduct the trial in accordance with regulatory requirements, or dropping out of a trial, including the possibility we could learn of additional subjects who were exposed by predecessor IND sponsors to investigational drugs outside of clinical protocols;
- lack of adequate funding to continue the clinical trial, including the incurrence of unforeseen costs due to enrollment delays, requirements to conduct additional clinical studies and increased expenses associated with the services of our contract research organizations ("CROs") and other third parties;

- clinical trials of our product candidates may produce negative or inconclusive results, and we may decide, or regulators may require us, to conduct additional clinical trials or abandon product development programs;
- the number of patients required for clinical trials of our product candidates may be larger than we anticipate, enrollment in these clinical trials may be slower than we anticipate, or participants may drop out of these clinical trials at a higher rate than we anticipate;
- we may experience delays or difficulties in the enrollment of patients that our product candidates are designed to target;
- our third-party contractors may fail to comply with regulatory requirements or meet their contractual obligations to us in a timely manner, or at all;
- we may have difficulty partnering with experienced CROs and study sites that can identify patients that our product candidates are designed to target and run our clinical trials effectively;
- regulators or institutional review boards ("IRBs") may require that we or our investigators suspend or terminate clinical research for various reasons, including noncompliance with regulatory requirements or a finding that the participants are being exposed to unacceptable health risks;
- the cost of clinical trials of our product candidates may be greater than we anticipate;
- the supply or quality of our product candidates or other materials necessary to conduct clinical trials of our product candidates may be insufficient or inadequate; or
- there may be changes in governmental regulations or administrative actions.

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

- be delayed in obtaining marketing approval for our product 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 safety warnings that would reduce the potential market for our products or inhibit our ability to successfully commercialize our products;
- be subject to additional post-marketing restrictions and/or testing requirements; or
- have the product removed from the market after obtaining marketing approval.

Our product development costs will also increase if we experience delays in testing or marketing approvals. We do not know whether any of our nonclinical studies or clinical trials will need to be restructured or will be completed on schedule, or at all. Significant nonclinical or clinical trial delays also could shorten any periods during which we may have the exclusive right to commercialize our product candidates or may allow our competitors to bring products to market before we do and impair our ability to successfully commercialize our product candidates and may harm our business and results of operations.

If we experience delays or difficulties in the enrollment of patients in clinical trials, our receipt of necessary regulatory approvals could be delayed or prevented and expenses for the development of our product candidates could increase.

We may not be able to initiate or continue clinical trials for our product candidates if we are unable to locate and enroll a sufficient number of eligible patients to participate in these trials to demonstrate safety and efficacy. We have yet to initiate the first clinical studies of OP-02 and we do not know whether the planned clinical trials will enroll subjects in a timely fashion, require redesign of essential trial elements or be completed on its projected schedule. In addition, competitors may have ongoing clinical trials for product candidates that treat related or the same indications as our product candidates, and patients who would otherwise be eligible for our clinical trials may instead enroll in clinical trials of our competitors' product candidates. Our inability to enroll a sufficient number of patients for our clinical trials would result in significant delays and could require us to abandon one or more clinical trials altogether.

Patient enrollment is affected by other factors including:

- the eligibility criteria for the study in question;
- the perceived risks and benefits of the product candidate under study;
- the efforts to facilitate timely enrollment in clinical trials;
- the inability to identify and maintain a sufficient number of trial sites, many of which may already be engaged in other clinical trial programs, including some that may be for the same disease indication;
- the patient referral practices of physicians;
- the proximity and availability of clinical trial sites for prospective patients;
- ambiguous or negative interim results of our clinical trials, or results that are inconsistent with earlier results;
- feedback from regulatory authorities, IRBs, ethics committees ("ECs"), or data safety monitoring boards, or results from earlier stage or concurrent nonclinical and clinical studies, that might require modifications to the protocol;
- decisions by regulatory authorities, IRBs, ECs, or the Company, or recommendations by data safety monitoring boards, to suspend or terminate clinical trials at any time for safety issues or for any other reason; and
- unacceptable risk-benefit profile or unforeseen safety issues or adverse effects.

Enrollment delays in our clinical trials may result in increased development costs for our product candidates, which would cause the value of the Company to decline and limit our ability to obtain additional financing.

If serious adverse events or unacceptable side effects are identified during the development of our product candidates, we may need to abandon or limit our development of some of our product candidates.

If our product candidates are associated with undesirable effects in nonclinical or clinical trials or have characteristics that are unexpected, we may need to interrupt, delay or abandon their development or limit development to more narrow 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. OP-02 has not been evaluated in any human clinical studies. OP-02 is an early-product candidate, and the side effect profile in humans has not been fully established. Currently unknown, drug-related side effects may be identified through OP-02 clinical studies and, as such, these possible drug-related side effects could affect patient recruitment, the ability of enrolled subjects to complete the trial, or result in potential product liability claims. Future reformulation of OP-01 may result in a product with an unacceptable side effect profile. Any occurrences of clinically significant adverse events with our product candidates may harm our business, financial condition and prospects significantly.

Risks Related to Our Financial Position and Need for Additional Capital

We will need substantial additional funding. If we are unable to raise capital when needed, we would be compelled to delay, reduce or eliminate our product development programs or commercialization efforts.

We expect our expenses to increase in parallel with our ongoing activities, particularly as we continue our nonclinical and clinical development, identify new clinical candidates and initiate clinical trials of, and seek marketing approval for, our product candidates. In addition, if we obtain marketing approval for any of our product candidates, we expect to incur significant commercialization expenses related to product sales, marketing, manufacturing and distribution. If we are unable to raise capital when needed or on attractive terms, we would be forced to delay, reduce or eliminate our nonclinical and clinical development programs or any future commercialization efforts.

Based upon current operating plans, we expect our current working capital will be sufficient to fund our operations for at least the next 12 months from the date of issuance of this report. We will require additional capital to complete the development and commercialization of OP-02 or other product candidates, and may also need to raise additional funds to pursue other development activities related to additional product candidates that we may develop. Our funding needs may fluctuate significantly based on a number of factors, such as:

- the scope, progress, results and costs of formulation development and manufacture of drug product to support nonclinical and clinical development of our product candidates;

- the extent to which we enter into additional collaboration arrangements regarding product discovery or development, or acquire or in-license products or technologies;
- our ability to establish additional collaborations with favorable terms, if at all;
- the costs, timing and outcome of regulatory review of our product candidates;
- the costs of future commercialization activities, including product sales, marketing, manufacturing and distribution, for any of our product candidates for which we receive marketing approval;
- revenue, if any, received from commercial sales of our product candidates, should any of our product candidates receive marketing approval; and
- the costs of preparing, filing and prosecuting patent applications, maintaining and enforcing our intellectual property rights and defending intellectual property-related claims.

Identifying potential product candidates and conducting formulation development, nonclinical testing and clinical trials is a time-consuming, expensive and uncertain process that takes years to complete, and we may never generate the necessary data or results required to obtain marketing approval and achieve product sales. In addition, our product candidates, if approved, may not achieve commercial success. Our commercial revenues, if any, will be derived from sales of products that we do not expect to be commercially available for several years, if at all. Accordingly, we will need to continue to rely on additional financing to achieve our business objectives. Adequate additional financing may not be available to us on acceptable terms, or at all.

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

Until such time, if ever, as we can generate substantial product revenues, we expect to finance our cash needs through a combination of equity offerings and debt financings. We do not have any committed external source of funds. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interest of common stockholders will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of common stockholders. Debt financing and preferred equity financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends.

We cannot be certain that additional funding will be available on acceptable terms, or at all. 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.

Future sales of shares by existing stockholders could cause the Company's stock price to decline.

If existing stockholders of the Company sell, or indicate an intention to sell, substantial amounts of the Company's common stock in the public market the trading price of the common stock of the combined company could decline. At December 31, 2017, the Company had approximately 7.1 million shares outstanding.

The Share Purchase Agreement by and among Tokai, Otic, and stockholders of Otic contained a lock-up covenant from the Otic stockholders, which expired on November 5, 2017. The lock-up covenant prevented any Otic stockholder from offering, selling, or otherwise disposing of, directly or indirectly, any securities of the Company, or otherwise enter into a transaction that would have similar effect for 180 days following the closing of the Reverse Merger. Concurrent with the Reverse Merger, the company completed the Private Placement. A registration statement covering the resale of the shares of Company common stock issuable in connection with the Private Placement is in effect, allowing up to 400,400 shares of common stock to be sold in the public market. Further, as of November 5, 2017, shares held by directors, executive officers of the Company and other affiliates are eligible for sale in the public market, subject to volume limitations under Rule 144 under the Securities Act.

Because the Reverse Merger resulted in an ownership change under Section 382 of the Internal Revenue Code, for Tokai, Tokai's pre-merger net operating loss carryforwards and certain other tax attributes are subject to limitations. The net operating loss carryforwards and other tax attributes of Otic and of the post-merger Company may also be subject to limitations as a result of ownership changes.

If a corporation undergoes an "ownership change" within the meaning of Section 382 of the Code, the corporation's net operating loss carryforwards and certain other tax attributes arising from before the ownership change are subject to limitations on use after the ownership change. In general, an ownership change occurs if there is a cumulative change in the corporation's equity ownership by certain stockholders that exceeds 50 percentage points over a rolling three-year period. Similar rules may apply under state tax laws. The Reverse Merger resulted in an ownership change for Tokai and, accordingly, Tokai's net operating loss carryforwards and certain other tax attributes may be subject to limitations (or disallowance) on their use after the Reverse Merger. Otic's net operating loss carryforwards may also be subject to limitation as a result of prior shifts in equity ownership and/or the transaction. Additional ownership changes in the future could result in additional limitations on Tokai's, Otic's and the post-merger Company's net operating loss carryforwards. Consequently, even if the Company achieves profitability, it may not be able to utilize a material portion of Tokai's, Otic's, or the post-merger Company's net operating loss carryforwards and other tax attributes, which could have a material adverse effect on cash flow and results of operations.

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

If we are not able to obtain, or if there are delays in obtaining, required regulatory approvals, or the approvals may be for a narrow indication, we may not be able to commercialize our product candidates, and our ability to generate revenue may be materially impaired.

Our product candidates must be approved by the FDA pursuant to a new drug application in the United States and by other regulatory authorities outside the United States prior to commercialization. The process of obtaining marketing approvals, both in the United States and outside the United States, is expensive and takes several years, if approval is obtained at all, and can vary substantially based upon a variety of factors, including the type, complexity and novelty of the product candidates involved. Failure to obtain marketing approval for a product candidate will prevent us from commercializing the product candidate. We have not received approval to market any of our product candidates from regulatory authorities in any country. We have no experience in filing and supporting the applications necessary to gain marketing approvals for ear, nose, or throat (ENT) products and may engage third-party consultants to assist in this process. Securing marketing approval requires the submission of extensive nonclinical and clinical data, and other supporting information to regulatory authorities for each therapeutic indication to establish the product candidate's safety and efficacy. Securing marketing approval also requires the submission of information about the product formulation and manufacturing process to, and inspection of manufacturing facilities by, the regulatory authorities. Our product 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. Regulatory authorities have substantial discretion in the approval process and may refuse to accept any application or may decide that our data are insufficient for approval and require additional nonclinical, clinical or other data. In addition, varying interpretations of the data obtained from nonclinical and clinical studies could delay, limit or prevent marketing approval of a product candidate. 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 also cause delays in or prevent the approval of an application.

Any marketing approval we ultimately obtain may be for fewer or more limited indications than requested or subject to restrictions or post-approval commitments that render the approved product not commercially viable or its market potential significantly impaired. In addition, regulatory agencies may not approve the labeling claims that are necessary or desirable for the successful commercialization of our product candidates.

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

Failure to obtain marketing approval in international jurisdictions would prevent our product candidates from being marketed outside the United States.

In order to market and sell our products in the European Union and other international jurisdictions outside of the United States, 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 may require additional nonclinical,

clinical or health outcome data. In addition, the time required to obtain approval may differ substantially amongst international jurisdictions. The regulatory approval process outside the United States generally includes all the risks associated with obtaining FDA approval. In addition to regulatory approval, in many countries outside the United States, it is required that the product be approved for reimbursement before the product can be approved for sale in that country. We or these third parties may not obtain approvals from regulatory authorities outside the United States on a timely basis, if at all. Approval by the EMA, MHRA, or 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.

Any product candidate for which we obtain marketing approval will be subject to extensive post-marketing regulatory requirements and could be subject to post-marketing restrictions or withdrawal from the market, and we may be subject to penalties if we fail to comply with regulatory requirements or if we experience unanticipated problems with our products, when and if any of them are approved.

Our product candidates and the activities associated with their development and commercialization, including their testing, manufacture, recordkeeping, labeling, storage, approval, advertising, promotion, sale and distribution, are subject to comprehensive regulation that are specific to those defined by regulatory authorities in the countries where the product is approved. In the United States and other countries that follow the International Conference on Harmonization (ICH), these requirements include submissions of safety and other post-marketing information and reports, registration and listing requirements, cGMP requirements relating to manufacturing, quality control, quality assurance and corresponding maintenance of records and documents, including periodic inspections by the FDA and other regulatory authorities, requirements regarding the distribution of samples to physicians and recordkeeping.

The FDA, or other regulatory authorities, may also impose requirements for costly post-marketing studies or clinical trials and surveillance to monitor the safety or efficacy of the product. The FDA closely regulates the post-approval marketing and promotion of drugs to ensure drugs are marketed only for the approved indications and in accordance with the provisions of the approved labeling. The FDA imposes stringent restrictions on manufacturers' communications regarding use of their products and if we promote our products beyond their approved indications, we may be subject to enforcement action for off-label promotion. Violations of the Federal Food, Drug, and Cosmetic Act relating to the promotion of prescription drugs may lead to investigations alleging violations of federal and state healthcare 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 product distribution or use;
- requirements to conduct post-marketing studies or clinical trials;
- warning or untitled letters;
- withdrawal of the products from the market;
- refusal to approve pending applications or supplements to approved applications that we submit;
- recall of products;
- fines, restitution or disgorgement of profits or revenues;
- suspension or withdrawal of marketing approvals;
- refusal to permit the import or export of our products;
- product seizure; or
- injunctions or the imposition of civil or criminal penalties.

Non-compliance with 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.

Recently enacted and future legislation may increase the difficulty and cost for us to obtain marketing approval of and commercialize our product candidates and affect the prices we 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 prevent or delay marketing approval of our product candidates, restrict or regulate post-approval activities and affect our ability to profitably sell any product candidates for which we obtain marketing approval.

For example, in 2010, President Obama signed into law the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act (collectively, the "PPACA"). Among the provisions of the PPACA of importance to our potential product candidates are the following:

- an annual, nondeductible fee on any entity that manufactures or imports specified branded prescription drugs and biologic agents;
- an increase in the statutory minimum rebates a manufacturer must pay under the Medicaid Drug Rebate Program;
- expansion of healthcare fraud and abuse laws, including the False Claims Act and the Anti-Kickback Statute, new government investigative powers, and enhanced penalties for noncompliance;
- a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% point-of-sale discounts off negotiated prices;
- extension of manufacturers' Medicaid rebate liability;
- expansion of eligibility criteria for Medicaid programs;
- expansion of the entities eligible for discounts under the Public Health Service pharmaceutical pricing program;
- new requirements to report financial arrangements with physicians and teaching hospitals;
- a new requirement to annually report drug samples that manufacturers and distributors provide to physicians; and
- a new Patient-Centered Outcomes Research Institute to oversee, identify priorities in, and conduct comparative clinical effectiveness research, along with funding for such research.

In addition, other legislative changes have been proposed and adopted since the PPACA was enacted. These changes included aggregate reductions to Medicare payments to providers of up to 2% per fiscal year, starting in 2013. In January 2013, President Obama signed into law the American Taxpayer Relief Act of 2012, which, 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. Further, under the current Trump administration there may be additional regulatory changes, as well as the potential repeal (in whole or in part) of the PPACA, that could negatively affect insurance coverage and/or drug prices. Any such new laws may result in additional reductions in Medicare and other healthcare funding.

We expect that the PPACA, 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 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 payers. 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.

Legislative and regulatory proposals have been made to expand post-approval requirements and restrict sales and promotional activities for pharmaceutical products. Additionally, legislation has been introduced to repeal the PPACA. 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 product candidates, if any, may be. In addition, increased scrutiny by the U.S. Congress of the FDA's approval process may significantly delay or prevent marketing approval, as well as subject us to more stringent product labeling and post-marketing testing and other requirements.

Laws, restrictions, and other regulatory measures are also imposed by healthcare laws and regulations in international jurisdictions and in those jurisdictions we face the same issues as in the United State regarding difficulty and cost for us to obtain marketing approval and commercialization of our product candidates and which may affect the prices we may obtain.

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

In some countries, particularly the countries of the European Union, the pricing of prescription pharmaceuticals is subject to governmental control. 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 may be required to conduct a clinical trial that compares the cost-effectiveness of our product candidate 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 harmed, possibly materially.

Our relationships with customers and third-party payers will be subject to applicable anti-kickback, fraud and abuse and other healthcare laws and regulations, which could expose us to criminal sanctions, civil penalties, program exclusion, contractual damages, reputational harm and diminished profits and future earnings.

Healthcare providers, physicians and third-party payers play a primary role in the recommendation and prescription of any product candidates for which we receive marketing approval. Our future arrangements with third-party payers and customers 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 the products for which we receive marketing approval. Restrictions under applicable federal and state healthcare laws and regulations include the following:

- the federal healthcare 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 either the referral of an individual for, or the purchase, order or recommendation of, any good or service, for which payment may be made under federal and state healthcare programs such as Medicare and Medicaid;
- the federal False Claims Act imposes civil penalties, including civil whistleblower or qui tam actions, against individuals or entities for knowingly presenting, or causing to be presented, to the federal government, claims for payment that are false or fraudulent or making a false statement to avoid, decrease or conceal an obligation to pay money to the federal government;
- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act, imposes criminal and civil liability for executing a scheme to defraud any healthcare benefit program and also imposes obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information;
- the federal false statements statute 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 under the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010, require manufacturers of covered drugs, devices, biologics and medical supplies to report to the Department of Health and Human Services information related to physician payments and other transfers of value and physician ownership and investment interests; and
- analogous state laws and regulations, such as state anti-kickback and false claims laws, may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payers, including private insurers, and 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 to physicians and other healthcare providers or marketing expenditures.

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 physicians and other healthcare providers 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.

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, 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 providers or entities with whom we expect to do business are found to be not in compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs.

Laws, restrictions, and other regulatory measures are also imposed by anti-kickback, fraud and abuse, and other healthcare laws and regulations in international jurisdictions and in those jurisdictions we face the same issues as in the United State regarding exposure to criminal sanctions, civil penalties, program exclusion, contractual damages, reputational harm, and diminished profits and future earnings.

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 harm our business.

We may incur substantial costs in order to comply with current or future environmental, health and safety laws and regulations. These current or future laws and regulations may impair our nonclinical or clinical development or production efforts. Our failure to comply with these laws and regulations also may result in substantial fines, penalties or other sanctions.

Risks Related to the Commercialization of Our Product Candidates

Even if any of our product candidates receives marketing approval, we may fail to achieve the degree of market acceptance by physicians, patients, third-party payers and others in the medical community necessary for commercial success.

If any of our product candidates receives marketing approval, we may nonetheless fail to gain sufficient market acceptance by physicians, patients, third-party payers and others in the medical community. In addition, physicians, patients and third-party payers may prefer other novel products to ours. If our product candidates do not achieve an adequate level of acceptance, we may not generate significant product revenues and we may not become profitable. The degree of market acceptance of our product candidates, if approved for commercial sale, will depend on a number of factors, including:

- the efficacy and safety and potential advantages and disadvantages compared to alternative treatments;
- the ability to offer our products for sale at competitive prices;
- the convenience and ease of administration compared to alternative treatments;
- the willingness of the target patient population to try new therapies and of physicians to prescribe these therapies;
- the strength of our marketing and distribution support;
- the availability of third-party coverage and adequate reimbursement, including patient cost-sharing programs such as copays and deductibles;
- the ability to develop or partner with third-party collaborators to develop companion diagnostics;
- the prevalence and severity of any side effects; and
- any restrictions on the use of our products together with other medications.

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

Clinical trials are conducted in carefully defined subsets of patients who have agreed to enter into clinical trials. Consequently, it is possible that our clinical trials may indicate an apparent beneficial effect of a product candidate that is greater than the actual positive effect in a broader patient population or alternatively fail to identify undesirable side effects.

If, following approval of a product candidate, we, or others, discover that the product is less effective than previously believed or causes undesirable side effects that were not previously identified, any of the following events could occur:

- regulatory authorities may withdraw their approval of the product or seize the product;
- the product may be required to be recalled or changes may be required to the way the product is administered;
- additional restrictions may be imposed on the marketing of, or the manufacturing processes for, the product;
- regulatory authorities may require the addition of labeling statements, such as a “black box” warning or a contraindication;
- the creation of a Medication Guide outlining the risks of the previously unidentified side effects for distribution to patients;
- additional restrictions may be imposed on the distribution or use of the product via a Risk Evaluation and Mitigation Strategy;
- we could be sued and held liable for harm caused to patients;
- the product 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. The commercial prospects for our product candidates may be harmed and our ability to generate revenues will be materially impaired.

We currently have no marketing and sales force. If we are unable to establish effective marketing and sales capabilities or enter into agreements with third parties to market and sell our product candidates, we may not be able to effectively market and sell our product candidates, if approved, or generate product revenues.

We currently do not have a marketing or sales team for the marketing, sales and distribution of any of our product candidates that are able to obtain regulatory approval. In order to commercialize any product candidates, we must build on a territory-by-territory basis marketing, sales, distribution, managerial and other non-technical capabilities or make arrangements with third parties to perform these services, and we may not be successful in doing so. If our product candidates receive regulatory approval, we intend to establish an internal sales and marketing team with technical expertise and supporting distribution capabilities to commercialize our product candidates, which will be expensive and time-consuming, will require significant attention of our executive officers to manage and may nonetheless fail to effectively market and sell our product candidates. Any failure or delay in the development of our internal sales, marketing and distribution capabilities would adversely impact the commercialization of any of our products that we obtain approval to market. With respect to the commercialization of all or certain of our product candidates, we may choose to collaborate, either globally or on a territory-by-territory basis, with third parties that have direct sales forces and established distribution systems, either to augment our own sales force and distribution systems or in lieu of our own sales force and distribution systems. If we are unable to enter into such arrangements when needed on acceptable terms or at all, we may not be able to successfully commercialize any of our product candidates that receive regulatory approval or any such commercialization may experience delays or limitations. If we are not successful in commercializing our product candidates, either on our own or through collaborations with one or more third parties, our future product revenue will suffer and we may incur significant additional losses.

We face substantial competition, which may result in others discovering, developing or commercializing competing products before or more successfully than we do.

The development and commercialization of new drug products is highly competitive. We face competition with respect to our current product candidates, and will face competition with respect to any product candidates that we may seek to develop or commercialize in the future, from major pharmaceutical companies, specialty pharmaceutical companies and biotechnology companies worldwide. There are a number of large pharmaceutical and biotechnology companies that currently market and sell products or are pursuing the development of products for the treatment of the disease indications for which we are developing our product candidates. Some of these competitive products and therapies are based on scientific approaches that are the same as or similar to our approach, and others are based on entirely different approaches. Potential competitors also include academic institutions, government agencies and other public and private research organizations that conduct research, seek patent protection and establish collaborative arrangements for research, development, manufacturing and commercialization.

Specifically, there are a number of companies developing or marketing treatments for AOE, including many major pharmaceutical and biotechnology companies. We expect that OP-01 will face competition from numerous FDA-approved therapeutics, including CIPRODEX® and numerous other branded and generic ear anti-infectives.

In OM, there are currently no drug therapies approved for the treatment or prevention of OM. We expect that OP-02 will compete primarily with a surgery where the tympanic membrane is perforated to improve drainage and ventilation of the middle ear (myringotomy or tympanostomy tube insertions) as a means of preventing recurrent or chronic OM. We may also compete with a medical device that uses a small intranasal balloon inserted into the Eustachian tube to facilitate ventilation of the Eustachian tube in patients with Eustachian tube dysfunction of a particular type. Surgery may continue to be the preferred treatment for OM in children whereas the intranasal balloon may be the preferred treatment for Eustachian tube dysfunction in adults. Patients may be prescribed concurrent antibiotic therapy for acute OM, but these products will not be competitive with, but likely used in conjunction with OP-02.

Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are safer, more effective, have fewer or less severe side effects, are more convenient or are less expensive than any products that we may develop. In addition, our ability to compete may be affected in many cases by insurers or other third-party payers seeking to encourage the use of generic products.

Generic products are currently available, with additional products expected to become available over the coming years, potentially creating pricing pressure. If our product candidates achieve marketing approval, we expect that they will be priced at a significant premium over competitive generic products.

Many of the companies against which we are competing or against which we may compete in the future have significantly greater financial resources and expertise in research and development, manufacturing, conducting nonclinical studies, conducting clinical trials, obtaining regulatory 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 and other early stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These third parties compete with us in recruiting and retaining qualified scientific and management personnel, establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs.

The insurance coverage and reimbursement status of newly approved products is uncertain. Failure to obtain or maintain adequate coverage and reimbursement for new or current products could limit our ability to market those products and decrease our ability to generate revenue.

The availability and extent of reimbursement by governmental and private payers is essential for most patients to be able to afford expensive treatments. Sales of our product candidates will depend substantially, both domestically and internationally, on the extent to which the costs of our product candidates will be paid by health maintenance, managed care, pharmacy benefit and similar healthcare management organizations, or reimbursed by government health administration authorities, private health coverage insurers and other third-party payers. If reimbursement is not available, or is available only to limited levels, we may not be able to successfully commercialize our product candidates. Even if coverage is provided, the approved reimbursement amount may not be high enough to allow us to establish or maintain pricing sufficient to realize a sufficient return on our investment.

There is significant uncertainty related to the insurance coverage and reimbursement of newly approved products. In the United States, the principal decisions about reimbursement for new medicines are typically made by the Centers for Medicare & Medicaid Services (“CMS”), an agency within the U.S. Department of Health and Human Services, as CMS decides whether and to what extent a new medicine will be covered and reimbursed under Medicare. Private payers tend to follow CMS to a substantial degree. It is difficult to predict what CMS will decide with respect to reimbursement for fundamentally novel products such as ours, as there is no body of established practices and precedents for these new products. Reimbursement agencies in Europe may be more conservative than CMS. Outside the United States, international operations are generally subject to extensive governmental price controls and other market regulations, and we believe the increasing emphasis on cost-containment initiatives in Europe, Canada, and other countries has and will continue to put pressure on the pricing and usage of our product candidates. In many countries, the prices of medical products are subject to varying price control mechanisms as part of national health systems. In general, the prices of medicines under such systems are substantially lower than in the United States. Other countries allow companies to fix their own prices for medicines, but monitor and control company profits. Additional foreign price controls or other changes in pricing regulation could restrict the amount that we are able to charge for our product candidates. Accordingly, in markets outside the United States, the

reimbursement for our products may be reduced compared with the United States and may be insufficient to generate commercially reasonable revenues and profits.

Moreover, increasing efforts by governmental and third-party payers, in the United States and internationally, to cap or reduce healthcare costs may cause such organizations to limit both coverage and level of reimbursement for new products approved and, as a result, they may not cover or provide adequate payment for our product candidates. Increased expense is incurred to cover costs of health outcome focused research used to generate data necessary to justify the value of our products in order to secure reimbursement. We expect to experience pricing pressures in connection with the sale of any of our product candidates, due to the trend toward managed healthcare, the increasing influence of health maintenance organizations and additional legislative changes. The downward pressure on healthcare costs in general, particularly prescription drugs and surgical procedures and other treatments, has become very intense. As a result, increasingly high barriers are being erected to the entry of new products into the healthcare market.

In addition, many private payers contract with commercial vendors who sell software that provide guidelines that attempt to limit utilization of, and therefore reimbursement for, certain products deemed to provide limited benefit to existing alternatives. Such organizations may set guidelines that limit reimbursement or utilization of our products.

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

We face an inherent risk of product liability exposure related to the testing of our product candidates in human clinical trials and will face an even greater risk if we commercially sell any products that we may develop. If we cannot successfully defend against claims that our product candidates or products caused injuries, we will incur substantial liabilities. Regardless of merit or eventual outcome, liability claims may result in:

- decreased demand for any product 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 the related 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.

We currently hold $2 million in product liability insurance coverage in the aggregate, with a per incident limit of $2 million, which may not be adequate to cover all liabilities that we may incur. We may need to increase our insurance coverage as we expand our clinical trials or if we commence commercialization of our product candidates. Insurance coverage is increasingly expensive. We may not be able to maintain insurance coverage at a reasonable cost or in an amount adequate to satisfy any liability that may arise.

Risks Related to Our Dependence on Third Parties

Future development collaborations may be important to us. If we are unable to enter into or maintain these collaborations, or if these collaborations are not successful, our business could be adversely affected.

For some of our product candidates, we may in the future determine to seek to collaborate with pharmaceutical and biotechnology companies for development or commercialization of our product candidates. We face significant competition in seeking appropriate collaborators. Our ability to reach a definitive agreement for any 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. If we are unable to reach agreements with suitable collaborators on a timely basis, on acceptable terms, or at all, we may have to curtail the development of a product candidate, reduce or delay its development program or one or more of our other development programs, delay its potential development schedule or reduce the scope of research activities, or increase our expenditures and undertake discovery or nonclinical development activities at our own expense. If we fail to enter into collaborations and do not have sufficient funds

or expertise to undertake the necessary development activities, we may not be able to further develop our product candidates or continue to develop our product candidates, and our business may be materially and adversely affected.

Future collaborations we may enter into may involve the following risks:

- collaborators may have significant discretion in determining the efforts and resources that they will apply to these collaborations;
- collaborators may not perform their obligations as expected;
- changes in the collaborators' strategic focus or available funding, or external factors, such as an acquisition, may divert resources or create competing priorities;
- collaborators may delay discovery, nonclinical or clinical development, provide insufficient funding for product development of targets selected by us, stop or abandon discovery, nonclinical or clinical development for a product candidate, or repeat or conduct new discovery, and nonclinical and clinical development for a product candidate;
- collaborators could independently develop, or develop with third parties, products that compete directly or indirectly with our products or product candidates if the collaborators believe that competitive products are more likely to be successfully developed than our products;
- product candidates discovered in collaboration with us may be viewed by our collaborators as competitive with their own product candidates or products, which may cause collaborators to cease to devote resources to the development of our product candidates;
- disagreements with collaborators, including disagreements over proprietary rights, contract interpretation or the preferred course of development, might cause delays or termination of the discovery, nonclinical or clinical development or commercialization of product candidates, might lead to additional responsibilities for us with respect to product 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 intellectual property rights licensed to us 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;
- collaborators may infringe the intellectual property rights of third parties, which may expose us to litigation and potential liability; and
- collaborations may be terminated for the convenience of the collaborator and, if terminated, we could be required to raise additional capital to pursue further development or commercialization of the applicable product candidates.

Additionally, subject to its contractual obligations to us, if a collaborator is involved in a business combination, the collaborator might deemphasize or terminate the development of any of our product candidates. If one of our collaborators terminates its agreement with us, we may find it more difficult to attract new collaborators and our perception in the business and financial communities could be adversely affected.

If our collaborations do not result in the successful development of products or product candidates, product candidates could be delayed and we may need additional resources to develop product candidates. All of the risks relating to product development, regulatory approval and commercialization described in this periodic report also apply to the activities of our collaborators.

We contract with third parties for the manufacture of our product candidates for nonclinical and clinical studies and expect to continue to do so for commercialization. This reliance on third parties increases the risk that we will not have sufficient quantities of our product candidates or products at an acceptable cost and quality, which could delay, prevent or impair our development or commercialization efforts.

We have utilized, and intend to continue utilizing, third parties to formulate, manufacture, package, and distribute clinical supplies of our drug candidates. We have no experience in manufacturing and do not have any manufacturing facilities. Currently, we have sole suppliers for one or more of our active pharmaceutical ingredients ("API"), and a different sole manufacturer for each of our product candidates. In addition, these materials are custom-made and available from only a limited number of sources. In particular, there may be a limited supply source for APIs for OP-02 or other potential product candidates. Although we believe

that our third-party suppliers maintain a significant supply of APIs on hand, any sustained disruption in this supply could adversely affect our operations. We do not have any long-term agreements in place with our current API suppliers. If we are required to change manufacturers, we may experience delays associated with finding an alternate manufacturer that is properly qualified to produce supplies of our products and product candidates in accordance with regulatory requirements and our specifications. Any delays or difficulties in obtaining APIs or in manufacturing, packaging or distributing approved product candidates could negatively affect our sales revenues, as well as delay our clinical trials.

We expect to rely on third-party manufacturers or third-party collaborators for the manufacture of commercial supply of any other product candidates for which our collaborators or we obtain marketing approval. Despite drug substance and product risk management, this reliance on third parties presents a risk that we will not have sufficient quantities of our product candidates or products or such quantities at an acceptable cost or quality, which could delay, prevent or impair our development or commercialization efforts. Any performance failure on the part of our existing or future manufacturers of drug substance or drug products could delay clinical development or marketing approval. We do not currently have arrangements in place for redundant supply. If suppliers cannot supply us with our requirements, we may be required to identify alternative manufacturers, which would lead us to incur added costs and delays in identifying and qualifying any such replacement.

Formulations and devices used in early studies are not final formulations and devices for commercialization. Additional changes may be required by the FDA or other regulatory authorities on specifications and storage conditions. These may require additional studies, and may result in a delay in our clinical trials and commercialization activities.

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

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

- reliance on the third party for regulatory compliance and quality assurance;
- the possible breach of the manufacturing agreement by the third party;
- the possible misappropriation of our proprietary information, including our trade secrets and know-how; and
- the possible termination or nonrenewal of the agreement by the third party at a time that is costly or inconvenient for us.

The third parties we rely on for manufacturing and packaging are also subject to regulatory review, and any regulatory compliance problems with these third parties could significantly delay or disrupt our clinical or commercialization activities. Third-party manufacturers may not be able to comply with cGMP regulations or similar regulatory requirements outside the United States. Our failure, or the failure of our third-party manufacturers, to comply with applicable regulations could result in sanctions being imposed on us, including clinical holds, fines, injunctions, civil penalties, delays, suspension or withdrawal of approvals, license revocation, seizures or recalls of product candidates or products, operating restrictions and criminal prosecutions, any of which could significantly and adversely affect supplies of our products. Additionally, macro-economic conditions may adversely affect these third parties, causing them to suffer liquidity or operational problems. If a key third-party vendor becomes insolvent or is forced to lay off workers assisting with our projects, our results and development timing could suffer.

Our product candidates and any products that we may develop may compete with other product candidates and products for access to manufacturing facilities. There are a limited number of manufacturers that operate under cGMP regulations and that might be capable of manufacturing for us.

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

We depend on contract research organizations ("CROs") and other contracted third parties to perform nonclinical and clinical testing and certain other research and development activities. As a result, the outcomes of the activities performed by these organizations will be, to a certain extent, beyond our control.

The nature of outsourcing a substantial portion of our business will require that we rely on CROs and other contractors to assist us with research and development, clinical testing activities, patient enrollment, data collection, and regulatory submissions to the FDA or other regulatory bodies. As a result, our success will depend partially on the success of these third parties in performing their responsibilities. Although we intend to pre-qualify our CROs and other contractors and we believe that the contractors selected will be fully capable of performing their contractual obligations, we cannot directly control the adequacy and timeliness of the resources and expertise that they apply to these activities. Additionally, macro-economic conditions may affect our development partners and vendors, which could adversely affect their ability to timely perform their tasks. If our contractors do not perform their obligations in an adequate and timely manner, the pace of clinical development, regulatory approval and commercialization of our drug candidates could be significantly delayed and our prospects could be adversely affected.

Risks Related to Our Intellectual Property

If we are unable to obtain and maintain intellectual property protection for our technology and products or if the scope of the intellectual property protection obtained is not sufficiently broad, our competitors could develop and commercialize technology and products similar or identical to ours, and our ability to successfully commercialize our technology and products may be impaired.

Our success depends in large part on our ability to obtain and maintain patent protection in the European Union, the United States and other countries with respect to our proprietary technology and products. We seek to protect our proprietary position by filing patent applications in the United States and internationally that are related to our novel technologies and product candidates. This patent portfolio includes issued patents and pending patent applications covering pharmaceutical methods of use.

The patent prosecution process is expensive and time-consuming, and we may not be able to file and prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner. We may choose not to seek patent protection for certain innovations and may choose not to pursue patent protection in certain jurisdictions, and under the laws of certain jurisdictions, patents or other intellectual property rights may be unavailable or limited in scope. It is also possible that we will fail to identify patentable aspects of our discovery and nonclinical development output before it is too late to obtain patent protection. Moreover, in some circumstances, we may not have the right to control the preparation, filing and prosecution of patent applications, or to maintain the patents, covering technology that we license from third parties. Therefore, these patents and applications may not be prosecuted and enforced in a manner consistent with the best interests of our business.

The patent position of biotechnology and pharmaceutical companies generally is highly uncertain, involves complex legal and factual questions and has in recent years been the subject of much litigation. In addition, the laws of foreign countries may not protect our rights to the same extent as the laws of the United States. For example, India and China do not allow patents for methods of treating the human body. Publications of discoveries in the scientific literature often lag behind the actual discoveries, and patent applications in the United States and other jurisdictions are typically not published until 18 months after filing, or in some cases not at all. Therefore, we cannot know with certainty whether we were the first to make the inventions claimed in our owned or licensed patents or pending patent applications, or that we were the first to file for patent protection of such inventions. As a result, the issuance, scope, validity, enforceability and commercial value of our patent rights are highly uncertain. Our pending and future patent applications may not result in patents being issued which protect our technology or products, in whole or in part, or which effectively prevent others from commercializing competitive technologies and products. Changes in either the patent laws or interpretation of the patent laws in the European Union, the United States and other countries may diminish the value of our patents or narrow the scope of our patent protection.

Recent patent reform legislation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents. On September 16, 2011, the Leahy-Smith America Invents Act (the "Leahy-Smith Act"), was signed into law. The Leahy-Smith Act includes a number of significant changes to United States patent law. These include provisions that affect the way patent applications are prosecuted and may also affect patent litigation. The United States Patent and Trademark Office ("USPTO") recently developed new regulations and procedures to govern administration of the Leahy-Smith Act, and many of the substantive changes to patent law associated with the Leahy-Smith Act, and in particular, the first to file provisions, only became effective on March 16, 2013. Accordingly, it is not clear what, if any, impact the Leahy-Smith Act will have on the operation of our business. However, the Leahy-Smith Act and its implementation

could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business and financial condition.

Moreover, we may be subject to a third-party pre-issuance submission of prior art to the USPTO, or become involved in opposition, derivation, reexamination, inter partes review, post-grant review or interference proceedings challenging our patent rights or the patent rights of others. An adverse determination in any such submission, proceeding or litigation could reduce the scope of, or invalidate, our patent rights, allow third parties to commercialize our technology or products and compete directly with us, without payment to us, or result in our inability to manufacture or commercialize products without infringing third-party patent rights. In addition, if the breadth or strength of protection provided by our patents and patent applications is threatened, it could dissuade companies from collaborating with us to license, develop or commercialize current or future product candidates.

Even if our owned and licensed patent applications issue as patents, they may not issue in a form that will provide us with any meaningful protection, prevent competitors from competing with us or otherwise provide us with any competitive advantage. Our competitors may be able to circumvent our owned or licensed patents by developing similar or alternative technologies or products in a non-infringing manner.

The issuance of a patent is not conclusive as to its inventorship, scope, validity, or enforceability, and our owned and licensed patents may be challenged in the courts or patent offices in the United States and abroad. Such challenges may result in loss of exclusivity or freedom to operate or in patent claims being narrowed, invalidated or held unenforceable, in whole or in part, which could limit our ability to stop others from using or commercializing similar or identical technology and products, or limit the duration of the patent protection of our technology and products. Given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized. As a result, our owned and licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing products similar or identical to our own.

The risks described elsewhere pertaining to our patents and other intellectual property rights also apply to the intellectual property rights that we license, and any failure to obtain, maintain and enforce these rights could have a material adverse effect on our business. In some cases, we may not have control over the prosecution, maintenance or enforcement of the patents that we license, and our licensors may fail to take the steps that we believe are necessary or desirable in order to obtain, maintain and enforce the licensed patents. Any inability on our part to protect adequately our intellectual property may have a material adverse effect on our business, operating results and financial position.

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

Periodic maintenance fees, renewal fees, annuity fees and various other governmental fees on patents and/or applications will be due to be paid to the USPTO and various governmental patent agencies outside of the United States in several stages over the lifetime of the patents and/or applications. The USPTO and various non-U.S. governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other similar provisions during the patent application process. In certain situations, non-compliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, our competitors might be able to enter the market and this circumstance would have a material adverse effect on our business.

If we fail to comply with our obligations in the agreements under which we license intellectual property and other rights from third parties or otherwise experience disruptions to our business relationships with our licensors, we could lose license rights that are important to our business.

We have acquired rights to our OP-02 technology through a license agreement with Otodyne, Inc. and may in the future enter into other license agreements with third parties for other intellectual property rights or assets. These license agreements may impose various diligence, milestone payment, royalty, and other obligations on us. If we fail to comply with our obligations under these agreements, or we are subject to a bankruptcy, we may be required to make certain payments to the licensor, we may lose the exclusivity of our license, or the licensor may have the right to terminate the license, in which event we would not be able to develop or market products covered by the license. Additionally, the milestone and other payments associated with these licenses will make it less profitable for us to develop our drug candidates than if we had developed the licensed technology internally.

In some cases, patent prosecution of our licensed technology may be controlled solely by the licensor. If our licensors fail to obtain and maintain patent or other protection for the proprietary intellectual property we license from them, we could lose our rights to the intellectual property or our exclusivity with respect to those rights, and our competitors could market competing products using the intellectual property. In certain cases, we may control the prosecution of patents resulting from licensed technology. In the event we breach any of our obligations related to such prosecution, we may incur significant liability to our licensing partners. If disputes over intellectual property and other rights that we have licensed prevent or impair our ability to maintain our current licensing arrangements on acceptable terms, we may be unable to successfully develop and commercialize the affected product candidates.

We may become involved in lawsuits to protect or enforce our patents or other intellectual property, which could be expensive, time-consuming and unsuccessful.

Because competition in our industry is intense, competitors may infringe or otherwise violate our issued patents, patents of our licensors or other intellectual property. To counter infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming. Any claims we assert against perceived infringers could provoke these parties to assert counterclaims against us alleging that we infringe their patents. In addition, in a patent infringement proceeding, a court may decide that a patent of ours is invalid or unenforceable, in whole or in part, construe the patent's claims narrowly, or refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover the technology in question. An adverse result in any litigation proceeding could put one or more of our patents at risk of being invalidated or interpreted narrowly. We may also elect to enter into license agreements in order to settle patent infringement claims or to resolve disputes prior to litigation, and any such license agreements may require us to pay royalties and other fees that could be significant. 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.

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

A third party may hold intellectual property, including patent rights, that are important or necessary to the development of our products. It may be necessary for us to use the patented or proprietary technology of third parties to commercialize our products, in which case we would be required to obtain a license from these third parties on commercially reasonable terms, or our business could be harmed, possibly materially. If we were not able to obtain a license, or were not able to obtain a license on commercially reasonable terms, our business could be harmed, possibly materially.

Third parties may initiate legal proceedings alleging that we are infringing their intellectual property rights, the outcome of which would be uncertain and could have a material adverse effect on the success of our business.

Our commercial success depends upon our ability, and the ability of our collaborators, to develop, manufacture, market and sell our product candidates and use our proprietary technologies without infringing the proprietary rights of third parties. There is considerable intellectual property litigation in the biotechnology and pharmaceutical industries. We may become party to, or threatened with, future adversarial proceedings or litigation regarding intellectual property rights with respect to our products and technology, including interference or derivation proceedings before the USPTO. Third parties may assert infringement claims against us based on existing patents or patents that may be granted in the future.

If we are found to infringe a third party's intellectual property rights, we could be required to obtain a license from such third party to continue developing and marketing our products and technology. However, we may not be able to obtain any required license on commercially reasonable terms or at all. Even if we were able to obtain a license, it could be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. We could be forced, including by court order, to cease commercializing the infringing technology or product. In addition, we could be found liable for monetary damages, including treble damages and attorneys' fees if we are found to have willfully infringed a patent. A finding of infringement could prevent us from commercializing our product candidates or force us to cease some of our business operations, which could materially harm our business. Claims that we have misappropriated the confidential information or trade secrets of third parties could have a similar negative impact on our business.

If we are unable to protect the confidentiality of our trade secrets, our business and competitive position would be harmed.

In addition to seeking patents for some of our technology and product candidates, we also rely on trade secrets, including unpatented know-how, technology and other proprietary information, to maintain our competitive position. Any NDAs or similar agreements entered into by the Company may not be with all relevant parties, or adequately protect the confidentiality of our trade secrets. Moreover, to the extent we enter into such agreements, any of these parties may breach the agreements and disclose our proprietary information, including our trade secrets, and we may not be able to obtain adequate remedies for such breaches. Enforcing a claim that a party illegally disclosed or misappropriated a trade secret is difficult, expensive and time-consuming, and the outcome is unpredictable. In addition, some courts inside and outside the United States are less willing or unwilling to protect trade secrets. If any of our trade secrets were to be lawfully obtained or independently developed by a competitor, we would have no right to prevent them, or those to whom they communicate them, from using that technology or information to compete with us. If any of our trade secrets were to be disclosed to or independently developed by a competitor, our competitive position would be harmed.

Risks Related to Our Employee Matters, Managing Growth and Macroeconomic Conditions

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

We are highly dependent on the product development, clinical and business development expertise of the principal members of our management, scientific and clinical team. Although we have entered into employment agreements with our executives and key employees, each of them may terminate their employment with us at any time. We do not maintain "key person" insurance for any of our executives or other employees.

Recruiting and retaining qualified scientific, clinical, manufacturing, sales and marketing personnel is critical to our success. Due to the small size of the Company and the limited number of employees, each of our executives and key employees serves in a critical role. The loss of the services of our executive officers or other key employees could impede the achievement of our development and commercialization objectives and seriously harm our ability to successfully implement our business strategy. Furthermore, replacing executive officers and key employees may be difficult and may take an extended period of time because of the limited number of individuals in our industry with the breadth of skills and experience required to successfully develop, gain regulatory approval of, and commercialize products. Competition to hire from this limited pool is intense, and we may be unable to hire, train, retain or motivate these key personnel on acceptable terms given the competition among numerous pharmaceutical and biotechnology companies for similar personnel. We also experience competition for the hiring of scientific and clinical personnel from universities and research institutions. In addition, we rely on consultants and advisors, including scientific and clinical advisors, to assist us in formulating drug product, nonclinical development, clinical development, regulatory strategy, and commercial strategy. Our consultants and advisors may be employed by employers other than us and may have commitments under consulting or advisory contracts with other entities that may limit their availability to provide services to us. If we are unable to continue to attract and retain high quality personnel, our ability to pursue our growth strategy will be limited.

We expect to expand our research and development function, as well as our corporate operations, and as a result, we may encounter difficulties in managing our growth, which could disrupt our operations.

We expect to experience significant growth in the number of our employees and the scope of our operations, particularly in the areas of drug development, regulatory affairs and, if any of our product candidates receives marketing approval, sales, marketing and distribution. To manage our anticipated future growth, we must continue to implement and improve our managerial, operational and financial systems, expand our facilities and continue to recruit and train additional qualified personnel. Due to our limited financial resources, we may not be able to effectively manage the expansion of our

operations or recruit and train additional qualified personnel. The expansion of our operations may lead to significant costs and may divert our management and business development resources. Any inability to manage growth could delay the execution of our business plans or disrupt our operations.

We may be subject to claims that our employees or directors have wrongfully used or disclosed alleged trade secrets of their former employers.

Many of our employees and certain of our directors were previously employed at universities or other biotechnology or pharmaceutical companies, including our competitors or potential competitors. Although we try to ensure that our employees and directors do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that we or these employees or directors have used or disclosed intellectual property, including trade secrets or other proprietary information, of any such employee's or director's former employer. Litigation may be necessary to defend against these claims. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management.

Unfavorable global economic conditions could adversely affect our business, financial condition or results of operations.

Our results of operations could be adversely affected by general conditions in the global economy and in the global financial markets. A severe or prolonged economic downturn, such as the recent global financial crisis, could result in a variety of risks to our business, including our ability to raise additional capital when needed on acceptable terms, if at all. This is particularly true in Europe, where the United Kingdom's vote to leave the European Union has created additional economic uncertainty. A weak or declining economy could also strain our suppliers, possibly resulting in supply disruption. Any of the foregoing could harm our business and we cannot anticipate all of the ways in which the current economic climate and financial market conditions could adversely impact our business.

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

Despite the implementation of security measures, our internal computer systems and those of the CROs, collaborators and third-parties on whom we rely are vulnerable to damage from computer viruses, unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. Furthermore, we have little or no control over the security measures and computer systems of our third-party collaborators. While we and, to our knowledge, our third-party collaborators have not experienced any such system failure, accident or security breach to date, if such an event were to occur and cause interruptions in our operations or our third-party collaborators, it could result in a material disruption of our drug development programs. For example, the loss of research data could delay development of our product candidates and the loss of clinical trial data from completed or ongoing or planned clinical trials could result in delays in our regulatory approval efforts and we may incur substantial costs to attempt to recover or reproduce the data. Similarly, we have no control over the security measures and computer systems of the regulatory bodies to whom we provide financial and other sensitive information. If any disruption or security breach resulted in a loss of or damage to our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur liability and/or the further development of our product candidates could be delayed.

Risks Related to Our Common Stock

We expect our stock price to be volatile, and the market price of our common stock may drop unexpectedly.

The market price of our common stock could be subject to significant fluctuations. Market prices for securities of early-stage pharmaceutical, biopharmaceutical, 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:

- our ability to obtain regulatory approvals for our product candidates or other product candidates, and delays or failures to obtain such approvals;
- failure of any of our product candidates, if approved, to achieve commercial success;
- issues in manufacturing our approved products, if any, or product candidates;
- the results of our current and any future clinical trials of our product candidates;
- the entry into, or termination of, key agreements, including key commercial partner agreements;

- the initiation of, material developments in, or conclusion of litigation to enforce or defend any of our intellectual property rights or defend against the intellectual property rights of others;
- announcements by commercial partners or competitors of new commercial products, clinical progress or the lack thereof, significant contracts, commercial relationships or capital commitments;
- the introduction of technological innovations or new therapies that compete with our potential products;
- the loss of key employees;
- changes in estimates or recommendations by securities analysts, if any, who cover our common stock;
- general and industry-specific economic conditions that may affect our research and development expenditures;
- changes in the structure of healthcare payment systems; and
- period-to-period fluctuations in our financial results.

Moreover, 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 also 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 profitability and reputation.

If securities analysts do not publish research or reports about our business, or if they publish negative evaluations, the price of our common stock could decline.

The trading market for our common stock may be impacted by the availability or lack of research and reports that third-party industry or financial analysts publish about the Company. There are many large, publicly traded companies active in the biopharmaceutical industry, which may mean it will be less likely that we receive widespread analyst coverage. Furthermore, if one or more of the analysts who do cover the Company downgrade our stock, our stock price would likely decline. If we do not receive adequate coverage by reputable analysts that have an understanding of our business and industry, we could fail to achieve visibility in the market, which in turn could cause our stock price to decline.

Our executive officers, directors and principal stockholders, if they choose to act together, will have the ability to control all matters submitted to stockholders for approval.

Our executive officers and directors, combined with our principal stockholders, beneficially own shares representing approximately 78.1% of our capital stock as of December 31, 2017. 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, as well as our management and affairs. For example, these persons, if they choose to act together, would control the election of directors and approval of any merger, consolidation or sale of all or substantially all of our assets. This concentration of ownership control may:

- delay, defer or prevent a change in control;
- entrench our management and the board of directors; or
- impede a merger, consolidation, takeover or other business combination involving the Company that other stockholders may desire.

We will incur costs and demands upon management as a result of complying with the laws and regulations affecting public companies.

We will incur significant legal, accounting and other expenses that Otic did not incur as a private company, including costs associated with public company reporting requirements. We will also incur costs associated with corporate governance requirements, including requirements under the Sarbanes-Oxley Act and rules and regulations promulgated by the SEC and Nasdaq. These rules and regulations are expected to increase our legal and financial compliance costs and to make some activities more time-consuming and costly. These rules and regulations may also make it difficult and expensive for the Company to obtain directors' and officers' liability insurance. As a result, it may be more difficult for the Company to attract

and retain qualified individuals to serve on our board of directors or as executive officers of the Company, which may adversely affect investor confidence in the Company and could cause our business or stock price to suffer.

If we fail to establish and maintain proper and effective internal control over financial reporting, our operating results and our ability to operate our business could be harmed.

Ensuring that we will have adequate internal financial and accounting controls and procedures in place so that we can produce accurate financial statements on a timely basis is a costly and time-consuming effort that needs to be re-evaluated frequently. 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 in accordance with GAAP.

Through the fiscal year ended December 31, 2014, Otic's financial statements have been audited in accordance with generally accepted auditing standards in Israel. The consolidated financial statements for the years ended December 31, 2016 and 2015 were audited in accordance with generally accepted auditing standards in the United States.

For the fiscal year ended December 31, 2017, our financial statements will be audited in accordance with the standards of the Public Company Accounting Oversight Board (United States). In addition, we will be required to be compliant with public company internal control requirements mandated under Section 302 and 906 of the Sarbanes-Oxley Act. We will be implementing measures designed to improve our internal controls over financial reporting, including bringing in additional accounting resources and establishing new accounting and financial reporting procedures to establish an appropriate level of internal controls over financial reporting. However, we are still in the process of implementing these measures and cannot provide assurances that we will be successful in doing so. If we are unable to successfully implement internal controls over financial reporting, the accuracy and timing of our financial reporting, and our stock price, may be adversely affected and we may be unable to maintain compliance with the applicable stock exchange listing requirements.

Implementing any appropriate changes to our internal controls may distract the officers and employees of the Company, entail substantial costs to modify its existing processes and take significant time to complete. These changes may not, however, be effective in maintaining the adequacy of the internal controls of the Company, and any failure to maintain that adequacy, or consequent inability to produce accurate financial statements on a timely basis, could increase operating costs and harm the business. In addition, investors' perceptions that the internal controls of the Company are inadequate or that we are unable to produce accurate financial statements on a timely basis may harm the stock price of the Company.

Provisions in our corporate charter documents and under Delaware law could make an acquisition of the Company, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current management.

Provisions in our corporate charter and bylaws may discourage, delay or prevent a merger, acquisition or other change in control of the Company that stockholders may consider favorable, including transactions in which our stockholders might otherwise receive a premium for their 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 the board of directors is responsible for appointing the members of our management team, these provisions may frustrate or prevent any attempts by stockholders to replace or remove the current management by making it more difficult for stockholders to replace members of the board of directors. Among other things, these provisions:

- establish a classified board of directors such that not all members of the board are 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 stockholder proposals that can be acted on at stockholder meetings and nominations to our board of directors;
- 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 stockholder meetings;
- authorize the 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 the Company's charter or bylaws.

Moreover, because the Company is incorporated in Delaware, it is governed by the provisions of Section 203 of the DGCL, which prohibits a person who owns in excess of 15% of its 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.

We do not expect to pay any cash dividends in the foreseeable future.

We expect to retain our future earnings to fund the development and growth of our business. As a result, capital appreciation, if any, of our common stock will be the sole source of gain, if any, for any stockholders for the foreseeable future.

Item 1B. Unresolved Staff Comments.

Not applicable.

Item 2. Properties.

Our executive offices are located in Irvine, California. We lease approximately 5,197 square feet of office space under an operating lease that expires in September 2018.

Item 3. Legal Proceedings.

Doshi Action

On August 1, 2016, a purported stockholder of Tokai filed a putative class action lawsuit in the U.S. District Court for the Southern District of New York against Tokai, Jodie P. Morrison, and Lee H. Kalowski, entitled *Doshi v. Tokai Pharmaceuticals, Inc., et al.*, No. 1:16-cv-06106 ("Doshi Action"). The plaintiff sought to represent a class of purchasers of Tokai securities between June 24, 2015, and July 25, 2016, and alleges that, in violation of the Securities Exchange Act of 1934 ("Exchange Act") and Rule 10b-5 promulgated thereunder, defendants made false and misleading statements and omissions about Tokai's clinical trials for its drug candidate, galeterone. The lawsuit sought, among other things, unspecified compensatory damages, interest, costs, and attorneys' fees. On October 3, 2016, the case was transferred to the U.S. District Court for the District of Massachusetts. On September 28, 2017, this action was consolidated with *Garbowski, et al. v. Tokai Pharmaceuticals, Inc., et al.*, No. 1:16-cv-11963 (see below). Given the uncertainty of litigation, the preliminary stage of the case, and the legal standards that must be met for, among other things, success on the merits, we are unable to predict the ultimate outcome of these actions, and therefore we cannot estimate the reasonably possible loss or range of loss that may result from this action.

Legal Proceedings Related to Tokai IPO

On September 22, 2014, Tokai completed the initial public offering of its common stock (the "IPO"). Subsequent to the IPO, several lawsuits were filed against Tokai, Jodie P. Morrison, Lee H. Kalowski, Seth L. Harrison, Timothy J. Barberich, David A. Kessler, Joseph A. Yanchik, III, and the underwriters of the IPO. The lawsuits allege that, in violation of the Securities Act of 1933 ("Securities Act"), Tokai's registration statement for the IPO made false and misleading statements and omissions about Tokai's clinical trials for galeterone (the "Securities Act claims"). Each lawsuit sought, among other things, unspecified compensatory damages, interest, costs, and attorneys' fees. Further details on each lawsuit are set forth below. Given the uncertainty of litigation, the preliminary stage of these cases, and the legal standards that must be met for, among other things, success on the merits, we are unable to predict the ultimate outcome of these actions, and therefore we cannot estimate the reasonably possible loss or range of loss that may result from these actions.

- Jackie888 Action. On August 19, 2016, a purported stockholder of Tokai filed a putative class action lawsuit in the Superior Court of the State of California, County of San Francisco, entitled *Jackie888, Inc. v. Tokai Pharmaceuticals, Inc., et al.*, No. CGC-16-553796. The plaintiff sought to represent a class of purchasers of Tokai common stock in or traceable to the IPO. On October 19, 2016, the defendants moved to dismiss or stay the action on grounds of forum non conveniens, and certain individual defendants moved to quash the plaintiff's summons for lack of personal jurisdiction. On February 27, 2017, the Superior Court entered an order granting defendants' motion to stay the lawsuit.

- Garbowski Action. On September 29, 2016, two purported stockholders of Tokai filed a putative class action lawsuit in the U.S. District Court for the District of Massachusetts, entitled *Garbowski, et al. v. Tokai Pharmaceuticals, Inc., et al.*, No. 1:16-cv-11963 ("Garbowski Action"). In addition to the Securities Act claims, this lawsuit also alleges that the defendants made false and misleading statements and omissions about Tokai's clinical trials for galeterone, in violation of the Exchange Act and Rule 10b-5 promulgated thereunder. The plaintiffs sought to represent a class of purchasers of Tokai common stock in or traceable to the IPO as well as a class of purchasers of Tokai common stock between September 17, 2014, and July 25, 2016. On September 28, 2017, this action was consolidated with the Doshi Action.
- Wu Action. On December 5, 2016, a putative securities class action was filed in the Business Litigation Session of the Superior Court Department of the Suffolk County Trial Court, Massachusetts ("Massachusetts State Court"), entitled *Wu v. Tokai Pharmaceuticals, Inc., et al.*, 16-3725 BLS ("Wu Action"). The plaintiff seeks to represent a class of purchasers of Tokai common stock in or traceable to the IPO. On December 19, 2016, defendants removed the Wu Action to the U.S. District Court for the District of Massachusetts, where it was captioned *Wu v. Tokai Pharmaceuticals, Inc., et al.*, 16-cv-12550, and assigned to the same judge presiding over the Doshi and Garbowski Actions. On December 22, 2016, defendants filed a motion to consolidate the Wu Action with the Doshi and Garbowski Actions. On January 6, 2017, plaintiff filed a motion to remand the Wu Action to Massachusetts State Court. On September 28, 2017, the court stayed the case pending a decision by the *United States Supreme Court in Cyan, Inc. v. Beaver County Employees Retirement Fund*, S. Ct. Case No. 15-1439. On March 20, 2018, the United States Supreme Court ruled in Cyan that state courts have subject matter jurisdiction over covered class actions alleging only Securities Act claims and that such actions are not removable to federal court. On March 22, 2018, plaintiff moved for leave to submit the Cyan decision in support of plaintiff's remand motion.
- Angelos Action. On July 25, 2017, a purported stockholder of Tokai filed a lawsuit in the U.S. District Court for the District of Massachusetts, entitled *Peter B. Angelos v. Tokai Pharmaceuticals, Inc., et al.*, No. 1:17-cv-11365-MLW. The case has been assigned to the same judge presiding over the Doshi, Garbowski, and Wu Actions.

The Company has always maintained and continues to believe that it did not engage in any wrongdoing or otherwise commit any violation of federal or state securities laws or other laws.

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 is traded on the Nasdaq Capital Market under the symbol "NVUS" as of May 11, 2017, subsequent to our Reverse Merger with Tokai. Prior to May 11, 2017, our common stock was traded on the Nasdaq Capital Market under the symbol "TKAI" since September 17, 2014. The following table sets forth the quarterly high and low sales prices per share of our common stock. The per share prices below reflect a one-for-nine reverse split of common stock effected on May 11, 2017:

	Price Range			
	2017		2016	
Fiscal Quarter	High	Low	High	Low
First	$ 10.08	$ 6.94	$ 77.67	$ 44.37
Second	7.65	4.52	79.20	45.27
Third	5.90	3.42	52.74	8.82
Fourth	5.43	3.65	18.81	6.53

On March 23, 2017, the last reported sales price of our common stock was $5.51 per share as reported by Nasdaq. As of December 31, 2017, there were approximately 40 stockholders of record of our common stock.

Dividends

We have never declared or paid, and do not anticipate declaring or paying in the foreseeable future, any cash dividends on our common stock. Future determination as to the declaration and payment of dividends, if any, will be at the discretion of our board of directors and will depend on then existing conditions, including our operating results, financial condition, contractual restrictions, capital requirements, business prospects and other factors that our board of directors may deem relevant.

Item 6. Selected Financial Data.

Per §229.301 of Regulation S-K, the Company, designated a Smaller Reporting Company as defined in §229.10(f)(1) of Regulation S-K, is not required to provide the disclosure required by this Item.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations.

Management's Discussion and Analysis of Financial Condition and Results of Operations is intended to help the reader understand the results of operations and financial condition of the Company. The Management's Discussion and Analysis of Financial Condition and Results of Operations should be read in conjunction with our audited consolidated financial statements and notes thereto for the year ended December 31, 2017. In addition to historical information, this Annual Report on Form 10-K contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended, which are intended to be covered by the safe harbors created thereby. See "Cautionary Note Regarding Forward-Looking Statements" in this report. Our actual results and the timing of events could differ materially from those discussed in our forward-looking statements as a result of many factors, including those set forth under the Part I, Item 1A. Risk Factors section and elsewhere in this report, as well as, in other reports and documents we file with the Securities and Exchange Commission from time to time. Except as required by law, we undertake no obligation to update any forward-looking statements to reflect events or circumstances occurring after the date of this Annual Report on Form 10-K.

ABOUT NOVUS THERAPEUTICS

Novus Therapeutics is a specialty pharmaceutical company focused on developing products for disorders of the ear, nose, and throat (ENT). Novus has two technologies, each that has the potential to be developed for multiple ENT indications. The company's lead product (OP-02) is a surfactant-based, combination drug product being developed as a potential first-in-class treatment option for patients at risk for or with otitis media (OM) (middle ear inflammation with or without infection). Globally, OM affects more than 700 million adults and children every year. OM is a common disorder seen in pediatric practice, and in the United States is the most frequent reason children are prescribed antibiotics and undergo surgery. Novus also has a foam-based drug delivery technology (OP-01), which may be developed in the future to deliver drugs into the ear, nasal, and sinus cavities.

OP-02 Surfactant Program

OP-02 is being developed as a potential first-in-class treatment option for otitis media (OM), which is often caused by Eustachian tube dysfunction ("ETD"). OP-02 is a drug-device combination product comprised of a novel formulation of a surfactant (dipalmitoylphosphatidylcholine [DPPC]) and a spreading agent (cholesteryl palmitate [CP]) suspended in propellant. The product is administered intranasally via a metered dose inhaler and is intended to be used to restore the normal physiologic activity of the Eustachian tube (ET). Together DPPC and CP effectively absorb to the air-liquid interface of the mucosa and reduce the interfacial surface tension of the ET, which reduces passive pressure required for the ET to open. In other words, OP-02 promotes 'de-sticking' of the ET so that ventilation and drainage of the middle ear may occur. Novus expects to initiate the OP-02 phase 1 clinical program in 2018. The phase 1 program will include a single study to evaluate repeated intranasal doses of OP-02 in healthy subjects plus additional phase 1 studies to explore safety and efficacy in patients with OM. Upon completion of the phase 1 program, Novus intends to initiate phase 2 and 3 studies of OP-02, with an initial focus on a development program that will lead to registration of OP-02 in North America and key European markets as a product to treat OM and prevent OM in children. Additional development activities to support registration in other countries and/or for other OM/ETD disorders, or in other patient populations, may occur in the future.

OP-01 Foam Platform

OP-01 is a foam-based product intended to be used as a delivery vehicle for drugs to be administered into the ears, as well as the nasal and sinus cavities. Specifically, OP-01 was initially developed as an improved treatment option for AOE, a common medical condition of the outer ear canal that affects tens of millions of adults and children each year. Novus completed four clinical trials of OP-01 in 353 adult and pediatric subjects, including a successful phase 2b study with a steroid-free, antibiotic-only formulation of OP-01 that performed similarly to standard of care. In 2016, Novus began development of a second-generation formulation of OP-01 designed to rapidly relieve ear pain (an unmet need in AOE) and eradicate infection with less than seven days of treatment. Novus subsequently paused the OP-01 development program to focus resources on OP-02.

RECENT DEVELOPMENTS

Reverse Merger

On December 21, 2016, Novus, formerly known as Tokai Pharmaceuticals, Inc. ("Tokai"), a Delaware corporation, and the stockholders of Otic (each a "Seller" and collectively, the "Sellers"), entered into a Share Purchase Agreement (the "Share Purchase Agreement"), pursuant to which, among other things, each Seller agreed to sell to Tokai, and Tokai agreed to purchase

from each Seller, all of the common and preferred shares of Otic ("Otic Shares") owned by such Seller in exchange for the issuance of a certain number of shares of common stock of Tokai, as determined pursuant to the terms of the Share Purchase Agreement (the "Reverse Merger"). The parties amended and restated the Share Purchase Agreement on March 2, 2017.

On May 9, 2017, Tokai, Otic, and the Sellers closed the transaction contemplated by the Share Purchase Agreement and subsequently effected a reverse stock-split of common stock at a ratio of one-for-nine (see *Reverse Stock-Split* below). On a post-split basis, Tokai issued to the Sellers an aggregate of 4,027,693 shares of Tokai's common stock in exchange for 840,115 Otic Shares. Following the completion of the Reverse Merger, the business being conducted by Tokai became primarily the business conducted by Otic. Subsequent to the Reverse Merger, the name of the surviving corporation was changed to "Novus Therapeutics, Inc."

Private Placement

On January 31, 2017, Novus entered into a stock purchase agreement (the "Stock Purchase Agreement") with certain purchasers named therein (the "Purchasers"), pursuant to which the Purchasers agreed to purchase approximately $4.0 million of the Company's common stock through the purchase of 400,400 shares of the Company's common stock at a price of $9.99 per share (the "Private Placement"). The Private Placement closed on May 10, 2017. After giving effect to the issuance of the shares in the Private Placement, the stockholders of Otic owned approximately 64% of the Company's common stock.

Reverse Stock-Split

On May 11, 2017, Novus effected a reverse stock-split of its issued and outstanding common stock and options for common stock at a ratio of one-for-nine. The Company filed an Amended and Restated Certificate of Incorporation with the Secretary of State of the State of Delaware effecting the reverse stock-split. The accompanying consolidated financial statements and notes give retroactive effect to the reverse stock-split of common stock for all periods presented. All share and per share amounts for common stock in this filing have been retroactively adjusted to reflect the reverse stock-split.

Equity Distribution Agreement

On August 21, 2017, the Company entered into an equity distribution agreement (the "Equity Distribution Agreement") with Piper Jaffray & Co. ("Piper Jaffray"), as sales agent, pursuant to which the Company may offer and sell, from time to time, through Piper Jaffray, up to $8.5 million in shares of its common stock. From October 2, 2017 through March 9, 2018, the Company had sold 2,463,966 shares of its common stock through Piper Jaffray under the Equity Distribution Agreement for gross proceeds of approximately $8.5 million.

CRITICAL ACCOUNTING POLICIES AND SIGNIFICANT JUDGMENTS AND ESTIMATES

Our management's discussion and analysis of our financial condition and results of operations are based on our financial statements, which have been prepared in accordance with GAAP. The preparation of these financial statements requires us to make estimates and judgments that affect the reported amount of assets, liabilities, and expenses and the disclosure of contingent assets and liabilities as of the date of the financial statements. On an ongoing basis, we evaluate our estimates and judgments. We base our estimates on historical experience, known trends and events, and various other factors that are believed to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying value of assets and liabilities that are not readily apparent from other sources. Actual results may differ materially from these estimates under different assumptions or conditions.

Business Combinations

Accounting for acquisitions requires extensive use of estimates and judgment to measure the fair value of the identifiable tangible and intangible assets acquired, including in-process research and development and liabilities assumed. Additionally, we must determine whether an acquired entity is considered a business or a set of net assets because the excess of the purchase price over the fair value of net assets acquired can only be recognized as goodwill in a business combination. We accounted for the Reverse Merger with Tokai as a business combination under the acquisition method of accounting. Consideration paid to acquire Tokai was measured at fair value and included the exchange of Tokai's common stock. The allocation of the purchase price resulted in recognition of goodwill.

Goodwill

Goodwill represents the difference between the consideration transferred and the fair value of the net assets acquired under the acquisition method of accounting. Goodwill is not amortized but is evaluated for impairment during the last fiscal quarter of the year or if indicators of impairment exist that would, more likely than not, reduce the fair value from its carrying amount.

Significant management judgment is required in the forecasts of future operating results that are used in our impairment evaluation. The estimates we have used are consistent with the plans and estimates that we use to manage our business. It is possible, however, that the plans may change and estimates used may prove to be inaccurate. If our actual results, or the plans and estimates used in the future impairment analyses, are lower than the original estimates used to assess the recoverability of these assets, we could incur future impairment charges.

Stock-based Compensation

For stock options granted to employees, the Company recognizes compensation expense for all stock-based awards based on the grant-date estimated fair value. The fair value of stock options is determined using the Black-Scholes option pricing model, using assumptions which are subjective and require significant judgment and estimation by management. The risk-free rate assumption was based on observed yields from governmental zero-coupon bonds with an equivalent term. The expected volatility assumption was based on historical volatilities of a group of comparable industry companies whose share prices are publicly available. The peer group was developed based on companies in the pharmaceutical industry. The expected term of stock options represents the weighted-average period that the stock options are expected to be outstanding. Because the Company does not have historical exercise behavior, it determined the expected life assumption using the simplified method, which is an average of the options ordinary vesting period and the contractual term. The expected dividend assumption was based on the Company's history and expectation of dividend payouts. The Company has not paid and does not expect to pay dividends at any time in the foreseeable future. The Company recognizes forfeitures on an actual basis and as such did not estimate forfeitures to calculate share based compensation.

Stock-based compensation expense related to stock options granted to non-employees is recognized based on the fair value of the stock options, determined using the Black-Scholes option pricing model, as they are earned. The awards generally vest over the period the Company expects to receive services from the non-employee. Stock options granted to non-employees are subject to periodic revaluation over their vesting terms.

RESULTS OF OPERATIONS

Comparison of the Years Ended December 31, 2017 and 2016

The following table provides comparative results of operations for the years ended December 31, 2017 and 2016 (in thousands):

	Year Ended December 31,			
	2017	2016	$ Variance	% Variance
Operating expenses:				
Research and Development	$ 2,022	$ 3,191	$ (1,169)	(37)%
General and Administrative	11,099	1,937	9,162	473%
Total operating expenses	13,121	5,128	7,993	156%
Loss from operations	(13,121)	(5,128)	(7,993)	156%
Other income (expense), net	5	(527)	532	(101)%
Net loss and other comprehensive loss	$ (13,116)	$ (5,655)	$ (7,461)	132%

Research and Development Expenses

During the year ended December 31, 2017, research and development expenses of $2.0 million were primarily comprised of formulation development costs for OP-02 and clinical development closeout costs for Tokai's legacy programs. During the year ended December 31, 2016, research and development expenses of $3.2 million were comprised of expenses associated with the development of a second-generation formulation for OP-01 and development costs for OP-02. The decrease from period to period is primarily attributed to decreased spending on OP-01, offset by wind down costs incurred for legacy Tokai programs. We expect research and development expenses to increase in subsequent periods as we advance our OP-02 programs.

General and Administrative Expenses

General and administrative expenses increased in the 2017 period primarily due to the recognition of $4.0 million in merger-related expenses, an increase of $2.9 million in administrative costs associated with operating a public company and $536,000 in the ongoing legal costs related to Tokai's stockholder lawsuits.

Other Income (Expense), Net

The change in other income (expense), net was primarily related to the fair value adjustment for convertible notes incurred in the year ended December 31, 2016. No such adjustment was necessary during the year ended December 31, 2017 as the convertible notes were converted to common stock contemporaneously with the Reverse Merger.

LIQUIDITY AND CAPITAL RESOURCES

As of December 31, 2017, we had cash, cash equivalents, and restricted cash of $17.3 million, consisting of readily available cash in bank accounts. While we believe our cash and cash equivalents are not subject to excessive risk, we maintain significant amounts of cash and cash equivalents at one or more financial institutions that are in excess of federally insured limits. To date, our operations have been financed primarily by net proceeds from the sale of preferred and common stock, the issuance of convertible promissory notes, and cash received in the Reverse Merger with Tokai. We believe our cash and cash equivalents will be sufficient to fund our operations for at least the next 12 months from the date of issuance of these financial statements.

On May 9, 2017, we completed our Reverse Merger with Tokai, which provided $23.3 million in cash and cash equivalents. Immediately following the Reverse Merger, we raised $4.0 million in aggregate gross proceeds from a private placement of our common stock.

Our primary uses of capital are, and we expect will continue to be, funding research efforts and the development of our product candidates, compensation and related expenses, hiring additional staff (including clinical, scientific, operational, financial, and management personnel) and costs associated with operating as a public company. We expect to incur substantial expenditures in the foreseeable future for the development and potential commercialization of our product candidates.

We plan to continue to fund losses from operations and capital funding needs through cash on hand and future equity or debt financings, as well as potential additional collaborations or strategic partnerships with other companies. During the third quarter of 2017, we entered into an equity distribution agreement pursuant to which we may sell shares of common stock from time to time in "at-the-market" offerings. The sale of additional equity or convertible debt could result in additional dilution to our stockholders. The incurrence of indebtedness would result in debt service obligations and could result in operating and financing covenants that would restrict our operations. We can provide no assurance that financing will be available in the amounts we need or on terms acceptable to us, if at all. If we are not able to secure adequate additional funding we may be forced to delay, make reductions in spending, extend payment terms with suppliers, liquidate assets where possible, or suspend or curtail planned programs. Any of these actions could materially harm our business.

Cash Flows

The following table provides a summary of our net cash flow activity for the years ended December 31, 2017 and 2016 (in thousands):

	Year Ended December 31,	
	2017	2016
Net cash used in operating activities	$ (14,941)	$ (4,923)
Net cash provided by investing activities	23,258	1
Net cash provided by financing activities	7,869	2,930
Net increase (decrease) in cash, cash equivalents, and restricted cash	$ 16,186	$ (1,992)

Comparison of the Years Ended December 31, 2017 and 2016

Net cash used in operating activities for the year ended December 31, 2017 consisted primarily of our net loss of $13.1 million, partially offset by non-cash items consisting primarily of depreciation, stock-based compensation, and loss on disposal of fixed assets totaling $650,000. Additionally, cash used in operating expenses for the year ended December 31, 2017 reflected a net decrease in cash from changes in operating assets and liabilities of $2.5 million, primarily due to an increase in our prepaid expenses and the payment of accounts payable and accrued liabilities assumed in the Reverse Merger.

Net cash used in operating activities for the year ended December 31, 2016 consisted primarily of our net loss of $5.7 million, partially offset by non-cash items consisting of depreciation, stock-based compensation, loss on disposal of fixed assets, and fair value adjustment for convertible note totaling $732,000. Cash used in operating expenses for the year ended December 31, 2016 reflected no increase in cash from changes in net operating assets and liabilities as the decrease in our accounts payable and accrued expenses were exactly offset by the decrease in prepaid expenses.

Net cash provided by investing activities for the year ended December 31, 2017 consisted primarily of cash received from the Reverse Merger of $23.3 million.

Net cash provided by investing activities for the year ended December 31, 2016 consisted of proceeds from the sale of equipment offset by the purchase of property and equipment in the net amount of $1,000.

Net cash provided by financing activities for the year ended December 31, 2017 was comprised of $4.0 million in proceeds from the Stock Purchase Agreement for the purchase of 400,400 shares of Novus common stock, net proceeds of $750,000 for the issuance of approximately 167,000 shares of common stock under the Equity Distribution Agreement, and proceeds from the exercise of warrants in the amount of $3.1 million.

Net cash provided by significant financing activities in the year ended December 31, 2016 consisted of $2.9 million in proceeds from a convertible bridge financing transaction.

Contractual Obligations

Contractual obligations represent future cash commitments and liabilities under agreements with third parties, and exclude contingent liabilities for which we cannot reasonably predict future payment. Our contractual obligations primarily result from property leases for office space. Although we do have obligations for CRO services, the table below excludes potential payments we may be required to make under our agreements with CROs because timing of payments and actual amounts paid under those agreements may be different depending on the timing of receipt of goods or services or changes to agreed-upon terms or amounts for some obligations, and those agreements are cancelable upon written notice by the Company and therefore, not long-term liabilities. Additionally, the expected timing of payment of the obligations presented below is estimated based on current information.

The following table represents our contractual obligations as of December 31, 2017, aggregated by type (in thousands):

	Payments Due by Period				
Contractual Obligations	**Total**	**Less than 1 year**	**1 - 3 years**	**3 - 5 years**	**More than 5 years**
Operating Lease Obligations	$ 112	$ 112	$ —	$ —	$ —
Total	$ 112	$ 112	$ —	$ —	$ —

See *Note 8. Commitments and Contingencies* in the notes to the consolidated financial statements for a summary of contracts held by the Company as of December 31, 2017.

Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements as defined in the rules and regulations of the SEC.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk.

Per §229.305 of Regulation S-K, the Company, designated a Smaller Reporting Company as defined in §229.10(f)(1) of Regulation S-K, is not required to provide the disclosure required by this Item.

Item 8. Financial Statements and Supplementary Data.

The Report of Independent Registered Public Accounting Firm, our consolidated financial statements and accompanying notes listed under Part IV, Item 15. *Exhibits, Financial Statement Schedules* of this Annual Report on Form 10-K are set forth beginning on page F-1 immediately following the signature page hereof and incorporated by reference herein.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure.

As previously reported on the Company's Current Report on Form 8-K, filed May 15, 2017, the Audit Committee of the Company's Board of Directors approved the dismissal of PricewaterhouseCoopers LLP ("PwC") as the Company's independent registered public accounting firm, effective as of May 10, 2017, and approved the appointment of Ernst & Young LLP ("EY") as the Company's independent registered public accounting firm to perform independent audit services beginning with the fiscal year ending December 31, 2017.

During the fiscal year ended December 31, 2017, there were no disagreements (as that term is defined in Item 304(a)(1)(iv) of Regulation S-K and the related instructions) between the Company and EY on any matter of accounting principles or practices, financial statement disclosure, or auditing scope or procedure, which, if not resolved to the satisfaction of EY, would have caused EY to make reference to the subject matter of the disagreement in connection with its reports on the Company's consolidated financial statements for the year.

During the fiscal years ended December 31, 2016 and 2015, and through May 10, 2017, there were no disagreements (as that term is defined in Item 304(a)(1)(iv) of Regulation S-K and the related instructions) between the Company and PwC on any matter of accounting principles or practices, financial statement disclosure, or auditing scope or procedure, which, if not resolved to the satisfaction of PwC, would have caused PwC to make reference to the subject matter of the disagreement in connection with its reports on the Company's consolidated financial statements for such years.

Item 9A. Controls and Procedures.

Evaluation of Disclosure Controls and Procedures

As of December 31, 2017, our management, with the participation of our principal executive officer and principal financial officer, evaluated the effectiveness of our disclosure controls and procedures. 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 this evaluation, management concluded that our disclosure controls and procedures were effective in alerting them in a timely manner to material information required to be disclosed in our periodic reports filed with the SEC.

Internal Control Over Financial Reporting

Management's Report on Internal Control Over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting as defined in Rule 13a-15(f) under the Exchange Act. Our internal control system is designed to provide reasonable assurance to our management and board of directors regarding the preparation and fair presentation of published financial statements. All internal control systems, no matter how well designed, have inherent limitations. Therefore, even those systems determined to be effective can provide only reasonable assurance with respect to financial statement preparation and presentation.

Our management has assessed the effectiveness of our internal control over financial reporting as of December 31, 2017. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in its 2013 *Internal Control—Integrated Framework.* Based on this assessment, our management has concluded that as of December 31, 2017, our internal control over financial reporting is effective.

As an emerging growth company, as defined under the terms of the JOBS Act of 2012, the Company's independent registered accounting firm is not required to issue an attestation report on the internal control over financial reporting.

Changes in Internal Control over Financial Reporting

There have been no changes in our internal control over financial reporting (as defined in Rules 13a-15(f) or 15d-15(f) of the Exchange Act) during the quarter ended December 31, 2017 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information.

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance.

The information required by this Item 10 will be included in our definitive proxy statement to be filed with the SEC with respect to our 2018 Annual Meeting of Stockholders and is incorporated herein by reference.

We have adopted a written code of business conduct and ethics that applies to our directors, officers and employees, including our principal executive officer, principal financial officer, principal accounting officer or controller, or persons performing similar functions. A copy of the code is available on the Corporate Governance section of our website, which is located at *http://ir.novustherapeutics.com/corporate-governance/governance-overview*. We intend to disclose on our website any amendments to, or waivers from, the code of business conduct and ethics that are required to be disclosed pursuant to the disclosure requirements of Item 5.05 of Form 8-K.

Item 11. Executive Compensation.

The information required by this Item 11 will be included in our definitive proxy statement to be filed with the SEC with respect to our 2018 Annual Meeting of Stockholders and is incorporated herein by reference.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters.

The information required by this Item 12 will be included in our definitive proxy statement to be filed with the SEC with respect to our 2018 Annual Meeting of Stockholders and is incorporated herein by reference.

Item 13. Certain Relationships and Related Transactions, and Director Independence.

The information required by this Item 13 will be included in our definitive proxy statement to be filed with the SEC with respect to our 2018 Annual Meeting of Stockholders and is incorporated herein by reference.

Item 14. Principal Accounting Fees and Services.

The information required by this Item 14 will be included in our definitive proxy statement to be filed with the SEC with respect to our 2018 Annual Meeting of Stockholders and is incorporated herein by reference.

PART IV

Item 15. Exhibits, Financial Statement Schedules.

(a) The following documents are filed as part of this Annual Report on Form 10-K:

(1) Financial Statements:

The Report of Independent Registered Public Accounting Firm, our consolidated financial statements and accompanying notes are set forth beginning on page F-1 immediately following the signature page of this Annual Report on Form 10-K.

(2) Financial Statement Schedules:

The financial statement schedules are omitted as they are either not applicable or the information required is presented in the financial statements and notes thereto under Part II, Item 8. *Financial Statements and Supplementary Data*.

(3) Exhibits:

Exhibit Number	Exhibit Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Exhibit	Filing Date	
3.1	Restated Certificate of Incorporation of Novus Therapeutics, Inc., a Delaware corporation, dated September 22, 2014	8-K	001-36620	3.1	September 26, 2014	
3.2	Certificate of Amendment to Certificate of Incorporation of Novus Therapeutics, Inc. (effecting, among other things a reverse stock-split), filed with the Secretary of the State of Delaware on May 9, 2017	8-K	001-36620	3.1	May 15, 2017	
3.3	Certificate of Amendment to Certificate of Incorporation of Novus Therapeutics, Inc. (effecting, among other things a change in the corporation's name to "Novus Therapeutics, Inc."), filed with the Secretary of the State of Delaware on May 9, 2017	8-K	001-36620	3.2	May 15, 2017	
3.4	Amended and Restated Bylaws of Novus Therapeutics, Inc.	8-A/A	001-36620	3.4	June 23, 2017	
4.1	Form of Common Stock Certificate	8-A/A	001-36620	4.1	June 23, 2017	
10.1	Registration Rights Agreement, dated May 10, 2017, by and among the Company and the Purchasers	8-K	001-36620	10.1	May 15, 2017	
10.2*	Form of Indemnification Agreement between Novus Therapeutics, Inc. and each of its directors and executive officers	10-Q	001-36620	10.1	August 9, 2017	
10.3	Lease Agreement, dated as of September 2, 2015, by and between The Irvine Company LLC and Otic Pharma, Inc.	10-Q	001-36620	10.2	August 9, 2017	
10.4*	Executive Employment Agreement, dated July 15, 2015, between Otic Pharma, Inc., and Gregory J. Flesher	10-Q	001-36620	10.3	August 9, 2017	
10.5	Exclusive License Agreement, dated November 1, 2015, between Scientific Development and Research, Inc. and Otodyne, Inc., on the one hand, and Oticpharma, Inc., on the other hand†	10-Q	001-36620	10.4	August 9, 2017	

Exhibit Number	Exhibit Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Exhibit	Filing Date	
10.6*	Offer of Employment, dated July 1, 2017, from Novus Therapeutics, Inc. to Jon Kuwahara	10-Q	001-36620	10.5	August 9, 2017	
10.7*	Management Continuity Agreement, dated August 7, 2017, between Novus Therapeutics, Inc. and Gregory J. Flesher	10-Q	001-36620	10.6	August 9, 2017	
10.8*	Management Continuity Agreement, dated August 7, 2017, between Novus Therapeutics, Inc. and Jon S. Kuwahara	10-Q	001-36620	10.7	August 9, 2017	
10.9	Equity Distribution Agreement, dated as of August 21, 2017, between Novus Therapeutics, Inc. and Piper Jaffray & Co.	8-K	001-36620	1.1	August 22, 2017	
10.10	Otic Pharma Ltd. Global Share Incentive Plan (2012)					X
10.11	Tokai Pharmaceuticals, Inc. 2007 Stock Incentive Plan					X
10.12	Tokai Pharmaceuticals, Inc. 2014 Stock Incentive Plan					X
21.1	Subsidiaries of the Registrant					X
23.1	Consent of Ernst & Young LLP, independent registered public accounting firm					X
23.2	Consent of Brightman, Almagor Zohar & Co., a member of Deloitte Touche Tohmatsu Limited, the independent auditors of Otic Pharma, Ltd. and its subsidiary					X
31.1	Certification of Principal Executive Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002					X
31.2	Certification of Principal Financial Officer Pursuant to Rules 13a-14(a) and 15d-14(a) under the Securities Exchange Act of 1934, as Adopted Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002					X
32.1#	Certification of Principal 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 Principal 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.INS	XBRL Instance Document					
101.SCH	XBRL Taxonomy Extension Schema Document					
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document					
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document					
101.LAB	XBRL Taxonomy Extension Label Linkbase Document					

Exhibit Number	Exhibit Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Exhibit	Filing Date	
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document					
*	Indicates a management contract or compensatory plan					
†	Portions of this exhibit have been omitted and filed separately with the Securities and Exchange Commission pursuant to a request for confidential treatment.					
#	These certifications are not deemed filed by the SEC and are not to be incorporated by reference in any filing we make under the Securities Act of 1933 or the Securities Exchange Act of 1934, irrespective of any general incorporation language in any filings.					

Item 16. Form 10-K Summary.

None.

SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Novus Therapeutics, Inc.

Date: March 30, 2018 By: /s/ Gregory J. Flesher

Gregory J. Flesher
Chief Executive Officer and Director (Principal Executive Officer)

Date: March 30, 2018 By: /s/ Jon S. Kuwahara

Jon S. Kuwahara
Senior Vice President Finance & Administration (Principal Financial and Accounting Officer)

Pursuant to the requirements of the Securities Exchange Act of 1934, as amended, this Report has been signed below by the following persons on behalf of the Registrant in the capacities and on the dates indicated.

Name	Title	Date
/s/ Gregory J. Flesher **Gregory J. Flesher**	Chief Executive Officer and Director **(**Principal Executive Officer)	March 30, 2018
/s/ Jon S. Kuwahara **Jon S. Kuwahara**	Senior Vice President Finance & Administration (Principal Financial and Accounting Officer)	March 30, 2018
/s/ Keith A. Katkin **Keith A. Katkin**	Chairman of the Board of Directors	March 30, 2018
/s/ Erez Chimovits **Erez Chimovits**	Director	March 30, 2018
/s/ Cheryl L. Cohen **Cheryl L. Cohen**	Director	March 30, 2018
/s/ Gary A. Lyons **Gary A. Lyons**	Director	March 30, 2018
/s/ John S. McBride **John S. McBride**	Director	March 30, 2018
/s/ Jodie P. Morrison **Jodie P. Morrison**	Director	March 30, 2018

NOVUS THERAPEUTICS, INC.
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Report of Independent Registered Public Accounting Firm

To the Stockholders and the Board of Directors of Novus Therapeutics, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Novus Therapeutics, Inc. (the Company) as of December 31, 2017, the related consolidated statement of operations and comprehensive loss, stockholders' equity (deficit) and cash flows, for the year in the period ended December 31, 2017, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2017, and the results of its operations and its cash flows for the year ended December 31, 2017, in conformity with U.S generally accepted accounting principles.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audit. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audit we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audit included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audit also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audit provides a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 2017.

Irvine, California
March 30, 2018

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Stockholders of Novus Therapeutics, Inc.

We have audited the accompanying consolidated balance sheet of Novus Therapeutics, Inc. and its subsidiary (the "Company") as of December 31, 2016 and the related consolidated statement of operations and other comprehensive loss, stockholders' equity (deficit) and cash flows for the year then ended. These financial statements are the responsibility of the Company's Board of Directors and management. Our responsibility is to express an opinion on the financial statements based on our audit.

We conducted our audit in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. Our audit included consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes 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, as well as evaluating the overall financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the Company as of December 31, 2016 and the results of its operations and its cash flows for the year then ended in conformity with accounting principles generally accepted in the United States of America.

The 2016 consolidated financial statements of Otic Pharma Ltd. and its subsidiary ("Otic") were prepared assuming that the Company will continue as a going concern. As of the date of issuance of Otic's 2016 consolidated financial statements, the Company had not generated revenues from its activities and had incurred substantial operating losses. The resulting operating losses raised substantial doubt about its ability to continue as a going concern as of the date of issuance of the 2016 consolidated financial statements. The 2016 consolidated financial statements did not include any adjustments that might result from the outcome of these uncertainties.

Brightman Almagor Zohar & Co.
Certified Public Accountants
Member of Deloitte Touche Tohmatsu Limited

Tel Aviv, Israel

March 30, 2018

NOVUS THERAPEUTICS, INC.
CONSOLIDATED BALANCE SHEETS
(In thousands, except share data)

	December 31,	
	2017	2016 (Note 2)
ASSETS		
Current assets:		
Cash and cash equivalents	$ 17,233	$ 1,103
Restricted cash	70	14
Prepaid expenses and other current assets	1,697	33
Total current assets	19,000	1,150
Property and equipment, net	25	31
Goodwill	1,867	—
Other assets	—	15
Total assets	$ 20,892	$ 1,196
LIABILITIES AND STOCKHOLDERS' EQUITY (DEFICIT)		
Accounts payable	$ 418	$ 338
Accrued severance	668	—
Accrued expenses and other liabilities	354	113
Convertible notes	—	3,447
Total liabilities	1,440	3,898
Commitments and contingencies (Note 8)		
Stockholders' equity (deficit):		
Preferred stock, $0.001 par value, 5,000,000 shares authorized and none issued and outstanding at December 31, 2017; $0.001 par value, 44,140,630 shares authorized and 19,533,331 shares issued and outstanding at December 31, 2016 (1)	—	19
Common stock, $0.001 par value, 200,000,000 shares authorized and 7,110,414 shares issued and outstanding at December 31, 2017; $0.001 par value, 31,476,614 shares authorized and 394,306 shares issued and outstanding at December 31, 2016 (2)	7	—
Additional paid-in capital	46,951	11,378
Receipts on account of preferred stock	—	291
Accumulated deficit	(27,506)	(14,390)
Total stockholders' equity (deficit)	19,452	(2,702)
Total liabilities and stockholders' equity (deficit)	$ 20,892	$ 1,196

(1) Number of shares as of December 31, 2016, has been retroactively adjusted to reflect the effect of the exchange ratio of the Reverse Merger consummated on May 9, 2017.

(2) Number of shares has been retroactively adjusted to reflect the effect of the exchange ratio of the Reverse Merger consummated on May 9, 2017, and the reverse stock-split effected on May 11, 2017.

See accompanying notes to consolidated financial statements.

NOVUS THERAPEUTICS, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS AND OTHER COMPREHENSIVE LOSS
(In thousands, except share and per share data)

	Year Ended December 31,	
	2017	2016
Operating expenses		
Research and development	$ 2,022	$ 3,191
General and administrative	11,099	1,937
Total operating expenses	13,121	5,128
Loss from operations	(13,121)	(5,128)
Other income (expense), net	5	(527)
Net loss and other comprehensive loss	$ (13,116)	$ (5,655)
Net loss per share, basic and diluted (Note 2)	$ (2.30)	$ (2.46)
Weighted-average common shares outstanding, basic and diluted	4,677,610	382,747

See accompanying notes to consolidated financial statements.

NOVUS THERAPEUTICS, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY (DEFICIT)
(In thousands, except share data)

	Stockholders' Equity (Deficit)							
	Common Stock (1)		Preferred Stock (2)					
	Shares	Amount	Shares	Amount	Additional Paid-In Capital	Receipts on Account of Preferred Stock	Accumulated Deficit	Total
Balance as of December 31, 2015	373,259	$ —	19,533,331	$ 19	$ 11,207	$ 291	$ (8,735)	$ 2,782
Exercise of options	21,047	—	—	—	—	—	—	—
Stock-based compensation	—	—	—	—	171	—	—	171
Net loss and other comprehensive loss	—	—	—	—	—	—	(5,655)	(5,655)
Balance as of December 31, 2016	394,306	—	19,533,331	19	11,378	291	(14,390)	(2,702)
Issuance of preferred stock for exercise of warrants	—	—	7,941,493	8	3,111	—	—	3,119
Issuance of common stock for cashless exercise of warrants	152,580	—	—	—	—	—	—	—
Conversion of convertible note and accrued interest to common stock	323,261	1	—	—	3,446	—	—	3,447
Receipt on account of contingently convertible stock	104,788	—	—	—	291	(291)	—	—
Conversion of preferred stock and accrued dividends to common stock	3,052,758	3	(27,474,824)	(27)	24	—	—	—
Issuance of common stock in connection with Reverse Merger	2,515,739	3	—	—	23,372	—	—	23,375
Issuance of common stock for cash	400,400	—	—	—	4,000	—	—	4,000
Issuance of common stock at-the-market, net of issuance costs of $24	167,356	—	—	—	750	—	—	750
Cancellation of fractional common stock	(774)	—	—	—	—	—	—	—
Stock-based compensation	—	—	—	—	579	—	—	579
Net loss and other comprehensive loss	—	—	—	—	—	—	(13,116)	(13,116)
Balance as of December 31, 2017	7,110,414	$ 7	—	$ —	$ 46,951	$ —	$ (27,506)	$ 19,452

(1) Number of shares has been retroactively adjusted to reflect the effect of the exchange ratio of the Reverse Merger consummated on May 9, 2017, and the reverse stock-split effected on May 11, 2017.

(2) Number of shares has been retroactively adjusted to reflect the effect of the exchange ratio of the Reverse Merger consummated on May 9, 2017.

See accompanying notes to consolidated financial statements.

NOVUS THERAPEUTICS, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS
(In thousands)

	Year Ended December 31,	
	2017	**2016**
Operating activities		
Net loss	$ (13,116)	$ (5,655)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	22	35
Stock-based compensation	579	171
Loss on disposal of equipment	49	9
Fair value of debt in excess of proceeds	—	517
Changes in operating assets and liabilities:		
Prepaid expenses and other assets	(517)	65
Accounts payable and accrued expenses	(1,958)	(65)
Net cash used in operating activities	(14,941)	(4,923)
Investing activities		
Cash received from merger transaction	23,250	—
Proceeds from sale of equipment	8	10
Purchase of property and equipment	—	(9)
Net cash provided by investing activities	23,258	1
Financing activities		
Proceeds from issuance of common stock, net	4,750	—
Proceeds from exercise of warrants	3,119	—
Proceeds from convertible note	—	2,930
Net cash provided by financing activities	7,869	2,930
Net increase (decrease) in cash, cash equivalents and restricted cash	16,186	(1,992)
Cash, cash equivalents and restricted cash at beginning of period	1,117	3,109
Cash, cash equivalents and restricted cash at end of period	$ 17,303	$ 1,117
Supplemental disclosure of cash flow information		
Noncash activities:		
Conversion of promissory note and interest to common stock	$ 3,447	$ —
Conversion of contingently issuable shares to common stock	$ 291	$ —
Issuance of common stock in merger	$ 23,375	$ —
Conversion of preferred shares to common stock	$ 27	$ —
Fair value of assets acquired and liabilities assumed in the merger:		
Fair value of assets acquired, excluding cash and restricted cash	$ 3,072	$ —
Fair value of liabilities assumed	(2,947)	—
Fair value of net assets acquired in the merger	$ 125	$ —

See accompanying notes to consolidated financial statements.

Note 1. Description of Business

Novus Therapeutics is a specialty pharmaceutical company focused on developing products for disorders of the ear, nose, and throat (ENT). Unless otherwise indicated, references to the terms the "combined company", "Novus", the "Company", refer to Otic Pharma, Ltd. prior to the consummation of the Reverse Merger, and Novus Therapeutics, Inc., upon the consummation of the Reverse Merger described herein. The term "Tokai" refers to Tokai Pharmaceuticals, Inc., and its subsidiaries prior to the Reverse Merger.

Reverse Merger

On December 21, 2016, Tokai, a Delaware corporation, Otic, and the stockholders of Otic Pharma, Ltd., a private limited company organized under the laws of the State of Israel ("Otic") (each a "Seller" and collectively, the "Sellers"), entered into a Share Purchase Agreement (the "Share Purchase Agreement"), pursuant to which, among other things, each Seller agreed to sell to Tokai, and Tokai agreed to purchase from each Seller, all of the common and preferred shares of Otic ("Otic Shares") owned by such Seller in exchange for the issuance of a certain number of shares of common stock of Tokai, as determined pursuant to the terms of the Share Purchase Agreement (the "Reverse Merger"). The parties amended and restated the Share Purchase Agreement on March 2, 2017.

On May 9, 2017, Tokai, Otic, and the Sellers closed the transaction contemplated by the Share Purchase Agreement, and subsequently effected a reverse stock-split of common stock at a ratio of one-for-nine (see *Reverse Stock-Split* below). On a post-split basis, Tokai issued to the Sellers an aggregate of 4,027,693 shares of Tokai's common stock in exchange for 840,115 Otic Shares. Following the completion of the Reverse Merger, the business being conducted by Tokai became primarily the business conducted by Otic. In connection with the Reverse Merger, the name of the surviving corporation was changed to "Novus Therapeutics, Inc."

Private Placement

On January 31, 2017, Novus entered into a stock purchase agreement (the "Stock Purchase Agreement") with certain purchasers named therein (the "Purchasers"), pursuant to which the Purchasers agreed to purchase approximately $4.0 million of the Company's common stock through the purchase of 400,400 shares of the Company's common stock at a price of $9.99 per share (the "Private Placement"). The Private Placement closed on May 10, 2017. After giving effect to the issuance of the shares in the Private Placement, the stockholders of Otic owned approximately 64% of the Company's common stock.

Note 2. Summary of Significant Accounting Policies

Basis of Presentation and Principles of Consolidation

The consolidated financial statements are prepared in accordance with accounting principles generally accepted in the United States ("GAAP"). Novus, a Delaware corporation, owns 100% of the issued and outstanding common stock or other ownership interest in Otic. Otic owns 100% of the issued and outstanding common stock or other ownership interest in its U.S. subsidiary, Otic Pharma, Inc. The functional currency of the Company's foreign subsidiary is the U.S. Dollar; however, certain expenses, assets and liabilities are transacted at the local currency. These transactions are translated from the local currency into U.S. Dollars at exchange rates during or at the end of the reporting period.

All significant intercompany accounts and transactions among the entities have been eliminated from the consolidated financial statements.

Liquidity and Financial Condition

The Company has experienced recurring net losses and negative cash flows from operating activities since its inception. The Company recorded a net loss of $13.1 million for the year ended December 31, 2017. As of December 31, 2017, the Company had cash, cash equivalents, and restricted cash of $17.3 million, working capital of $17.6 million and an accumulated deficit of $27.5 million. Due to continuing research and development activities, the Company expects to continue to incur net losses into the foreseeable future. In order to continue these activities, the Company may need to raise

additional funds through future public or private debt and equity financings or strategic collaboration and licensing arrangements. If the Company issues equity or convertible debt securities to raise additional funding, its existing stockholders may experience dilution, it may incur significant financing costs, and the new equity or convertible debt securities may have rights, preferences and privileges senior to those of its existing stockholders. If the Company issues debt securities to raise additional funding, it would incur additional debt service obligations, it could become subject to additional restrictions limiting its ability to operate its business, and it may be required to further encumber its assets. Sufficient additional funding may not be available or be available on acceptable terms. If so, the Company may need to delay, reduce the scope of, or put on hold research and development activities while the Company seeks strategic alternatives.

The Company's ability to raise additional capital in the equity and debt markets is dependent on a number of factors, including, but not limited to, the market demand for the Company's common stock, which itself is subject to a number of development and business risks and uncertainties, as well as the uncertainty that the Company would be able to raise such additional capital at a price or on terms that are favorable to the Company.

At the time of issuance of Otic's 2016 financial statements, the Company concluded that there was substantial doubt regarding the Company's ability to continue as a going concern. The Company has performed an analysis and concluded substantial doubt does not exist with respect to the Company being able to continue as a going concern and the Company has sufficient cash resources to continue for a period of at least twelve months from the date of issuance of the consolidated financial statements for the year ended December 31, 2017.

Reverse Stock-Split

On May 11, 2017, Novus effected a reverse stock-split of its issued and outstanding common stock and options for common stock at a ratio of one-for-nine. The Company filed an Amended and Restated Certificate of Incorporation with the Secretary of State of the State of Delaware effecting such reverse stock-split. The accompanying consolidated financial statements and notes give retroactive effect to the reverse stock-split for all periods presented.

Use of Estimates

The preparation of the Company's consolidated financial statements in conformity with GAAP requires management to make informed estimates and assumptions that affect the reported amounts of assets, liabilities and expenses and the disclosure of contingent assets and liabilities in the Company's consolidated financial statements and accompanying notes. The most significant estimates in the Company's financial statements relate to the valuation of the convertible debt instrument, stock-based compensation, accruals for liabilities, carrying value of goodwill, and other matters that affect the consolidated financial statements and related disclosures. Actual results could differ materially from those estimates under different assumptions or conditions and the differences may be material to the consolidated financial statements.

Cash and Cash Equivalents

Cash represents cash deposits held at financial institutions. The Company considers all liquid investments purchased with an original maturity of three months or less and that can be liquidated without prior notice or penalty to be cash equivalents. The carrying value of cash equivalents approximate their fair value due to the short-term maturities of these instruments. Cash equivalents are held for the purpose of meeting short-term liquidity requirements, rather than for investment purposes. The Company had cash equivalents of $0 and $531,000 at December 31, 2017 and 2016, respectively.

Restricted Cash

Restricted cash represents cash required to be set aside as security for lease payments or to maintain a letter of credit for the benefit of the landlord for the Company's offices.

Concentration of Credit Risk and Other Risks and Uncertainties

As of December 31, 2017 and 2016, all of the Company's long-lived assets were located in the United States.

Financial instruments that are subject to concentration of credit risk consist primarily of cash equivalents. The Company's policy is to invest cash in institutional money market funds to limit the amount of credit exposure. At times, the Company maintains cash equivalents in short-term money market funds and it has not experienced any losses on its cash equivalents.

The Company's products will require approval from the U.S. Food and Drug Administration ("FDA") and foreign regulatory agencies before commercial sales can commence. There can be no assurance that its products will receive any of these required approvals. The denial or delay of such approvals may impact the Company's business in the future.

The Company is subject to risks common to companies in the pharmaceutical industry, including, but not limited to, new technological innovations, clinical development risk, establishment of appropriate commercial partnerships, protection of proprietary technology, compliance with government and environmental regulations, uncertainty of market acceptance of products, product liability, the volatility of its stock price and the need to obtain additional financing.

Business Combinations

Accounting for acquisitions requires extensive use of estimates and judgment to measure the fair value of the identifiable tangible and intangible assets acquired, including in-process research and development and liabilities assumed. Additionally, the Company must determine whether an acquired entity is considered a business or a set of net assets because the excess of the purchase price over the fair value of net assets acquired can only be recognized as goodwill in a business combination. The Company accounted for the merger with Tokai as a business combination under the acquisition method of accounting. Consideration paid to acquire Tokai was measured at fair value and included the exchange of Tokai's common stock and preferred stock. The allocation of the purchase price resulted in recognition of an intangible asset related to goodwill. The operating activity for Tokai, the acquiree for accounting purposes, was immediately integrated with Otic post-merger, therefore it is not practical to segregate results of operations related specifically to Tokai since the date of acquisition.

As a result of the Reverse Merger, historical common stock, stock options and additional paid-in capital, including share and per share amounts, have been retroactively adjusted to reflect the equity structure of the Company.

Reportable Segments

Operating segments under GAAP are defined as components of an enterprise about which separate financial information is available that is evaluated regularly by the Chief Operating Decision Maker ("CODM"), or decision-making group, in deciding how to allocate resources and in assessing performance. The CODM is the Company's Chief Executive Officer and the Company has determined that it operates in one business segment, which is the development of products for disorders of the ear, nose, and throat.

Goodwill

Goodwill represents the difference between the consideration transferred and the fair value of the net assets acquired under the acquisition method of accounting. Goodwill is not amortized but is evaluated for impairment during the last fiscal quarter of the year or if indicators of impairment exist that would, more likely than not, reduce the fair value from its carrying amount.

Long-Lived Assets

Property and equipment are recorded at cost. Depreciation is computed using the straight-line method over the estimated useful lives of the respective assets. Additions, major renewals and improvements are capitalized and repair and maintenance costs are charged to expense as incurred. Leasehold improvements are amortized over the remaining life of the initial lease term or the estimated useful lives of the assets, whichever is shorter.

The carrying value of long-lived assets, including intangible assets, is evaluated whenever events or changes in business circumstances or the Company's planned use of long-lived assets indicate, based on undiscounted future operating cash flows, that their carrying amounts may not be fully recoverable or that their useful lives are no longer appropriate. When an indicator of impairment exists, undiscounted future operating cash flows of long-lived assets are compared to their respective carrying value. If the carrying value is greater than the undiscounted future operating cash flows of long-lived assets, the long-lived assets are written down to their respective fair values and an impairment loss is recorded. Fair value is determined primarily using the discounted cash flows expected to be generated from the use of assets. Significant management judgment is required in the forecast of future operating results that are used in the preparation of expected cash flows. No impairments of tangible assets have been identified during the years presented.

Research and Development Expenses

Research and development expenses include personnel and facility-related expenses, outside contracted services including clinical trial costs, manufacturing and process development costs, research costs and other consulting services and non-cash stock-based compensation. Research and development costs are expensed as incurred. Amounts due under contracts with third parties may be either fixed fee or fee for service, and may include upfront payments, monthly payments and payments upon the completion of milestones or receipt of deliverables. Non-refundable advance payments under agreements are capitalized and expensed as the related goods are delivered or services are performed.

The Company's contracts with third parties to perform various clinical trial activities in the on-going development of potential products. The financial terms of these agreements are subject to negotiation, vary from contract to contract and may result in uneven payment flows to its vendors. Payments under the contracts depend on factors such as the achievement of certain events, successful enrollment of patients, and completion of portions of the clinical trial or similar conditions. The Company's accrual for clinical trials is based on estimates of the services received and efforts expended pursuant to contracts with clinical trial centers and clinical research organizations. These contracts may be terminated by the Company upon written notice and the Company is generally only liable for actual effort expended by the organizations to the date of termination, although in certain instances the Company may be further responsible for termination fees and penalties. The Company estimates its research and development expenses and the related accrual as of each balance sheet date based on the facts and circumstances known to the Company at that time. There have been no material adjustments to the Company's prior period accrued estimates for clinical trial activities through December 31, 2017.

Net Loss Per Share

Basic net loss per common share is calculated by dividing the net loss attributable to common stockholders by the weighted-average number of common shares outstanding during the period, without consideration for potentially dilutive securities. Diluted net loss per share is computed by dividing the net loss attributable to common stockholders by the weighted-average number of common shares and potentially dilutive securities outstanding for the period determined using the treasury-stock and if-converted methods. For purposes of the diluted net loss per share calculation, preferred stock, convertible notes and accrued interest, and stock options and warrants are considered to be potentially dilutive securities and are excluded from the calculation of diluted net loss per share because their effect would be anti-dilutive. Therefore, basic and diluted net loss per share was the same for the periods presented due to the Company's net loss position.

	Year Ended December 31,	
	2017	2016
	(In thousands, except share and per share data)	
Net loss available to stockholders of the company	$ (13,116)	$ (5,655)
Interest accumulated on preferred shares and on preferred shares contingently issuable for little or no cash	(328)	(917)
Net loss attributable to stockholders of preferred shares and to stockholders of preferred shares contingently issuable for little or no cash	2,666	5,631
Net loss used in the calculation of basic and diluted loss per share	$ (10,778)	$ (941)
Net loss per share, basic and diluted	$ (2.30)	$ (2.46)
Weighted-average number of common shares	4,677,610	382,747

The computation of diluted earnings per share excludes stock options, warrants, and restricted stock units that are anti-dilutive. For the year ended December 31, 2017, common share equivalents of 400,735 shares were anti-dilutive. For the year ended December 31, 2016, common share equivalents of 8,153,389 shares were anti-dilutive.

Stock-based Compensation

For stock options granted to employees, the Company recognizes compensation expense for all stock-based awards based on the grant-date estimated fair value. The fair value of stock options is determined using the Black-Scholes option pricing model, using assumptions which are subjective and require significant judgment and estimation by management. The

risk-free rate assumption was based on observed yields from governmental zero-coupon bonds with an equivalent term. The expected volatility assumption was based on historical volatilities of a group of comparable industry companies whose share prices are publicly available. The peer group was developed based on companies in the pharmaceutical industry. The expected term of stock options represents the weighted-average period that the stock options are expected to be outstanding. Because the Company does not have historical exercise behavior, it determined the expected life assumption using the simplified method, which is an average of the options ordinary vesting period and the contractual term. The expected dividend assumption was based on the Company's history and expectation of dividend payouts. The Company has not paid and does not expect to pay dividends at any time in the foreseeable future. The Company recognizes forfeitures on an actual basis and as such did not estimate forfeitures to calculate share based compensation.

Stock-based compensation expense related to stock options granted to non-employees is recognized based on the fair value of the stock options, determined using the Black-Scholes option pricing model, as they are earned. The awards generally vest over the period the Company expects to receive services from the non-employee. Stock options granted to non-employees are subject to periodic revaluation over their vesting terms.

For the year ended December 31, 2017, no excess tax benefits for tax deductions related to stock-based awards were recognized in the accompanying consolidated statements of operations and other comprehensive income as no stock options were exercised.

Income Taxes

The asset and liability approach is used to recognize deferred tax assets and liabilities for the expected future tax consequences of temporary differences between the carrying amounts and the tax bases of assets and liabilities. Tax law and rate changes are reflected in income in the period such changes are enacted. The Company includes interest and penalties related to income taxes, including unrecognized tax benefits, within income tax expense.

The Company's income tax returns are based on calculations and assumptions that are subject to examination by the Internal Revenue Service and other tax authorities. In addition, the calculation of the Company's tax liabilities involves dealing with uncertainties in the application of complex tax regulations. The Company recognizes liabilities for uncertain tax positions based on a two-step process. The first step is to evaluate the tax position for recognition by determining if the weight of available evidence indicates that it is more likely than not that the position will be sustained on audit, including resolution of related appeals or litigation processes, if any. The second step is to measure the tax benefit as the largest amount that is more than 50% likely of being realized upon settlement. While the Company believes it has appropriate support for the positions taken on its tax returns, the Company regularly assesses the potential outcomes of examinations by tax authorities in determining the adequacy of its provision for income taxes. The Company continually assesses the likelihood and amount of potential revisions and adjusts the income tax provision, income taxes payable and deferred taxes in the period in which the facts that give rise to a revision become known. For additional information, see *Note 9. Income Taxes* in the notes to the consolidated financial statements.

Recently Issued Accounting Pronouncements

In January 2016, the FASB issued Accounting Standards Update ("ASU") No. 2016-01, *Financial Instruments—Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities*, which updates certain aspects of recognition, measurement, presentation, and disclosure of financial instruments. ASU No. 2016-01 will be effective for the Company beginning in its first quarter of 2018. The adoption of ASU No. 2016-01 is not expected to have a material impact on the Company's consolidated financial statements.

In February 2016, the FASB issued ASU No. 2016-02, *Leases (Topic 842)*. Under this guidance, an entity is required to recognize right-of-use assets and lease liabilities on its balance sheet and disclose key information about leasing arrangements. This guidance offers specific accounting guidance for a lessee, a lessor, and sale and leaseback transactions. Lessees and lessors are required to disclose qualitative and quantitative information about leasing arrangements to enable a user of the financial statements to assess the amount, timing and uncertainty of cash flows arising from leases. The Company will adopt the standard effective in the first quarter of 2019 and is currently assessing the impact of adopting this guidance on its consolidated financial statements.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments—Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments*, which modifies the measurement of expected credit losses of certain financial instruments. ASU No. 2016-13 will be effective for the Company beginning in its first quarter of 2020 and early adoption is

permitted. The adoption of ASU No. 2016-13 is not expected to have a material impact on the Company's consolidated financial statements.

In October 2016, the FASB issued ASU No. 2016-16, *Income Taxes (Topic 740): Intra-Entity Transfer of Assets Other than Inventory*, which requires the recognition of the income tax consequences of an intra-entity transfer of an asset, other than inventory, when the transfer occurs. ASU No. 2016-16 will be effective for the Company beginning in its first quarter of 2018. The adoption of ASU No. 2016-16 is not expected to have a material impact on the Company's consolidated financial statements.

In January 2017, the FASB issued ASU No. 2017-01, *Clarifying the Definition of a Business (Topic 805)*, which clarifies and provides a more robust framework to use in determining when a set of assets and activities is a business. The amendments in this update should be applied prospectively on or after the effective date. ASU No. 2017-01 will be effective for the Company beginning in its first quarter of 2018. The adoption of ASU No. 2017-01 is not expected to have a material impact on the Company's consolidated financial statements.

In January 2017, the FASB issued ASU No. 2017-04, *Intangibles – Goodwill and Other (Topic 350)*, which eliminates the requirement to calculate the implied fair value of goodwill to measure a goodwill impairment charge. Instead, entities will record an impairment charge based on the excess of a reporting unit's carrying amount over its fair value. The standard has tiered effective dates, starting in 2020 for calendar-year public business entities that meet the definition of an SEC filer. Early adoption is permitted for annual and interim goodwill impairment testing dates after January 1, 2017. The Company is currently assessing the impact and timing of adopting this guidance on its consolidated financial statements.

In May 2017, the FASB issued ASU No. 2017-09, *Scope of Modification Accounting*, which amends the scope of modification accounting for share-based payment arrangements, provides guidance on the types of changes to the terms or conditions of share-based payment awards to which an entity would be required to apply modification accounting under ASC 718 *Compensation – Stock Compensation*. ASU No. 2017-09 will be effective for the Company beginning in its first quarter of 2018. The adoption of ASU No. 2017-09 is not expected to have a material impact on the Company's consolidated financial statements.

In February 2018, the FASB issued ASU No. 2018-02, Income Statement—Reporting Comprehensive Income (Topic 220), which allows a reclassification from accumulated other comprehensive income to retained earnings for stranded tax effects resulting from the passing of H.R. 1/Public Law No. 115-97, commonly known as the Tax Cuts and Jobs Act (the "Act") and requires certain disclosures about stranded tax effects. The amendments in ASU No. 2018-02 are effective beginning in 2019, with early adoption permitted, and may be applied either in the period of adoption or retrospectively to each period in which the effect of the change in the U.S. Federal corporate tax rate in the Act is recognized. The Company is currently assessing the impact and timing of adopting this guidance on its consolidated financial statements.

Recently Adopted Accounting Pronouncements

In March 2016, the FASB issued ASU No. 2016-09, *Compensation—Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting*. This guidance identifies areas for simplification involving several aspects of accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, an option to recognize gross stock compensation expense with actual forfeitures recognized as they occur, as well as certain classifications on the statement of cash flows. This guidance was effective for the Company beginning January 1, 2017, and did not have a material impact in the accompanying financial statements.

In November 2016, the FASB issued ASU No. 2016-18, *Statements of Cash Flows (Topic 230): Classification and Presentation of Restricted Cash in the Statements of Cash Flows*, which requires that restricted cash and restricted cash equivalents be included as components of total cash and cash equivalents in the statement of cash flows. The Company adopted the provisions of this guidance using the retrospective approach in the first quarter of 2017. The adoption did not have a material impact on its consolidated financial statements; however, prior period restricted cash was added to beginning and ending cash and cash equivalents in the consolidated statement of cash flows to confirm to the current presentation.

A reconciliation of cash, cash equivalents, and restricted cash reported within the consolidated balance sheets that sum to the total of the same such amounts shown in the consolidated statements of cash flows, is as follows (in thousands):

	Year Ended December 31,	
	2017	2016
Cash and cash equivalents	$ 17,233	$ 1,103
Restricted cash, as part of current assets	70	14
Total cash, cash equivalents, and restricted cash shown in the consolidated statements of cash flows	$ 17,303	$ 1,117

Amounts included in restricted cash as part of current assets represented those required to be set aside as security for lease payments for Otic's Israel facility as of December 31, 2016. Restricted cash as part of current assets on the consolidated balance sheet as of December 31, 2017, represents amounts set aside to maintain a letter of credit for the benefit of the landlord of Tokai's Boston office. Although the Boston office lease was terminated in November 2017, the process to release the restricted cash was not completed as of December 31, 2017. On March 12, 2018, the restricted cash was released and transferred into general funds.

Note 3. Reverse Merger

The Company completed the Reverse Merger with Tokai as discussed in Note 1. Based on the terms of the Reverse Merger, the Company concluded that the transaction is a business combination pursuant to ASC 805 *Business Combinations*, Otic was deemed the acquiring company for accounting purposes, and the transaction has been accounted for as a reverse acquisition under the acquisition method of accounting for business combinations in accordance with GAAP. Under the acquisition method of accounting, the total purchase price was allocated to the acquired tangible and intangible assets and assumed liabilities of Tokai based on their estimated fair values as of the Reverse Merger closing date. The excess of the purchase price over the fair value of assets acquired and liabilities assumed was allocated to goodwill.

On May 9, 2017, Tokai issued 4,027,693 shares of its common stock to the stockholders of Otic and the holders of warrants and options of Otic upon the exercise of such options and warrants in exchange for 840,115 Otic Shares. All warrants were exercised as of the merger date and after consummation of the Reverse Merger, Otic stockholders owned a majority of the fully diluted common stock of Novus Therapeutics, Inc.

Purchase Consideration

The purchase price for Tokai on May 9, 2017, the closing date of the Reverse Merger, was as follows (in thousands):

Fair value of Tokai common stock outstanding (1)	$ 14,486
Premium paid (2)	8,889
Purchase price	$ 23,375

(1) Comprised of 2,515,739 shares of common stock outstanding at the date of the Reverse Merger based on the closing price of $5.76 per share on May 9, 2017, as adjusted for the one-for-nine reverse stock-split on May 11, 2017.

(2) Premium paid over fair value of common stock based on net tangible asset multiple of 1.08x book value of Tokai equity of $21.5 million as of May 9, 2017.

Allocation of Purchase Consideration

The allocation of the estimated purchase price to the acquired assets and liabilities assumed of Tokai, based on their estimated fair values as of May 9, 2017, the close of the transaction, was as follows (in thousands):

Cash, cash equivalents, and restricted cash	$ 23,250
Prepaids and other current assets	1,132
Property and equipment	73
Goodwill	1,867
Accounts payable, accrued expenses and other liabilities	(2,947)
Net assets acquired	$ 23,375

The Company engaged a third-party valuation firm to assist management in its analysis of the fair value of Tokai. All estimates, key assumptions, and forecasts were either provided by or reviewed by management. While the Company chose to utilize a third-party valuation firm, the fair value analysis and related valuations represent the conclusions of management and not the conclusions or statements of any third party. The excess of the total purchase price over the fair value of assets acquired and liabilities assumed was allocated to goodwill.

The Company believes that the historical values of Tokai's current assets and current liabilities approximated fair value based on the short-term nature of such items.

Goodwill, which relates principally to intangible assets that do not qualify for separate recognition under GAAP, was calculated as the difference between the fair value of the consideration expected to be transferred and the values assigned to the identifiable tangible and intangible assets acquired and liabilities assumed. Goodwill is not expected to be deductible for tax purposes.

Pro Forma Results in Connection with Reverse Merger

The operating activity for Tokai, the acquiree for accounting purposes, was immediately integrated with Otic post-merger, therefore it is not practical to segregate results of operations related specifically to Tokai since the date of acquisition.

The unaudited financial information in the following table summarizes the combined results of operations of the Company and Tokai, on a pro forma basis, as if the Reverse Merger had occurred at the beginning of the periods presented (in thousands):

	Year Ended December 31,	
	2017	2016
Operating expenses		
Research and development	$ 2,481	$ 28,215
General and administrative	9,356	14,361
Total operating expenses	11,837	42,576
Loss from operations	(11,837)	(42,576)
Other income, net	45	154
Net loss and other comprehensive loss	$ (11,792)	$ (42,422)
Net loss per share, basic and diluted	$ (2.52)	$ (5.89)
Weighted-average shares outstanding, basic and diluted	4,677,610	7,208,003

The above unaudited pro forma information was determined based on historical GAAP results of Otic and Tokai. The unaudited pro forma combined results are not necessarily indicative of what the Company's combined results of operations would have been if the acquisition was completed at the beginning of the periods presented. The unaudited pro forma combined net loss includes pro forma adjustments primarily relating to the following non-recurring items directly attributable to the business combination:

- Elimination of transaction costs of $7.2 million and $700,000 incurred during the years ended December 31, 2017 and December 31, 2016, respectively. These amounts have been eliminated on a pro forma basis as they are not expected to have a continuing effect on the operating results of the combined company.
- Elimination of a fair value adjustment of $517,000 related to the convertible note issued on July 11, 2016.
- An increase in the weighted-average shares outstanding for the period after giving effect to the issuance of Tokai common stock in connection with the Reverse Merger and Private Placement.

Note 4. Fair Value Measurements

Financial assets and liabilities are recorded at fair value. At December 31, 2017, the Company had no financial instruments. At December 31, 2016, the Company's financial instruments included cash equivalents and short-term

convertible note. The carrying amount of cash equivalents and short-term convertible note approximate fair value due to the short-term maturities of these instruments. The convertible notes had a term of 12 months.

The Company measures the fair value of certain of its financial instruments on a recurring basis. A fair value hierarchy is used to rank the quality and reliability of the information used to determine fair values. Financial assets and liabilities carried at fair value will be classified and disclosed in one of the following three categories:

Level 1—Quoted prices (unadjusted) in active markets for identical assets and liabilities.

Level 2—Inputs other than Level 1 that are observable, either directly or indirectly, such as unadjusted quoted prices for similar assets and liabilities, unadjusted quoted prices in the markets that are not active, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.

Level 3—Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities.

There have been no transfers of assets for liabilities between these fair value measurement classifications during the periods presented.

The Company had no financial assets or liabilities measured at fair value on a recurring basis at December 31, 2017.

The following table summarizes the Company's financial assets and liabilities measured at fair value on a recurring basis at December 31, 2016 (in thousands):

	Level 1	Level 2	Level 3	Total
Assets				
Cash equivalents	$ 531	$ —	$ —	$ 531
Total assets at fair value	$ 531	$ —	$ —	$ 531
Liabilities				
Convertible notes	$ —	$ 3,447	$ —	$ 3,447
Total liabilities at fair value	$ —	$ 3,447	$ —	$ 3,447

Note 5. Prepaid Expenses, Other Assets, Accrued Expenses and Other Liabilities

Prepaid expenses and other current assets consisted of the following as of December 31, 2017 and December 31, 2016 (in thousands):

	Year Ended December 31,	
	2017	2016
Prepaid insurance	$ 1,518	$ —
Prepaid other	161	—
Other current assets	18	33
Total prepaid expenses and other current assets	$ 1,697	$ 33

Accrued expenses and other liabilities consisted of the following as of December 31, 2017 and December 31, 2016 (in thousands):

	Year Ended December 31,	
	2017	2016
Accrued clinical	$ 85	$ —
Accrued compensation and related expenses	—	51
Accrued professional services	158	—
Accrued vacation	111	50
Accrued other	—	12
Total accrued expenses and other liabilities	$ 354	$ 113

Note 6. Goodwill

The changes in the carrying amount of goodwill consisted of the following as of December 31, 2017 and December 31, 2016 (in thousands):

	Gross Carrying Amount	Accumulated Impairment Losses	Net Carrying Amount
Balance as of January 1, 2016	$ —	$ —	$ —
Additions	—	—	—
Balance as of December 31, 2016	—	—	—
Additions (1)	1,867	—	1,867
Balance as of December 31, 2017	$ 1,867	$ —	$ 1,867

(1) Relates to the Reverse Merger (See *Note 3. Reverse Merger*).

Note 7. Convertible Note

On July 11, 2016, OrbiMed Israel Partners Limited Partnership and Peregrine Management II Ltd. provided Otic with a convertible bridge financing (the "Bridge Financing") in the aggregate amount of $2.9 million (the "Bridge Financing Amount"), pursuant to a Bridge Financing Agreement (the "Bridge Financing Agreement"). Under the terms of the Bridge Financing Agreement, other than upon occurrence of an Event of Default (as defined in the Bridge Financing Agreement), Otic was not required to repay the Bridge Financing Amount or any portion in cash. The Bridge Financing Agreement further provided that upon a Deemed Liquidation (as defined in Otic's Articles of Association), the Bridge Financing Amount is convertible into Preferred C Shares of Otic at a price per share representing 85% of the Preferred C Shares' original issue price. Upon closing of the Reverse Merger, pursuant to the terms of the Bridge Financing Agreement, the Bridge Financing amount converted into 323,261 shares of common stock.

The Company concluded the value of the Bridge Financing is predominantly based on a fixed monetary amount known at the date of issuance as represented by the 15% discount on the Company's shares to be sold upon a Deemed Liquidation event. Accordingly, the Bridge Financing was classified as debt and was remeasured at its fair value of $3.4 million as of December 31, 2016, pursuant to the provisions of ASC 480-10, "Accounting for Certain Financial instruments with Characteristics of both Liabilities and Equity." As of December 31, 2017, the Company has no convertible note.

Note 8. Commitments and Contingencies

Operating Leases

The Company leases office space under various operating leases. Total rent expense for all operating leases in the consolidated statements of operations and comprehensive loss was approximately $1.0 million and $188,000 for the year ended December 31, 2017 and 2016, respectively.

In February 2015, Tokai entered into a sublease for 15,981 square feet of office space in Boston, Massachusetts. The term of the sublease commenced on April 1, 2015 and expired on December 31, 2016 and subsequently extended through July 31, 2018. In November 2017, the Company terminated the lease early and paid an additional $455,000 in advance rent in conjunction with the lease termination.

In September 2015, Otic entered into a three-year operating lease for 5,197 square feet of office space in Irvine, California. The lease has an expiration date of August 31, 2018.

Future payments under noncancelable operating leases having initial or remaining terms of one year or more are as follows for the succeeding fiscal year and thereafter (in thousands):

2018	$ 112
Total minimum lease payments	$ 112

Restricted Cash and Letter of Credit

The Company was required to maintain a letter of credit totaling $70,000 for the benefit of the landlord of Tokai's Boston office. The landlord can draw against the letter of credit in the event of default by the Company. The Company held $70,000, which is in restricted cash as part of current assets on the consolidated balance sheet as of December 31, 2017. Although the Boston office lease was terminated in November 2017, the process to release the restricted cash was not completed as of December 31, 2017. On March 12, 2018, the restricted cash was released and transferred into general funds.

As of December 31, 2016, the Company maintained a $14,000 restricted cash balance that was used as security for lease payments for Otic's Israel facility and was invested in highly liquid deposits with original maturities of less than three months. As of March 31, 2017, the restricted cash was released and transferred into general funds.

Grants and Licenses

From 2012 through 2015, the Company received grants in the amount of approximately $537,000 from the Israeli Innovation Authority (previously the Office of Chief Scientist) of the Israeli Ministry of Economy and Industry designated for investments in research and development. The grants are linked to the U.S. dollar and bear annual interest of LIBOR. The grants are to be repaid as royalties from sales of the products developed by the Company from their investments in research and development. Because the Company has not yet earned revenues related to these investments and cannot estimate potential royalties, no liabilities related to these grants have been recorded as of each period presented. Repayment of the grant is contingent upon the successful completion of the Company's R&D programs and generating sales. The Company has no obligation to repay these grants, if the R&D program fails, is unsuccessful or aborted or if no sales are generated. The Company had not yet generated sales as of December 31, 2017; therefore, no liability was recorded for the repayment in the accompanying consolidated financial statements.

In November 2015, the Company entered into an exclusive license agreement with Scientific Development and Research, Inc. and Otodyne, Inc. (collectively, the "Licensors") granting it exclusive worldwide rights to develop and commercialize OP-02, a potential first-in-class treatment option for patients at risk for or with otitis media (middle ear inflammation with or without infection), which is often caused by Eustachian tube dysfunction. Under the terms of the agreement, the Company is obligated to use commercially reasonable efforts to seek approval for and commercialize at least one product for otitis media in the U.S. and key European markets (France, Germany, Italy, Spain, and the United Kingdom). The Company is responsible for prosecuting, maintaining, and enforcing all intellectual property and will be the sole owner of improvements. Under the agreement with the Licensors, the Company paid license fees totaling $750,000 and issued 9,780 common shares to the Licensors, which was expensed to research and development during the year ended December,31, 2015.

In December 2015, the Licensors completed transfer of all technology, including the active Investigational New Drug application ("IND") to the Company. The Company is obligated to pay up to $42.1 million in development and regulatory milestones if OP-02 is approved for three indications in the U.S., two in Europe, and two in Japan. The Company is also obligated to pay up to $36.0 million in sales based milestones, beginning with sales exceeding $1.0 billion in a calendar year. The Company is also obligated to pay a tiered royalty for a period up to eight years, on a country-by-country basis. The royalty ranges from a low-single to mid-single percentage of net sales. There were no milestones achieved during the years ended December 31, 2017 or 2016.

The Company has a master license agreement with the University of Maryland, Baltimore ("UMB"), which was originally entered into by Tokai. Pursuant to the license agreement, UMB granted an exclusive, worldwide license, with the right to sublicense, and, under certain patents and patent applications to make, have made, use, sell, offer to sell and import certain anti-androgen steroids, including galeterone, for the prevention, diagnosis, treatment or control of any human or animal disease. In addition, UMB granted the Company a first option to receive an exclusive license to UMB's rights in certain improvements to the licensed products. The Company has exercised its option and acquired exclusive rights to licensed improvements under four amendments to the license agreement. The Company is obligated to pay UMB an annual maintenance fee of $10,000 each year until the first commercial sale of a product developed using the licensed technology. The Company is also obligated to make milestone payments of an additional $50,000 for the filing of each additional investigational new drug application filed for a licensed product, aggregate milestone payments of up to $150,000 associated with the development of a licensed product for a particular non-prostate disease indication, and a $100,000 milestone payment upon the approval by the U.S. Food and Drug Administration ("FDA") of each new drug application ("NDA") for a licensed product. There were no milestones achieved during the years ended December 31, 2017 or 2016.

The Company must also pay UMB a low-single digit percentage royalty on aggregate worldwide net sales of licensed products, including sales by sublicensees, on a licensed product-by-licensed product and country-by-country basis until the later of the expiration of the last-to-expire applicable licensed patent or ten years after the first commercial sale of the applicable licensed product, in each case in the applicable country. The royalty obligations are subject to specified reductions in the event that additional licenses need to be obtained from third parties or in the event of specified competition from third-party products licensed by UMB. Minimum annual royalty payments to UMB are $50,000 beginning in the year following the year in which the first commercial sale occurs. The Company must also pay UMB 10% of all non-royalty sublicense income received from sublicensees. Finally, the Company is responsible for all patent expenses related to the prosecution and maintenance of the licensed patents. As of December 31, 2017, the Company has not yet developed a commercial product using the licensed technologies, nor has it entered into any sublicense agreements for the technologies.

In January 2015, the Company (through Tokai) entered into an exclusive license agreement with The Johns Hopkins University ("Johns Hopkins") pursuant to which Johns Hopkins granted the Company an exclusive, worldwide license under certain patents and patent applications, and a non-exclusive license under certain know-how, in each case with the right to sublicense, and to make, have made, use, sell, offer to sell and import certain assays to identify androgen receptor variants for use as a companion diagnostic with galeterone. In addition, Johns Hopkins granted the Company an option to negotiate an exclusive license to Johns Hopkins's rights in certain improvements to the licensed intellectual property.

In consideration for the rights granted to the Company under the license agreement, Tokai made an upfront payment to Johns Hopkins of $75,000 following the execution of the license agreement, which was recognized as research and development expense during the year ended December 31, 2015. The Company is obligated to pay Johns Hopkins an annual minimum royalty of up to $30,000 and to make milestone payments to Johns Hopkins upon the achievement of specified technical and commercial milestones. If all such milestones were achieved, the total milestone payments owed to Johns Hopkins would equal $700,000 in the aggregate. During the year ended December 31, 2015, Tokai expensed $50,000 upon the achievement of two of these milestones. The Company has not achieved any other milestones and, therefore, no additional liabilities for such milestone payments have been recorded in the Company's financial statements.

The Company must also pay Johns Hopkins single digit percentage royalties on aggregate worldwide net sales of licensed products (but not galeterone), including sales by sublicensees, on a licensed product-by-licensed product and country-by-country basis until the later of the expiration of the last-to-expire applicable licensed patent or ten years after first commercial sale of the applicable licensed product, in each case in the applicable country. These royalty obligations are subject to specified reductions in the event that additional licenses from third parties are required. The Company must also pay Johns Hopkins 20% of all non-royalty sublicense income received from sublicensees and reimburse Johns Hopkins for patent costs. As of December 31, 2017, the Company has not yet developed a commercial product using the licensed technologies.

On October 5, 2017, the Company submitted notice of termination to all parties. The Company no longer has any obligations to UMB as of December 4, 2017, and to John Hopkins as of January 3, 2018.

Legal Matters

The Company is involved in various lawsuits and claims arising in the ordinary course of business, including actions with respect to intellectual property, employment, and contractual matters. In connection with these matters, the Company assesses, on a regular basis, the probability and range of possible loss based on the developments in these matters. A liability is recorded in the financial statements if it is believed to be probable that a loss has been incurred and the amount of the loss can be reasonably estimated. Because litigation is inherently unpredictable and unfavorable results could occur, assessing contingencies is highly subjective and requires judgments about future events. The Company regularly reviews outstanding legal matters to determine the adequacy of the liabilities accrued and related disclosures. The amount of ultimate loss may differ from these estimates. Each matter presents its own unique circumstances, and prior litigation does not necessarily provide a reliable basis on which to predict the outcome, or range of outcomes, in any individual proceeding. Because of the uncertainties related to the occurrence, amount, and range of loss on any pending litigation or claim, the Company does not consider a liability probable and is currently unable to predict their ultimate outcome, and, with respect to any pending litigation or claim where no liability has been accrued, to make a meaningful estimate of the reasonably possible loss or range of loss that could result from an unfavorable outcome. In the event that opposing litigants in outstanding litigation proceedings or claims ultimately succeed at trial and any subsequent appeals on their claims, any potential loss or charges in excess of any established accruals, individually or in the aggregate, could have a material adverse effect on the Company's business, financial condition, results of operations, and/or cash flows in the period in which the unfavorable outcome occurs or becomes probable, and potentially in future periods.

Legal Proceedings

Doshi Action

On August 1, 2016, a purported stockholder of Tokai filed a putative class action lawsuit in the U.S. District Court for the Southern District of New York against Tokai, Jodie P. Morrison, and Lee H. Kalowski, entitled *Doshi v. Tokai Pharmaceuticals, Inc., et al.*, No. 1:16-cv-06106 ("Doshi Action"). The plaintiff sought to represent a class of purchasers of Tokai securities between June 24, 2015, and July 25, 2016, and alleges that, in violation of the Securities Exchange Act of 1934 ("Exchange Act") and Rule 10b-5 promulgated thereunder, defendants made false and misleading statements and omissions about Tokai's clinical trials for its drug candidate, galeterone. The lawsuit sought, among other things, unspecified compensatory damages, interest, costs, and attorneys' fees. On October 3, 2016, the case was transferred to the U.S. District Court for the District of Massachusetts. On September 28, 2017, this action was consolidated with *Garbowski, et al. v. Tokai Pharmaceuticals, Inc., et al.*, No. 1:16-cv-11963 (see below). The Company intends to vigorously defend against these claims. Given the uncertainty of litigation, the preliminary stage of the case, and the legal standards that must be met for, among other things, success on the merits, the Company is unable to predict the ultimate outcome of these actions, and therefore it cannot estimate the reasonably possible loss or range of loss that may result from this action.

Legal Proceedings Related to Tokai IPO

On September 22, 2014, Tokai completed the initial public offering of its common stock (the IPO"). Subsequent to the IPO, several lawsuits were filed against Tokai, Jodie P. Morrison, Lee H. Kalowski, Seth L. Harrison, Timothy J. Barberich, David A. Kessler, Joseph A. Yanchik, III, and the underwriters of the IPO. The lawsuits allege that, in violation of the Securities Act of 1933 ("Securities Act"), Tokai's registration statement for the IPO made false and misleading statements and omissions about Tokai's clinical trials for galeterone (the "Securities Act claims"). Each lawsuit sought, among other things, unspecified compensatory damages, interest, costs, and attorneys' fees. Further details on each lawsuit are set forth below. The Company intends to vigorously defend against these claims. Given the uncertainty of litigation, the preliminary stage of these cases, and the legal standards that must be met for, among other things, success on the merits, the Company is unable to predict the ultimate outcome of these actions, and therefore it cannot estimate the reasonably possible loss or range of loss that may result from these actions.

- Jackie888 Action. On August 19, 2016, a purported stockholder of Tokai filed a putative class action lawsuit in the Superior Court of the State of California, County of San Francisco, entitled *Jackie888, Inc. v. Tokai Pharmaceuticals, Inc., et al.*, No. CGC-16-553796. The plaintiff sought to represent a class of purchasers of Tokai common stock in or traceable to Tokai's IPO. On October 19, 2016, the defendants moved to dismiss or stay the action on grounds of forum non conveniens, and certain individual defendants moved to quash the plaintiff's summons for lack of personal jurisdiction. On February 27, 2017, the Superior Court entered an order granting defendants' motion to stay the lawsuit.
- Garbowski Action. On September 29, 2016, two purported stockholders of Tokai filed a putative class action lawsuit in the U.S. District Court for the District of Massachusetts, entitled *Garbowski, et al. v. Tokai Pharmaceuticals, Inc., et al.*, No. 1:16-cv-11963 ("Garbowski Action"). In addition to the Securities Act claims, this lawsuit also alleges that the defendants made false and misleading statements and omissions about Tokai's clinical trials for galeterone, in violation of the Exchange Act and Rule 10b-5 promulgated thereunder. The plaintiffs sought to represent a class of purchasers of Tokai common stock in or traceable to Tokai's IPO as well as a class of purchasers of Tokai common stock between September 17, 2014, and July 25, 2016. On September 28, 2017, this action was consolidated with the Doshi Action.
- Wu Action. On December 5, 2016, a putative securities class action was filed in the Business Litigation Session of the Superior Court Department of the Suffolk County Trial Court, Massachusetts ("Massachusetts State Court"), entitled *Wu v. Tokai Pharmaceuticals, Inc., et al.*, 16-3725 BLS ("Wu Action"). The plaintiff seeks to represent a class of purchasers of Tokai common stock in or traceable to Tokai's IPO. On December 19, 2016, defendants removed the Wu Action to the U.S. District Court for the District of Massachusetts, where it was captioned *Wu v. Tokai Pharmaceuticals, Inc., et al.*, 16-cv-12550, and assigned to the same judge presiding over the Doshi and Garbowski Actions. On December 22, 2016, defendants filed a motion to consolidate the Wu Action with the Doshi and Garbowski Actions. On January 6, 2017, plaintiff filed a motion to remand the Wu Action to Massachusetts State Court. On September 28, 2017, the court stayed the case pending a decision by the *United States Supreme Court in Cyan, Inc. v. Beaver County Employees Retirement Fund*, S. Ct. Case No. 15-1439. On March 20, 2018, the United States Supreme Court ruled in Cyan that state courts have subject matter jurisdiction over covered class actions alleging only Securities Act claims and that such actions are not removable to federal court. On March 22, 2018, plaintiff moved for leave to submit the Cyan decision in support of plaintiff's remand motion.

- Angelos Action. On July 25, 2017, a purported stockholder of Tokai filed a lawsuit in the U.S. District Court for the District of Massachusetts, entitled *Peter B. Angelos v. Tokai Pharmaceuticals, Inc., et al.*, No. 1:17-cv-11365-MLW. The case has been assigned to the same judge presiding over the Doshi, Garbowski, and Wu Actions.

Indemnification

In the normal course of business, the Company enters into contracts and agreements that contain a variety of representations and warranties and provide for general indemnification. The Company's exposure under these agreements is unknown because it involves future claims that may be made against the Company but have not yet been made. To date, the Company has not paid any claims or been required to defend any action related to its indemnification obligations. However, the Company may record charges in the future because of these indemnification obligations. No amounts associated with such indemnifications have been recorded to date.

Contingencies

From time to time, the Company may have certain contingent liabilities that arise in the ordinary course of business activities. The Company accrues a liability for such matters when it is probable that future expenditures will be made and such expenditures can be reasonably estimated. There have been no contingent liabilities requiring accrual at December 31, 2017 and 2016.

Note 9. Stock-Based Compensation

Otic had one stock compensation plan prior to the Reverse Merger, the 2012 Global Share Incentive Plan (the "2012 Plan"). Under the 2012 Plan, stock options, restricted share units and performance share awards may be granted the Company's directors, employees and consultants. Options remain outstanding under the 2012 Plan. In connection with the Reverse Merger, all such options converted into options to purchase shares of Tokai common stock, as renamed Novus, and the applicable share amounts and exercise prices were adjusted to reflect the exchange ratio and in connection with the one-for-nine reverse stock-split. No additional grants shall be made from the 2012 Plan. Options granted under the 2012 Plan generally expire ten years from the date of grant.

Prior to the Reverse Merger, Tokai had two stock compensation plans, the 2014 Stock Incentive Plan (the "2014 Plan") and the 2007 Stock Incentive Plan (the "2007 Plan"). The 2014 Plan permits the Company to make grants of incentive stock options, non-statutory stock options, restricted stock, restricted stock units, stock appreciation rights and other stock-based awards to the Company's employees, officers, directors, consultants and advisors; however, incentive stock options may only be granted to the Company's employees. The number of shares initially reserved for issuance under the 2014 Plan was 1,700,000 shares of common stock and may be increased by the number of shares under the 2007 Plan that expire, terminate or are otherwise surrendered, cancelled, forfeited or repurchased by the Company. The number of shares of common stock that may be issued under the plan is also subject to an annual increase on the first day of each fiscal year equal to the lesser of (i) 1,800,000 shares of the Company's common stock, (ii) 4% of the number of shares of the Company's common stock outstanding on the first day of the applicable fiscal year or (iii) an amount determined by the Company's board of directors. Options remain outstanding under both the 2007 and the 2014 Plan. The number of shares subject to and the exercise prices applicable to these outstanding options were adjusted in connection with the one for nine reverse stock-split. As of December 31, 2017, there were no options issued or outstanding under the 2007 plan. Options granted under the 2007 and 2014 Plans generally expire ten years from the date of grant. The Company intends for the 2014 Plan to be its primary stock compensation plan in the future.

Because Otic is considered to be the acquirer for accounting purposes, the pre-Reverse Merger vested stock options granted by Tokai under the 2007 Plan and the 2014 Plan are deemed to have been exchanged for equity awards of the Company and as such the portion of the acquisition date fair value of these equity awards attributable to pre-Reverse Merger service to Tokai were accounted for as a component of the consideration transferred.

The exchange of Otic stock options to purchase Tokai common stock, as renamed Novus, was accounted for as a modification of the awards because the legal exchange of the awards is considered a modification of Otic stock options. The modification of the stock options did not result in any incremental compensation expense as the modification did not increase the fair value of the stock options.

Stock Option Activity

As of December 31, 2017, a total of 3,617,376 options were available for grant under the 2014 Plan.

The following table shows the stock option activity, as follows:

	Shares Issuable Under Options	Weighted Average Exercise Price	Weighted Average Remaining Contractual Term (In years)	Aggregate Intrinsic Value (In thousands)
Outstanding as of January 1, 2016	63,627	$ 17.70		
Granted	13,054	19.75		
Exercised	(2,120)	0.06		$ 2.1
Forfeited	(8,074)	19.01		
Canceled	(6,710)	19.75		
Outstanding as of December 31, 2016	59,777	18.45	8.8	$ 4.3
Granted	595,800	5.54		
Options assumed in the Reverse Merger	37,000	5.84		
Exercised	—	—		
Forfeited / Canceled	(10,377)	7.78		
Outstanding as of December 31, 2017	682,200	$ 6.65	9.2	$ 8.6
Options vested and expected to vest as of December 31, 2017	682,200	$ 6.65	9.2	$ 8.6
Options exercisable as of December 31, 2017	143,657	$ 8.68	8.7	$ 8.6

As of December 31, 2017, the range of exercise prices was between $4.21 and $19.75 for options outstanding.

Intrinsic value is calculated as the difference between the exercise price of the underlying options and the fair value of the common stock for the options that had exercise prices that were lower than the fair value per share of the common stock on the date of exercise. The aggregate intrinsic value of options exercised during the years ended December 31, 2017 and 2016 was $0 and $2,100, respectively.

As of December 31, 2017, total unrecognized stock-based compensation expense related to non-vested equity awards was $2.3 million, which is expected to be recognized over an estimated weighted-average period of 2.5 years.

Stock-based Compensation Expense

Total compensation expense related to all of the Company's share-based awards for the years ended December 31, 2017 and December 31, 2016 was comprised of the following (in thousands):

	Year Ended December 31, 2017	2016
Stock-based compensation classified as:		
Research and development expense	$ 69	$ 65
General and administrative expense	510	106
Total stock-based compensation expense	$ 579	$ 171

Stock-based compensation expense for the year ended December 31, 2017 includes $80,000 of stock-based compensation expense related to a performance-based option grant which vested during 2017.

Valuation Assumptions

The Company determined the grant-date value of stock options using the Black-Scholes option pricing model. The fair value of each stock option grant was determined using assumptions which are subjective and require significant judgment

and estimation by management. The risk-free rate assumption was based on observed yields from governmental zero-coupon bonds with an equivalent term. The expected volatility assumption was based on historical volatilities of a group of comparable industry companies whose share prices are publicly available. The peer group was developed based on companies in the pharmaceutical industry. The expected term of stock options represents the weighted-average period that the stock options are expected to be outstanding. Because the Company does not have historical exercise behavior, it determined the expected life assumption using the simplified method, which is an average of the options ordinary vesting period and the contractual term. The expected dividend assumption was based on the Company's history and expectation of dividend payouts. The Company has not paid and does not expect to pay dividends at any time in the foreseeable future. The Company recognizes forfeitures on an actual basis and as such did not estimate forfeitures to calculate share based compensation.

The following table presents the assumptions used in the Black-Scholes option pricing model to determine the fair value of stock options granted in the periods presented, as follows:

	Year Ended December 31,	
	2017	2016
Expected stock price volatility	78% - 86%	93%
Risk-free interest rate	1% - 3%	0.95%
Expected life of option (in years)	5 - 7	5 - 6
Estimated dividend yield	0%	0%

Prior to the Reverse Merger, the fair value of the shares of common stock underlying the stock options had been the responsibility of and determined by the Company's Board of Directors. Because there had been no public market for the Company's common stock, the Board of Directors determined fair value of common stock at the time of grant of the option by considering a number of objective and subjective factors including independent third party valuations of the Company's common stock, sales prices of convertible preferred stock to unrelated third parties, operating and financial performance, the lack of liquidity of capital stock and general and industry specific economic outlook, among other factors.

Note 10. Income Taxes

Losses before income taxes and the provision for income taxes are as follows (in thousands):

	Year Ended December 31,	
	2017	2016
Losses before income taxes:		
U.S.	$ (12,470)	$ (2,870)
Non-U.S.	(646)	(2,785)
Total	$ (13,116)	$ (5,655)

The Company is subject to income taxes under the Israeli and U.S. tax laws. The Company was subject to an Israeli corporate tax rate of 25% in the year 2016, 24% in the year 2017 and will be subject to an Israeli corporate tax rate of 23% in the year 2018 and thereafter. The Company was subject to a blended U.S. tax rate (Federal as well as state corporate tax) of 35% in 2016.

On December 22, 2017, H.R. 1/Public Law No. 115-97, commonly known as the Tax Cuts and Jobs Act (the "Act"), was signed into law. The effects of this new federal legislation are recognized upon enactment, which is the date a bill is signed into law. The Act includes numerous changes in existing tax law, including a permanent reduction in the federal corporate income tax rate from 35% to 21%, converting to a territorial tax system, and creating various income inclusion and expense limitation provisions. The rate reduction takes effect on January 1, 2018. As a result of the Act, the Company has revalued its net deferred tax assets as of December 31, 2017 to reflect the rate reduction. Based on currently available information, the Company recorded a provisional reduction in its net deferred tax assets of $1.9 million in the fourth quarter of 2017 related to the revaluation of the net deferred tax assets as a result of the Act; however, the revaluation does not result in any additional net income tax expense as the net deferred tax assets are fully offset by the valuation allowance.

The SEC staff issued Staff Accounting Bulletin No. 118 ("SAB 118"), which provides guidance on accounting for the tax effects of the Act. SAB 118 provides a measurement period that should not extend beyond one year from the Act enactment date for companies to complete the accounting under ASC 740. In accordance with SAB 118, a company must

reflect the income tax effects of those aspects of the Act for which the accounting under ASC 740 is complete. To the extent that a company's accounting for certain income tax effects of the Act is incomplete but it is able to determine a reasonable estimate, it must record a provisional estimate in the financial statements. If a company cannot determine a provisional estimate to be included in the financial statements, it should continue to apply ASC 740 on the basis of the provisions of the tax laws that were in effect immediately before the enactment of the Act.

Due to insufficient guidance on certain aspects of the Act, such as officer's compensation, as well as uncertainty around the GAAP treatment associated with many other parts of the Act, such as the implementation of certain international provisions, the Company cannot be certain that all deferred tax assets and liabilities have been established for the future effects of the legislation. Therefore, the final accounting for these provisions is subject to change as further information becomes available and further analysis is complete. Additionally, given the uncertainty and complexity of these new international tax regimes, the Company is continuing to evaluate how these provisions will be accounted for under U.S. generally accepted accounting principles; therefore, the Company has not yet adopted an accounting policy for treating the effects of these provisions as either a component of income tax expense in the period the tax arises, or through adjusting its deferred tax assets and liabilities to account for the estimated future impact of the special international tax regimes.

Significant judgment is required in determining the Company's provision for income taxes, deferred tax assets and liabilities and the valuation allowance recorded against net deferred tax assets. Deferred tax assets and liabilities are determined using the enacted tax rates in effect for the years in which those tax assets are expected to be realized. A valuation allowance is established when it is more likely than not the future realization of all or some of the deferred tax assets will not be achieved. The evaluation of the need for a valuation allowance is performed on a jurisdiction-by-jurisdiction basis, and includes a review of all available positive and negative evidence. Factors reviewed include projections of pre-tax book income for the foreseeable future, determination of cumulative pre-tax book income after permanent differences, earnings history, and reliability of forecasting.

Based on its review, the Company concluded that it was more likely than not that they would not realize the benefit of its deferred tax assets in the future. This conclusion was based on historical and projected operating performance, as well as the Company's expectation that its operations will not generate sufficient taxable income in future periods to realize the tax benefits associated with the deferred tax assets within the statutory carryover periods. Therefore, the Company maintained a full valuation allowance on its deferred tax assets as of December 31, 2017 and 2016.

The Company will continue to assess the need for a valuation allowance on its deferred tax assets by evaluating both positive and negative evidence that may exist. Any adjustment to the net deferred tax asset valuation allowance would be recorded in the statement of operations for the period that the adjustment is determined to be required.

A reconciliation of the U.S. federal statutory income tax rate to the Company's effective income tax rate is as follows:

	Year Ended December 31,	
	2017	2016
Statutory Federal income tax rate	$ (4,460)	$ (1,923)
State income taxes, net of Federal tax benefits	—	—
Foreign losses	59	328
Tax credits	(2)	(58)
Change in statutory rates	1,859	—
Stock-based compensation	135	—
Permanent items	693	—
Other	43	404
Change in valuation allowance	1,673	1,249
Total provision for income taxes	$ —	$ —

Significant components of the Company's deferred tax assets and liabilities as of December 31, 2017 and 2016 consisted of the following (in thousands):

	Year Ended December 31,	
	2017	2016
Net operating loss carryforwards	$ 4,516	$ 2,928
Research and development tax credits	95	58
Accruals and reserves	221	360
Stock compensation	48	—
Depreciation and amortization	139	—
Other (rate change)	—	—
Total deferred tax assets	5,019	3,346
Less: Valuation allowance	(5,019)	(3,346)
Net deferred tax assets	$ —	$ —

The following table reconciles the beginning and ending amounts of unrecognized tax benefits for the years presented (in thousands):

	Year Ended December 31,	
	2017	2016
Gross unrecognized tax benefits at the beginning of the year	$ —	$ —
Additions from tax positions taken in the current year	75	—
Additions from tax positions taken in prior years	106	—
Reductions from tax positions taken in prior years	—	—
Tax settlements	—	—
Gross unrecognized tax benefits at the end of the year	$ 181	$ —

The deferred income tax assets have been fully offset by a valuation allowance, as realization is dependent on future earnings, if any, the timing and amount of which are uncertain. The net valuation allowance increased by $1.7 million.

The Company's accounting for deferred taxes involves the evaluation of a number of factors concerning the realizability of its net deferred tax assets. The Company primarily considered such factors as its history of operating losses, the nature of the Company's deferred tax assets, and the timing, likelihood, and amount, if any, of future taxable income during the periods in which those temporary differences and carryforwards become deductible. At present, the Company does not believe that it is more likely than not that the deferred tax assets will be realized; accordingly, a full valuation allowance has been established and no deferred tax asset is shown in the accompanying balance sheets.

As of December 31, 2017, and December 31, 2016, the Company had federal net operating loss carryforwards of approximately $12.5 million and $3.3 million, respectively, available to reduce future taxable income. The Company also has state net operating loss carryforwards of $900,000. The Federal net operating loss carryforward begins expiring in 2035 if not utilized. The California net operating loss carryforward begin expiring in 2035 if not utilized. As of December 31, 2017, and December 31, 2016, the Company had Israeli net operating losses of $8.4 million and $7.8 million, respectively, which carryforward indefinitely.

The Company has Federal research and development tax credit carryforwards of approximately $132,000. If not utilized, the carryforwards will begin expiring in 2025. The Company has state research and development credit carryforwards or approximately $67,000 which do not expire.

Pursuant to Internal Revenue Code (IRC) Sections 382 and 383, annual use of the Company's net operating loss and research and development credit carryforwards may be limited in the event a cumulative change in ownership of more than 50% occurs within a three-year period. The Company has not completed an IRC Section 382/383 analysis regarding the limitation of net operating loss and research and development credit carryforwards. Due to the existence of the valuation allowance, future changes in the Company's unrecognized tax benefits will not impact the Company's effective tax rate.

The Company's ability to use its remaining net operating loss and tax credit carryforwards may be further limited if the Company experiences a Section 382 ownership change in connection with future changes in the Company's stock ownership.

In the United States, the Company files income tax returns in the U.S. Federal jurisdiction and California. The Company's tax years for 2015 and forward are subject to examination by the Federal and California tax authorities due to the carryforward of unutilized net operating losses and research and development credits.

The Company's policy is to recognize interest expense and penalties related to income tax matters as a component of income tax expense. There was no accrued interest and penalties associated with uncertain tax positions as of December 31, 2017 and 2016. The Company has not recorded any interest or penalties in 2017 or 2016.

Note 11. Stockholders' Equity

Warrants

During 2017, the following transactions represent the exercise of all outstanding warrants for the Company's preferred stock, for total proceeds of approximately $3.1 million:

- In March 2017, OrbiMed Israel Partners Limited Partnership, a related party, exercised a warrant to purchase 978,561 shares of Preferred B shares of the Company at $0.41 per share for an aggregate amount of approximately $400,000.
- In May 2017, OrbiMed Israel Partners Limited Partnership, a related party, exercised warrants to purchase 6,458,628 shares of Preferred B shares of the Company at a price of $0.41 per share for an aggregate amount of approximately $2.6 million. Additionally, 51,477 shares of common stock were issued in a cashless exercise of warrants.
- In May 2017, Peregrine Management II Ltd., a related party, exercised warrants to purchase 192,454 shares of Preferred B shares at $0.41 per share for an aggregate amount of approximately $79,000. Additionally, in a 10,299 shares of common stock were issued in a cashless exercise of warrants.
- In May 2017, Pontifax, in a cashless exercise of its warrants, purchased 90,804 shares of the Company's common stock.
- In the first half of 2017, individual shareholders, in a cashless exercise, purchased 311,850 of the Company's preferred stock.

As of December 31, 2017 and 2016, 0 and 8,094,073 warrants, respectively, were issued and outstanding.

Preferred Stock

Preferred stock is convertible into common stock at the option of their holders, and confer upon their holders all rights accruing to holders of common stock in the Company on an as-converted basis. In addition, holders of preferred stock were entitled to preference upon a liquidation event and upon distribution of dividends, plus 8% annual interest calculated on the preferred share original issue price, as further detailed in the Company's Articles of Association. The Reverse Merger met the criteria for a liquidation event as detailed in the Company's Articles of Association and all shares of preferred stock converted to common stock.

Receipts on Account of Preferred Stock

On June 20, 2010, Incentive II Management Ltd. ("Incentive") provided Otic with a loan (the "Incentive Loan") under a Convertible Loan Agreement (the "Loan Agreement") between Otic and Incentive. As part of the closing of the Series B Preferred Shares Purchase Agreement in February 2012, Incentive, Otic and the Series B Investors agreed that the Incentive Loan provided by Incentive shall be convertible by Incentive into 104,788 Preferred A Shares (the "Incentive A Shares"), which conversion shall occur upon request by Incentive. Just prior to the Reverse Merger, the Incentive A Shares that were issuable to Incentive were deemed issued and converted into Otic common shares and the loan provided was deemed, for all intents and purposes, as repaid in full pursuant to its terms. As of December 31, 2017, no receipts on account of preferred stock remained outstanding. As the underlying shares were not issued as of December 31, 2016, the funds received in their regard are presented as receipts on account of shares on the Company's shareholders equity statement. The Incentive A shares are included in basic earnings per share as shares contingently issuable for little or no cash.

Equity Distribution Agreement

On August 21, 2017, the Company entered into an equity distribution agreement (the "Equity Distribution Agreement") with Piper Jaffray & Co. ("Piper Jaffray"), as sales agent, pursuant to which the Company may offer and sell, from time to time, through Piper Jaffray, up to $8.5 million in shares of its common stock. As of December 31, 2017, the Company had sold 167,356 shares of its common stock through the Equity Distribution Agreement for gross proceeds of approximately $774,000.

Note 12. Subsequent Events

On March 9, 2018, Piper Jaffray sold the remaining shares of the Company's common stock under the Equity Distribution Agreement. Subsequent to December 31, 2017, 2,296,610 shares of the Company's common stock were sold by Piper Jaffray, resulting in total gross proceeds of approximately $7.7 million. No further sales will be made pursuant to the Equity Distribution Agreement.

Exhibit 10.10

OTIC PHARMA LTD.

GLOBAL SHARE INCENTIVE PLAN (2012)

1. NAME AND PURPOSE.

1.1 This plan, which has been adopted by the Board of Directors of the Company, Otic Pharma Ltd., as amended from time to time, shall be known as the Otic Pharma Ltd. Global Share Incentive Plan (2012)(the **"Plan**").

1.2 The purposes of the Plan are to attract and retain the best available personnel for positions of substantial responsibility, to provide additional incentive to Service Providers of the Company and its affiliates and subsidiaries, if any, and to promote the Company's business by providing such individuals with opportunities to receive Awards pursuant to the Plan and to strengthen the sense of common interest between such individuals and the Company's Shareholders.

1.3 Awards granted under the Plan to Service Providers in various jurisdictions may be subject to specific terms and conditions for such grants may be set forth in one or more separate appendix to the Plan, as may be approved by the Board of Directors of the Company from time to time.

2. DEFINITIONS

"**Administrator**" shall mean the Board of Directors or a Committee.

"**Appendix**" shall mean any appendix to the Plan adopted by the Board of Directors containing country-specific or other special terms relating to Awards including additional terms with respect to grants of restricted shares and other equity-based Awards.

"**Award**" shall mean a grant of Options under the Plan or allotment of Shares (including Restricted Shares) or other equity-based award hereunder. All Awards shall be confirmed by an Award Agreement, and subject to the terms and conditions of such Award Agreement.

"**Award Agreement**" shall mean a written instrument setting forth the terms applicable to a particular Award.

"**Board of Directors**" shall mean the board of directors of the Company.

"Cause" shall have the meaning ascribed to such term or a similar term as set forth in the Participant's employment agreement or the agreement governing the provision of services by a non-employee Service Provider, or, in the absence of such a definition: (a) conviction of a crime of moral turpitude; (b) any material breach by a Participant of his/her fiduciary duties towards the Company, including theft, embezzlement, or self-dealing, (b) engagement in competing activities, any disclosure of confidential information of the Company or breach of any obligation not to violate a restrictive covenant; (c) a material breach of the Participant's employment agreement or the agreement governing the provision of services by a non-employee Service Provider

which are not cured (if curable) within seven (7) days after receipt of written notice thereof; or (d) if the Participant an employee residing in Israel, any other circumstances under which severance pay (or part of them) may be denied from the Participant upon termination of employment under the applicable Israeli law.

"**Committee**" shall mean a compensation committee or other committee as may be appointed and maintained by the Board of Directors, in its discretion, to administer the Plan, to the extent permissible under applicable law, as amended from time to time.

"Company" shall mean Otic Pharma Ltd., an Israeli Company, and its successors and assigns.

"Companies Law" shall mean the Israeli Companies Law, 1999, as amended from time to time.

"Consultant" means any entity or individual who (either directly or, in the case of an individual, through his or her employer) is an advisor or consultant to the Company or its subsidiary or affiliate.

"**Corporate Charter**" shall mean the Articles of Association of the Company, and any subsequent amendments or replacements thereto.

"Disability" shall have the meaning ascribed to such term or a similar term in the Participant's employment agreement (where applicable), or in the absence of such a definition, the inability of the Participant, in the opinion of a qualified physician acceptable to the Company, to perform the major duties of the Participant's position with the Company because of the sickness or injury of the Participant for a consecutive period of 90 days.

"Fair Market Value" shall mean, as of any date, the value of Shares, determined as follows:

(i) If the Shares are listed on any established stock exchange or traded on the Nasdaq National Market or the Nasdaq Small Cap Market, the Fair Market Value of an Ordinary Share of the Company shall be the closing sales price for such shares (or the closing bid, if no sales were reported) as quoted on such exchange or market (or the exchange or market with the greatest volume of trading in the Ordinary Shares) on the last market trading day prior to the day of determination, as reported in The Wall Street Journal or such other source as the Board deems reliable.

(ii) In the absence of such markets for the Shares, the Fair Market Value shall be determined in good faith by the Board.

"IPO" shall mean an initial offering of the Company's Shares to the public in an underwritten offering under an applicable registration statement.

"Options" shall mean options to purchase Shares awarded under the Plan.

"**Participant**" shall mean a recipient of an Award hereunder who executes an Award Agreement.

"**Restricted Shares**" means an Award of Shares under this Plan that is subject to the terms and conditions of Section 7.

"**Service Provider**" shall mean an employee, director, office holder or Consultant of the Company or its subsidiary or affiliate.

"**Shares**" shall mean ordinary shares of the Company, nominal value NIS 0.01 per share.

"**Transaction**" shall have the meaning set forth in Section 10.2.

3. ADMINISTRATION OF THE PLAN.

3.1 The Plan will be administered by the Administrator. If the Administrator is a Committee, such Committee will consist of such number of members of the board of directors of the Company (not less than two in number), as may be determined from time to time by the Board of Directors. The Board of Directors shall appoint such members of the Committee, may from time to time remove members from, or add members to, the Committee, and shall fill vacancies in the Committee however caused.

3.2 The Committee, if appointed, shall select one of its members as its Chairman and shall hold its meetings at such times and places as it shall determine. Actions at a meeting of the Committee at which a majority of its members are present or acts approved in writing by all members of the Committee shall be the valid acts of the Committee. The Committee shall appoint a secretary, who shall keep records of its meetings and shall make such rules and regulations for the conduct of its business and the implementation of the Plan, as it shall deem advisable, subject to the directives of the Board of Directors and in accordance with applicable law.

3.3 Subject to the general terms and conditions of the Plan, and in particular Section 3.4 below, the Administrator shall have full authority in its discretion, from time to time and at any time, to determine (i) eligible Participants, (ii) the number of Options or Shares to be covered by each Award, (iii) the time or times at which the Award shall be granted, (iv) the vesting schedule and other terms and conditions applying to Awards, (v) the form(s) of written agreements applying to Awards, and (vi) any other matter which is necessary or desirable for, or incidental to, the administration of the Plan and the granting of Awards. The Board of Directors may, in its sole discretion, delegate some or all of the powers listed above to the Committee, to the extent permitted by the Companies Law, its Corporate Charter or other applicable law.

3.4 No member of the Board of Directors or of the Committee shall be liable for any action or determination made in good faith with respect to the Plan or any Award granted hereunder. Subject to the Company's decision and to all approvals legally required, each member of the Board or the Committee shall be indemnified and held harmless by the Company against any cost or expense (including counsel fees) reasonably incurred by him or her, or any liability (including any sum paid in settlement of a claim with the approval of the Company) arising out of any act or omission to act in connection with the Plan unless arising out of such member's own willful misconduct or

bad faith, to the fullest extent permitted by applicable law. Such indemnification shall be in addition to any rights of indemnification the member may have as a director or otherwise under the Company's Corporate Charter, any agreement, any vote of shareholders or disinterested directors, insurance policy or otherwise.

3.5 The interpretation and construction by the Administrator of any provision of the Plan or of any Award hereunder shall be final and conclusive. In the event that the Board appoints a Committee, the interpretation and construction by the Committee of any provision of the Plan or of any Award hereunder shall be conclusive unless otherwise determined by the Board of Directors. To avoid doubt, the Board of Directors may at any time exercise any powers of the Administrator, notwithstanding the fact that a Committee has been appointed.

3.6 The Administrator shall have the authority to adopt, alter and repeal such administrative rules, guidelines and practices governing the Plan and perform all acts, including the delegation of its responsibilities (to the extent permitted by applicable law and applicable stock exchange rules), as it shall, from time to time, deem advisable; to construe and interpret the terms and provisions of the Plan and any Award issued under the Plan (and any agreements relating thereto); and to otherwise supervise the administration of the Plan. The Administrator may correct any defect, supply any omission or reconcile any inconsistency in the Plan or in any agreement relating thereto in the manner and to the extent it shall deem necessary to effectuate the purpose and intent of the Plan. Notwithstanding the foregoing, no action of the Administrator under this Section 3.6 not otherwise provided for herein or in an Award Agreement shall reduce the vested rights of any Participant without the Participant's consent.

3.7 Without limiting the generality of the foregoing, the Administrator may adopt special appendices and/or guidelines and provisions for persons who are residing in or employed in, or subject to, the taxes of, any domestic or foreign jurisdictions, to comply with applicable laws, regulations, or accounting, listing or other rules with respect to such domestic or foreign jurisdictions.

4. ELIGIBLE PARTICIPANTS.

4.1 No Award may be granted pursuant to the Plan to any person serving as a member of the Committee or to any other Director of the Company at the time of the grant, unless such grant is approved in the manner prescribed for the approval of compensation of directors under the Companies Law.

4.2 Subject to the limitation set forth in Section 4.1 above and any restriction imposed by applicable law, Awards may be granted to any Service Provider of the Company, whether or not a director of the Company or its affiliates. The grant of an Award to a Participant hereunder shall neither entitle such Participant to receive an additional Award or participate in other incentive plans of the Company, nor disqualify such Participant from receiving and additional Award or participating in other incentive plans of the Company.

5. RESERVED SHARES.

The Company shall determine the number of Shares reserved hereunder from time to time, and such number may be increased or decreased by the Company from time to time. Any Shares under the Plan, in respect of which the right hereunder of a Participant to purchase the same shall for any reason terminate, expire or otherwise cease to exist, shall again be available for grant as Awards under the Plan. Any Shares that remain unissued and are not subject to Awards at the termination of the Plan shall cease to be reserved for purposes of the Plan. Until termination of the Plan the Company shall at all times reserve a sufficient number of Shares to meet the requirements of the Plan.

6. AWARD AGREEMENT.

6.1 The Board of Directors in its discretion may award to Participants Awards available under the Plan. The terms of the Award will be set forth in the Award Agreement. The date of grant of each Award shall be the date specified by the Board of Directors at the time such award is made, or in the absence of such specification, the date of approval of the award by the Board of Directors.

6.2 The Award Agreement shall state, *inter alia*, the number of Options or Shares or equity-based units covered thereby, the type of Option or Share-based or other grant awarded, any special terms applying to such Award (if any), including the terms of any country-specific or other applicable Appendix, as determined by the Board of Directors.

7. RESTRICTED SHARES AND OTHER EQUITY-BASED AWARDS.

7.1 Eligibility. Restricted Shares may be issued to all Participants either alone or in addition to other Awards granted under the Plan. The Administrator shall determine the eligible Participants to whom, and the time or times at which, grants of Restricted Shares will be made, the number of shares to be awarded, the purchase price (if any) to be paid by the Participant (subject to Section 7.2), the time or times at which such Awards may be subject to forfeiture (if any), the vesting schedule (if any) and rights to acceleration thereof, and all other terms and conditions of the Awards. The Administrator may condition the grant or vesting of Restricted Shares upon the attainment of specified performance targets or such other factors as the Administrator may determine, in its sole discretion. Unless otherwise determined by the Administrator, the Participant shall not be permitted to sell or transfer shares of Restricted Shares awarded under this Plan during a period set by the Administrator (if any) (the "**Restriction Period**") commencing with the date of such Award, as set forth in the applicable Award agreement.

7.2 Terms. A Participant selected to receive Restricted Shares shall not have any rights with respect to such Award, unless and until such Participant has delivered a fully executed copy of the Award Agreement evidencing the Award to the Company and has otherwise complied with the applicable terms and conditions of such Award. The purchase price of Restricted Shares shall be determined by the Administrator, but shall not be less than as permitted under applicable law. Awards of Restricted Shares must be accepted within a period of 21 days (or such shorter period as the Administrator may

specify at grant) after the grant date, by executing an Award Agreement and by paying whatever price (if any) the Administrator has designated thereunder.

7.3 Legend. Each Participant receiving Restricted Shares shall be issued a share certificate in respect of such Restricted Shares, unless the Administrator elects to use another system, such as book entries by the transfer agent, as evidencing ownership of Restricted Shares. Such certificate shall be registered in the name of such Participant, and shall bear an appropriate legend referring to the terms, conditions, and restrictions applicable to such Award, substantially in the following form (as well as other legend required by the Administrator pursuant to Section 18.3 below):

> "The anticipation, alienation, attachment, sale, transfer, assignment, pledge, encumbrance or charge of the shares represented hereby are subject to the terms and conditions (including forfeiture) of the Otic Pharma Ltd. Global Incentive Plan (2012), and an Award Agreement entered into between the registered owner and the Company dated___. Copies of such Plan and Award agreement are on file at Otic Pharma Ltd."

7.4 Custody. The Administrator may require that any share certificates evidencing such shares be held in custody by the Company until the restrictions thereon shall have lapsed, and that, as a condition of any Restricted Shares Award, the Participant shall have delivered a duly signed share transfer deed, endorsed in blank, relating to the Shares covered by such Award.

7.5 Rights as Shareholder. Except as provided in this Section and Section 7.4 above and as otherwise determined by the Administrator and set forth in the Award Agreement, the Participant shall have, with respect to the Restricted Shares, all of the rights of a holder of Shares including, without limitation, the right to receive any dividends, the right to vote such shares and, subject to and conditioned upon the full vesting of Restricted Shares, the right to tender such shares. Notwithstanding the foregoing, the payment of dividends shall be deferred until, and conditioned upon, the expiration of the applicable Restriction Period, unless the Administrator, in its sole discretion, specifies otherwise at the time of the Award.

7.6 Lapse of Restrictions. If and when the Restriction Period expires without a prior forfeiture of the Restricted Shares subject to such Restriction Period, the certificates for such shares shall be delivered to the Participant. All legends shall be removed from said certificates at the time of delivery to the Participant except as otherwise required by applicable law. Notwithstanding the foregoing, actual certificates shall not be issued to the extent that book entry recordkeeping is used.

7.7 Other Equity-Based Awards. Other equity-based awards (including, without limitation, restricted share units and performance share awards) may be granted either alone or in addition to or other Awards granted under the Plan to all eligible Participants pursuant to such terms and conditions as the Administrator may determine, including without limitation, in one or more appendix adopted by the administrator and appended to this Plan.

8. EXERCISE OF OPTIONS.

8.1 Options shall be exercisable pursuant to the terms under which they were awarded and subject to the terms and conditions of the Plan and any applicable Appendix, as specified in the Award Agreement.

8.2 The exercise price for each share to be issued upon exercise of an Option shall be such price as is determined by the Board in its discretion, provided that the price per Share is not less than the nominal value of each Share, or to the extent required pursuant to applicable law or to qualify for favorable tax treatment (as determined by the Administrator), not less than 100% of the Fair Market Value of a Share on the date of grant.

8.3 An Option, or any part thereof, shall be exercisable by the Participant's signing and returning to the Company at its principal office, a "Notice of Exercise" in such form and substance as may be prescribed by the Board of Directors from time to time, together with full payment for the Shares underlying such Option, and the execution and delivery of any other document required pursuant to the applicable Award Agreement.

8.4 Each payment for Shares under an Option shall be in respect of a whole number of Shares, shall be effected in cash or by check payable to the order of the Company, or such other method of payment acceptable to the Company as determined by the Administrator, and shall be accompanied by a notice stating the number of Shares being paid for thereby.

8.5 Until the Shares are issued (as evidenced by the appropriate entry in the share register of the Company or of a duly authorized transfer agent of the Company) a Participant shall have no right to vote or right to receive dividends or any other rights as a shareholder shall exist with respect to such Shares, notwithstanding the exercise of the Option. The Company shall issue (or cause to be issued) such Shares promptly after the Option is exercised. No adjustment will be made for a dividend or other right the record date for which is prior to the date the Shares are issued, except as provided in Section 10 of the Plan.

8.6 To the extent permitted by law, if the Share is traded on a national securities exchange, The Nasdaq Share Market or quoted on a national quotation system sponsored by the National Association of Securities Dealers or otherwise publicly traded or quoted, payment for the Shares underlying an Option may be made all or in part by the delivery (on a form prescribed by the Company) of an irrevocable direction to a securities broker approved by the Company to sell Shares and to deliver all or part of the sales proceeds to the Company in payment of the exercise price (or the relevant portion thereof, as applicable) and any withholding taxes, or on such other terms and conditions as may be acceptable to the Administrator. No Shares shall be issued until payment has been made or provided for, as provided herein.

8.7 The Administrator may designate certain periods, at its reasonable discretion, with respect to all or certain groups of Participants and/or with respect to certain types of Awards, during which the exercise of Awards and/or sale of Shares shall be restricted or prohibited, including without limitation, in order to comply with applicable laws in any relevant jurisdiction and/or rules of any exchange on which the Company's shares are traded. During such blackout periods, Participants will not be able to exercise the Options (or other Awards) and/or sale the Shares held by or on behalf of the Participants, and the Company shall not bear any liability to Participants for any claim, loss or liability that may result from such restrictions.

9. TERMINATION OF RELATIONSHIP AS SERVICE PROVIDER.

9.1 Effect of Termination; Exercise after Termination. Unless otherwise determined by the Administrator, if a Participant ceases to be a Service Provider, such Participant may exercise any outstanding Options within such period of time as is specified in the Award Agreement or the Plan to the extent that the Options are vested on the date of termination (but in no event later than the expiration of the term of the Option as set forth in the Award Agreement). If, on the date of termination, any Options are unvested, the Shares covered by the unvested portion of the Option shall revert to the Plan. If, after termination, the Participant does not exercise the vested Options within the time specified in the Award Agreement or the Plan, the Option shall terminate, and the Shares covered by such Option shall revert to the Plan.

In the absence of a provision specifying otherwise in the relevant Award Agreement, then:

(a) in the event that the Participant ceases to be a Service Provider for any reason other than termination for Cause , or as a result of Participant's death or Disability, then (i) the vested Options shall remain exercisable until the earlier of: (a) a period of three (3) months from the Date of Termination; or (b) expiration of the term of the Option as set forth in Section 13; and (ii) all Restricted Shares still subject to restriction under the applicable Restriction Period, as set forth in the Award Agreement, shall be forfeited.

(b) in the event that the Participant ceases to be a Service Provider for Cause, then (i) all Options will terminate immediately upon the date of such termination for cause, such that the unvested portion of the Options will not vest, and the vested portion of the Options will no longer be exercisable; and (ii) all Restricted Shares still subject to restriction under the applicable Restriction Period as of the Date of Termination, as set forth in the Award Agreement, shall be forfeited**.**

(c) in the event that the Participant ceases to be a Service Provider as a result of Participant's Disability, then (i) the vested Options shall remain exercisable until the earlier of: (a) a period of twelve (12) months from the Date of Termination; or (b)expiration of the term of the Option as set forth in Section 13; and (ii) subject to sub-section (i) above, all Restricted Shares still subject to restriction under the applicable Restriction Period, as set forth in the Award Agreement, shall be forfeited.

(d) in the event that the Participant dies while a Service Provider: (i) the vested portion of the Option shall remain exercisable by the Participant's estate or by a person who acquires the right to exercise the Option by bequest or inheritance for twelve (12) months following the Participant's date of death; and (ii) subject to sub-section (i) above, all Restricted Shares still subject to restriction under the applicable Restriction Period as of the Date of Termination, as set forth in the Award Agreement, shall be forfeited as of the Date of Termination.

9.2 Date of Termination. For purposes of the Plan and any Award or Award Agreement, and unless otherwise set forth in the relevant Award Agreement, the "**Date of Termination**" (whether for Cause or otherwise) shall be the effective date of termination of the Participant's employment or engagement as a Service Provider.

9.3 Leave of Absence. Unless the Administrator provides otherwise, vesting of Awards granted hereunder shall be suspended during any unpaid leave of absence (except, for the avoidance of doubt, periods of legally protected leave of absence pursuant to applicable law).

9.4 Change of Status. A Service Provider shall not cease to be considered as such in the case of any (a) leave of absence approved by the Company or pursuant to applicable law, or (b) transfers between locations of the Company or between the Company, and its parent, subsidiary, affiliate, or any successor thereof; or (c) changes in status (employee to director, employee to consultant, etc.) provided that such change may affect the specific terms applying to the Service Provider's Award.

10. Adjustments.

Upon the occurrence of any of the following described events, a Participant's rights to purchase Shares under the Plan shall be adjusted as hereinafter provided:

10.1 Changes in Capitalization. Subject to any required action by the shareholders of the Company, the number of Shares covered by each outstanding Award, and the number of Shares which have been authorized for issuance under the Plan but as to which no Options or other Award have yet been granted or which have been returned to the Plan upon cancellation or expiration of an Option or other Award, as well as the price per Share covered by each such outstanding Award, shall be proportionately adjusted for any increase or decrease in the number of issued Shares resulting from a share split, reverse share split, share dividend, combination or reclassification of the Shares, or any other increase or decrease in the number of issued Shares effected without receipt of consideration by the Company. The conversion of any convertible securities of the Company shall not be deemed to have been "effected without receipt of consideration." Such adjustment shall be made by the Board, whose determination in that respect shall be final, binding and conclusive. Except as expressly provided herein, no issuance by the Company of shares of any class, or securities convertible into shares of any class, shall affect, and no adjustment by reason thereof shall be made with respect to, the number or price of Shares subject to an Option or other Award.

10.2 Merger, Acquisition, or Asset Sale.

(a) In the event of (i) a merger or consolidation of the Company with or into another corporation resulting in such other corporation being the surviving entity or the direct or indirect parent of the Company or resulting in the Company being the surviving entity and any other person or entity owning fifty percent (50%) or more of the outstanding voting power of the Company's securities by virtue of the transaction, (ii) an acquisition of all or substantially all of the shares of the Company, or (iii) the sale of all or substantially all of the assets of the Company (each such event, a **"Transaction"**), the unexercised or restricted portion of each outstanding Award shall be assumed or an equivalent Award or right substituted, by the successor corporation or an affiliate of the successor corporation, as shall be determined by such entity, subject to the terms hereof. In the event that the successor corporation or a parent or subsidiary of the successor corporation does not provide for such an assumption or substitution of Awards, the Administrator shall have sole and absolute discretion to determine the effect of the Transaction on the unexercised and unvested or restricted portion of Awards outstanding at the time of the Transaction, which may include either of the following: (i) all or a portion of the outstanding Awards shall become exercisable in full and/or the vesting of all or a portion of the unvested Awards will accelerate on a date no later than two (2) days prior to the date of consummation of the Transaction, provided that unless otherwise determined by the Administrator, the exercise and/or vesting of all Awards that otherwise would not have been exercisable and/or vested in the absence of a Transaction, shall be contingent upon the actual consummation of the Transaction; (ii) that all or a portion or certain categories of the outstanding Awards shall be cancelled upon the actual consummation of the Transaction, and instead the Participants will receive a cash payment in the amount and under the terms determined by the Administrator at it sole and absolute discretion; and/or (iii) that all or a portion or certain categories of the outstanding unvested or restricted Awards shall be cancelled upon the actual consummation of the Transaction, without consideration.

(b) For the purposes of this Section 10.2, an Award shall be considered assumed or substituted if, following a Transaction, the Award confers the right to purchase or receive, for each Share subject to the Award immediately prior to the Transaction, the consideration (whether shares, cash, or other securities or property) received in the merger or sale of assets by holders of Shares of the Company for each Share held on the effective date of the Transaction (and if holders were offered a choice of consideration, the type of consideration determined by the Administrator, at its sole discretion); provided, however, that if the consideration received in the Transaction is not solely common stock or ordinary shares (or the equivalent) of the successor corporation or its direct or indirect parent, the Administrator may, with the consent of the successor corporation, provide for the per share consideration to be received upon the exercise of the Award to be solely common stock or ordinary shares (or the equivalent) of the successor corporation or its direct or indirect parent equal in fair market value to the per share consideration received by holders of Shares in the Transaction, as determined by the Administrator.

(c) In the event that the Board of Directors determines in good faith that, in the context of a Transaction, certain Awards have no monetary value and thus do not entitle the holders of such Awards to any consideration under the terms of the Transaction, the Board of Directors may determine that such Awards shall terminate effective as of the effective date of the Transaction.

(d) It is the intention that the Administrator's authority to make determinations, adjustments and clarifications in connection with the treatment of Awards shall be interpreted as widely as possible, to allow the Administrator maximal power and flexibility to interpret and implement the provisions of the Plan in the event of Transaction, provided that the Administrator shall determine in good faith that a Participant's vested rights are not thereby adversely affected without the Participant's express written consent. Without derogating from the generality of the foregoing, the Administrator shall have the authority, at its sole discretion, to determine that the treatment of Awards, whether vested or unvested, in a Transaction may differ among individual Participants or groups of Participants, provided that the overall economic impact of the different approaches determined by the Administrator shall be substantively equivalent as of the date of the closing of the Transaction.

11. NON-TRANSFERABILITY OF OPTIONS AND SHARES.

11.1 No Option may be transferred other than by will or by the laws of descent and distribution, and during the Participant's lifetime an Option may be exercised only by such Participant.

11.2 Restricted Shares may not be assigned, transferred, pledged or mortgaged, other than by will or laws of descent and distribution, prior to the date on which the date on which any applicable restriction, performance or deferred period lapses. Shares for which full payment has not been made, may not be assigned, transferred, pledged or mortgaged, other than by will or laws of descent and distribution.

11.3 For avoidance of doubt, the foregoing shall not be deemed to restrict the transfer of a Participant's rights in respect of Options or Shares purchasable pursuant to the exercise thereof upon the death of such Participant to such Participant's estate or other successors by operation of law or will, whose rights therein shall be governed by Section 9.1(d) hereof, and as may otherwise be determined by the Administrator.

12. TERM AND AMENDMENT OF THE PLAN.

12.1 The Plan shall expire on the date which is ten (10) years from the date of its adoption by the Board of Directors (except as to Awards outstanding on that date).

12.2 Notwithstanding any other provision of the Plan, the Board (or a duly authorized Committee thereof) may at any time, and from time to time, amend, in whole or in part, any or all of the provisions of the Plan (including any amendment deemed necessary to ensure that the Company may comply with any regulatory requirement), or suspend or terminate it entirely, retroactively or otherwise; provided, however, that, except (x) to correct obvious drafting errors or as otherwise required by law or (y) as specifically provided herein, the rights of a Participant with respect to vested

Awards granted prior to such amendment, suspension or termination, may not be reduced without the consent of such Participant. The Administrator may amend the terms of any Award theretofore granted, prospectively or retroactively, but except (x) to correct obvious drafting errors or as otherwise required by law or applicable accounting rules, or (y) as specifically provided herein, no such amendment or other action by the Committee shall reduce the rights of any Participant with respect to vested Awards without the Participant's consent.

13. TERM OF OPTION.

Unless otherwise explicitly provided in an Award Agreement, if any Option, or any part thereof, has not been exercised and the Shares covered thereby not paid for within ten (10) years after the date on which the Option was granted, as set forth in the Award Agreement (or any other period set forth in the instrument granting such Option pursuant to Section 6), such Option, or such part thereof, and the right to acquire such Shares shall terminate, all interests and rights of the Participant in and to the same shall expire, and, in the event that in connection therewith any Shares are held in trust as aforesaid, such trust shall expire.

14. CONTINUANCE OF ENGAGEMENT.

Neither the Plan nor any offer of Shares or Options to a Participant shall impose any obligation on the Company or a related company thereof, to continue the employment or engagement of any Participant as a Service Provider, and nothing in the Plan or in any Award granted pursuant thereto shall confer upon any Participant any right to continue to serve as a Service Provider of the Company or a related company thereof or restrict the right of the Company or a related company thereof to terminate such employment or engagement at any time.

15. GOVERNING LAW.

The Plan and all instruments issued thereunder or in connection therewith, shall be governed by, and interpreted in accordance with, the laws of the State of Israel.

16. APPLICATION OF FUNDS.

The proceeds received by the Company from the sale of Shares pursuant to Awards granted under the Plan will be used for general corporate purposes of the Company or any related company thereof.

17. TAXES.

17.1 Any tax consequences arising from the grant, or vesting or exercise of any Award, from the payment for Shares covered thereby, or from any other event or act (of the Company, and/or its affiliates, or the Participant), hereunder, shall be borne solely by the Participant. The Company and/or its affiliates shall withhold taxes according to the requirements under the applicable laws, rules, and regulations, including withholding taxes at source. Furthermore, the Participant shall agree to indemnify the Company and/or its affiliates and hold them harmless against and from any and all liability for any such tax or interest or penalty thereon, including without limitation, liabilities relating to

the necessity to withhold, or to have withheld, any such tax from any payment made to the Participant. The Company or any of its affiliates may make such provisions and take such steps as it may deem necessary or appropriate for the withholding of all taxes required by law to be withheld with respect to Awards granted under the Plan and the exercise thereof, including, but not limited, to (i) deducting the amount so required to be withheld from any other amount (or Shares issuable) then or thereafter to be provided to the Participant, including by deducting any such amount from a Participant's salary or other amounts payable to the Participant, to the maximum extent permitted under law and/or (ii) requiring the Participant to pay to the Company or any of its affiliates the amount so required to be withheld as a condition of the issuance, delivery, distribution or release of any Shares and/or (iii) by causing the exercise and sale of any Awards or Shares held by on behalf of the Participant to cover such liability, up to the amount required to satisfy minimum statutory withholding requirements. In addition, the Participant will be required to pay any amount due in excess of the tax withheld and transferred to the tax authorities, pursuant to applicable tax laws, regulations and rules.

17.2 The receipt of an Award and/or the acquisition of Shares issued upon the exercise of the Awards may result in tax consequences. The description of tax consequences set forth in the Plan or any Appendix hereto does not purport to be complete, up to date or to take into account any special circumstances relating to a Participant.

17.3 THE PARTICIPANT IS ADVISED TO CONSULT WITH A TAX ADVISOR WITH RESPECT TO THE TAX CONSEQUENCES OF RECEIVING OR EXERCISING ANY AWARD IN LIGHT OF HIS OR HER PARTICULAR CIRCUMSTANCES.

18. MARKET STAND-OFF

If so requested by the Company or any representative of the underwriters (the "**Managing Underwriter**") in connection with any registration of the offering of any securities of the Company under the securities laws of any jurisdiction, the Participant shall not sell or otherwise transfer any Shares or other securities of the Company during a 180-day period or such other period as may be requested in writing by the Managing Underwriter and agreed to in writing by the Company (the "**Market Standoff Period**") following the effective date of registration statement of the Company filed under such securities laws. The Company may require the Participant to execute a form of undertaking to this effect or impose stop transfer instructions with respect to securities subject to the foregoing restrictions until the end of such Market Standoff Period.

19. CONDITIONS UPON ISSUANCE OF SHARES.

19.1 Legal Compliance. Shares shall not be issued pursuant to the exercise of an Option or with respect to any other Award unless the exercise of such Option or grant of such Award and the issuance and delivery of such Shares shall comply with applicable laws and shall be further subject to the approval of counsel for the Company with respect to such compliance. The inability of the Company to obtain authority from any regulatory body having jurisdiction, which authority is deemed by the Company's counsel to be necessary to the lawful issuance and sale of any Shares hereunder, shall relieve the Company of any liability in respect of the failure to issue or sell such Shares as to which such requisite authority shall not have been obtained.

19.2 Investment Representations. As a condition to the exercise of an Option or receipt of an Award, the Board may require the person exercising such Option or receiving such Award to represent and warrant at the time of any such exercise or the time of receipt of the Award that the Shares are being purchased only for investment and without any present intention to sell or distribute such Shares, and make other representations as may be required under applicable securities laws if, in the opinion of counsel for the Company, such representations are required, all in form and content specified by the Board.

19.3 Legend. The Administrator may require each person receiving Shares pursuant to an Award granted under the Plan to represent to and agree with the Company in writing that the Participant is acquiring the shares without a view to distribution thereof and such other securities law related representations as the Administrator shall request. In addition to any legend required by the Plan, the certificates for such shares may include any legend which the Administrator deems appropriate to reflect any applicable restrictions on transfer. All certificates for Shares delivered under the Plan shall be subject to such share transfer orders and other restrictions as the Administrator may deem advisable under the rules, regulations and other requirements of any relevant securities authority, any stock exchange upon which the Shares are then listed or any national securities association system upon whose system the Shares are then quoted, any applicable securities law, and any applicable corporate law, and the Administrator may cause a legend or legends to be put on any such certificates to make appropriate reference to such restrictions**.**

20. PROXY

The Company, at its sole discretion, may require that as a condition of grant of an Award or of exercise of an Option, the Participant be required to grant an irrevocable proxy to any appropriate person designated by the Company or as required pursuant to any agreement between the Participant and existing shareholders of the Company, to vote all Shares obtained by the Participant pursuant to an Award at all general meetings of Company, and to sign all written resolutions, waivers, consents etc. of the shareholders of the Company on behalf of the Participant, including the right to waive on behalf of the Participant all minimum notice requirements for meetings of shareholders of the Company. Such proxy shall remain in effect until the consummation of an IPO, and shall be irrevocable as the rights of third parties, including investors in the Company, depend upon such proxy. The proxy shall be personal to the Participant and shall not survive the transfer of the Participant's Shares to a third-party transferee; provided,

however, that upon a transfer of the Participant's Shares to such a transferee (subject to the terms and conditions of the Plan concerning any such transfer), the transferee may be required to grant an irrevocable proxy to such appropriate person as the Company, in giving its approval to the transfer, so requires. The proxy may be contained in the Award Agreement of each Participant or otherwise as the Committee determines. If contained in the Award Agreement, no further document shall be required to implement such proxy, and the signature of the Participant on the Award Agreement shall indicate approval of the proxy thereby granted. The holder of the proxy shall be indemnified and held harmless by the Company against any cost or expense (including counsel fees) reasonably incurred by him/her, or any liability (including any sum paid in settlement of a claim with the approval of the Company) arising out of any act or omission to act in connection with the voting of the proxy unless arising out of his/her own fraud, bad faith or gross negligence, to the extent permitted by applicable law. Such indemnification shall be in addition to any rights of indemnification the holder of the proxy may have as a director, officer or otherwise under the Company's Corporate Charter or any agreement, any vote of shareholders or directors, insurance policy or otherwise.

21. Additional Restrictions on Transfer of Shares.

Until such time as the Shares are registered for trade to the public, a Participant shall not be permitted to transfer, sell, assign, pledge, hypothecate, or otherwise encumber or dispose of in any way to one or more third parties other than other than with the prior approval of the Board of Directors, and in any event, subject to any relevant provisions of the Corporate Charter, as in effect from time to time, and/or the Award Agreement.

22. Miscellaneous.

Whenever applicable in the Plan, the singular and the plural, and the masculine, feminine and neuter shall be freely interchangeable, as the context requires. The Section headings or titles shall not in any way control the construction of the language herein, such headings or titles having been inserted solely for the purpose of simplified reference. Words such as "herein", "hereof", "hereto", "hereinafter", "hereby", and "hereinabove" when used in the Plan refer to the Plan as a whole, including any applicable Appendices, unless otherwise required by context.

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Exhibit 10.11

TOKAI PHARMACEUTICALS, INC.

2007 STOCK INCENTIVE PLAN

1. Purpose

The purpose of this 2007 Stock Incentive Plan (the "Plan" of Tokai Pharmaceuticals, Inc. a Delaware corporation (the "Company"), is to advance the interests of the Company's stockholders by enhancing the Company's ability to attract, retain and motivate persons who are expected to make important contributions to the Company and by providing such persons with equity ownership opportunities and performance-based incentives that are intended to align their interests with those of the Company's stockholders. Except where the context otherwise requires, the term "Company" shall include any of the Company's present or future parent or subsidiary corporations as defined in Sections 424(e) or (f) of the Internal Revenue Code of 1986, as amended, and any regulations promulgated thereunder (the "Code") and any other business venture (including, without limitation, joint venture or limited liability company) in which the Company has a controlling interest, as determined by the Board of Directors of the Company (the "Board").

2. Eligibility

All of the Company's employees, officers, directors, consultants and advisors are eligible to receive options, restricted stock, restricted stock units and other stock-based awards (each, an "Award") under the Plan. Each person who receives an Award under the Plan is deemed a "Participant".

3. Administration and Delegation

(a) Administration by Board of Directors. The Plan will be administered by the Board. The Board shall have authority to grant Awards and to adopt, amend and repeal such administrative rules, guidelines and practices relating to the Plan as it shall deem advisable. The Board may correct any defect, supply any omission or reconcile any inconsistency in the Plan or any Award in the manner and to the extent it shall deem expedient to carry the Plan into effect and it shall be the sole and final judge of such expediency. All decisions by the Board shall be made in the Board's sole discretion and shall be final and binding on all persons having or claiming any interest in the Plan or in any Award. No director or person acting pursuant to the authority delegated by the Board shall be liable for any action or determination relating to or under the Plan made in good faith.

(b) Appointment of Committees. To the extent permitted by applicable law, the Board may delegate any or all of its powers under the Plan to one or more committees or subcommittees of the Board (a "Committee"). All references in the Plan to the "Board" shall mean the Board or a Committee of the Board or the officers referred to in Section 3(c) to the extent that the Board's powers or authority under the Plan have been delegated to such Committee or officers.

(c) Delegation to Officers. To the extent permitted by applicable law, the Board may delegate to one or more officers of the Company the power to grant Awards to employees or officers of the Company or any of its present or future subsidiary corporations and to exercise such other powers under the Plan as the Board may determine, provided that the Board shall fix the terms of the Awards to be granted by such officers (including the exercise price of such Awards, which may include a formula by which the exercise price will be determined) and the

maximum number of shares subject to Awards that the officers may grant; provided further, however, that no officer shall be authorized to grant Awards to any "executive officer" of the Company (as defined by Rule 3b-7 under the Securities Exchange Act 1934, as amended (the "Exchange Act")) or to any "officer" of the Company (as defined by Rule 16a-l under the Exchange Act).]

4. Stock Available for Awards. Subject to adjustment under Section 8, Awards may be made under the Plan for up to 235,519 shares of common stock, $0.001 par value per share, of the Company (the "Common Stock"). If any Award expires or is terminated, surrendered or canceled without having been fully exercised or is forfeited in whole or in part (including as the result of shares of Common Stock subject to such Award being repurchased by the Company at the original issuance price pursuant to a contractual repurchase right) or results in any Common Stock not being issued, the unused Common Stock covered by such Award shall again be available for the grant of Awards under the Plan. Further, shares of Common Stock tendered to the Company by a Participant to exercise an Award shall be added to the number of shares of Common Stock available for the grant of Awards under the Plan. However, in the case of Incentive Stock Options (as hereinafter defined), the foregoing provisions shall be subject to any limitations under the Code. Shares issued under the Plan may consist in whole or in part of authorized but unissued shares or treasury shares. At no time while there is any Option (as defined below) outstanding and held by a Participant who was a resident of the State of California on the date of grant of such Option, shall the total number of shares of Common Stock issuable upon exercise of all outstanding options and the total number of shares provided for under any stock bonus or similar plan of the Company exceed the applicable percentage as calculated in accordance with the conditions and exclusions of Section 260.140.45 of the California Code of Regulations (the "California Regulations"), based on the shares of the Company which are outstanding at the time the calculation is made.

5. Stock Options

(a) General. The Board may grant options to purchase Common Stock (each, an "Option") and determine the number of shares of Common Stock to be covered by each Option, the exercise price of each Option and the conditions and limitations applicable to the exercise of each Option, including conditions relating to applicable federal or state securities laws, as it considers necessary or advisable. An Option which is not intended to be an Incentive Stock Option (as hereinafter defined) shall be designated a "Nonstatutory Stock Option".

(b) Incentive Stock Options. An Option that the Board intends to be an "incentive stock option" as defined in Section 422 of the Code (an "Incentive Stock Option") shall only be granted to employees of Tokai Pharmaceuticals, Inc., any of Tokai Pharmaceuticals, Inc.'s present or future parent or subsidiary corporations as defined in Sections 424(e) or (f) of the Code, and any other entities the employees of which are eligible to receive Incentive Stock Options under the Code, and shall be subject to and shall be construed consistently with the requirements of Section 422 of the Code. The Company shall have no liability to a Participant, or any other party, if an Option (or any part thereof) that is intended to be an Incentive Stock Option is not an Incentive Stock Option or for any action taken by the Board pursuant to Section 9(f), including without limitation the conversion of an Incentive Stock Option to a Nonstatutory Stock Option.

(c) Exercise Price. The Board shall establish the exercise price of each Option and specify such exercise price in the applicable option agreement.

(d) Duration of Options. Each Option shall be exercisable at such times and subject to such terms and conditions as the Board may specify in the applicable option agreement.

(e) Exercise of Option. Options may be exercised by delivery to the Company of a written notice of exercise signed by the proper person or by any other form of notice (including electronic notice) approved by the Board together with payment in full as specified in Section 5(f) for the number of shares for which the Option is exercised. Shares of Common Stock subject to the Option will be delivered by the Company following exercise either as soon as practicable or, subject to such conditions as the Board shall specify, on a deferred basis (with the Company's obligation to be evidenced by an instrument providing for future delivery of the deferred shares at the time or times specified by the Board).

(f) Payment Upon Exercise. Common Stock purchased upon the exercise of an Option granted under the Plan shall be paid for as follows:

(1) in cash or by check, payable to the order of the Company;

(2) except as the Board may otherwise provide in an option agreement, by (i) delivery of an irrevocable and unconditional undertaking by a creditworthy broker to deliver promptly to the Company sufficient funds to pay the exercise price and any required tax withholding or (ii) delivery by the Participant to the Company of a copy of irrevocable and unconditional instructions to a creditworthy broker to deliver promptly to the Company cash or a check sufficient to pay the exercise price and any required tax withholding;

(3) when the Common Stock is registered under the Exchange Act, by delivery of shares of Common Stock owned by the Participant valued at their fair market value as determined by (or in a manner approved by) the Board ("Fair Market Value"), provided (i) such method of payment is then permitted under applicable law, (ii) such Common Stock, if acquired directly from the Company, was owned by the Participant for such minimum period of time, if any, as may be established by the Board in its discretion and (iii) such Common Stock is not subject to any repurchase, forfeiture, unfulfilled vesting or other similar requirements;

(4) to the extent permitted by applicable law and by the Board, by (i) delivery of a promissory note of the Participant to the Company on terms determined by the Board, or (ii) payment of such other lawful consideration as the Board may determine; or

(5) by any combination of the above permitted forms of payment.

(g) Substitute Options. In connection with a merger or consolidation of an entity with the Company or the acquisition by the Company of property or stock of an entity, the Board may grant Options in substitution for any options or other stock or stock-based awards granted by such entity or an affiliate thereof. Substitute Options may be granted on such terms as the Board deems appropriate in the circumstances, notwithstanding any limitations on Options contained in the other sections of this Section 5 or in Section 2. Substitute Options shall not count against the overall share limit set forth in Section 4(a), except as may be required by reason of Section 422 and related provisions of the Code.

(h) Repricing of Options. The Board may, without stockholder approval, amend any outstanding Option granted under the Plan to provide an exercise price per share that is lower than the then-current exercise price per share of such outstanding Option. The Board may also, without stockholder approval, cancel any outstanding option (whether or not granted under the Plan) and grant in substitution therefor new Awards under the Plan covering the same or a different number of shares of Common Stock and having an exercise price per share lower than the then-current exercise price per share of the cancelled option.

6. Restricted Stock; Restricted Stock Units

(a) General. The Board may grant Awards entitling recipients to acquire shares of Common Stock ("Restricted Stock"), subject to the right of the Company to repurchase all or part of such shares at their issue price or other stated or formula price (or to require forfeiture of such shares if issued at no cost) from the recipient in the event that conditions specified by the Board in the applicable Award are not satisfied prior to the end of the applicable restriction period or periods established by the Board for such Award. Instead of granting Awards for Restricted Stock, the Board may grant Awards entitling the recipient to receive shares of Common Stock to be delivered at the time such shares of Common Stock vest ("Restricted Stock Units") (Restricted Stock and Restricted Stock Units are each referred to herein as a "Restricted Stock Award").

(b) Terms and Conditions. The Board shall determine the terms and conditions of a Restricted Stock Award, including the conditions for repurchase (or forfeiture) and the issue price, if any.

(c) Stock Certificates. Any stock certificates issued in respect of a Restricted Stock Award shall be registered in the name of the Participant and, unless otherwise determined by the Board, deposited by the Participant, together with a stock power endorsed in blank, with the Company (or its designee). At the expiration of the applicable restriction periods, the Company (or such designee) shall deliver the certificates no longer subject to such restrictions to the Participant or if the Participant has died, to the beneficiary designated, in a manner determined by the Board, by a Participant to receive amounts due or exercise rights of the Participant in the event of the Participant's death (the "Designated Beneficiary"). In the absence of an effective designation by a Participant, "Designated Beneficiary" shall mean the Participant's estate.

7. Other Stock-Based Awards

Other Awards of shares of Common Stock, and other Awards that are valued in whole or in part by reference to, or are otherwise based on, shares of Common Stock or other property, may be granted hereunder to Participants ("Other Stock Unit Awards"), including without limitation stock appreciation rights and Awards entitling recipients to receive shares of Common Stock to be delivered in the future. Such Other Stock Unit Awards shall also be available as a form of payment in the settlement of other Awards granted under the Plan or as payment in lieu of compensation to which a Participant is otherwise entitled. Other Stock Unit Awards may be paid in shares of Common Stock or cash, as the Board shall determine. Subject to the provisions of the Plan, the Board shall determine the conditions of each Other Stock Unit Award, including any purchase price applicable thereto.

8. Adjustments for Changes in Common Stock and Certain Other Events

(a) Changes in Capitalization. In the event of any stock split, reverse stock split, stock dividend, recapitalization, combination of shares, reclassification of shares, spin-off or other similar change in capitalization or event, or any distribution to holders of Common Stock other than an ordinary cash dividend, (i) the number and class of securities available under this Plan, (ii) the number and class of securities and exercise price per share of each outstanding Option, (iii) the repurchase price per share subject to each outstanding Restricted Stock Award, and (iv) the terms of each other outstanding Award shall be appropriately adjusted by the Company (or substituted Awards may be made, if applicable) to the extent determined by the Board.

(b) Reorganization Events

(1) Definition. A "Reorganization Event" shall mean: (a) any merger or consolidation of the Company with or into another entity as a result of which all of the Common Stock of the Company is converted into or exchanged for the right to receive cash,

securities or other property or is cancelled, (b) any exchange of all of the Common Stock of the Company for cash, securities or other property pursuant to a share exchange transaction or (c) any liquidation or dissolution of the Company.

(2) Consequences of a Reorganization Event on Awards Other than Restricted Stock Awards. In connection with a Reorganization Event, the Board shall take any one or more of the following actions as to all or any outstanding Awards on such terms as the Board determines: (i) provide that Awards shall be assumed, or substantially equivalent Awards shall be substituted, by the acquiring or succeeding corporation (or an affiliate thereof), (ii) upon written notice to a Participant, provide that the Participant's unexercised Options or other unexercised Awards shall become exercisable in full and will terminate immediately prior to the consummation of such Reorganization Event unless exercised by the Participant within a specified period following the date of such notice, (iii) provide that outstanding Awards shall become realizable or deliverable, or restrictions applicable to an Award shall lapse, in whole or in part prior to or upon such Reorganization Event, (iv) in the event of a Reorganization Event under the terms of which holders of Common Stock will receive upon consummation thereof a cash payment for each share surrendered in the Reorganization Event (the "Acquisition Price"), make or provide for a cash payment to a Participant equal to (A) the Acquisition Price times the number of shares of Common Stock subject to the Participant's Options or other Awards (to the extent the exercise price does not exceed the Acquisition Price) minus (B) the aggregate exercise price of all such outstanding Options or other Awards, in exchange for the termination of such Options or other Awards, (v) provide that, in connection with a liquidation or dissolution of the Company, Awards shall convert into the right to receive liquidation proceeds (if applicable, net of the exercise price thereof) and (vi) any combination of the foregoing.

For purposes of clause (i) above, an Option shall be considered assumed if, following consummation of the Reorganization Event, the Option confers the right to purchase, for each share of Common Stock subject to the Option immediately prior to the consummation of the Reorganization Event, the consideration (whether cash, securities or other property) received as a result of the Reorganization Event by holders of Common Stock for each share of Common Stock held immediately prior to the consummation of the Reorganization Event (and if holders were offered a choice of consideration, the type of consideration chosen by the holders of a majority of the outstanding shares of Common Stock); provided, however, that if the consideration received as a result of the Reorganization Event is not solely common stock of the acquiring or succeeding corporation (or an affiliate thereof), the Company may, with the consent of the acquiring or succeeding corporation, provide for the consideration to be received upon the exercise of Options to consist solely of common stock of the acquiring or succeeding corporation (or an affiliate thereof) equivalent value (as determined by the Board) to the per share consideration received by holders of outstanding shares of Common Stock as a result of the Reorganization Event.

To the extent all or any portion of an Option becomes exercisable solely as a result of clause (ii) above, the Board may provide that upon exercise of such Option the Participant shall receive shares subject to a right of repurchase by the Company or its successor at the Option exercise price; such repurchase right (x) shall lapse at the same rate as the Option would have become exercisable under its terms and (y) shall not apply to any shares subject to the Option that were exercisable under its terms without regard to clause (ii) above.

(3) Consequences of a Reorganization Event on Restricted Stock Awards. Upon the occurrence of a Reorganization Event other than a liquidation or dissolution of the Company, the repurchase and other rights of the Company under each outstanding Restricted Stock Award shall inure to the benefit of the Company's successor and shall apply to the cash, securities or other property which the Common Stock was converted into or exchanged for pursuant to such Reorganization Event in the same manner and to the same extent as they applied to the

Common Stock subject to such Restricted Stock Award. Upon the occurrence of a Reorganization Event involving the liquidation or dissolution of the Company, except to the extent specifically provided to the contrary in the instrument evidencing any Restricted Stock Award or any other agreement between a Participant and the Company, all restrictions and conditions on all Restricted Stock Awards then outstanding shall automatically be deemed terminated or satisfied.

9. General Provisions Applicable to Awards

(a) Transferability of Awards. Except as the Board may otherwise determine or provide in an Award, Awards shall not be sold, assigned, transferred, pledged or otherwise encumbered by the person to whom they are granted, either voluntarily or by operation of law, except by will or the laws of descent and distribution or, other than in the case of an Incentive Stock Option, pursuant to a qualified domestic relations order, and, during the life of the Participant, shall be exercisable only by the Participant. References to a Participant, to the extent relevant in the context, shall include references to authorized transferees.

(b) Documentation. Each Award shall be evidenced in such form (written, electronic or otherwise) as the Board shall determine. Each Award may contain terms and conditions in addition to those set forth in the Plan.

(c) Board Discretion. Except as otherwise provided by the Plan, each Award may be made alone or in addition or in relation to any other Award. The terms of each Award need not be identical, and the Board need not treat Participants uniformly.

(d) Termination of Status. The Board shall determine the effect on an Award of the disability, death, retirement, authorized leave of absence or other change in the employment or other status of a Participant and the extent to which, and the period during which, the Participant, or the Participant's legal representative, conservator, guardian or Designated Beneficiary, may exercise rights under the Award.

(e) Withholding. Each Participant shall pay to the Company, or make provision satisfactory to the Company for payment of, any taxes required by law to be withheld in connection with an Award to such Participant. Except as the Board may otherwise provide in an Award, for so long as the Common Stock is registered under the Exchange Act, Participants may satisfy such tax obligations in whole or in part by delivery of shares of Common Stock, including shares retained from the Award creating the tax obligation, valued at their Fair Market Value; provided, however, except as otherwise provided by the Board, that the total tax withholding where stock is being used to satisfy such tax obligations cannot exceed the Company's minimum statutory withholding obligations (based on minimum statutory withholding rates for federal and state tax purposes, including payroll taxes, that are applicable to such supplemental taxable income). Shares surrendered to satisfy tax withholding requirements cannot be subject to any repurchase, forfeiture, unfulfilled vesting or other similar requirements. The Company may, to the extent permitted by law, deduct any such tax obligations from any payment of any kind otherwise due to a Participant.

(f) Amendment of Award. The Board may amend, modify or terminate any outstanding Award, including but not limited to, substituting therefor another Award of the same or a different type, changing the date of exercise or realization, and converting an Incentive Stock Option to a Nonstatutory Stock Option, provided that the Participant's consent to such action shall be required unless the Board determines that the action, taking into account any related action, would not materially and adversely affect the Participant.

(g) Conditions on Delivery of Stock. The Company will not be obligated to deliver any shares of Common Stock pursuant to the Plan or to remove restrictions from shares previously delivered under the Plan until (i) all conditions of the Award have been met or removed to the satisfaction of the Company, (ii) in the opinion of the Company's counsel, all other legal matters in connection with the issuance and delivery of such shares have been satisfied, including any applicable securities laws and any applicable stock exchange or stock market rules and regulations, and (iii) the Participant has executed and delivered to the Company such representations or agreements as the Company may consider appropriate to satisfy the requirements of any applicable laws, rules or regulations.

(h) Acceleration. The Board may at any time provide that any Award shall become immediately exercisable in full or in part, free of some or all restrictions or conditions, or otherwise realizable in full or in part, as the case may be.

10. Miscellaneous

(a) No Right To Employment or Other Status. No person shall have any claim or right to be granted an Award, and the grant of an Award shall not be construed as giving a Participant the right to continued employment or any other relationship with the Company. The Company expressly reserves the right at any time to dismiss or otherwise terminate its relationship with a Participant free from any liability or claim under the Plan, except as expressly provided in the applicable Award.

(b) No Rights As Stockholder. Subject to the provisions of the applicable Award, no Participant or Designated Beneficiary shall have any rights as a stockholder with respect to any shares of Common Stock to be distributed with respect to an Award until becoming the record holder of such shares. Notwithstanding the foregoing, in the event the Company effects a split of the Common Stock by means of a stock dividend and the exercise price of and the number of shares subject to such Option are adjusted as of the date of the distribution of the dividend (rather than as of the record date for such dividend), then an optionee who exercises an Option between the record date and the distribution date for such stock dividend shall be entitled to receive, on the distribution date, the stock dividend with respect to the shares of Common Stock acquired upon such Option exercise, notwithstanding the fact that such shares were not outstanding as of the close of business on the record date for such stock dividend.

(c) Effective Date and Term of Plan. The Plan shall become effective on the date on which it is adopted by the Board. No Awards shall be granted under the Plan after the completion of 10 years from the earlier of (i) the date on which the Plan was adopted by the Board or (ii) the date the Plan was approved by the Company's stockholders, but Awards previously granted may extend beyond that date.

(d) Amendment of Plan. The Board may amend, suspend or terminate the Plan or any portion thereof at any time.

(e) Authorization of Sub-Plans. The Board may from time to time establish one or more sub- plans under the Plan for purposes of satisfying applicable blue sky, securities or tax laws of various jurisdictions. The Board shall establish such sub-plans by adopting supplements to this Plan containing (i) such limitations on the Board's discretion under the Plan as the Board deems necessary or desirable or (ii) such additional terms and conditions not otherwise inconsistent with the Plan as the Board shall deem necessary or desirable. All supplements adopted by the Board shall be deemed to be part of the Plan, but each supplement shall apply only to Participants within the affected jurisdiction and the Company shall not be required to provide copies of any supplement to Participants in any jurisdiction which is not the subject of such supplement.

(f) Compliance with Code Section 409A. No Award shall provide for deferral of compensation that does not comply with Section 409A of the Code, unless the Board, at the time of grant, specifically provides that the Award is not intended to comply with Section 409A of the Code.

(g) Governing Law. The provisions of the Plan and all Awards made hereunder shall be governed by and interpreted in accordance with the laws of the State of Delaware, excluding choice-oflaw principles of the law of such state that would require the application of the laws of a jurisdiction other than such state.

Exhibit 10.12

TOKAI PHARMACEUTICALS, INC.

2014 STOCK INCENTIVE PLAN

1. Purpose

The purpose of this 2014 Stock Incentive Plan (the "***Plan***") of Tokai Pharmaceuticals, Inc., a Delaware corporation (the "***Company***"), is to advance the interests of the Company's stockholders by enhancing the Company's ability to attract, retain and motivate persons who are expected to make important contributions to the Company and by providing such persons with equity ownership opportunities and performance-based incentives that are intended to better align the interests of such persons with those of the Company's stockholders. Except where the context otherwise requires, the term "***Company***" shall include any of the Company's present or future parent or subsidiary corporations as defined in Sections 424(e) or (f) of the Internal Revenue Code of 1986, as amended, and any regulations thereunder (the "***Code***") and any other business venture (including, without limitation, joint venture or limited liability company) in which the Company has a controlling interest, as determined by the Board of Directors of the Company (the "***Board***").

2. Eligibility

All of the Company's employees, officers and directors, as well as consultants and advisors to the Company (as such terms are defined and interpreted for purposes of Form S-8 under the Securities Act of 1933, as amended (the "***Securities Act***"), or any successor form) are eligible to be granted Awards under the Plan. Each person who is granted an Award under the Plan is deemed a "***Participant***." "***Award***" means Options (as defined in Section 5), SARs (as defined in Section 6), Restricted Stock (as defined in Section 7), Restricted Stock Units (as defined in Section 7) and Other Stock-Based Awards (as defined in Section 8).

3. Administration and Delegation

(a) Administration by Board of Directors. The Plan will be administered by the Board. The Board shall have authority to grant Awards and to adopt, amend and repeal such administrative rules, guidelines and practices relating to the Plan as it shall deem advisable. The Board may construe and interpret the terms of the Plan and any Award agreements entered into under the Plan. The Board may correct any defect, supply any omission or reconcile any inconsistency in the Plan or any Award in the manner and to the extent it shall deem expedient and it shall be the sole and final judge of such expediency. All decisions by the Board shall be made in the Board's sole discretion and shall be final and binding on all persons having or claiming any interest in the Plan or in any Award.

(b) Appointment of Committees. To the extent permitted by applicable law, the Board may delegate any or all of its powers under the Plan to one or more committees or subcommittees of the Board (a "***Committee***"). All references in the Plan to the "***Board***" shall mean the Board or a Committee of the Board or the officers referred to in Section 3(c) to the extent that the Board's powers or authority under the Plan have been delegated to such Committee or officers.

(c) Delegation to Officers. To the extent permitted by applicable law, the Board may delegate to one or more officers of the Company the power to grant Options and other Awards that constitute rights under Delaware law (subject to any limitations under the Plan) to employees or officers of the Company and to exercise such other powers under the Plan as the Board may determine, *provided* that the Board shall fix the terms of such Awards to be granted by such officers (including the exercise price of such Awards, which may include a formula by which the exercise price will be determined) and the maximum number of shares subject to such Awards that the officers may grant; *provided further*, however, that no officer shall be authorized to grant such Awards to any "executive officer" of the Company (as defined by Rule 3b-7 under the Securities Exchange Act of 1934, as amended (the "***Exchange Act***")) or to any "officer" of the Company (as defined by Rule 16a-1 under the Exchange Act). The Board may not delegate authority under this Section 3(c) to grant Restricted Stock, unless Delaware law then permits such delegation.

4. Stock Available for Awards

(a) Number of Shares; Share Counting.

(1) Authorized Number of Shares. Subject to adjustment under Section 9, Awards may be made under the Plan (any or all of which Awards may be in the form of Incentive Stock Options, as defined in Section 5(b)) for up to such number of shares of common stock, $0.001 par value per share, of the Company (the "***Common Stock***") as is equal to the sum of:

(A) 1,700,000 shares of Common Stock; plus

(B) such additional number of shares of Common Stock (up to 1,678,220 shares) as is equal to the sum of (x) the number of shares of Common Stock reserved for issuance under the Company's 2007 Stock Incentive Plan, as amended (the "***Existing Plan***") that remain available for grant under the Existing Plan immediately prior to the closing of the Company's initial public offering and (y) the number of shares of Common Stock subject to awards granted under the Existing Plan which awards expire, terminate or are otherwise surrendered, canceled, forfeited or repurchased by the Company at their original issuance price pursuant to a contractual repurchase right (subject, however, in the case of Incentive Stock Options to any limitations of the Code); plus

(C) an annual increase to be added on the first day of each fiscal year, beginning with the fiscal year ending December 31, 2015 and continuing for each fiscal year until, and including, the fiscal year ending December 31, 2024, equal to the least of (i) 1,800,000 shares of Common Stock, (ii) 4.0% of the outstanding shares on such date and (iii) an amount determined by the Board.

Shares issued under the Plan may consist in whole or in part of authorized but unissued shares or treasury shares.

(2) Share Counting. For purposes of counting the number of shares available for the grant of Awards under the Plan:

(A) all shares of Common Stock covered by SARs shall be counted against the number of shares available for the grant of Awards under the Plan; *provided, however*, that (i) SARs that may be settled only in cash shall not be so counted and (ii) if the Company grants an SAR in tandem with an Option for the same number of shares of Common Stock and provides that only one such Award may be exercised (a "***Tandem SAR***"), only the shares covered by the Option, and not the shares covered by the Tandem SAR, shall be so counted, and the expiration of one in connection with the other's exercise will not restore shares to the Plan;

(B) if any Award (i) expires or is terminated, surrendered or canceled without having been fully exercised or is forfeited in whole or in part (including as the result of shares of Common Stock subject to such Award being repurchased by the Company at the original issuance price pursuant to a contractual repurchase right) or (ii) results in any Common Stock not being issued (including as a result of an SAR that was settleable either in cash or in stock actually being settled in cash), the unused Common Stock covered by such Award shall again be available for the grant of Awards; *provided, however*, that (1) in the case of Incentive Stock Options, the foregoing shall be subject to any limitations under the Code, (2) in the case of the exercise of an SAR, the number of shares counted against the shares available under the Plan shall be the full number of shares subject to the SAR multiplied by the percentage of the SAR actually exercised, regardless of the number of shares actually used to settle such SAR upon exercise and (3) the shares covered by a Tandem SAR shall not again become available for grant upon the expiration or termination of such Tandem SAR; and

(C) shares of Common Stock delivered (either by actual delivery, attestation, or net exercise) to the Company by a Participant to (i) purchase shares of Common Stock upon the exercise of an Award or (ii) satisfy tax withholding obligations (including shares retained from the Award creating the tax obligation) shall not be added back to the number of shares available for the future grant of Awards.

(b) Substitute Awards. In connection with a merger or consolidation of an entity with the Company or the acquisition by the Company of property or stock of an entity, the Board may grant Awards in substitution for any options or other stock or stock-based awards granted by such entity or an affiliate thereof. Substitute Awards may be granted on such terms as the Board deems appropriate in the circumstances, notwithstanding any limitations on Awards contained in the Plan. Substitute Awards shall not count against the overall share limit set forth in Section 4(a)(1), except as may be required by reason of Section 422 and related provisions of the Code.

5. Stock Options

(a) General. The Board may grant options to purchase Common Stock (each, an "***Option***") and determine the number of shares of Common Stock to be covered by each Option, the exercise price of each Option and the conditions and limitations applicable to the exercise of each Option, including conditions relating to applicable federal or state securities laws, as it considers necessary or advisable.

(b) Incentive Stock Options. An Option that the Board intends to be an "incentive stock option" as defined in Section 422 of the Code (an "***Incentive Stock Option***") shall only be granted to employees of Tokai Pharmaceuticals, Inc., any of Tokai Pharmaceuticals, Inc.'s present or future parent or subsidiary corporations as defined in Sections 424(e) or (f) of the Code, and any other entities the employees of which are eligible to receive Incentive Stock Options under the Code, and shall be subject to and shall be construed consistently with the requirements of Section 422 of the Code. An Option that is not intended to be an Incentive Stock Option shall be designated a "***Nonstatutory Stock Option***." The Company shall have no liability to a Participant, or any other party, if an Option (or any part thereof) that is intended to be an Incentive Stock Option is not an Incentive Stock Option or if the Company converts an Incentive Stock Option to a Nonstatutory Stock Option.

(c) Exercise Price. The Board shall establish the exercise price of each Option and specify the exercise price in the applicable Option agreement. The exercise price shall be not less than 100% of the fair market value per share of Common Stock as determined by (or in a manner approved by) the Board ("***Fair Market Value***") on the date the Option is granted; *provided* that if the Board approves the grant of an Option with an exercise price to be determined on a future date, the exercise price shall be not less than 100% of the Fair Market Value on such future date.

(d) Duration of Options. Each Option shall be exercisable at such times and subject to such terms and conditions as the Board may specify in the applicable option agreement; *provided, however*, that no Option will be granted with a term in excess of 10 years.

(e) Exercise of Options. Options may be exercised by delivery to the Company of a notice of exercise in a form (which may be electronic) approved by the Company, together with payment in full (in the manner specified in Section 5(f)) of the exercise price for the number of shares for which the Option is exercised. Shares of Common Stock subject to the Option will be delivered by the Company as soon as practicable following exercise.

(f) Payment Upon Exercise. Common Stock purchased upon the exercise of an Option granted under the Plan shall be paid for as follows:

(1) in cash or by check, payable to the order of the Company;

(2) except as may otherwise be provided in the applicable Option agreement or approved by the Board, in its sole discretion, by (i) delivery of an irrevocable and unconditional undertaking by a creditworthy broker to deliver promptly to the Company sufficient funds to pay the exercise price and any required tax withholding or (ii) delivery by the Participant to the Company of a copy of irrevocable and unconditional instructions to a creditworthy broker to deliver promptly to the Company cash or a check sufficient to pay the exercise price and any required tax withholding;

(3) to the extent provided for in the applicable Option agreement or approved by the Board, in its sole discretion, by delivery (either by actual delivery or attestation) of shares of Common Stock owned by the Participant valued at their Fair Market Value, provided (i) such method of payment is then permitted under applicable law, (ii) such Common Stock, if acquired directly from the Company, was owned by the Participant for such minimum period of time, if any, as may be established by the Board in its discretion and (iii) such Common Stock is not subject to any repurchase, forfeiture, unfulfilled vesting or other similar requirements;

(4) to the extent provided for in the applicable Nonstatutory Stock Option agreement or approved by the Board in its sole discretion, by delivery of a notice of "net exercise" to the Company, as a result of which the Participant would receive (i) the number of shares underlying the portion of the Option being exercised, less (ii) such number of shares as is equal to (A) the aggregate exercise price for the portion of the Option being exercised divided by (B) the Fair Market Value on the date of exercise;

(5) to the extent permitted by applicable law and provided for in the applicable Option agreement or approved by the Board, in its sole discretion, by payment of such other lawful consideration as the Board may determine; or

(6) by any combination of the above permitted forms of payment.

(g) Limitation on Repricing. Unless such action is approved by the Company's stockholders, the Company may not (except as provided for under Section 9): (1) amend any outstanding Option granted under the Plan to provide an exercise price per share that is lower than the then-current exercise price per share of such outstanding Option, (2) cancel any outstanding option (whether or not granted under the Plan) and grant in substitution therefor new Awards under the Plan (other than Awards granted pursuant to Section 4(b)) covering the same or a different number of shares of Common Stock and having an exercise price per share lower than the then-current exercise price per share of the cancelled option, (3) cancel in exchange for a cash payment any outstanding Option with an exercise price per share above the then-current Fair Market Value, or (4) take any other action under the Plan that constitutes a "repricing" within the meaning of the rules of the NASDAQ Stock Market ("***NASDAQ***").

6. Stock Appreciation Rights

(a) General. The Board may grant Awards consisting of stock appreciation rights ("***SARs***") entitling the holder, upon exercise, to receive an amount of Common Stock or cash or a combination thereof (such form to be determined by the Board) determined by reference to appreciation, from and after the date of grant, in the Fair Market Value of a share of Common Stock over the measurement price established pursuant to Section 6(b). The date as of which such appreciation is determined shall be the exercise date.

(b) Measurement Price. The Board shall establish the measurement price of each SAR and specify it in the applicable SAR agreement. The measurement price shall not be less than 100% of the Fair Market Value on the date the SAR is granted; *provided* that if the Board approves the grant of an SAR effective as of a future date, the measurement price shall be not less than 100% of the Fair Market Value on such future date.

(c) Duration of SARs. Each SAR shall be exercisable at such times and subject to such terms and conditions as the Board may specify in the applicable SAR agreement; *provided*, *however*, that no SAR will be granted with a term in excess of 10 years.

(d) Exercise of SARs. SARs may be exercised by delivery to the Company of a notice of exercise in a form (which may be electronic) approved by the Company, together with any other documents required by the Board.

(e) Limitation on Repricing. Unless such action is approved by the Company's stockholders, the Company may not (except as provided for under Section 9): (1) amend any outstanding SAR granted under the Plan to provide a measurement price per share that is lower than the then-current measurement price per share of such outstanding SAR, (2) cancel any outstanding SAR (whether or not granted under the Plan) and grant in substitution therefor new Awards under the Plan (other than Awards granted pursuant to Section 4(b)) covering the same or a different number of shares of Common Stock and having an exercise or measurement price per share lower than the then-current measurement price per share of the cancelled SAR, (3) cancel in exchange for a cash payment any outstanding SAR with a measurement price per share above the then-current Fair Market Value, or (4) take any other action under the Plan that constitutes a "repricing" within the meaning of the rules of NASDAQ.

7. Restricted Stock; Restricted Stock Units

(a) General. The Board may grant Awards entitling recipients to acquire shares of Common Stock ("***Restricted Stock***"), subject to the right of the Company to repurchase all or part of such shares at their issue price or other stated or formula price (or to require forfeiture of such shares if issued at no cost) from the recipient in the event that conditions specified by the Board in the applicable Award are not satisfied prior to the end of the applicable restriction period or periods established by the Board for such Award. The Board may also grant Awards entitling the recipient to receive shares of Common Stock or cash to be delivered at the time such Award vests ("***Restricted Stock Units***") (Restricted Stock and Restricted Stock Units are each referred to herein as a "***Restricted Stock Award***").

(b) Terms and Conditions for All Restricted Stock Awards. The Board shall determine the terms and conditions of a Restricted Stock Award, including the conditions for vesting and repurchase (or forfeiture) and the issue price, if any.

(c) Additional Provisions Relating to Restricted Stock.

(1) Dividends. Unless otherwise provided in the applicable Award agreement, any dividends (whether paid in cash, stock or property) declared and paid by the Company with respect to shares of Restricted Stock ("***Accrued Dividends***") shall be paid to the Participant only if and when such shares become free from the restrictions on transferability and forfeitability that apply to such shares. Each payment of Accrued Dividends will be made no later than the end of the calendar year in which the dividends are paid to stockholders of that class of stock or, if later, the 15th day of the third month following the lapsing of the restrictions on transferability and the forfeitability provisions applicable to the underlying shares of Restricted Stock.

(2) Stock Certificates. The Company may require that any stock certificates issued in respect of shares of Restricted Stock, as well as dividends or distributions paid on such Restricted Stock, shall be deposited in escrow by the Participant, together with a stock power endorsed in blank, with the Company (or its designee). At the expiration of the applicable restriction periods, the Company (or such designee) shall deliver the certificates no longer subject to such restrictions to the Participant or if the Participant has died, to his or her Designated Beneficiary. "***Designated Beneficiary***" means (i) the beneficiary designated, in a manner determined by the Board, by a Participant to receive amounts due or exercise rights of the Participant in the event of the Participant's death or (ii) in the absence of an effective designation by a Participant, the Participant's estate.

(d) Additional Provisions Relating to Restricted Stock Units.

(1) Settlement. Upon the vesting of and/or lapsing of any other restrictions (i.e., settlement) with respect to each Restricted Stock Unit, the Participant shall be entitled to receive from the Company such number of shares of Common Stock or (if so provided in the applicable Award agreement) an amount of cash equal to the Fair Market Value of such number of shares of Common Stock as are set forth in the applicable Restricted Stock Unit agreement. The Board may, in its discretion, provide that settlement of Restricted Stock Units shall be deferred, on a mandatory basis or at the election of the Participant in a manner that complies with Section 409A of the Code.

(2) Voting Rights. A Participant shall have no voting rights with respect to any Restricted Stock Units.

(3) Dividend Equivalents. The Award agreement for Restricted Stock Units may provide Participants with the right to receive an amount equal to any dividends or other distributions declared and paid on an equal number of outstanding shares of Common Stock ("***Dividend Equivalents***"). Dividend Equivalents may be settled in cash and/or shares of Common Stock and shall be subject to the same restrictions on transfer and forfeitability as the Restricted Stock Units with respect to which paid, in each case to the extent provided in the Award agreement.

8. Other Stock-Based Awards

(a) General. Other Awards of shares of Common Stock, and other Awards that are valued in whole or in part by reference to, or are otherwise based on, shares of Common Stock or other property, may be granted hereunder to Participants ("***Other Stock-Based Awards***"). Such Other Stock-Based Awards shall also be available as a form of payment in the settlement of other Awards granted under the Plan or as payment in lieu of compensation to which a Participant is otherwise entitled. Other Stock-Based Awards may be paid in shares of Common Stock or cash, as the Board shall determine.

(b) Terms and Conditions. Subject to the provisions of the Plan, the Board shall determine the terms and conditions of each Other Stock-Based Award, including any purchase price applicable thereto.

9. Adjustments for Changes in Common Stock and Certain Other Events

(a) Changes in Capitalization. In the event of any stock split, reverse stock split, stock dividend, recapitalization, combination of shares, reclassification of shares, spin-off or other similar change in capitalization or event, or any dividend or distribution to holders of Common Stock other than an ordinary cash dividend, (i) the number and class of securities available under the Plan, (ii) the share counting rules set forth in Section 4(a), (iii) the number and class of securities and exercise price per share of each outstanding Option, (iv) the share and per-share provisions and the measurement price of each outstanding SAR, (v) the number of shares subject to and the repurchase price per share subject to each outstanding Restricted Stock Award and (vi) the share and per-share-related provisions and the purchase price, if any, of each outstanding Other Stock-Based Award, shall be equitably adjusted by the Company (or substituted Awards may be made, if applicable) in the manner determined by the Board.Without limiting

the generality of the foregoing, in the event the Company effects a split of the Common Stock by means of a stock dividend and the exercise price of and the number of shares subject to an outstanding Option are adjusted as of the date of the distribution of the dividend (rather than as of the record date for such dividend), then an optionee who exercises an Option between the record date and the distribution date for such stock dividend shall be entitled to receive, on the distribution date, the stock dividend with respect to the shares of Common Stock acquired upon such Option exercise, notwithstanding the fact that such shares were not outstanding as of the close of business on the record date for such stock dividend.

(b) Reorganization Events.

(1) Definition. A "***Reorganization Event***" shall mean: (a) any merger or consolidation of the Company with or into another entity as a result of which all of the Common Stock of the Company is converted into or exchanged for the right to receive cash, securities or other property or is cancelled, (b) any transfer or disposition of all of the Common Stock of the Company for cash, securities or other property pursuant to a share exchange or other transaction or (c) any liquidation or dissolution of the Company.

(2) Consequences of a Reorganization Event on Awards Other than Restricted Stock.

(A) In connection with a Reorganization Event, the Board may take any one or more of the following actions as to all or any (or any portion of) outstanding Awards other than Restricted Stock on such terms as the Board determines (except to the extent specifically provided otherwise in an applicable Award agreement or another agreement between the Company and the Participant): (i) provide that such Awards shall be assumed, or substantially equivalent Awards shall be substituted, by the acquiring or succeeding corporation (or an affiliate thereof), (ii) upon written notice to a Participant, provide that all of the Participant's unvested and/or unexercised Awards will terminate immediately prior to the consummation of such Reorganization Event unless exercised by the Participant (to the extent then exercisable) within a specified period following the date of such notice, (iii) provide that outstanding Awards shall become exercisable, realizable, or deliverable, or restrictions applicable to an Award shall lapse, in whole or in part prior to or upon such Reorganization Event, (iv) in the event of a Reorganization Event under the terms of which holders of Common Stock will receive upon consummation thereof a cash payment for each share surrendered in the Reorganization Event (the "***Acquisition Price***"), make or provide for a cash payment to Participants with respect to each Award held by a Participant equal to (A) the number of shares of Common Stock subject to the vested portion of the Award (after giving effect to any acceleration of vesting that occurs upon or immediately prior to such Reorganization Event) multiplied by (B) the excess, if any, of (I) the Acquisition Price over (II) the exercise, measurement or purchase price of such Award and any applicable tax withholdings, in exchange for the termination of such Award, (v) provide that, in connection with a liquidation or dissolution of the Company, Awards shall convert into the right to receive liquidation proceeds (if applicable, net of the exercise, measurement or purchase price thereof and any applicable tax withholdings) and (vi) any combination of the foregoing. In taking any of the actions permitted under this Section 9(b)(2), the Board shall not be obligated by the Plan to treat all Awards, all Awards held by a Participant, or all Awards of the same type, identically.

(B) Notwithstanding the terms of Section 9(b)(2)(A), in the case of outstanding Restricted Stock Units that are subject to Section 409A of the Code: (i) if the applicable Restricted Stock Unit agreement provides that the Restricted Stock Units shall be settled upon a "change in control event" within the meaning of Treasury Regulation Section 1.409A-3(i)(5)(i), and the Reorganization Event constitutes such a "change in control event", then no assumption or substitution shall be permitted pursuant to Section 9(b)(2)(A)(i) and the Restricted Stock Units shall instead be settled in accordance with the terms of the applicable Restricted Stock Unit agreement; and (ii) the Board may only undertake the actions set forth in clauses (iii), (iv) or (v) of Section 9(b)(2)(A) if the Reorganization Event constitutes a "change in control event" as defined under Treasury Regulation Section 1.409A-3(i)(5)(i) and such action is permitted or required by Section 409A of the Code; if the Reorganization Event is not a "change in control event" as so defined or such action is not permitted or required by Section 409A of the Code, and the acquiring or succeeding corporation does not assume or substitute the Restricted Stock Units pursuant to clause (i) of Section 9(b)(2)(A), then the unvested Restricted Stock Units shall terminate immediately prior to the consummation of the Reorganization Event without any payment in exchange therefor.

(C) For purposes of Section 9(b)(2)(A)(i), an Award (other than Restricted Stock) shall be considered assumed if, following consummation of the Reorganization Event, such Award confers the right to purchase or receive pursuant to the terms of such Award, for each share of Common Stock subject to the Award immediately prior to the consummation of the Reorganization Event, the consideration (whether cash, securities or other property) received as a result of the Reorganization Event by holders of Common Stock for each share of Common Stock held immediately prior to the consummation of the Reorganization Event (and if holders were offered a choice of consideration, the type of consideration chosen by the holders of a majority of the outstanding shares of Common Stock); *provided*, *however*, that if the consideration received as a result of the Reorganization Event is not solely common stock of the acquiring or succeeding corporation (or an affiliate thereof), the Company may, with the consent of the acquiring or succeeding corporation, provide for the consideration to be received upon the exercise or settlement of the Award to consist solely of such number of shares of common stock of the acquiring or succeeding corporation (or an affiliate thereof) that the Board determined to be equivalent in value (as of the date of such determination or another date specified by the Board) to the per share consideration received by holders of outstanding shares of Common Stock as a result of the Reorganization Event.

(3) Consequences of a Reorganization Event on Restricted Stock. Upon the occurrence of a Reorganization Event other than a liquidation or dissolution of the Company, the repurchase and other rights of the Company with respect to outstanding Restricted Stock shall inure to the benefit of the Company's successor and shall, unless the Board determines otherwise, apply to the cash, securities or other property which the Common Stock was converted into or exchanged for pursuant to such Reorganization Event in the same manner and to the same extent as they applied to such Restricted Stock; *provided*, *however*, that the Board may provide for termination or deemed satisfaction of such repurchase or other rights under the instrument evidencing any Restricted Stock or any other agreement between a Participant and the Company, either initially or by amendment. Upon the occurrence of a Reorganization Event involving the liquidation or dissolution of the Company, except to the extent specifically provided to the contrary in the instrument evidencing any Restricted Stock or any other agreement between a Participant and the Company, all restrictions and conditions on all Restricted Stock then outstanding shall automatically be deemed terminated or satisfied.

10. General Provisions Applicable to Awards

(a) Transferability of Awards. Awards shall not be sold, assigned, transferred, pledged or otherwise encumbered by the person to whom they are granted, either voluntarily or by operation of law, except by will or the laws of descent and distribution or, other than in the case of an Incentive Stock Option, pursuant to a qualified domestic relations order, and, during the life of the Participant, shall be exercisable only by the Participant; *provided*, *however*, that the Board may permit or provide in an Award for the gratuitous transfer of the Award by the Participant to or for the benefit of any immediate family member, family trust or other entity established for the benefit of the Participant and/or an immediate family member thereof if the Company would be eligible to use a Form S-8 under the Securities Act for the registration of the sale of the Common Stock subject to such Award to such proposed transferee; *provided further*, that the Company shall not be required to recognize any such permitted transfer until such time as such permitted transferee shall, as a condition to such transfer, deliver to the Company a written instrument in form and substance satisfactory to the Company confirming that such transferee shall be bound by all of the terms and conditions of the Award. References to a Participant, to the extent relevant in the context, shall include references to authorized transferees. For the avoidance of doubt, nothing contained in this Section 10(a) shall be deemed to restrict a transfer to the Company.

(b) Documentation. Each Award shall be evidenced in such form (written, electronic or otherwise) as the Board shall determine. Each Award may contain terms and conditions in addition to those set forth in the Plan.

(c) Board Discretion. Except as otherwise provided by the Plan, each Award may be made alone or in addition or in relation to any other Award. The terms of each Award need not be identical, and the Board need not treat Participants uniformly.

(d) Termination of Status. The Board shall determine the effect on an Award of the disability, death, termination or other cessation of employment, authorized leave of absence or other change in the employment or other status of a Participant and the extent to which, and the period during which, the Participant, or the Participant's legal representative, conservator, guardian or Designated Beneficiary, may exercise rights under the Award.

(e) Withholding. The Participant must satisfy all applicable federal, state, and local or other income and employment tax withholding obligations before the Company will deliver stock certificates or otherwise recognize ownership of Common Stock under an Award. The Company may decide to satisfy the withholding obligations through additional withholding on salary or wages. If the Company elects not to or cannot withhold from other compensation, the Participant must pay the Company the full amount, if any, required for withholding or have a broker tender to the Company cash equal to the withholding obligations. Payment of withholding obligations is due before the Company will issue any shares on exercise, vesting or release from forfeiture of an Award or at the same time as payment of the exercise or purchase price, unless the Company determines otherwise. If provided for in an Award or approved by the Board in its sole discretion, a Participant may satisfy such tax obligations in whole or in part by delivery (either by actual delivery or attestation) of shares of Common Stock, including shares retained from the Award creating the tax obligation, valued at their Fair Market Value; *provided*, *however*, except as otherwise provided by the Board, that the total tax withholding where stock is being used to satisfy

such tax obligations cannot exceed the Company's minimum statutory withholding obligations (based on minimum statutory withholding rates for federal and state tax purposes, including payroll taxes, that are applicable to such supplemental taxable income). Shares used to satisfy tax withholding requirements cannot be subject to any repurchase, forfeiture, unfulfilled vesting or other similar requirements.

(f) Amendment of Award. Except as otherwise provided in Sections 5(g) and 6(e) with respect to repricings and Section 11(d) with respect to actions requiring stockholder approval, the Board may amend, modify or terminate any outstanding Award, including but not limited to, substituting therefor another Award of the same or a different type, changing the date of exercise or realization, and converting an Incentive Stock Option to a Nonstatutory Stock Option. The Participant's consent to such action shall be required unless (i) the Board determines that the action, taking into account any related action, does not materially and adversely affect the Participant's rights under the Plan or (ii) the change is permitted under Section 9.

(g) Conditions on Delivery of Stock. The Company will not be obligated to deliver any shares of Common Stock pursuant to the Plan or to remove restrictions from shares previously issued or delivered under the Plan until (i) all conditions of the Award have been met or removed to the satisfaction of the Company, (ii) in the opinion of the Company's counsel, all other legal matters in connection with the issuance and delivery of such shares have been satisfied, including any applicable securities laws and regulations and any applicable stock exchange or stock market rules and regulations, and (iii) the Participant has executed and delivered to the Company such representations or agreements as the Company may consider appropriate to satisfy the requirements of any applicable laws, rules or regulations.

(h) Acceleration. The Board may at any time provide that any Award shall become immediately exercisable in whole or in part, free of some or all restrictions or conditions, or otherwise realizable in whole or in part, as the case may be.

11. Miscellaneous

(a) No Right To Employment or Other Status. No person shall have any claim or right to be granted an Award by virtue of the adoption of the Plan, and the grant of an Award shall not be construed as giving a Participant the right to continued employment or any other relationship with the Company. The Company expressly reserves the right at any time to dismiss or otherwise terminate its relationship with a Participant free from any liability or claim under the Plan, except as expressly provided in the applicable Award.

(b) No Rights As Stockholder. Subject to the provisions of the applicable Award, no Participant or Designated Beneficiary shall have any rights as a stockholder with respect to any shares of Common Stock to be distributed with respect to an Award until becoming the record holder of such shares.

(c) Effective Date and Term of Plan. The Plan shall become effective upon the effectiveness of the registration statement on Form S-1 for the Company's initial public offering of its Common Stock (the "***Effective Date***"). No Awards shall be granted under the Plan after the expiration of 10 years from the Effective Date, but Awards previously granted may extend beyond that date.

(d) Amendment of Plan. The Board may amend, suspend or terminate the Plan or any portion thereof at any time provided that (i) to the extent required by Section 162(m) of the Code, no Award granted to a Participant that is intended to comply with Section 162(m) of the Code after the date of such amendment shall become exercisable, realizable or vested, as applicable to such Award, unless and until the Company's stockholders approve such amendment in the manner required by Section 162(m) of the Code; and (ii) no amendment that would require stockholder approval under the rules of the NASDAQ Stock Market may be made effective unless and until the Company's stockholders approve such amendment. In addition, if at any time the approval of the Company's stockholders is required as to any other modification or amendment under Section 422 of the Code or any successor provision with respect to Incentive Stock Options, the Board may not effect such modification or amendment without such approval. Unless otherwise specified in the amendment, any amendment to the Plan adopted in accordance with this Section 11(d) shall apply to, and be binding on the holders of, all Awards outstanding under the Plan at the time the amendment is adopted, provided the Board determines that such amendment, taking into account any related action, does not materially and adversely affect the rights of Participants under the Plan. No Award shall be made that is conditioned upon stockholder approval of any amendment to the Plan unless the Award provides that (i) it will terminate or be forfeited if stockholder approval of such amendment is not obtained within no more than 12 months from the date of grant and (2) it may not be exercised or settled (or otherwise result in the issuance of Common Stock) prior to such stockholder approval.

(e) Authorization of Sub-Plans (including for Grants to non-U.S. Employees). The Board may from time to time establish one or more sub-plans under the Plan for purposes of satisfying applicable securities, tax or other laws of various jurisdictions. The Board shall establish such sub-plans by adopting supplements to the Plan containing (i) such limitations on the Board's discretion under the Plan as the Board deems necessary or desirable or (ii) such additional terms and conditions not otherwise inconsistent with the Plan as the Board shall deemnecessary or desirable. All supplements adopted by the Board shall be deemed to be part of the Plan, but each supplement shall apply only to Participants within the affected jurisdiction and the Company shall not be required to provide copies of any supplement to Participants in any jurisdiction which is not the subject of such supplement.

(f) Compliance with Section 409A of the Code. Except as provided in individual Award agreements initially or by amendment, if and to the extent (i) any portion of any payment, compensation or other benefit provided to a Participant pursuant to the Plan in connection with his or her employment termination constitutes "nonqualified deferred compensation" within the meaning of Section 409A of the Code and (ii) the Participant is a specified employee as defined in Section 409A(a)(2)(B)(i) of the Code, in each case as determined by the Company in accordance with its procedures, by which determinations the Participant (through accepting the Award) agrees that he or she is bound, such portion of the payment, compensation or other benefit shall not be paid before the day that is six months plus one day after the date of "separation from service" (as determined under Section 409A of the Code) (the "New Payment Date"), except as Section 409A of the Code may then permit. The aggregate of any payments that otherwise would have been paid to the Participant during the period between the date of separation from service and the New Payment Date shall be paid to the Participant in a lump sum on such New Payment Date, and any remaining payments will be paid on their original schedule.

The Company makes no representations or warranty and shall have no liability to the Participant or any other person if any provisions of or payments, compensation or other benefits under the Plan are determined to constitute nonqualified deferred compensation subject to Section 409A of the Code but do not to satisfy the conditions of that section.

(g) Limitations on Liability. Notwithstanding any other provisions of the Plan, no individual acting as a director, officer, employee or agent of the Company will be liable to any Participant, former Participant, spouse, beneficiary, or any other person for any claim, loss, liability, or expense incurred in connection with the Plan, nor will such individual be personally liable with respect to the Plan because of any contract or other instrument he or she executes in his or her capacity as a director, officer, employee or agent of the Company. The Company will indemnify and hold harmless each director, officer, employee or agent of the Company to whom any duty or power relating to the administration or interpretation of the Plan has been or will be delegated, against any cost or expense (including attorneys' fees) or liability (including any sum paid in settlement of a claim with the Board's approval) arising out of any act or omission to act concerning the Plan unless arising out of such person's own fraud or bad faith.

(h) Governing Law. The provisions of the Plan and all Awards made hereunder shall be governed by and interpreted in accordance with the laws of the State of Delaware, excluding choice-of-law principles of the law of such state that would require the application of the laws of a jurisdiction other than the State of Delaware.

EXHIBIT 21.1

SUBSIDIARIES OF THE REGISTRANT

Subsidiaries	**State Or Other Jurisdiction of Incorporation or Organization**
Otic Pharma, Ltd.	Israel

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the Registration Statements on Forms S-3 (Nos. 333-218949 and 333-207359) and S-8 (Nos. 333-216432, 333-210058, 333-203032, and 333-200413) of our report dated March 30, 2018, with respect to the consolidated financial statements of Novus Therapeutics, Inc. included in this Annual Report (Form 10-K) for the year ended December 31, 2017.

/s/ Ernst & Young LLP

Irvine, California
March 30, 2018

Exhibit 23.2

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the Registration Statements on Forms S-3 (Nos. 333-218949 and 333-207359) and S-8 (Nos. 333-216432, 333-210058, 333-203032, and 333-200413) of our report dated March 30, 2018 (which expresses an unqualified opinion and explanatory paragraph regarding the company's ability to continue as a going concern), with respect to the consolidated financial statements of Novus Therapeutics, Inc. and its subsidiary as of December 31, 2016 and for the year then ended included in this Annual Report (Form 10-K) for the year ended December 31, 2017.

/s/ Brightman, Almagor Zohar & Co.
Brightman, Almagor Zohar & Co.
Certified Public Accountants
Member of Deloitte Touche Tohmatsu Limited

Tel Aviv, Israel
March 30, 2018

Exhibit 31.1

CERTIFICATIONS

I, Gregory J. Flesher, certify that:

1. I have reviewed this Annual Report on Form 10-K of Novus Therapeutics, 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.

Date: March 30, 2018

By: /s/ Gregory J. Flesher
Gregory J. Flesher
Chief Executive Officer
(Principal Executive Officer)

Exhibit 31.2

CERTIFICATIONS

I, Jon S. Kuwahara, certify that:

1. I have reviewed this Annual Report on Form 10-K of Novus Therapeutics, 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.

Date: March 30, 2018

By: /s/ Jon S. Kuwahara
Jon S. Kuwahara
Senior Vice President Finance & Administration
(Principal Financial and Accounting Officer)

Exhibit 32.1

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 Novus Therapeutics, Inc. (the "Company") for the period ended December 31, 2017 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Gregory J. Flesher, President and Chief Executive Officer of the Company, hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of her knowledge:

(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: March 30, 2018

By: /s/ Gregory J. Flesher
Gregory J. Flesher
Chief Executive Officer
(Principal Executive Officer)

Exhibit 32.2

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 Novus Therapeutics, Inc. (the "Company") for the period ended December 31, 2017 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), the undersigned, Jon S. Kuwahara, Chief Financial Officer of the Company, hereby certifies, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that to the best of his knowledge:

(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: March 30, 2018

By: /s/ Jon S. Kuwahara
Jon S. Kuwahara
Senior Vice President Finance & Administration
(Principal Financial and Accounting Officer)