# 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, 2018**

**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**<br>**(State or other jurisdiction of incorporation or organization)** | **20-1000967**<br>**(I.R.S. Employer Identification No.)** |
|---|---|
| **19900 MacArthur Boulevard, Suite 550**<br>**Irvine, California**<br>**(Address of principal executive offices)** | **92612**<br>**(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 every Interactive Data File required to be submitted 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 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 | ☒ | 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 29, 2018, 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 $47,021,457, based on the last reported sale price of such stock on the Nasdaq Global Market as of such date.

As of March 22, 2019, the registrant had 9,434,243 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 2019 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, 2018, are incorporated by reference into Items 10, 11, 12, 13 and 14 of Part III of this Annual Report on Form 10-K.

**INDEX**

*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, Inc. (Novus) is a specialty pharmaceutical company focused on developing products for patients with disorders of the ear, nose, and throat (ENT). The Company has two platform technologies, each with the potential to be developed for multiple indications. Novus' lead program (OP0201) is a surfactant-based nasal aerosol drug-device combination product candidate being developed as a potential first-in-class treatment option for patients at risk for, or with, otitis media (OM), which is middle ear inflammation and effusion with or without infection. Globally, OM affects more than 700 million adults and children every year, with over half of the cases occurring in children under five years of age. OM is one of the most common disorders seen in pediatric practice, and in the U.S. is a leading cause of health care visits and the most frequent reason children are prescribed antibiotics or undergo surgery. Novus also has a foam-based drug delivery technology platform (OP01xx), which may be developed in the future to deliver drugs into the ear, nasal, and sinus cavities.

#### *Surfactant Platform (OP02xx)*

The first product in the surfactant platform program, OP0201, is being developed as a potential first-in-class treatment option for OM. OM is often caused by Eustachian tube dysfunction (ETD). OP0201 is a nasal aerosol, 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 pressurized metered-dose inhaler (pMDI). OP0201is 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, the active ingredients in OP0201 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, OP0201 promotes 'de-sticking' of the ET so that ventilation of the middle ear is restored.

Novus is currently conducting four clinical trials to explore the safety, tolerability, and potential efficacy of OP0201. These trials include a phase 1 safety and pharmacodynamic effects study (study C-001), a phase 1 safety and tolerability study (study C-002), a phase 1 safety and exploration of effects study in adults with acute otitis media (study C-004), and an exploratory phase 2a study in children with acute otitis media (study C-006). Upon completion of these clinical studies, Novus intends to initiate phase 2 and phase 3 studies, with an initial focus on a development program that, if successful, will lead to registration of OP0201 in North America and key European markets as a product to treat OM and prevent OM in children. Additional development activities to support registration of OP0201 in other countries, or for other indications, or other patient populations, may occur in the future.

#### *Foam Platform (OP01xx)*

OP0101 and OP0102 are foam-based products intended to be used as a delivery vehicle for drugs to be administered into the ear canals, as well as the nasal and sinus cavities. OP0101 was the initial product utilizing the foam platform. It was developed as an improved treatment option for acute otitis externa (AOE), a common infectious 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 OP0101 in 353 adult and pediatric subjects, including a successful phase 2b study with a steroid-free, antibiotic-only formulation of OP0101 that was non-inferior to standard of care, but with a more favorable dosing regimen (once a day dosing instead of twice a day).

In 2016, Novus began development of OP0102, a second-generation formulation designed to rapidly relieve ear pain (an unmet need in AOE) and eradicate infection with less than seven days of treatment. Novus subsequently suspended the OP0102 development program to focus resources on the surfactant program.

**OP0201 for Otitis Media (OM)**

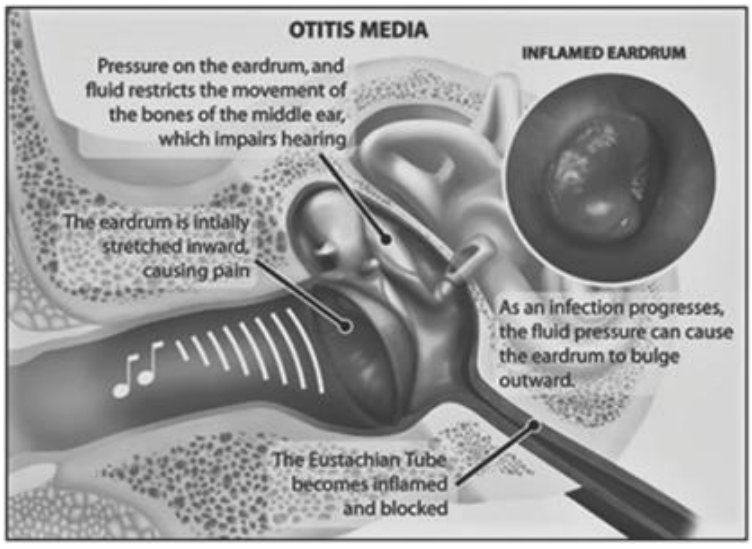
OM is a generic term without reference to a specific etiology or pathogenesis and best regarded as a spectrum of diseases of the middle ear. OM is a very common condition and a leading cause of healthcare visits and antibiotic prescriptions. Common forms of OM are acute OM (AOM) and otitis media with effusion (OME). Both AOM and OME can 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 AOM (RAOM). If middle ear effusion (MEE) persists in the middle ear for longer than three months, then the patient is diagnosed with chronic OME (COME).

AOM is very common and can affect both children and adults. 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, fever or irritability) in the presence of MEE. 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 (RAOM) 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) MEE 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 ETD. Like AOM, patients can experience multiple OME episodes over the course of months or years (recurrent OME; ROME). If MEE persists for longer than three months, then the patient is diagnosed with COME and is often considered as a surgical candidate to insert tympanostomy tubes to facilitate ventilating the middle ear.

An important component of middle ear health is a normally functioning ET. The ET 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 ET opens periodically upon swallowing, chewing, yawning, or when a pressure differential exists between the middle ear and the external environment. When the ET becomes blocked or does not open normally, 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 15 million visits to physicians during 2014 related to OM and ETD. It is one of the most common diseases seen in Pediatric and Otolaryngology practices and is the most frequent reason children consume antibiotics or undergo surgery.

To date, no drug product has been approved to treat 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 as OM treatments or to prevent OM. In addition, the American Academy of Otolaryngology—Head and Neck Surgery recommends against use of these drugs in patients with OM. The only option today to treat and possibly prevent RAOM, ROME or COME, 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 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 safe, 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 ET to treat persistent ETD in adults. However, like OM, no drug product has been approved for the prevention of ETD.

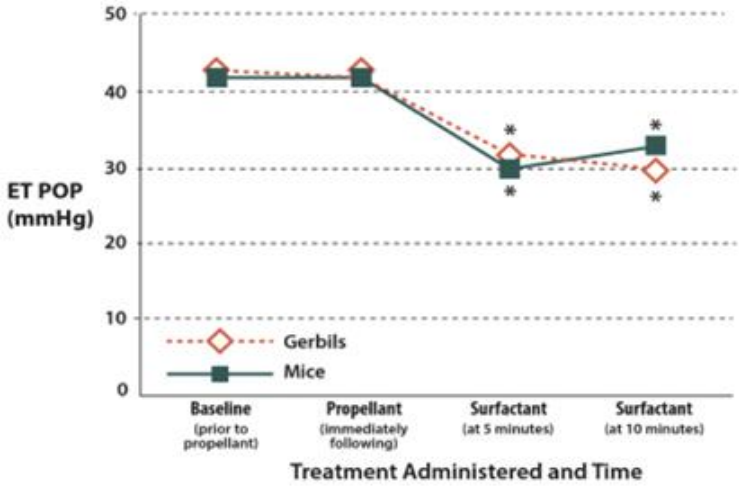
OP0201 is a novel nasal aerosol combination drug product, comprised of the two active ingredients, DPPC and CP, and formulated with a propellant for easy administration. OP0201 is delivered as a local treatment through each nostril using a pMDI device. The pMDI device holds the canister and sprays the drug product into the nasal cavity. Together DPPC and CP are designed to effectively absorb to the air-liquid interface of the mucosa and reduce the interfacial surface tension of the ET, which reduces the passive pressure required for the ET to open. In other words, OP0201 is intended to promote ‘de-sticking’ of the ET so that ventilation of the middle ear may occur.

Avanti Polar Lipids, Inc. (Alabaster, Alabama, U.S.) is our sole supplier of DPPC and CP, the active pharmaceutical ingredients used in OP0201. Other manufacturers of DPPC and CP exist, but we have not yet qualified a secondary supplier. The drug product is currently manufactured using Good Manufacturing Practices by Sciarra Aeromed, Inc. (Hicksville, New York, U.S.). We have not yet qualified a secondary manufacturer.

Surfactants are ubiquitous and well-understood endogenous compounds present in human nasal passages, the ET, 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 ET, it is known that the quantity of surfactants along the ET of children with OM is significantly reduced when compared to otologically healthy children. Also, the ET surface tension in patients with OM is higher than reported for patients with healthy ETs, causing the luminal surfaces to stick together. Indeed, reduction in ET luminal surface tension and passive opening pressure (POP), as well as improved ET function was demonstrated in a study of six cynomolgus monkeys who received injections of the calf lung surfactant extract INFASURF® (whose main component is the surfactant DPPC) directly into the ET lumen.

The positive effects of OP0201 on ET function have been observed in preclinical animal studies using an early formulation of a DPPC and CP combination surfactant product. Meaningful reductions in POP of healthy ET, as well as meaningful reduction in severity and duration of OM episodes in three animal species after treatment were observed. In two separate animal-model experiments, the investigators studied the effects of intranasal administration of the early formulation on ET POP of the left ear as compared to propellant in healthy Mongolian gerbils and albino mice. In both animal species, administration of the product resulted in significant ($p<0.001$) reductions in mean ET 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]) ET 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) ET 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 the early formulation 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 treatment alone (i.e., no antibiotics were administered in this study). Based on these findings, Novus believes that resolution of MEE may occur significantly earlier with treatment. The data suggest that restoration of ET function and ventilation of the middle ear is beneficial in resolving bacterial AOM.

Prior to licensing rights to the surfactant program, the inventors treated nine humans who had various OM and ETD conditions. 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 is currently conducting four clinical trials to explore the safety, tolerability, and potential efficacy of OP0201.

- Study OP0201-C-001 (“C-001”) is a phase 1 clinical trial designed to evaluate safety, tolerability, and ET function following a single intranasal dose of OP0201 in 16 healthy adults. The randomized, double-blind, placebo-controlled, cross-over trial will explore the effect of a 20 mg dose of OP0201 on ET function. Assessment of ET function will be captured using continuous tympanic impedance while subjects are exposed to changes in atmospheric pressure produced in a hyperbaric/hypobaric chamber. The single center study will be conducted in Germany. Additional information about the study can be found at clinicaltrials.gov using the identifier NCT03828149.

- Study OP0201-C-002 (“C-002”) is a phase 1 clinical trial designed to evaluate safety and tolerability of daily intranasal administration of OP0201 over 14 consecutive days in 30 healthy adults. The randomized, double-blind, placebo-controlled, parallel-group, dose-escalation trial includes a 30 mg per day dose (Cohort A) and 60 mg per day dose (Cohort B) of OP0201. The study is being conducted at a single phase 1 unit in the U.S. Additional information about the study can be found at clinicaltrials.gov using the identifier NCT03748758.

- Study OP0201-C-004 (“C-004”) is a phase 1 clinical trial designed to evaluate safety, tolerability, and relief of ear pain over a 60-minute observation period following a single intranasal dose of OP0201 in 24 adults with acute otitis media. The randomized, double-blind, placebo-controlled, parallel-group trial will explore the effects of a 20 mg intranasal dose of OP0201. Assessment of pain relief will be captured utilizing a Visual Analog Scale (VAS), Numeric Rating Scale (NRS-11), Patient Global Impression of Change (PGIC), and Clinical Global Impressions Scale: Global Improvement (CGI-I). The multicenter study was conducted in the U.S. Additional information about the study can be found at clinicaltrials.gov using the identifier NCT03766373.

- Study OP0201-C-006 (“C-006”) is an exploratory phase 2a clinical trial designed to evaluate safety, tolerability, and efficacy of daily intranasal administration of OP0201 over 10 consecutive days in 50 pediatric patients, 6 to 24 months of age, with acute otitis media. The randomized, double-blind, placebo-controlled, parallel-group trial will explore the effects of a 20 mg per day dose of OP0201 as an adjunct to oral antibiotics. Patients will receive 10 days of treatment and will be followed for up to 30 days, during which multiple endpoints will be explored. The single center study will be conducted in the U.S. Additional information about the study can be found at clinicaltrials.gov using the identifier NCT03818815.

Upon completion of these clinical studies, Novus intends to initiate phase 2 and phase 3 studies, with an initial focus on a development program that, if successful, will lead to registration of OP0201 in North America and key European markets as a product to treat OM and prevent OM in children. Additional development activities to support registration of OP0201 in other countries, or for other indications, or for other patient populations, may occur in the future.

**OP0101 and OP0102 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 U.S. 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 OP0101 and OP0102 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 (OP0101), which it believes supported the utility of the foam platform in AOE. 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, OP0101, 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 OP0101 was found to be non-inferior to CIPRODEX, even though OP0101 contained no steroid and utilized 50% fewer doses over the week-long course of therapy. Although OP0101 proved to be effective in treating AOE infection, the product is not sufficiently differentiated from other products in the market. Novus believes that none of the currently marketed products adequately address the greatest unmet need, which is rapid pain relief. Therefore, in 2016, Novus began development of OP0102, a second-generation formulation designed to rapidly relieve ear pain and eradicate infection with less than seven days of treatment. Novus subsequently paused OP0102 development to focus resources on the surfactant program.

The competitive conditions faced by the Company are described in greater detail in Part I, Item 1A. *Risk Factors* in this Annual Report on Form 10-K under the caption “We face substantial competition, which may result in others discovering, developing or commercializing competing products before or more successfully than we do.”

**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 issued patents and patent applications directed towards products derived from Novus’s foam platform (OP01xx) and surfactant platform (OP02xx) with claims to pharmaceutical preparations as well as to methods of treatment. For OP0101 and OP0102, Novus owns or has exclusive rights to two families of patents, one with three U.S. and seven foreign patents (Canada, France, Germany, Israel, Italy, Spain, and the United Kingdom), and a second with two U.S. and five foreign patents (France, Germany, Italy, Spain and the United Kingdom). In the first family the last to expire issued patent in the U.S. will expire in September 2027, including patent term adjustment. In the second family the last to expire issued patent in the U.S. will expire in December 2033. For OP0201, 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 two U.S. patent applications and seven foreign patent applications. If allowed. the last to expire patent application will expire in December 2039, 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 surfactant-based products. 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 investigational new drug application (IND), to Novus. Novus is obligated to pay up to $42.1 million in development and regulatory milestones if OP0201 is approved for three indications in the U.S., two in Europe, and two in Japan. Novus is also obligated to pay up to $36.0 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 U.S., 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***

The FDA regulates drugs under the Federal Food, Drug, and Cosmetic Act (FDCA) and its implementing regulations, and biologics under the FDCA and the Public Health Service Act (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 U.S. 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 U.S. generally involves the following:

- completion of extensive preclinical laboratory tests and preclinical animal studies, all performed in accordance with the Good Laboratory Practices (GLP) regulations;
- submission to the FDA of an investigational new drug application (IND) which must become effective before human clinical trials may begin and must be updated annually;
- approval by an independent institutional review board (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 (BLA) or a new drug application, or NDA, after completion of all pivotal clinical trials;
- potential review of the product application by a 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 a FDA pre-approval inspection of the manufacturing facilities where the proposed product is produced to assess compliance with current Good Manufacturing Practices (cGMP) regulations;
- 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.

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 (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 (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 (compassionate use). 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. At this time, Novus does not have a program for the compassionate use of an investigational product outside of a clinical trial as it is not applicable to our investigational products and our current stage of development.

*Submission of a BLA or NDA to the FDA*

Assuming successful completion of all required testing (e.g. completion of pivotal clinical trials) 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 and these fees are typically increased on an annual basis. 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. No application user fees are anticipated for OP0201 in calendar 2019.

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 several alternative sources, including investigator-initiated trials that are not sponsored by Novus. 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 (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, 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 U.S., or if it affects more than 200,000 individuals in the U.S., 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 U.S.

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 (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 (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 U.S. 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 (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 (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 U.S., 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 U.S. apply similarly in the context of the European Union (EU) 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 U.S. 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 EU, for example, a clinical trial authorization application (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 (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 EU regulatory systems, we must submit a marketing authorization application. The content of the BLA or NDA filed in the U.S. is like that required in the EU, except, among other things, country-specific document requirements

For other countries outside of the EU, 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 EU, 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 EU*

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

- Centralized procedure. The European Medicines Agency (EMA) implemented the centralized procedure for the approval of human medicines to facilitate marketing authorizations that are valid throughout the European Economic Area (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 EU 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 EU country of medicinal products that have not yet been authorized in any EU 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 EU Member State, in accordance with the national procedures of that country. Following this, further marketing authorizations can be sought from other EU 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 (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. Because Novus intends to pursue pediatric indications for OP0201 before adult indications, a PIP will be submitted to EMA and other EU countries, as required. The PIP will need to be submitted early during product development, before marketing authorization applications are submitted. The timing of PIP submission cannot be after initiation of pivotal trials or confirmatory (phase 3) trials.

*Exclusivity of New Chemical Entities and New Fixed Dose Combinations*

In the EU, new chemical entities, sometimes referred to as new active substances as well as new fixed dose combinations, 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 EU 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 EU 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 EU, 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 U.S. 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, 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 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 U.S. 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, (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 (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 (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 22, 2019, Novus had ten employees, all of which were 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 reportable segment in the U.S.

**Reverse Merger**

On December 21, 2016, Tokai Pharmaceuticals, Inc. ("Tokai"), a Delaware corporation, Otic, and the stockholders of Otic Pharma, Ltd. ("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 (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 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 (SEC). In particular, please read our definitive proxy statement, which will be filed with the SEC in connection with our 2019 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 its website at www.sec.gov. 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.***

We have incurred significant annual net operating losses in every year since our inception. We have no products approved for commercial sale and have not generated any revenue from product sales to date, and we continue to incur significant research and development and other expenses related to our ongoing operations. If OP0201 or any future product candidates we develop are not successfully developed and approved, we may never generate any revenue from sales of products. The Company has experienced net losses and negative cash flows from operating activities since its inception. The Company's net loss for the year ended December 31, 2018 is $14.1 million and the Company has an accumulated deficit of $41.6 million. We have not generated any revenues from product sales, have not completed the development of any product candidate and may never have a product candidate approved for commercialization. We expect it will be several years, if ever, before we have a product candidate ready for commercialization. We have financed our operations to date primarily through sales of equity. We have devoted substantially all of our financial resources and efforts to research and development, including pre-clinical studies and our clinical trials. Our net losses may fluctuate significantly from quarter to quarter and year to year and will depend, in part, on the rate at which we incur expenses and our ability to generate revenue. Net losses and negative cash flows have had, and will continue to have, an adverse effect on our stockholders' equity and working capital.

We are focused primarily on developing OP0201 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). Although we have successfully manufactured a current Good Manufacturing Procedures (cGMP) batch of OP0201 drug product suitable for clinical trials, this was done on a smaller scale, and we may have difficultly scaling up manufacturing in a timely and cost-effective manner. We are currently conducting four clinical trials to explore the safety, tolerability, and potential efficacy of OP0201. Upon completion of these clinical studies, we intend to initiate phase 2 and phase 3 studies, with an initial focus on a development program that, if successful, will lead to registration of OP0201 in North America and key European markets as a product to treat OM and prevent 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 generate clinical data for the OP0201 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 device development for our drug-device 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, OP0102 and OP0201. 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 our efforts and financial resources in product development, including funding our formulation and device development, manufacturing, nonclinical studies, 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, manufacturing, clinical, and nonclinical development activities;
- manufacture drug product at commercial scale;
- establish and confirm commercially acceptable stability (shelf-life) of our drug products;
- in-license or acquire other product candidates and advance them through clinical development;
- obtain required regulatory approvals for the development and commercialization of OP0201 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 any approved and marketed drug products;
- obtain and maintain adequate product pricing and reimbursement;
- develop and maintain any strategic relationships we elect to enter; 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, OP0101. Subsequent to the completion of the Reverse Merger, we paused OP0101 and the OP0102 development program and began focusing substantially all our resources on the advancement of our surfactant product (OP0201) for otitis media. Operations related to OP0201 include arranging for third party vendors to formulate and manufacture material using cGMP and preparing for phase 1 and phase 2 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 U.S. We may incur additional costs or experience delays in completing, or ultimately be unable to complete, the formulation and commercialization of our product candidates.***

We will continue to conduct OP0201 formulation and device development as the product advances through clinical development. We are highly dependent on third parties for OP0201 formulation and device development as well as manufacturing of drug product for future clinical trials and commercial supply.

Reformulation work for OP0102 to explore adding a second active ingredient (anesthetic) to address immediate relief of ear pain associated with AOE commenced in 2016 but was subsequently put on hold. If development of OP0102 is resumed, additional formulation development and clinical studies with the new OP0102 combination product (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 U.S. and/or that subsequent studies will not match results seen in prior studies with OP0101.

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 and device 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 and device 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 the earlier generation OP0101 formulation may not be predictive of the results of studies conducted with OP0102 formulation. 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, safe and well-tolerated 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 EMA, or the Medicines & Healthcare Products Regulatory Agency (MHRA; the United Kingdom regulatory authority), will approve Clinical Trial Application's for any of our product candidates in the future. There is also no assurance that 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 development and manufacturing as a prerequisite to commencing clinical work;
- 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. In addition, our development and commercialization activities could be harmed or delayed by a shutdown of the U.S. government, including the FDA. For example, a prolonged shutdown may significantly delay the FDA's ability to timely review and process any submissions we may file or cause other regulatory delays, which could materially and adversely affect our business.

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.

Additionally, because we are developing a drug-device combination product, we will be subject to greater regulatory scrutiny and technical challenges. Devices such as our metered-dose inhaler are regulated by a separate division within the FDA. Even if our drug compound is shown to be safe and effective, our delivery device must also demonstrate that it can reliably deliver a consistent dose of the drug across repeated uses. This is challenging and is subject to a further layer of regulatory review before our product can be approved. If we are unsuccessful in addressing these technical and regulatory challenges, our prospects could be adversely affected.

***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 do not know whether the ongoing or 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. Any occurrences of clinically significant adverse events with our product candidates may harm our business, financial condition and prospects significantly.

OP0201 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 ongoing and future OP0201 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.

OP0102 second generation formulation will be an early-product candidate. The side effect profile in animals and humans will need to be fully established. OP0102 may be a product with an unacceptable side effect profile.

**Risks Related to Our Financial Position and Need for Additional Capital**

***We have concluded and disclosed in the footnotes to our consolidated financial statements, included elsewhere within this Annual Report, that we do not have sufficient cash to fund our operations through 12 months from the date of issuance of the most recent financial statements.***

Our consolidated financial statements included in this Annual Report have been prepared on a basis that assumes that we will continue as a going concern and does not include any adjustments that may result from the outcome of this uncertainty.

Our ability to continue as a going concern is dependent upon a number of factors, including our ability to obtain the necessary financing to meet our obligations and repay our liabilities arising from obligations that become due in the ordinary course of business. Management currently believes that it will be necessary for us to raise additional funding in the form of an equity financing from the sale of common stock. There can be no guarantee that we will successfully raise all the funding we require. However, substantial doubt about a company's ability to continue as a going concern is generally viewed unfavorably by current and prospective investors, as well as by analysts and creditors. As a result, it may be more difficult for us to raise the additional financing necessary to continue to operate our business and we may be forced to significantly alter our business strategy, substantially curtail our current operations, or cease operations altogether.

***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.

We have sufficient capital to complete the ongoing OP0201 phase 1 clinical studies but will require additional capital to conduct additional OP0201 studies and ultimately commercialize OP0201 if approved. We 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, 2018, the Company had approximately 9.4 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 U.S. and by other regulatory authorities outside the U.S. prior to commercialization in the respective regions. The process of obtaining marketing approvals, both in the U.S. and outside the U.S., 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 U.S.***

In order to market and sell our products in the EU and other international jurisdictions outside of the U.S., 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 U.S. generally includes all the risks associated with obtaining FDA approval. In addition to regulatory approval, in many countries outside the U.S., 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 U.S. 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 U.S. 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 U.S. 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 EU 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 EU's requirements regarding the protection of personal information can also lead to significant penalties and sanctions.

***Legislation regulating the pharmaceutical and healthcare industries 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 U.S. and some foreign jurisdictions, there have been a number of legislative and regulatory changes and proposed changes intended to contain healthcare costs and modify the regulation of drug and biologic products. These and other regulatory changes 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, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act (collectively, the "PPACA") substantially changed the way healthcare is financed by both governmental and private insurers, significantly impacting the U.S. pharmaceutical industry. The PPACA, among other things, addresses a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for certain drugs, increases the minimum Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program and extends the rebate program to individuals enrolled in Medicaid managed care organizations, and establishes annual fees and taxes on manufacturers of certain branded prescription drugs. Implementation of the PPACA remains ongoing, but there is uncertainty as to how the law's various provisions will ultimately affect the industry and whether all aspects of the law will remain in place.

In addition to the PPACA, other legislative changes have been proposed and adopted since the PPACA was enacted. In the U.S., the Budget Control Act of 2011 included aggregate reductions to Medicare payments to providers of up to 2% per fiscal year, starting in 2013. This policy was initially set to expire in fiscal year 2021 but has been extended to 2025. 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 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 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. 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.

We expect that additional state and federal healthcare reform measures and regulations will be adopted in the future. Any of these measures and regulations could limit the amounts that federal and state governments will pay for healthcare products and services, result in reduced demand for our product candidates or additional pricing pressures and affect our product development, testing, marketing approvals and post-market activities.

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 U.S. 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 U.S. tend to impose strict price controls, which may adversely affect our revenues, if any.***

In some countries, particularly the countries of the EU, 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 (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 several 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 OP0102 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 OP0201 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 ET to ventilate the ET in patients with ETD 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 ET dysfunction in adults. Patients may be prescribed concurrent antibiotic therapy for AOM, but these products will not be competitive with, but likely used in conjunction with OP0201.

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 U.S., 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 U.S., 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 U.S. 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 U.S., the reimbursement for our products may be reduced compared with the U.S. and may be insufficient to generate commercially reasonable revenues and profits.

Moreover, increasing efforts by governmental and third-party payers, in the U.S. 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 $5.0 million in product liability insurance coverage in the aggregate, with a per incident limit of $5.0 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 several 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 that we may enter could 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 OP0201 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 U.S. 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 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 EU, the U.S. and other countries with respect to our proprietary technology and products. We seek to protect our proprietary position by filing patent

applications in the U.S. and internationally that are related to our novel technologies and product candidates. This patent portfolio includes issued patents and pending patent applications covering pharmaceutical compositions and 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 U.S. 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 U.S. 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 EU, the U.S. 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 U.S. patent law. These include provisions that affect the way patent applications are prosecuted and may also affect patent litigation. The U.S. 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 U.S. 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 U.S. 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 several 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 OP0201 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 are 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 U.S. 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 EU 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 65.2% of our capital stock as of December 31, 2018. 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.***

As a public company, we incur significant legal, accounting and other expenses that we did not previously 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 accounting principles generally accepted in the U.S. ("GAAP").

Our financial statements have only been prepared in accordance with GAAP since the closing of the Reverse Merger. Since that time, we have implemented measures designed to improve our internal controls over financial reporting, including by bringing in additional accounting resources and establishing new accounting and financial reporting procedures to establish an appropriate level of internal controls over financial reporting. If we are unable to successfully maintain 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 2021.

**Item 3. Legal Proceedings.**

Information pertaining to legal proceedings is provided under the heading "Legal Proceedings" in Note 6, Commitments and Contingencies, to the consolidated financial statements and is incorporated by reference herein.

**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.

As of March 22, 2019, there were approximately 18 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, 2018. 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

### Overview

Novus Therapeutics, Inc. (Novus) is a specialty pharmaceutical company focused on developing products for patients with disorders of the ear, nose, and throat (ENT). Novus has two technologies, each with the potential to be developed for multiple indications. Novus' lead program (OP0201) is a surfactant-based nasal aerosol drug-device combination product being developed as a potential first-in-class treatment option for patients at risk for, or with, otitis media (OM), which is middle ear inflammation with or without infection. Globally, OM affects more than 700 million adults and children every year, with over half of the cases occurring in children under five years of age. OM is one of the most common disorders seen in pediatric practice, and in the U.S. is a leading cause of health care visits and the most frequent reason children are prescribed antibiotics or undergo surgery. Novus also has a foam-based drug delivery technology (OP01xx), which may be developed in the future to deliver drugs into the ear, nasal, and sinus cavities.

### *Surfactant Platform (OP02xx)*

The first product in the surfactant platform program is OP0201, which is being developed as a potential first-in-class treatment option for OM. OM is often caused by Eustachian tube dysfunction (ETD). OP0201 is a nasal aerosol, 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 pressurized metered-dose inhaler (pMDI). OP0201is 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 the active ingredients in OP0201 (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, OP0201 promotes 'de-sticking' of the ET so that ventilation of the middle ear is restored.

Novus is currently conducting four clinical trials to explore the safety, tolerability, and potential efficacy of OP0201. These trials include a phase 1 safety and pharmacodynamic effects study (study C-001), a phase 1 safety and tolerability study (study C-002), a phase 1 safety and exploration of effects study in adults with acute otitis media (study C-004), and an exploratory phase 2a study in children with acute otitis media (study C-006). Upon completion of these clinical studies, Novus intends to initiate phase 2 and phase 3 studies, with an initial focus on a development program that, if successful, will lead to registration of OP0201 in North America and key European markets as a product to treat OM and prevent OM in children. Additional development activities to support registration of OP0201 in other countries, or for other indications, or other patient populations, may occur in the future.

### *Foam Platform (OP01xx)*

OP0101 and OP0102 are foam-based products intended to be used as a delivery vehicle for drugs to be administered into the ear canals, as well as the nasal and sinus cavities. OP0101 was the initial product utilizing the foam platform. It was developed as an improved treatment option for acute otitis externa (AOE), a common infectious 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 OP0101 in 353 adult and pediatric subjects, including a successful phase 2b study with a steroid-free,

antibiotic-only formulation of OP0101 that was non-inferior to standard of care, but with a more favorable dosing regimen (once a day dosing instead of twice a day).

In 2016, Novus began development of OP0102, a second-generation formulation 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 OP0102 development program to focus resources on the surfactant program.

## RECENT DEVELOPMENTS

### *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, shares of the Company's common stock. In connection with the Equity Distribution Agreement on August 21, 2017, the Company filed a prospectus supplement (the "2017 Prospectus) under which the Company was permitted to offer and sell up to $8.5 million in shares of its common stock. From October 2, 2017 through March 9, 2018, the Company sold 2,463,966 shares of its common stock through Piper Jaffray under the Equity Distribution Agreement and 2017 Prospectus for gross proceeds of approximately $8.5 million. During the year ended December 31, 2018, the Company received approximately $7.5 million in proceeds, net of $232,000 in offering costs.

No further sales will be made under the 2017 Prospectus.

On July 23, 2018, the Company filed a new prospectus supplement (the "2018 Prospectus") under which the Company may offer and sell, from time to time, through Piper Jaffray, up to an additional $8.8 million in shares of its common stock. No shares have been sold under the 2018 Prospectus as of December 31, 2018.

## 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 accounting principles generally accepted in the U.S. ("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 as of October 1 of each year or earlier if indicators of impairment exist that would, more likely than not, reduce the fair value from its carrying amount.

The Company performs its goodwill impairment analysis at the reporting unit level, which aligns with the Company's reporting structure and availability of discrete financial information. The Company performs its annual impairment analysis by either comparing the reporting unit's estimated fair value to its carrying amount or doing a qualitative assessment of a

reporting unit's fair value from the last quantitative assessment to determine if there is potential impairment. The Company may do a qualitative assessment when the results of the previous quantitative test indicated the reporting unit's estimated fair value was significantly in excess of the carrying value of its net assets and it does not believe there have been significant changes in the reporting unit's operations that would significantly decrease its estimated fair value or significantly increase its net assets. If a quantitative assessment is performed the evaluation includes management estimates of cash flow projections based on internal future projections and/or use of a market approach by looking at market values of comparable companies. Key assumptions for these projections include revenue growth, future gross and operating margin growth, and its weighted cost of capital and terminal growth rates. The revenue and margin growth is based on increased sales of new products as the Company maintains investments in research and development. Additional assumed value creators may include increased efficiencies from capital spending. The resulting cash flows are discounted using a weighted average cost of capital. Operating mechanisms and requirements to ensure that growth and efficiency assumptions will ultimately be realized are also considered in the evaluation, including timing and probability of regulatory approvals for Company products to be commercialized. The Company's market capitalization is also considered as a part of its analysis.

## RESULTS OF OPERATIONS

### *Comparison of the Years Ended December 31, 2018 and 2017*

The following table provides comparative results of operations for the years ended December 31, 2018 and 2017 (in thousands):

| | Year Ended December 31, | | | |
|---|---|---|---|---|
| | 2018 | 2017 | $ Variance | % Variance |
| **Operating expenses:** | | | | |
| Research and Development | $ 6,817 | $ 2,022 | $ 4,795 | 237% |
| General and Administrative | 7,243 | 11,099 | (3,856) | -35% |
| Total operating expenses | 14,060 | 13,121 | 939 | 7% |
| Loss from operations | (14,060) | (13,121) | (939) | 7% |
| Other income (expense), net | (5) | 5 | (10) | (200)% |
| Net loss and other comprehensive loss | $ (14,065) | $ (13,116) | $ (949) | 7% |

*Research and Development Expenses*

The increase in research and development expenses of $4.8 million for the year ended December 31, 2018 was primarily due to an increase in formulation and device development costs of $2.1 million, an increase in clinical development costs of $1.7 million, and an increase in consulting costs of $242,000 related to the advancement of our OP0201 programs. Additionally, personnel costs to support our programs increased $713,000 due to additional headcount in clinical operations and regulatory operations and bonus accrual. We expect research and development expenses to increase in subsequent periods as we advance our OP0201 programs.

*General and Administrative Expenses*

The decrease in general and administrative expenses of $3.9 million for the year ended December 31, 2018 was primarily due to a reduction of $5.1 million in merger-related expenses, partially offset by an increase of $659,000 in administrative costs associated with operating a public company and a $511,000 increase in personnel related costs due to additional headcount and bonus accrual.

*Other Income (Expense), Net*

The change in other income (expense), net was primarily related to interest income received on interest bearing accounts in the year ended December 31, 2017. As cash was used in operations, all cash was needed in operating accounts and there was less balances in interest bearing accounts during the year ended December 31,2018. Other expense consisted primarily of realized losses related to foreign currency translation for vendor payments in the 2018 period.

**LIQUIDITY AND CAPITAL RESOURCES**

As of December 31, 2018, we had cash and cash equivalents of $13.0 million, consisting of readily available cash in bank accounts and an accumulated deficit of $41.6 million. 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 do not have any approved products for commercial sale and have never generated revenue from product sales, and have incurred significant net losses since our inception and expect to continue to incur net operating losses for the foreseeable future. We do not expect to receive any revenue from any product candidates that we develop unless and until we obtain regulatory approval and commercialize our product candidates, or enter into collaborative arrangements with third parties. Our primary use of cash is to fund operating expenses, which consist of research and development expenses and general and administrative expenses. Cash used to fund operating expenses is impacted by the timing of when we pay or prepay these expenses. We expect our expenses to increase in connection with our ongoing activities, particularly as we continue the research and development 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.

We will continue to require additional financing in order to advance OP0201 through clinical development, to manufacture, obtain regulatory approval for and to commercialize our product candidates, to develop, acquire or in-license other potential product candidates, and to fund operations for the foreseeable future. Therefore, we will seek to raise additional capital through equity offerings, debt financings or other capital sources, including potentially collaborations, licenses and other similar arrangements. Adequate additional funding may not be available to us on acceptable terms on a timely basis, or at all. Any such failure to raise capital as and when needed could have a negative impact on our financial condition and on our ability to pursue our business plans and strategies, and may cause us to delay the scope of or suspend one or more of our clinical trials, research and development programs or commercialization efforts, out-license intellectual property rights to our product candidates or sell unsecured assets, or a combination of the above. Any of these actions could materially harm our business. To the extent that we raise additional capital through the sale of equity or convertible debt securities, our stockholders' ownership interests will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect our stockholders' rights. Debt financing, if available, would result in fixed payment obligations and may involve agreements that include restrictive covenants that limit our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends, that could adversely impact our ability to conduct our business. If we raise funds through collaborations, licenses and other similar arrangements with third parties, we may have to relinquish valuable rights to our technologies, future revenue streams, research programs or product candidates or to grant licenses on terms that may not be favorable to us. See the section of this Annual Report titled "Risk Factors" for additional risks associated with our substantial capital requirements and the challenges we may face in raising capital.

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.

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. Under the 2017 Prospectus, we sold shares of common stock from October 2, 2017 through March 9, 2018 for gross proceeds of approximately $8.5 million. Under the 2018 Prospectus, we may offer and sell up to an additional $8.8 million in shares of common stock. 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.

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.

As a result of these conditions, we have concluded that substantial doubt about our ability to continue as a going concern exists as conditions and events, considered in the aggregate, indicate that it is probable that we will be unable to meet our obligations as they become due within one year after the date that our consolidated financial statements were issued without raising additional capital. The financial information and consolidated financial statements included in this Annual Report have been prepared on a basis that assumes that we will continue as a going concern, which contemplates the realization of assets and the satisfaction of liabilities and commitments in the normal course of business. This financial information and these financial statements do not include any adjustments that may result from an unfavorable outcome of this uncertainty. Our ability to continue as a going concern is dependent upon our ability to successfully secure sources of financing and ultimately achieve profitable operations.

***Cash Flows***

The following table provides a summary of our net cash flow activity for the years ended December 31, 2018 and 2017 (in thousands):

| | Year Ended December 31, | |
|---|---|---|
| | 2018 | 2017 |
| Net cash used in operating activities | $ (11,893) | $ (14,941) |
| Net cash provided by investing activities | — | 23,258 |
| Net cash provided by financing activities | 7,562 | 7,869 |
| Net increase (decrease) in cash, cash equivalents, and restricted cash | $ (4,331) | $ 16,186 |

***Comparison of the Years Ended December 31, 2018 and 2017***

Net cash used in operating activities for the year ended December 31, 2018 consisted primarily of our net loss of $14.1 million, partially offset by non-cash items consisting primarily of depreciation and stock-based compensation totaling $1.6 million. Additionally, cash used in operating expenses for the year ended December 31, 2018 reflected a net increase in cash from changes in operating assets and liabilities of $618,000, primarily due to an increase in our accounts payable and accrued liabilities.

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.

There was no cash provided by or used in investing activities for the year ended December 31, 2018.

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 financing activities for the year ended December 31, 2018 was comprised of net proceeds of $7.5 million from the issuance of approximately 2.3 million shares of common stock under the Equity Distribution Agreement, and proceeds from the exercise of stock options in the amount of $71,000.

Net cash provided by significant financing activities in 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.

***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, 2018, 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 | $ 514 | $ 180 | $ 334 | $ — | $ — |
| Total | $ 514 | $ 180 | $ 334 | $ — | $ — |

See *Note 6. Commitments and Contingencies* in the notes to the consolidated financial statements for a summary of contracts held by the Company as of December 31, 2018.

***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.**

Not applicable

**Item 9A. Controls and Procedures.**

**Evaluation of Disclosure Controls and Procedures**

As of December 31, 2018, 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, 2018. 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, 2018, 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, 2018 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 2019 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 within four business days following the date of the amendment or waiver.

### 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 2019 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 2019 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 2019 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 2019 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 | |
| 2.1 | Amended and Restated Share Purchase Agreement dated as of March 2, 2017, by and among the Registrant, Otic Pharma, Ltd., and shareholders of Otic Pharma, Ltd., named therein. | 10-K | 001-36620 | 2.1 | March 3, 2017 | |
| 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 | First Amendment to Lease Agreement, dated April 19, 2018, by and between The Irvine Company LLC and Novus Therapeutics, Inc. | 10-Q | 001-36620 | 10.1 | August 7, 2018 | |

| Exhibit Number | Exhibit Description | Incorporated by Reference | | | | Filed Herewith |
|---|---|---|---|---|---|---|
| | | Form | File No. | Exhibit | Filing Date | |
| 10.5* | Executive Employment Agreement, dated July 15, 2015, between Otic Pharma, Inc., and Gregory J. Flesher | 10-Q | 001-36620 | 10.3 | August 9, 2017 | |
| 10.6 | 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 | |
| 10.7* | Offer of Employment, dated July 1, 2017, from Novus Therapeutics, Inc. to Jon Kuwahara | 10-Q | 001-36620 | 10.5 | August 9, 2017 | |
| 10.8* | Management Continuity Agreement, dated August 7, 2017, between Novus Therapeutics, Inc. and Gregory J. Flesher | 10-Q | 001-36620 | 10.6 | August 9, 2017 | |
| 10.9* | Management Continuity Agreement, dated August 7, 2017, between Novus Therapeutics, Inc. and Jon S. Kuwahara | 10-Q | 001-36620 | 10.7 | August 9, 2017 | |
| 10.10 | 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 | |
| 10.11 | Otic Pharma Ltd. Global Share Incentive Plan (2012) | 10-K | 001-36620 | 10.10 | April 2, 2018 | |
| 10.12 | Tokai Pharmaceuticals, Inc. 2007 Stock Incentive Plan | 10-K | 001-36620 | 10.11 | April 2, 2018 | |
| 10.13 | Tokai Pharmaceuticals, Inc. 2014 Stock Incentive Plan | 10-Q | 001-36620 | 10.2 | August 7, 2018 | |
| 10.14 | Novus Therapeutics, Inc., 2014 Employee Stock Purchase Plan | 10-Q | 001-36620 | 10.3 | August 7, 2018 | |
| 10.15* | Executive Employment Agreement, dated November 10, 2015, between Otic Pharma, Inc. and Catherine C. Turkel | | | | | X |
| 21.1 | Subsidiaries of the Registrant | | | | | X |
| 23.1 | Consent of Independent Registered Public Accounting Firm | | | | | 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 |

| Exhibit Number | Exhibit Description | Incorporated by Reference | | | | Filed Herewith |
|---|---|---|---|---|---|---|
| | | Form | File No. | Exhibit | Filing Date | |
| 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 | | | | | |
| 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 27, 2019 By: /s/ Gregory J. Flesher

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

Date: March 27, 2019 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<br>**Gregory J. Flesher** | Chief Executive Officer and Director<br>**(**Principal Executive Officer) | March 27, 2019 |
| /s/ Jon S. Kuwahara<br>**Jon S. Kuwahara** | Senior Vice President Finance & Administration<br>(Principal Financial and Accounting Officer) | March 27, 2019 |
| /s/ Keith A. Katkin<br>**Keith A. Katkin** | Chairman of the Board of Directors | March 27, 2019 |
| /s/ Erez Chimovits<br>**Erez Chimovits** | Director | March 27, 2019 |
| /s/ Cheryl L. Cohen<br>**Cheryl L. Cohen** | Director | March 27, 2019 |
| /s/ Gary A. Lyons<br>**Gary A. Lyons** | Director | March 27, 2019 |
| /s/ John S. McBride<br>**John S. McBride** | Director | March 27, 2019 |

**NOVUS THERAPEUTICS, INC.**
**INDEX TO CONSOLIDATED FINANCIAL STATEMENTS**

## 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 sheets of Novus Therapeutics, Inc. (the Company) as of December 31, 2018 and 2017, the related consolidated statements of operations and comprehensive loss, stockholders' equity and cash flows, for each of the two years in the period ended December 31, 2018, 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, 2018 and 2017, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2018, in conformity with U.S generally accepted accounting principles.

**The Company's Ability to Continue as a Going Concern**

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 2 to the financial statements, the Company has suffered recurring losses and negative cash flows from operations since inception and has stated that substantial doubt exists about the Company's ability to continue as a going concern. Management's evaluation of the events and conditions and management's plans regarding these matters are also described in Note 2. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

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

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

/s/ Ernst & Young LLP

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

Irvine, California
March 27, 2019

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

| | December 31, 2018 | December 31, 2017 |
|---|---|---|
| **ASSETS** | | |
| Current assets: | | |
| Cash and cash equivalents | $ 12,972 | $ 17,233 |
| Restricted cash | — | 70 |
| Prepaid expenses and other current assets | 1,304 | 1,697 |
| Total current assets | 14,276 | 19,000 |
| Property and equipment, net | 14 | 25 |
| Goodwill | 1,867 | 1,867 |
| Other assets | 869 | — |
| Total assets | $ 17,026 | $ 20,892 |
| **LIABILITIES AND STOCKHOLDERS' EQUITY** | | |
| Accounts payable | $ 689 | $ 418 |
| Accrued severance | — | 668 |
| Accrued expenses and other liabilities | 1,845 | 354 |
| Total liabilities | 2,534 | 1,440 |
| Commitments and contingencies (Note 6) | | |
| Stockholders' equity: | | |
| Preferred stock, $0.001 par value, 5,000,000 shares authorized and none issued and outstanding at December 31, 2018 and 2017 | — | — |
| Common stock, $0.001 par value, 200,000,000 shares authorized at December 31, 2018 and 2017; 9,422,143 and 7,110,414 shares issued and outstanding at December 31, 2018 and 2017, respectively | 9 | 7 |
| Additional paid-in capital | 56,054 | 46,951 |
| Accumulated deficit | (41,571) | (27,506) |
| Total stockholders' equity | 14,492 | 19,452 |
| Total liabilities and stockholders' equity | $ 17,026 | $ 20,892 |

See accompanying notes to consolidated financial statements.

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

| | Year Ended December 31, | |
|---|---|---|
| | 2018 | 2017 |
| **Operating expenses** | | |
| Research and development | $ 6,817 | $ 2,022 |
| General and administrative | 7,243 | 11,099 |
| Total operating expenses | 14,060 | 13,121 |
| Loss from operations | (14,060) | (13,121) |
| Other income (expense), net | (5) | 5 |
| Net loss and other comprehensive loss | $ (14,065) | $ (13,116) |
| Net loss per share, basic and diluted | $ (1.56) | $ (2.30) |
| Weighted-average common shares outstanding, basic and diluted | 9,005,352 | 4,677,610 |

See accompanying notes to consolidated financial statements.

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

| | Stockholders' Equity | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Common Stock | | Preferred Stock | | | | | |
| | Shares | Amount | Shares | Amount | Additional Paid-In Capital | Receipts on Account of Preferred Stock | Accumulated Deficit | Total |
| 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 | 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 |
| Issuance of common stock at-the-market, net of issuance costs | 2,296,610 | 2 | — | — | 7,489 | — | — | 7,491 |
| Exercise of options | 15,119 | — | — | — | 71 | — | — | 71 |
| Stock-based compensation | — | — | — | — | 1,543 | — | — | 1,543 |
| Net loss and other comprehensive loss | — | — | — | — | — | — | (14,065) | (14,065) |
| Balance as of December 31, 2018 | 9,422,143 | $ 9 | — | $ — | $ 56,054 | $ — | $ (41,571) | $ 14,492 |

See accompanying notes to consolidated financial statements.

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

| | Year Ended December 31, | |
|---|---|---|
| | **2018** | **2017** |
| **Operating activities** | | |
| Net loss | $ (14,065) | $ (13,116) |
| Adjustments to reconcile net loss to net cash used in operating activities: | | |
| Depreciation and amortization | 11 | 22 |
| Stock-based compensation | 1,543 | 579 |
| Loss on disposal of equipment | — | 49 |
| Changes in operating assets and liabilities: | | |
| Prepaid expenses and other assets | (476) | (517) |
| Accounts payable and accrued expenses | 1,094 | (1,958) |
| Net cash used in operating activities | (11,893) | (14,941) |
| **Investing activities** | | |
| Cash received from merger transaction | — | 23,250 |
| Proceeds from sale of equipment | — | 8 |
| Net cash provided by investing activities | — | 23,258 |
| **Financing activities** | | |
| Proceeds from issuance of common stock, net | 7,491 | 4,750 |
| Proceeds from exercise of warrants | — | 3,119 |
| Proceeds from exercise of stock options | 71 | — |
| Net cash provided by financing activities | 7,562 | 7,869 |
| Net (decrease) increase in cash, cash equivalents and restricted cash | (4,331) | 16,186 |
| Cash, cash equivalents and restricted cash at beginning of period | 17,303 | 1,117 |
| Cash, cash equivalents and restricted cash at end of period | $ 12,972 | $ 17,303 |
| **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 U.S. ("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. The activities of the Company's foreign subsidiary are not significant to the consolidated financial statements.

All significant intercompany accounts and transactions among the entities have been eliminated in consolidation.

### *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 $14.1 million and used $11.9 million of cash in operating activities for the year ended December 31, 2018. As of December 31, 2018, the Company had cash of $13.0 million, working capital of $11.7 million and an accumulated deficit of $41.6 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 will need to raise additional funds through public or private debt and equity financings or strategic collaboration and licensing arrangements. 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. 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.

Adequate additional funding may not be available to us on acceptable terms on a timely basis, or at all. If the Company is unable to obtain the necessary level of capital through external financing during the first half of 2019, as contemplated in its operating plan, the Company intends to implement certain cost cutting measures commencing in the first half of 2019 to reduce its cash flow requirements. Consistent with the actions the Company has taken in the past, it will execute the appropriate steps to enable the continued operations of the business and preservation of the value of its assets beyond the next twelve months, including but not limited to actions such as reduced personnel-related costs, delay or curtailment of the Company's research and development activities, and other discretionary expenses that are within the Company's control. These initiatives, if required, may have an adverse impact on the Company's ability to achieve certain of its planned objectives during 2019 as it seeks strategic alternatives.

At the time of issuance of the consolidated financial statements for the year ended December 31, 2018, the Company concluded that there is substantial doubt regarding the Company's ability to continue as a going concern for the twelve months from the date of issuance of the consolidated financial statements for the year ended December 31, 2018. The financial information and the consolidated financial statements included in this Annual Report have been prepared on a basis that assumes that we will continue as a going concern, which contemplates the realization of assets and the satisfaction of liabilities and commitments in the normal course of business. This financial information and these financial statements do not include any adjustments that may result from an unfavorable outcome of this uncertainty. Our ability to continue as a going concern is dependent upon our ability to successfully secure sources of financing and ultimately achieve profitable operations.

***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 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 no cash equivalents at December 31, 2018 and 2017.

***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. The Company had restricted cash of $0 and $70,000 at December 31, 2018 and 2017, respectively.

***Fair Value Measurements***

Financial assets and liabilities are recorded at fair value.

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 instruments, assets or liabilities measured at fair value on a recurring basis at December 31, 2018 and 2017.

***Concentration of Credit Risk and Other Risks and Uncertainties***

As of December 31, 2018 and 2017, all of the Company's long-lived assets were located in the U.S.

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. In addition, after the approval by the FDA, there is still an ongoing risk of adverse events that did not appear during the product approval process.

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.

Our facilities and equipment may be affected by natural or man-made disasters. We currently conduct our research, development and management activities in Irvine, California, near known earthquake fault zones. We have taken precautions to safeguard our facilities, equipment and systems, including insurance, health and safety protocols, and off-site storage of computer data. However, our facilities and systems may be vulnerable to earthquakes, fire, storm, power loss, telecommunications failures, physical and software break-ins, software viruses and similar events which could cause substantial delays in our operations, damage or destroy our equipment or inventory, and cause us to incur additional expenses. In addition, the insurance coverage we maintain may not be adequate to cover our losses in any circumstance and may not continue to be available to use on acceptable terms, or at all.

***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 as of October 1 of each year or if indicators of impairment exist that would, more likely than not, reduce the fair value from its carrying amount.

The Company performs its goodwill impairment analysis at the reporting unit level, which aligns with the Company's reporting structure and availability of discrete financial information. The Company performs its annual impairment analysis by either comparing the reporting unit's estimated fair value to its carrying amount or doing a qualitative assessment of a reporting unit's fair value from the last quantitative assessment to determine if there is potential impairment. The Company may do a qualitative assessment when the results of the previous quantitative test indicated the reporting unit's estimated fair value was significantly in excess of the carrying value of its net assets and it does not believe there have been significant changes in the reporting unit's operations that would significantly decrease its estimated fair value or significantly increase its net assets. If a quantitative assessment is performed the evaluation includes management estimates of cash flow projections based on internal future projections and/or use of a market approach by looking at market values of comparable companies. Key assumptions for these projections include revenue growth, future gross and operating margin growth, and its weighted cost of capital and terminal growth rates. The revenue and margin growth is based on increased sales of new products as the Company maintains investments in research and development. Additional assumed value creators may include increased efficiencies from capital spending. The resulting cash flows are discounted using a weighted average cost of capital. Operating mechanisms and requirements to ensure that growth and efficiency assumptions will ultimately be realized are also considered in the evaluation, including timing and probability of regulatory approvals for Company products to be commercialized. The Company's market capitalization is also considered as a part of its analysis.

The Company's annual evaluation for impairment of goodwill consists of one reporting unit. In accordance with the Company's policy, the Company completed its most recent annual evaluation for impairment as of October 1, 2018 using the qualitative assessment and determined that no impairment existed. No impairments were recorded for the years ended December 31, 2018 and 2017.

***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 Company reviews property, plant and equipment for impairment whenever events or changes in circumstances indicate that the carrying value of an asset may not be recoverable. An impairment loss would be recognized when estimated future undiscounted cash flows relating to the asset are less than its carrying amount. An impairment loss is measured as the amount by which the carrying amount of an asset exceeds its fair value. 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, 2018.

***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, 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, | |
|---|---|---|
| | 2018 | 2017 |
| | (In thousands, except share and per share data) | |
| Net loss available to stockholders of the company | $ (14,065) | $ (13,116) |
| Interest accumulated on preferred shares and on preferred shares contingently issuable for little or no cash | — | (328) |
| Net loss attributable to stockholders of preferred shares and to stockholders of preferred shares contingently issuable for little or no cash | — | 2,666 |
| Net loss used in the calculation of basic and diluted loss per share | $ (14,065) | $ (10,778) |
| Net loss per share, basic and diluted | $ (1.56) | $ (2.30) |
| Weighted-average number of common shares | 9,005,352 | 4,677,610 |

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, 2018, common share equivalents of 974,817 shares were anti-dilutive. For the year ended December 31, 2017, common share equivalents of 782,340 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 stock-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.

***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 likelihood of realizing the tax benefits related to a potential deferred tax asset is evaluated, and a valuation allowance is recognized to reduce that deferred tax asset if it is more likely than not that all or some portion of the deferred tax asset will not be realized. Deferred tax assets and liabilities are calculated at the beginning and end of the year; the change in the sum of the deferred tax asset, valuation allowance and deferred tax liability during the year generally is recognized as a deferred tax expense or benefit. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in operations in the period that includes the enactment date.

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. We assess the likelihood that deferred tax assets will be recovered as deductions from future taxable income. 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. We have provided a full valuation allowance on our deferred tax assets as of December 31, 2018 and 2017 because we believe it is more likely than not that our deferred tax assets will not be realized as of those dates.

On December 22, 2017, President Trump signed U.S. tax reform legislation, commonly referred to as the Tax Cuts and Jobs Act (the "Tax Act"), which became effective January 1, 2018. The Tax Act significantly changed the fundamentals of U.S. corporate income taxation by, among many other things, reducing the U.S. federal corporate income tax rate from 35% to 21%, converting to a territorial tax system, and creating various income inclusion and expense limitation provisions. We have performed a review of the Tax Act, and recorded amounts related to the revaluation of our deferred taxes and the realization of certain tax credit carryforwards. However, as the Company records a valuation allowance for its entire deferred income tax asset, there was no impact to the reported amounts in the accompanying consolidated financial statements as a result of the Tax Act.

The Company evaluates the accounting for uncertainty in income tax recognized in its consolidated financial statements and determines whether it is more likely than not that a tax position will be sustained upon examination by the appropriate taxing authorities before any part of the benefit is recorded in its consolidated financial statements. For those tax positions where it is "not more likely than not" that a tax benefit will be sustained, no tax benefit is recognized. Where applicable, associated interest and penalties are also recorded. The Company has not accrued any liabilities for any such uncertain tax positions as of December 31, 2018 or 2017. The Company is subject to U.S. federal and state tax authority examinations for all the years since inception due to net operating loss and tax credit carryforwards. The net operating losses and tax credits are subject to adjustment until the statute closes on the year the attributes are ultimately utilized.

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 8. Income Taxes* in the notes to the consolidated financial statements.

***Recently Issued Accounting Pronouncements***

In August 2018, the SEC adopted the final rule under SEC Release No. 33-10532, Disclosure Update and Simplification, amending certain disclosure requirements that were redundant, duplicative, overlapping, outdated or superseded. In addition, the amendments expanded the disclosure requirements on the analysis of stockholders' equity for interim financial statements. Under the amendments, an analysis of changes in each caption of stockholders' equity presented in the balance sheet must be provided in a note or separate statement. The analysis should present a reconciliation of the beginning balance to the ending balance of each period for which a statement of comprehensive income is required to be filed. This final rule was effective on November 5, 2018. However, as provided for by the SEC in Q&A 105.09, the Company will defer presenting its analysis of stockholders' equity in its quarterly report in Form 10-Q until its quarter ended March 31, 2019. The Company does not expect the adoption of SEC Release No. 33-10532 to have a material impact on its financial position, results of operations or cash flows.

In August 2018, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) 2018-15, *Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement That Is a Service Contract* ("ASU 2018-15"), an amendment to the accounting guidance on cloud computing service arrangements that changes the accounting for implementation costs incurred in a cloud computing arrangement that is a service contract. The update aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software. The guidance also requires an entity to expense the capitalized implementation costs of a hosting arrangement that is a service contract over the term of the hosting arrangement. The guidance is effective for fiscal years beginning after December 15, 2019, and interim periods within those fiscal years. The Company is currently evaluating the impact the guidance will have on its consolidated financial statements.

In August 2018, the FASB issued ASU No. 2018-13, *"Fair Value Measurement (Topic 820): Disclosure Framework — Changes to the Disclosure Requirements for Fair Value Measurement"*, an amendment to the accounting guidance on fair value measurements. The guidance modifies the disclosure requirements on fair value measurements, including the removal of disclosures of the amount of and reasons for transfers between Level 1 and Level 2 of the fair value hierarchy, the policy for timing of transfers between levels, and the valuation processes for Level 3 fair value measurements. The guidance also adds certain disclosure requirements related to Level 3 fair value measurements. The guidance is effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2019. The Company does not expect the adoption of this guidance will have a material impact on its consolidated financial statements.

In June 2018, the FASB issued ASU No. 2018-07, *Improvements to Nonemployee Share-Based Payment Accounting*, which expands the scope of Topic 718 *Compensation—Stock Compensation*, to include share-based payments issued to nonemployees for goods or services. Consequently, the accounting for share-based payments to nonemployees and employees will be substantially aligned. ASU No. 2018-07 supersedes Subtopic 505-50 *Equity—Equity-Based Payments to Non-Employees*. The amendments in ASU No. 2018-07 are effective for the Company beginning in 2019, with early adoption permitted, but no earlier than a company's adoption date of Topic 606 *Revenue from Contracts with Customers*. The Company is currently assessing the impact and timing of adopting this guidance on its 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 Tax Act is recognized. The Company does not expect the adoption of this guidance will have an impact on its consolidated financial statements.

In July 2017, the FASB issued ASU 2017-11, *"Earnings Per Share (Topic 260) Distinguishing Liabilities from Equity (Topic 480) Derivatives and Hedging (Topic 815)"*, which addresses the complexity of accounting for certain financial instruments with down round features. Down round features are features of certain equity-linked instruments (or embedded features) that result in the strike price being reduced on the basis of the pricing of future equity offerings. Current accounting guidance creates cost and complexity for entities that issue financial instruments (such as warrants and convertible

instruments) with down round features that require fair value measurement of the entire instrument or conversion option. The amendments in Part I of this Update are effective for fiscal years, and interim periods within those fiscal years, beginning after December 15, 2018 with early adoption permitted. The Company is currently assessing the impact and timing of adopting this guidance on its consolidated financial statements.

In January 2017, the FASB issued ASU No. 2017-04 "*Intangibles – Goodwill and Other (Topic 350): Simplifying the Accounting for Goodwill Impairment*," or ASU 2017-04. ASU 2017-04 allows companies to apply a one-step quantitative test and record the amount of goodwill impairment as the excess of a reporting unit's carrying amount over its fair value, not to exceed the total amount of goodwill allocated to the reporting unit. The amendments of the ASU are effective for annual or interim goodwill impairment tests in fiscal years beginning after December 15, 2019. Early adoption is permitted for interim or annual goodwill impairment tests performed on testing dates after January 1, 2017. The Company is currently assessing the impact and timing of adopting this guidance on its consolidated financial.

In May 2017, the FASB issued ASU No. 2017-09, "*Stock Compensation – Scope of Modification Accounting"* or ASU 2017-09. ASU 2017-09 provides guidance on which changes to the terms or conditions of a share-based payment award require an entity to apply modification accounting. The new standard was effective for fiscal years beginning after December 15, 2017. The Company adopted the guidance effective January 1, 2018. There was no impact upon adoption.

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments – Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments* ("ASU 2016-13"), an amendment which modifies the measurement and recognition of credit losses for most financial assets and certain other instruments. The amendment updates the guidance for measuring and recording credit losses on financial assets measured at amortized cost by replacing the "incurred loss" model with an "expected loss" model. Accordingly, these financial assets will be presented at the net amount expected to be collected. The amendment also requires that credit losses related to available-for-sale debt securities be recorded as an allowance through net income rather than reducing the carrying amount under the current, other-than-temporary-impairment model. The guidance is effective for fiscal years beginning after December 15, 2019, including interim periods within those fiscal years. Early adoption is permitted for annual periods after December 15, 2018. The Company does not expect the adoption of this guidance will have a material impact on its 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-to-use assets and corresponding lease liabilities for all significant financing and operating leases on its balance sheet that are not considered short-term and disclose key information about leasing arrangements. It also changes the definition of a lease and expands the disclosure requirements of lease arrangements. In July 2018, the FASB issued ASU No. 2018-11, *Leases (Topic 842) Targeted Improvements*, which provides for an alternative transition method by allowing companies to continue to use the legacy guidance in Topic 840, Leases, including its disclosure requirements, in the comparative periods presented in the year of adoption of the new leases standard and recognize a cumulative-effect adjustment to the opening balance of retained earnings in the period of adoption rather than the earliest period presented.

The Company has adopted the requirements of the new lease standard effective January 1, 2019 and has elected the optional transition method to apply the standard as of the effective date and therefore, the Company will not apply the standard to the comparative periods presented in the consolidated financial statements. The Company will elect the transition package of three practical expedients permitted within the standard, which eliminates the requirements to reassess prior conclusions about lease identification, lease classification, and initial direct costs. The Company will not elect the hindsight practical expedient, which permits the use of hindsight when determining lease term and impairment of right-of-use assets. Further, the Company will elect a short-term lease exception policy, permitting the Company to not apply the recognition requirements of this standard to short-term leases (i.e. leases with terms of 12 months or less) and an accounting policy to account for lease and non-lease components as a single component for certain classes of assets. The Company is finalizing its analysis of certain key assumptions that will be utilized at the transition date including the incremental borrowing rate.

The standard will have a material impact on the Company's consolidated balance sheets effective January 1, 2019, but will not have an impact on its consolidated statements of operations as of January 1, 2019. The most significant impact will be the recognition of a right-to-use asset and corresponding lease liability for the Company's sole operating lease—the Company has no finance leases.

**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 |
|---|---|
| **Operating expenses** | |
| Research and development | $ 2,481 |
| General and administrative | 9,356 |
| Total operating expenses | 11,837 |
| Loss from operations | (11,837) |
| Other income, net | 45 |
| Net loss and other comprehensive loss | $ (11,792) |
| Net loss per share, basic and diluted | $ (2.52) |
| Weighted-average shares outstanding, basic and diluted | 4,677,610 |

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 incurred during the year ended December 31, 2017. The amount has 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.
- 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. Prepaid Expenses, Other Assets, Accrued Expenses and Other Liabilities**

Prepaid expenses and other current assets consisted of the following as of December 31, 2018 and December 31, 2017 (in thousands):

| | Year Ended December 31, | |
|---|---|---|
| | 2018 | 2017 |
| Prepaid insurance | $ 413 | $ 1,518 |
| Prepaid other | 261 | 161 |
| Other current assets | 630 | 18 |
| Total prepaid expenses and other current assets | $ 1,304 | $ 1,697 |

Accrued expenses and other liabilities consisted of the following as of December 31, 2018 and December 31, 2017 (in thousands):

| | Year Ended December 31, | |
|---|---|---|
| | 2018 | 2017 |
| Accrued compensation and related expenses | $ 742 | $ — |
| Accrued clinical | 735 | 85 |
| Accrued professional services | 194 | 158 |
| Accrued vacation | 160 | 111 |
| Accrued other | 14 | — |
| Total accrued expenses and other liabilities | $ 1,845 | $ 354 |

**Note 5. Goodwill**

The changes in the carrying amount of goodwill consisted of the following as of December 31, 2018 and December 31, 2017 (in thousands):

| | Gross Carrying Amount | Accumulated Impairment Losses | Net Carrying Amount |
|---|---|---|---|
| Balance as of January 1, 2017 | $ — | $ — | $ — |
| Additions (1) | 1,867 | — | 1,867 |
| Balance as of December 31, 2017 | 1,867 | — | 1,867 |
| Additions | — | — | — |
| Balance as of December 31, 2018 | $ 1,867 | $ — | $ 1,867 |

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

**Note 6. 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 $170,000 and $1.0 million for the year ended December 31, 2018 and 2017, 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 initially expired on December 31, 2016 until 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 had an initial expiration date of August 31, 2018; however, the Company extended the term of the lease through September 30, 2021 by amending the office lease in April 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):

| | |
|---|---|
| 2019 | $ 180 |
| 2020 | 188 |
| 2021 | 146 |
| Total minimum lease payments | $ 514 |

***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.

***Grants and Licenses***

*Israeli Innovation Authority Grant*

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, 2018; therefore, no liability was recorded for the repayment in the accompanying consolidated financial statements.

*Otodyne License Agreement*

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 OP0201, 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 ETD. 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 IND application to the Company. The Company is obligated to pay up to $42.1 million in development and regulatory milestones if OP0201 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, 2018 or 2017.

*Terminated License Agreements*

In October 2013, the Company (through Tokai) entered into a master license agreement with the University of Maryland, Baltimore ("UMB"), pursuant to which, UMB granted the Company 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 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.

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***

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. 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. On May 24, 2018, the plaintiff dismissed its complaint in the Superior Court of the State of California and refiled its complaint in the Business Litigation Session of the Superior Court Department of the Suffolk County Trial Court, Massachusetts ("Massachusetts State Court"). On June 28, 2018, plaintiff Wu moved to consolidate the Jackie888 Action with the Wu Action (discussed below). On June 29, 2018, plaintiffs Jackie888 and Wu filed a consolidated complaint. On July 6, 2018, the Jackie888 Action was consolidated with the Wu Action. Events following consolidation are discussed below.
- Wu Action. On December 5, 2016, a putative securities class action was filed in the 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. 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. On March 27, 2018 the Wu Action was remanded to the Massachusetts State Court. On May 3, 2018, plaintiff filed an amended class action complaint. Following the refiling of the Jackie888 Action in Massachusetts State Court (discussed above), on June 28, 2018, plaintiff Wu moved to consolidate the Jackie888 Action with the Wu Action. On June 29, 2018, plaintiffs Jackie888 and Wu filed a consolidated

complaint. On July 6, 2018, the Jackie888 Action was consolidated with the Wu Action. Defendants moved to dismiss the consolidated complaint on August 15, 2018, plaintiffs filed their opposition thereto on September 28, 2018, and defendants filed their reply in support of their motion on October 19, 2018. In addition, Defendants moved to strike the class allegations in the consolidated complaint on August 15, 2018, plaintiffs filed their opposition thereto on September 11, 2018, and defendants filed their reply in support of their motion on September 21, 2018. The court held a hearing on November 15, 2018 on defendants' motion to strike. On December 20, 2018, the court denied defendants' motion to strike. The court held a hearing on December 20, 2018 on defendants' motion to dismiss. On January 8, 2019, the court denied defendants' motion to dismiss. On February 6, 2019, the court entered a scheduling order, pursuant to which discovery on merits issues was stayed pending the court's resolution of class certification. Discovery on class certification and standing issues must be completed by July 12, 2019. Plaintiffs' motion for class certification and defendants; motion to dismiss for lack of standing shall be filed on or by August 22, 2019, oppositions thereto shall be filed on or by September 19, 2019, and replies in support shall be filed on or by October 10, 2019. The court scheduled a hearing for October 23, 2019 on the motions.

- 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. On September 7, 2018, plaintiff filed an amended complaint. Defendants moved to dismiss the amended complaint on October 15, 2018. Plaintiff will oppose defendants' motion by or on November 19, 2018, defendants will file any reply in support of their motion by or on December 17, 2018, and plaintiff filed a sur-reply in support of his opposition by or on January 8, 2019. The court set a hearing for February 25, 2019 on defendants' motion to dismiss but later cancelled the hearing. At this time, the hearing has not been rescheduled.

***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, 2018 and 2017.

**Note 7. 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 to 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. Subsequent to the reverse merger, no additional grants will 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, 2018, there were 84,612 options 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.

Effective as of August 1, 2018, the Board of Directors amended the Company's 2014 Stock Incentive Plan (the "2014 Plan") and the Company's 2014 Employee Stock Purchase Plan (the "ESPP" and, together with the 2014 Plan, the "Plans") to reduce the share reserves under the Plans. These reductions were made to equitably adjust the share reserves in accordance with the terms of the Plans. As a result of these equitable adjustments: (1) the number of shares of common stock authorized for issuance under the 2014 Plan (excluding shares underlying outstanding awards as of August 1, 2018) was reduced to 766,500 shares and the maximum number of shares that can be added to the 2014 Plan under evergreen provision set forth in Section 4(a)(1)(C) of the 2014 Plan was reduced to 550,000 shares annually; and (2) the number of shares of common stock authorized for future issuance under the ESPP was reduced to 209,500 shares (excluding shares previously issued under the ESPP prior to August 1, 2018) and the maximum number of shares that can be added to the ESPP under the evergreen provision set forth in the ESPP was reduced to 135,000 shares annually. The 2014 Plan and ESPP were amended and restated as of August 1, 2018 to reflect these equitable adjustments.

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, 2018, a total of 764,966 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, 2017 | 59,777 | $ 18.45 | 8.8 | $ 4.3 |
| Granted | 595,800 | 5.45 | | |
| Options assumed in the Reverse Merger | 137,139 | 50.25 | | |
| Exercised | — | — | | |
| Forfeited / Canceled | (10,376) | 6.85 | | |
| Outstanding as of December 31, 2017 | 782,340 | 14.28 | 8.8 | $ 8.5 |
| Granted | 267,950 | 5.02 | | |
| Exercised | (15,120) | 4.74 | | |
| Forfeited / Canceled | (60,353) | 7.31 | | |
| Outstanding as of December 31, 2018 | 974,817 | $ 12.31 | 8.2 | $ — |
| Options vested and expected to vest as of December 31, 2018 | 974,817 | $ 12.31 | 8.2 | $ — |
| Options exercisable as of December 31, 2018 | 548,328 | $ 17.57 | 7.6 | $ — |

As of December 31, 2018, the range of exercise prices was between $3.32 and $119.25 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. There was no aggregate intrinsic value of options exercised during the years ended December 31, 2018 and 2017.

As of December 31, 2018, total unrecognized stock-based compensation expense related to non-vested equity awards was $1.5 million, which is expected to be recognized over an estimated weighted-average period of 1.8 years.

***Stock-based Compensation Expense***

Total compensation expense related to all of the Company's stock-based awards for the years ended December 31, 2018 and December 31, 2017 was comprised of the following (in thousands):

| | Year Ended December 31, | |
|---|---|---|
| | 2018 | 2017 |
| Stock-based compensation classified as: | | |
| Research and development expense | $ 249 | $ 69 |
| General and administrative expense | 1,294 | 510 |
| Total stock-based compensation expense | $ 1,543 | $ 579 |

Stock-based compensation expense for the year ended December 31, 2018 includes $524,000 of stock-based compensation expense related to a performance-based option grant which vested during 2018.

***Valuation Assumptions***

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, | |
|---|---|---|
| | 2018 | 2017 |
| Expected stock price volatility | 63% - 86% | 79% - 86% |
| Risk-free interest rate | 2% - 3% | 1% - 3% |
| Expected life of option (in years) | 5 - 7 | 5 - 7 |
| 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 8. Income Taxes**

Income (loss) before income taxes are as follows (in thousands):

| | Year Ended December 31, | |
|---|---|---|
| | 2018 | 2017 |
| **Losses before income taxes:** | | |
| U.S. | $ (14,177) | $ (12,470) |
| Non-U.S. | 112 | (646) |
| Total | $ (14,065) | $ (13,116) |

The provision (benefit) for income taxes are as follows (in thousands):

| | Year Ended December 31, | | |
|---|---|---|---|
| | 2018 | 2017 | 2016 |
| Current: | $ — | $ — | $ — |
| Federal | — | — | — |
| State | — | — | — |
| Foreign | — | — | — |
| | — | — | — |
| Deferred | | | |
| Federal | — | — | — |
| State | — | — | — |
| Foreign | — | — | — |
| | — | — | — |
| Provision (benefit) for income taxes | $ — | $ — | $ — |

The Company is subject to income taxes under U.S. tax laws. The Company was subject to an Israeli corporate tax rate of 24% in 2017. The Company is subject to an Israeli corporate tax rate of 23% in 2018 and thereafter. The Company was subject to a blended U.S. tax rate (federal as well as state corporate tax) of 35% in 2017 and is subject to a blended U.S. tax rate of 21% in 2018.

On December 22, 2017, H.R. 1/Public Law No. 115-97, known as the Tax Cuts and Jobs Act (the "Tax 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 Tax Act includes numerous changes in existing tax law, including a permanent reduction in the federal corporate income tax rate from 35% to 21%. The rate reduction took effect on January 1, 2018. As a result of the Tax Act, we recorded a $1.9 million reduction in our net deferred tax assets to reflect the rate reduction in the fourth quarter of 2017. However, the revaluation did not result in any additional net income tax expense as our net deferred tax assets are fully offset by a valuation allowance.

The SEC staff issued Staff Accounting Bulletin No. 118 ("SAB 118"), which provides guidance on accounting for the tax effects of the Tax Act. SAB 118 provides a measurement period that should not extend beyond one year from the Tax 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 Tax 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 Tax 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 Tax Act. As of December 22, 2018, the Company's accounting for the remeasurement of its deferred tax assets was complete and there were no changes to the amount previously recorded.

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, 2018 and 2017.

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, | |
|---|---|---|
| | 2018 | 2017 |
| Statutory Federal income tax rate | $ (2,953) | $ (4,460) |
| State income taxes, net of Federal tax benefits | — | — |
| Foreign losses | — | 59 |
| Tax credits | (204) | (2) |
| Change in statutory rates | — | 1,859 |
| Stock-based compensation | 72 | 135 |
| Permanent items | 3 | 693 |
| Other | 90 | 43 |
| Change in valuation allowance | 2,992 | 1,673 |
| Total provision for income taxes | $ — | $ — |

Significant components of the Company's deferred tax assets and liabilities as of December 31, 2018 and 2017 consisted of the following (in thousands):

| | Year Ended December 31, | |
|---|---|---|
| | 2018 | 2017 |
| Net operating loss carryforwards | $ 7,126 | $ 4,516 |
| Research and development tax credits | 299 | 95 |
| Accruals and reserves | 159 | 221 |
| Stock compensation | 301 | 48 |
| Depreciation and amortization | 126 | 139 |
| Total deferred tax assets | 8,011 | 5,019 |
| Less: Valuation allowance | (8,011) | (5,019) |
| 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, | |
|---|---|---|
| | 2018 | 2017 |
| Gross unrecognized tax benefits at the beginning of the year | $ 181 | $ — |
| Additions from tax positions taken in the current year | 158 | 75 |
| Additions from tax positions taken in prior years | — | 106 |
| Reductions from tax positions taken in prior years | (11) | — |
| Tax settlements | — | — |
| Gross unrecognized tax benefits at the end of the year | $ 328 | $ 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 $3.0 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, 2018, and December 31, 2017, the Company had federal net operating loss carryforwards of approximately $25.0 million and $12.5 million, respectively, available to reduce future taxable income. As of December 31,

2018 and December 31, 2017, the Company also has state net operating loss carryforwards of $0.9 million. Both the federal and California net operating loss carryforwards incurred before 2018 begin expiring in 2034 if not utilized. The 2018 federal net operating loss of $12.5 million carryforward does not expire. As of December 31, 2018, and December 31, 2017, the Company had Israeli net operating losses of $8.2 million and $8.4 million, respectively, which carryforward indefinitely.

As of December 31, 2018 and 2017, the Company has federal research and development tax credit carryforwards of approximately $420,000 and $132,000, respectively. If not utilized, the carryforwards will begin expiring in 2025. As of December 31, 2018 and 2017, the Company has state research and development credit carryforwards or approximately $161,000 and $67,000, respectively, 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 U.S., 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, 2018 and 2017. The Company has not recorded any interest or penalties in 2018 or 2017.

**Note 9. Stockholders' Equity**

***Warrants***

During 2017, the following transactions represented 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, 2018 and 2017, no warrants were issued and outstanding.

***Preferred Stock***

Upon the Reverse Merger, all shares of preferred stock converted to common stock. As of December 31, 2018 and 2017, no shares of preferred stock were issued and outstanding.

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

On July 23, 2018, the Company filed a new prospectus supplement (the "2018 Prospectus") under which the Company may offer and sell, from time to time, through Piper Jaffray, up to an additional $8.8 million in shares of its common stock. No shares have been sold under the 2018 Prospectus as of December 31, 2018.

# EXECUTIVE EMPLOYMENT AGREEMENT

This Executive Employment Agreement (the **"Agreement"),** dated November 10, 2015, is between Otic Pharma, Inc., a Delaware corporation with operations in California (the **"Company"),** and Catherine Turkel, an individual (the **"Executive").**

## 1. POSITION AND RESPONSIBILITIES

**a. Position.** The Executive shall be employed by the Company to render services to the Company and its parent company, Otic Pharma Ltd. (the **"Parent")** in the position of Senior Vice President Clinical Research and Development and Chief Development Officer of the Company commencing on November 10, 2015. The Executive shall report to the Company's Chief Executive Officer and perform such duties and responsibilities as are normally related to such position in accordance with the standards of the industry and any additional duties now or hereafter assigned to the Executive by the Chief Executive Officer. The Executive shall abide by the rules, regulations, and practices as adopted or modified from time to time in the Company's sole discretion.

**b. Other Activities.** Except upon the prior written consent of the Company, the Executive will not, during the term of this Agreement, (i) accept any other employment, or (ii) engage, directly or indirectly, in any other business activity (whether or not pursued for pecuniary advantage) that could reasonably be expected to interfere with Executive's duties and responsibilities hereunder or create a conflict of interest with the Company.

**c. No Conflict.** Executive represents and warrants that the Executive's execution of this Agreement, the Executive's employment with the Company, and the performance of the Executive's proposed duties under this Agreement shall not violate any obligations the Executive may have to any other employer, person or entity, including any obligations with respect to proprietary or confidential information of any other person or entity.

## 2. COMPENSATION AND BENEFITS

**a. Base Salary.** In consideration of the services to be rendered under this Agreement, the Company shall pay the Executive a salary at the rate of $265,000 per year **("Base Salary").** The Base Salary shall be paid in accordance with the Company's regularly established payroll practice. Executive's Base Salary will be reviewed from time to time in accordance with the established procedures of the Company for adjusting salaries and may be adjusted upward in the sole discretion of the Board, or a designated committee thereof.

**b. Annual Performance Bonus.** The Executive will be eligible to receive an annual cash performance bonus (the **"Performance Bonus")** for the achievement of the Performance Goals (as defined below). The amount of such Performance Bonus shall be determined at the discretion of the Board, or a designated committee thereof, which amount shall be targeted at thirty percent (30%) of Executive's Base Salary in the event of achievement of the Performance Goals in full by the Executive. The Board, or such designated committee, shall use as guidance for the determination of the Performance Bonus certain corporate and individual goals (the **"Performance**

**Goals"),** which shall be established annually on a calendar year basis by Executive and the Board (or a designated committee thereof). Any Performance Bonus will be paid to Executive by March 15 of the year following the calendar year with respect to which a Performance Bonus is earned, so long as the Executive remains employed as of such payment date.

**c. Benefits.** The Executive shall be eligible to participate in the benefits made generally available by the Company to senior executives, in accordance with the benefit plans established by the Company, and as may be amended from time to time in the Company's sole discretion. In the event that the Company does not have appropriate medical and dental insurance in place on the date of this Agreement providing the Executive and his family with medical and dental coverage substantially equivalent to that provided by Executive's most recent previous employer, then the Company shall reimburse Executive, on a taxable basis, for the cost of COBRA premiums associated with his continued coverage under the plans of his prior employer until the earlier of such time as Executive and his family are (i) eligible to be covered under a Company plan or (ii) no longer eligible for continued coverage under the plans of his prior employer, and thereafter shall have no further obligation to reimburse Executive for the cost of such COBRA premium.

**d. Vacation.** In addition to nationally recognized holidays, the Executive shall be eligible to receive up to four (4) weeks of paid vacation per year and will receive paid Company holidays subject to the policies and procedures generally applicable to similarly situated executives for the Company as may be modified from time to time in the Company's sole discretion.

**e. Expenses.** The Company shall reimburse the Executive for reasonable business expenses incurred in the performance of the Executive's duties hereunder in accordance with the Company's expense reimbursement guidelines.

**3. EQUITY INCENTIVES**

**a. Time-Based Grant.** Subject to the completion of a 409A valuation and the resolution of the Board and shareholders of the Parent (the **"Option Grant Conditions"),** the Parent shall grant, from the shares available for grant pursuant to the Parent's Share Option Plan (as amended, modified or restated from time to time, the **"Share Incentive Plan"),** to the Executive (so long as the Executive is employed as of the grant date), an option to purchase 80,000 ordinary shares of the Parent (the **"First Grant").** The First Grant shall be an incentive stock option (ISO) to the maximum extent permitted by applicable tax laws. The First Grant shall vest and become exercisable as follows: 25% of the shares subject to the First Grant shall vest at the one year anniversary of the date of commencement of employment of the Executive and the remaining 75% of the shares subject to the First Grant shall vest quarterly over the next three years, provided that all vesting is conditioned on the Executive continuing to provide full-time services to the Company or the Parent as of the applicable vesting date (unless otherwise approved by the Board), and shall be subject to the additional acceleration set forth in Section 4.b. below.

**b. Performance-Related Grant.** Upon satisfaction of the Option Grant Condition, Parent shall grant pursuant to the Share Incentive Plan, from the shares available for grant pursuant to the Share Incentive Plan, to the Executive (so long as the Executive is employed as of the grant date) an option to purchase 30,000 ordinary shares of the Parent (the **"Performance Related Grant").** The Performance Related Grant shall be an ISO, to the maximum extent permitted by applicable

tax laws. Such Performance Related Grant shall vest and become exercisable in three installments of 10,000 shares each for achievement of (a) a Company approved development plan for the otitis media program by April 30, 2016, (b) a completed phase I study for the otitis media program by June 30, 2016, and (c) completion of an initial offering of the Parent's ordinary shares by December 31, 2016, all provided that the Executive is employed upon the achievement of the foregoing.

**c. Other Agreements.** The Executive's entitlement to any equity incentives that may be approved is conditioned upon the Executive's signing of the applicable equity incentive award agreement and is subject to its terms and the terms of the Share Incentive Plan, including the vesting requirements outlined above.

**4. AT-WILL EMPLOYMENT; TERMINATION BY COMPANY**

**a. At-Will Termination by Company.** The Executive's employment with the Company shall be "at-will" at all times. The Company may terminate the Executive's employment with the Company at any time, without any advance notice, for any reason or no reason at all, notwithstanding anything to the contrary contained in or arising from any statements, policies or practices of the Company relating to the employment, discipline or termination of its employees. Upon and after such termination, all obligations of the Company under this Agreement shall cease, except as otherwise provided herein.

**b. Severance.** Except in situations where the employment of the Executive is tenninated for Cause, by Death or by Complete Disability (as defined in Section 5 below), in the event that the Company terminates the Executive's employment at any time or the Executive terminates his employment for "Good Reason" as provided for in Section 6(b) below the Executive will be eligible to receive the following payments and severance benefits (collectively, **"Severance"):**

(i) after the first anniversary of the agreement date, an amount equal to three (3) months of the Executive's then-current Base Salary, payable in three (3) equal monthly installments commencing within ten (10) days of the effective date of the Release, *provided* that concurrent with an S-1 registration statement for the initial offering of the Parent's ordinary shares becoming effective, the Severance shall automatically increase to six (6) months of the Executive's then-current Base Salary, payable in six (6) equal monthly installments commencing within ten (10) days of the effective date of the Release;

(ii) if the Executive elects to continue his medical and/or dental coverage under COBRA, the Company shall pay the premiums for COBRA coverage for Executive and his qualified dependents (or, for such portion of the COBRA Continuation Period (as defined below) that the Company continues to be obligated to reimburse the Executive for the cost of COBRA premiums under Section 2.c., to reimburse the Executive for the cost of COBRA premiums associated with his continued coverage under the plans of his prior employer) until the earlier of (a) three (3) months following the date of the Executive's termination (six (6) months following an IPO) or (b) the date the Executive becomes eligible for comparable coverage

under another employer's plan(s) (such period, the **"COBRA Continuation Period");** and

(iii) if such termination is (x) by the Company within the period commencing upon a Deemed Liquidation (as defined in the Parent's Articles of Association in effect from time to time) and ending six (6) months following a Deemed Liquidation, the vesting of all unvested shares, options, or other equity incentive awards available to or held by the Executive shall be accelerated such that all such shares, options or other equity incentive awards shall be deemed vested in full with respect to all service related vesting conditions (but subject to the achievement of any financial targets that may otherwise remain applicable) or (y) by the Executive for "Good Reason" additional vesting only to the extent as provided for in Section 6(b) below.

The Executive's eligibility for Severance is conditioned on the Executive having first signed a release agreement in the form attached as Exhibit A (the **"Release")** and such Release becoming effective pursuant to its terms no later than sixty (60) days following the date of termination of the Executive's employment (the **"Release Deadline").** The Executive shall not be entitled to any Severance if Executive's employment is terminated pursuant to Section 5 for Cause, by Death or by Complete Disability or if the Executive's employment is terminated by the Executive (except for a termination for Good Reason, as provided in Section 6.b below). Notwithstanding subsection
(ii) above, if the Company determines, in its sole discretion, that the Company cannot provide the COBRA premium benefits set forth in subsection (ii) above without potentially incurring financial costs or penalties under applicable law (including, without limitation, Section 2716 of the Public Health Service Act), the Company shall in lieu thereof pay the Executive a taxable cash amount, which payment shall be made regardless of whether the Executive or the Executive's eligible family members elect group health insurance coverage (the **"Health Care Benefit Payment").** The Health Care Benefit Payment shall be paid in monthly installments on the same schedule that the COBRA premiums would otherwise have been paid to the insurer. The Health Care Benefit Payment shall be equal to the amount that the Company would have otherwise paid for COBRA insurance premiums (which amount shall be calculated based on the premium for the first month of coverage), and shall be paid until the expiration of the COBRA Continuation Period.

**5. OTHER TERMINATIONS BY COMPANY**

**a. Termination for Cause.** For purposes of this Agreement, **"Cause"** shall mean: (i) the Executive commits a crime involving dishonesty or physical harm to any person; (ii) the Executive willfully engages in conduct that is in bad faith and materially injurious to the Company and/or the Parent, including but not limited to, misappropriation of trade secrets, fraud or embezzlement;
(iii) the Executive commits a material breach of this Agreement, which breach is not cured within thirty (30) days afier delivery of written notice to the Executive by the Company; (iv) the Executive willfully refuses to implement or follow a lawful policy or directive of the Company or the Parent, which breach is not cured within thirty (30) days after delivery of written notice to Executive by the Company; or (v) the Executive engages in gross misfeasance or malfeasance demonstrated by a pattern of gross failure to perform job duties diligently and professionally. The Company may terminate the Executive's employment for Cause at anytime, without any advance notice except

as required by law. The Company shall pay the Executive all compensation to which the Executive is entitled up through the date of termination, subject to any other rights or remedies of the Company under law; and thereafter all obligations of the Company under this Agreement shall cease.

**b. Termination By Death.** Executive's employment shall terminate automatically upon the Executive's death. The Company shall pay to the Executive's beneficiaries or estate, as appropriate, any compensation then due and owing. Thereafter, all obligations of the Company under this Agreement shall cease. Nothing in this Section shall affect any entitlement of the Executive's heirs or devisees to the benefits of any life insurance plan or other applicable benefits.

**c. Termination By Complete Disability.** If the Executive becomes Completely Disabled (as defined below), the Company may terminate Executive's employment. **"Completely Disabled"** shall mean the inability of the Executive to perform his duties under this Agreement, even with reasonable accommodation, because he has become permanently disabled within the meaning of any policy of disability income insurance covering employees of the Company then in force, or, if the Company has no policy of disability income insurance covering employees of the Company in force when the Executive becomes disabled, the inability of the Executive to perform the Executive's duties under this Agreement, whether with or without reasonable accommodation, by reason of any incapacity, physical or mental, which the Board, based on medical advice or an opinion provided by a licensed physician mutually acceptable to the Board and the Executive (or the Executive's legal representative), determines to have incapacitated the Executive from satisfactorily performing all of his usual services for the Company, with or without reasonable accommodation, for a period of at least 180 days during any 12-month period (whether or not consecutive). Based upon such medical advice or opinion, such determination of the Board shall be final and binding. The Company shall pay to the Executive all compensation to which the Executive is entitled up through the date of termination, and thereafter all obligations of the Company under this Agreement shall cease. Nothing in this Section shall affect the Executive's rights under any disability plan in which the Executive is a participant.

## 6. TERMINATION BY EXECUTIVE

**a. At-Will Termination by Executive.** The Executive may terminate employment with the Company at any time for any reason or no reason at all, upon four (4) weeks' advance written notice. During such notice period the Executive shall continue to diligently perform all of the Executive's duties hereunder. The Company shall have the option, in its sole discretion, to make the Executive's termination effective at any time prior to the end of such notice period as long as the Company pays the Executive all compensation to which the Executive is entitled up through the last day of the four week notice period.

**b. Termination for Good Reason.** The Executive may terminate his employment for "Good Reason," subject to satisfaction of the conditions set forth below. For purposes of this Agreement, **"Good Reason"** means a resignation based on any of the following events occurring in each case without Executive's consent:

i. a material diminution in Executive's authority, duties, or responsibilities;

n. a material diminution in Executive's Base Salary;

m. a change in the geographic location at which the Executive must perform the services to a location outside of the greater Los Angeles area; or

iv. any other action or inaction that constitutes a material breach of the terms of this Agreement.

To constitute a resignation for Good Reason: (i) Executive must provide written notice to the Board within thirty (30) days of the initial existence of the event constituting Good Reason, (ii) Executive may not terminate his or her employment unless the Company or Parent (as applicable and acting at the direction of the Board) fails to remedy the event constituting Good Reason within sixty (60) days after such notice has been deemed given pursuant to this Agreement, and (iii) Executive must terminate employment with the Company and/or Parent (as applicable) no later than 30 days after the end of the 60-day period in which the Company and/or Parent (as applicable) fails to remedy the event constituting Good Reason. If the Executive terminates his employment for Good Reason, the Executive will be eligible to receive payments and severance benefits pursuant to Section 4.b, with section 4.b(iii) limited to six (6) months accelerated vesting, but conditioned on the Executive's execution, delivery and non-revocation of the release set forth as Exhibit A.

**7. TERMINATION OBLIGATIONS**

**a. Return of Property.** The Executive agrees that all property (including without limitation all equipment, tangible proprietary information, documents, records, notes, contracts and computer-generated materials) furnished to or created or prepared by the Executive incident to the Executive's employment belongs to the Company and shall be promptly returned to the Company upon termination of the Executive's employment.

**b. Resignation and Cooperation.** Upon te11nination of the Executive's employment, the Executive shall be deemed to have resigned from all offices, committee memberships and directorships then held with the Company, the Parent or any of their respective subsidiaries, except as may otherwise be agreed upon in writing by the Company, the Parent and the Executive in connection with such termination. Following any termination of employment, the Executive shall cooperate with the Company and the Parent in the winding up of pending work on behalf of the Company and the Parent and the orderly transfer of work to other employees. The Executive shall also cooperate with the Company and the Parent in the defense of any action brought by any third party against the Company or the Parent that relates to the period in which the Executive was employed by the Company or with respect to any matters for which the Executive had knowledge or responsibility during his tenure and the Company will reimburse the Executive for all reasonable out of pocket expenses incurred by the Executive in so cooperating.

**c. Continuing Obligations.** The Executive understands and agrees that Executive's obligations under Sections 7, 8 and 9 herein (including Exhibit B) shall survive the termination of the Executive's employment for any reason and the termination of this Agreement.

## 8. INVENTIONS AND PROPRIETARY INFORMATION; PROHIBITION ON THIRD PARTY INFORMATION

**a, Proprietary Information Agreement.** The Executive agrees to sign and be bound by the terms of the Company's Proprietary Information and Inventions Agreement **("Proprietary Information Agreement")** which is attached as Exhibit B.

**b. Non-Disclosure of Third Party Information.** The Executive represents and waiTants and covenants that the Executive shall not disclose to the Company or the Parent, or use, or induce the Company or the Parent to use, any proprietary information or trade secrets of others at any time, including but not limited to any proprietary information or trade secrets of any former employer, if any; and the Executive acknowledges and agrees that any violation of this provision shall be grounds for the Executive's immediate termination and could subject the Executive to substantial civil liabilities and criminal penalties. The Executive further specifically and expressly acknowledges that no officer or other employee or representative of the Company or the Parent has requested or instructed the Executive to disclose or use any such third party proprietary information or trade secrets.

## 9. ARBITRATION

Any dispute arising out of, or relating to, this Agreement or the breach thereof (excluding any breach of the Employee Proprietary Information and Inventions Assignment Agreement), or regarding the interpretation thereof, shall be exclusively decided by binding arbitration conducted in California in the County where the Company's headquarters are then located in accordance with the rules of the JAMS Employment Arbitration Rules & Procedures then in effect before a single arbitrator appointed in accordance with such rules. Judgment upon any award rendered therein may be entered and enforcement obtained thereon in any court having jurisdiction. The arbitrator shall have authority to grant any form of appropriate relief, whether legal or equitable in nature, including specific performance. Each of the parties agrees that service of process in such arbitration proceedings shall be satisfactorily made upon it if sent by registered mail addressed to it at the address referred to in Section 12 below. The arbitrator shall have the authority to award costs and fees to the prevailing party as provided by applicable law to the same extent as a court. Otherwise, each party shall pay its own costs and attorney's fees. The Company shall pay the costs and fees of the arbitrator and reimburse Employee for any filing fees paid to initiate arbitration. Judgment on the arbitration award may be entered by any court of competent jurisdiction.

## 10. AMENDMENTS; WAIVERS; REMEDIES

This Agreement may not be amended or waived except by a writing signed by the Executive and by a duly authorized representative of the Company other than the Executive. Failure to exercise any right under this Agreement shall not constitute a waiver of such right. Any waiver of any breach of this Agreement shall not operate as a waiver of any subsequent breaches. All rights or remedies specified for a party herein shall be cumulative and in addition to all other rights and remedies of the party hereunder or under applicable law.

**11. ASSIGNMENT; BINDING EFFECT**

**a. Assignment.** The performance of the Executive is personal hereunder, and the Executive agrees that the Executive shall have no right to assign and shall not assign or purport to assign any rights or obligations under this Agreement. This Agreement may be assigned or transferred by the Company; and nothing in this Agreement shall prevent the consolidation, merger or sale of the Company or a sale of any or all or substantially all of its assets.

**b. Binding Effect.** Subject to the foregoing restriction on assignment by the Executive, this Agreement shall inure to the benefit of and be binding upon each of the parties; the affiliates, officers, directors, agents, successors and assigns of the Company; and the heirs, devisees, spouses, legal representatives and successors of the Executive.

**12. NOTICES**

All notices or other communications required or permitted hereunder shall be made in writing and shall be deemed to have been duly given if delivered: (a) by hand; (b) by e mail, (c) by a nationally recognized overnight courier service; or (d) by United States first class registered or certified mail, return receipt requested, to the principal address of the other party, as set forth below. The date of notice shall be deemed to be the earlier of (i) actual receipt of notice by any permitted means, or
(ii) five business days following dispatch by overnight delivery service or the United States Mail. The Executive shall be obligated to notify the Company in writing of any change in the Executive's address. Notice of change of address by the Company or the Executive shall be effective only when done in accordance with this paragraph.

**Company's Notice Address:**

OticPharma Inc.
19900 MacArthur Boulevard, Suite 550
Irvine, CA 92612

Attn: Chief Executive Officer

**Executive's Notice Address:**

Last known residential address of Executive on file with Company

**13. SEVERABILITY**

If any provision of this Agreement shall be held by a court or arbitrator to be invalid, unenforceable, or void, such provision shall be enforced to the fullest extent permitted by law, and the remainder of this Agreement shall remain in full force and effect. In the event that the time period or scope of any provision is declared by a court or arbitrator of competent jurisdiction to exceed the maximum time period or scope that such comi or arbitrator deems enforceable, then

such court or arbitrator shall reduce the time period or scope to the maximum time period or scope permitted by law.

## 14. TAXES

**a. Withholding.** All amounts paid under this Agreement (including without limitation Base Salary and Severance) shall be paid less all applicable state and federal tax withholdings and any other withholdings required by any applicable jurisdiction or authorized by the Executive.

**b. Section 409A.** Notwithstanding anything to the contrary herein, the following provisions apply to the extent benefits provided herein are subject to Section 409A of the Internal Revenue Code of 1986, as amended (the **"Code")** and the regulations and other guidance thereunder and any state law of similar effect (collectively **"Section 409A").** Severance benefits shall not commence until the Executive has a "separation from service" for purposes of Section 409A. Each payment of severance benefits is a separate "payment" for purposes of Treas. Reg. Section l.409A-2(b)(2)(i), and the severance benefits are intended to satisfy the exemptions from application of Section 409A provided under Treasury Regulations Sections l.409A-l(b)(4), 1.409A-l(b)(5) and l.409A-l(b)(9). However, if such exemptions are not available and the Executive is, upon separation from service, a "specified employee" for purposes of Section 409A, then, solely to the extent necessary to avoid adverse personal tax consequences under Section 409A, the timing of the severance benefits payments shall be delayed until the earlier of (i) six (6) months and one day after the Executive's separation from service, or (ii) Executive's death.

If the severance benefits are not covered by one or more exemptions from the application of Section 409A and the Release could become effective in the calendar year following the calendar year in which the Executive separates from service, the Release will not be deemed effective any earlier than the Release Deadline, and the severance benefits will not be payable to the Executive until the calendar year following the calendar year in which the Executive separates from service. Except to the minimum extent that payments must be delayed because the Executive is a "specified employee" or until the effectiveness or deemed effectiveness of the Release, all amounts will be paid as soon as practicable in accordance with the other provisions of this Agreement.

To the extent that any taxable reimbursements of expenses provided under this Agreement are subject to Section 409A, such reimbursements will be administered as follows: (i) the amount of any such expense reimbursement or in-kind benefit provided during the Executive's taxable year shall not affect any expenses eligible for reimbursement in any other taxable year, (ii) the reimbursement of the eligible expense shall be made no later than the last day of the Executive's taxable year that immediately follows the taxable year in which the expense was incurred, and (iii) the Executive's right to any reimbursement shall not be subject to liquidation or exchange for another benefit or payment.

The benefits provided under this Agreement are intended to qualify for an exemption from application of Section 409A or comply with its requirements to the extent necessary to avoid adverse personal tax consequences under Section 409A, and any ambiguities herein shall be interpreted accordingly.

**c. 280G.** Notwithstanding anything to the contrary, in the event that any of the payments or benefits provided for in this Agreement or any other agreement or arrangement between the Executive and the Company (collectively, the **"Payments")** constitute "parachute payments" within the meaning of Section 280G of the Code and, but for this Section 14.c., would be subject to the excise tax imposed by Section 4999 of the Code (the **"Excise Tax"),** then such Payments shall be either (i) provided in full, or (ii) provided as to such lesser extent which would result in no portion of such benefit being subject to the Excise Tax, whichever of the foregoing amounts, taking into account the applicable federal, state and local income taxes and the Excise Tax, results in the receipt by the Executive on an after-tax basis of the greatest amount of benefits notwithstanding that all or some portion of such benefits may be subject to the Excise Tax (the **"Reduced Amount").** If a reduction in a Payment is required pursuant to the preceding sentence and the Reduced Amount is determined pursuant to clause (i) of the preceding sentence, the reduction shall occur in the manner (the **"Reduction Method")** that results in the greatest economic benefit for Executive. If more than one method of reduction will result in the same economic benefit, the items so reduced will be reduced pro rata (the **"Pro Rata Reduction Method").** If this Section 14.c. is applied to reduce an amount payable to the Executive, and the Internal Revenue Service successfully asserts that, despite the reduction, the Executive has nonetheless received payments which are in excess of the maximum amount that could have been paid to him without being subjected to any excise tax, then, unless it would be unlawful for the Company to make such a loan or similar extension of credit to the Executive, the Executive may repay such excess amount to the Company as though such amount constitutes a loan to the Executive made at the date of payment of such excess amount, bearing interest at 120% of the applicable federal rate (as determined under section 1274(d) of the Code in respect of such loan).

Notwithstanding any provision of this Section 14.c to the contrary, if the Reduction Method or the Pro Rata Reduction Method would result in any portion of the Payment being subject to taxes pursuant to Section 409A of the Code that would not otherwise be subject to taxes pursuant to Section 409A of the Code, then the Reduction Method and/or the Pro Rata Reduction Method, as the case may be, shall be modified so as to avoid the imposition of taxes pursuant to Section 409A of the Code as follows: (i) as a first priority, the modification shall preserve to the greatest extent possible, the greatest economic benefit for the Executive as determined on an after•tax basis; (ii) as a second priority, Payments that are contingent on future events (e.g., being terminated without Cause), shall be eliminated before Payments that are not contingent on future events; and (iii) as a third priority, Payments that are "deferred compensation" within the meaning of Section 409A of the Code shall be reduced before Payments that are not "deferred compensation" within the meaning of Section 409A of the Code.

Unless the Company and the Executive otherwise agree in writing, any determination required under this paragraph shall be made by the Company's independent public accountants (the **"Accountants"),** whose detennination shall be conclusive and binding upon all parties. For purposes of making the calculations required by this section, the Accountants may make reasonable assumptions concerning applicable taxes and may rely on reasonable, good faith interpretations concerning the application of Sections 280G and 4999 of the Code. The Company and the Executive shall furnish to the Accountants such information and documents as the

Accountants may reasonably request in order to make a determination under this section. The Company shall bear all costs of the Accountants in connection with any calculations contemplated by this section.

If the Reduction Method or Pro Rata Reduction Method in Section 14.c. is applied to reduce an amount payable to the Executive, and the Internal Revenue Service successfully asserts that, despite such reduction, the Executive has nonetheless received payments which are in excess of the maximum amount that could have been paid to him without being subjected to any Excise Tax, then the Executive shall promptly repay such excess amount to the Company so that no portion of the remaining payment is subject to the Excise Tax.

## 15. GOVERNING LAW

This Agreement shall be governed by and construed in accordance with the laws of the State of California.

## 16. INTERPRETATION

This Agreement shall be construed as a whole, according to its fair meaning, and not in favor of or against any party. Sections and section headings contained in this Agreement are for reference purposes only, and shall not affect in any manner the meaning or interpretation of this Agreement. Whenever the context requires, references to the singular shall include the plural and the plural the singular.

## 17. COUNTERPARTS

This Agreement may be executed in any number of counterparts, each of which shall be deemed an original of this Agreement, but all of which together shall constitute one and the same instrument.

## 18. AUTHORITY

Each party represents and warrants that such party has the right, power and authority to enter into and execute this Agreement and to perform and discharge all of the obligations hereunder; and that this Agreement constitutes the valid and legally binding agreement and obligation of such party and is enforceable in accordance with its terms.

## 19. ENTIRE AGREEMENT

This Agreement is intended to be the final, complete, and exclusive statement of the terms of the Executive's employment by the Company and may not be contradicted by evidence of any prior or contemporaneous statements or agreements, except for agreements specifically referenced herein, including without limitation the Proprietary Information and Inventions Agreement attached as Exhibit B. To the extent that the practices, policies or procedures of the Company, now or in the future, apply to the Executive and are inconsistent with the terms of this Agreement, the provisions of this Agreement shall control. Any subsequent change in the Executive's duties, position, or compensation will not affect the validity or scope of this Agreement.

*[Remainder of Page Left Intentionally Blank]*

IN WITNESS WHEREOF, THE PARTIES HAVE DULY EXECUTED THIS AGREEMENT AS OF THE DATE FIRST WRITTEN ABO VE.

**OTIC PHARMA INC.**
**THE EXECUTIVE**

EXHIBIT A

**General Release Agreement**

**SEPARATION AGREEMENT AND GENERAL RELEASE**

Catherine Turkel **("You")** and Otic Pharma Inc.; a Delaware corporation (the **"Company"),** (collectively, the **"Parties") ** have agreed to enter into this Separation Agreement and General Release **("Agreement")** on the following terms:

Your employment with the Company terminated on , 20_ (the **"Separation Date").**

If you seek reimbursement of any business expenses, you agree to submit your final expense reimbursement statement no later than the date you return the signed original of this Agreement to the Company, along with receipts or other supporting documentation. The Company will reimburse valid business expenses in accordance with its standard expense reimbursement policies.

To bring a smooth closure to your relationship with the Company, the Company would like to offer you severance benefits in exchange for a general release of claims.

Accordingly, you and the Company incorporate the above recitals into this Agreement, and agree as follows:

1. Subject to your compliance with your promises and agreements contained in this Agreement and provided you do not revoke this Agreement, the Company agrees to provide you with the Severance Benefits set forth in Section 4.b. or Section 6.b., as applicable, of the Executive Employment Agreement between you and the Company, dated as of [ ], 2015.

2. In exchange for the Severance Benefits and the Company's other promises contained in this Agreement, you completely release the Company, its affiliated, related, parent or subsidiary entities, and its present and former owners, directors, officers, investors, attorneys, and employees (the **"Released Parties")** from any and all claims you may now have or have ever had against the Company including all claims arising from your employment including, but not limited to, any claims arising under the Title VII of the Civil Rights Act of 1964, the Age Discrimination in Employment Act, the Older Workers Benefits Protection Act, the WARN Act or any state counterpart, the California Fair Employment and Housing Act, the California Labor Code or any other claims for violation of any federal, state, or municipal statutes or common law, including, without limitation, claims for alleged retaliation or wrongful termination of any kind, and any and all claims for attorneys' fees and costs (the **"Released Claims");** provided, however, that "Released Claims" shall exclude in any event (a) any rights or claims for indemnification you may have pursuant to any indemnification agreement with the Company, any policy of insurance, the charter, bylaws, or operating agreements of the Company, or under applicable law; (b) any rights under stock options, stock purchase agreements and equity plans of the Company, defined benefit, defined contribution or other plan by virtue of his employment with the Company, (c) any rights

or claims to workers compensation or unemployment compensation; (d) any rights that are not waivable as a matter of law; and (e) any rights or claims arising under or from this Agreement. The Parties intend for this release to be enforced to the fullest extent permitted by law.

3. You represent that you have not initiated, filed, or caused to be filed and agree not to initiate, file, cause to be filed, or otherwise pursue any Released Claims against any of the Released Parties. You understand that this paragraph does not prevent you from filing a charge with or participating in an investigation by a governmental administrative agency; provided, however, that you hereby waive any right to receive any monetary award resulting from such a charge or investigation and provided further that you agree not to encourage any person, including any cunent or former employee of the Company, to file any kind of claim whatsoever against the Company.

4. You agree that because this release specifically covers known and unknown claims, you waive your rights under Section 1542 of the California Civil Code, or under any comparable law of any other jurisdiction. Section 1542 states: "A general release does not extend to claims which the creditor does not know or suspect to exist in his or her favor at the time of executing the release, which if known by him or her must have materially affected his or her settlement with the debtor."

5. The Company and you also agree that this Agreement, and each of its terms, including the negotiations leading up to it, are confidential and neither of you will discuss the Agreement, or any of its terms or the negotiations leading up to it, with anyone except as applicable our respective attorneys, spouse or advisors without the other party's prior written consent. Further, the Company and you agree that neither will make or publish, either orally or in writing, any disparaging statement regarding the other, the Released Parties, or the other's employees, officers, directors, or customers, or in any way wrongfully impede or interfere with the other's customer relationships. The Company and you understand and agree that the terms of this Section 5 are material terms of this Agreement; without which neither of you would have entered into this Agreement.

6. Any requests for references regarding your employment by potential future employers or other third-parties shall be referred to the then current Chief Executive Officer of the Company who shall respond only that consistent with the Company's policy, the Company will confirm only dates of employment and last position held and shall provide that information.

7. You further acknowledge that this Agreement represents the entire agreement and understanding between the Parties regarding its subject matter, supersedes and replaces any and all prior agreements and understandings regarding its subject matter, with the exception of the Employee Proprietary Information and Inventions Assignment Agreement that you signed as a condition of your employment **("Proprietary Information Agreement"),** and shall not be modified in any way except in writing executed by the you and the then current Chief Executive Officer of the Company. This Agreement shall be governed by the laws of the State of California, excluding its laws relating to choice of law. You also agree that if any term or portion of this Agreement is found to be unenforceable under applicable law, such finding shall not invalidate the whole Agreement, but the Agreement shall be construed as not containing the particular term or

portion held to be invalid and the rights and obligations of the parties shall be construed and enforced accordingly. This Agreement is severable.

8. You understand and agree that this Agreement provides you with consideration to which you are not otherwise entitled under the Company's policies and practices or otherwise. You acknowledge that you have 21 days to consider this Agreement and you are advised to consult an attorney before signing the Agreement. You may sign the Agreement in fewer than 21 days if you choose to do so. You agree that even if there are any modifications made to the Agreement before you sign it, the 21 day period will not restart. You also acknowledge that you may revoke this Agreement within 7 days of signing it by delivering notice to that effect to the then current Chief Executive Officer of the Company at the Company's principal executive office in a manner calculated to be received by the Company by close of business on the seventh day after you sign the Agreement. You understand and agree that this Agreement shall not become effective or enforceable until the 7-day revocation period has expired.

9. The payments made under this Agreement are intended to be exempt from application of section 409A of the Internal Revenue Code of 1986, as amended, and applicable guidance issued thereunder **("Section 409A"),** and structured to be distributed in the short-term deferral period, as defined under Treasury Regulation section l.409A-l(b)(4), or the separation pay exemption, as provided in Treasury Regulation section l.409A l(b)(9). The timing of payments should be interpreted and construed consistent with these exemptions to Section 409A, or to the extent such exemptions are not available, in compliance with the requirements of Section 409A.

10. You understand and agree that this Agreement is not an admission of guilt or wrongdoing by the Company and that the Company does not believe or admit that they have done anything wrong.

11. Except as provided m this Agreement you will not receive any benefits or compensation.

12. Finally, you acknowledge that you have been afforded every opportunity to and have read this Agreement, are fully aware of its contents and legal effect, and have chosen to enter into this Agreement freely, without coercion, and based on your own judgment.

[*Remainder of Page Left Intentionally Blank]*

Date delivered to employee:_ ,. 20_

**YOU:**

By: ----------
Name: Catherine Turkel
Title: ----------

Date: - - - - - - - - - -

**THE COMPANY:**

By:
Name: - - - - - - - - - - - - -
TitIe: - - - - - - - - - - - - -

Date: ----------

EXHIBITB

**Proprietary Information and Invention Assignment Agreement**

**EXHIBITB**

**PROPRIETARY INFORMATION AND INVENTIONS AGREEMENT**

As a condition of my employment with Otic Pharma Inc. and its parents (including but not limited to Otic Pharma Ltd.), subsidiaries, affiliates, successors or assigns (collectively, the ***"Company"),*** and in consideration of my employment with the Company and my receipt of the compensation now and hereafter paid to me by the Company, I agree to the following terms under this Proprietary Information and Inventions Agreement (this ***"Intellectual Property Agreement"):***

**1. Employment**

(a) I understand and acknowledge that my employment with the Company is for an unspecified duration and constitutes "at-will" employment. I acknowledge that this employment relationship may be terminated at any time, with or without good cause or for any or no cause, at the option either of the Company or myself, with or without notice.

(b) I agree that, <luting the term ofmy employment with the Company, I will not engage in any other employment, occupation, consulting or other business activity related to the business in which the Company is now involved or becomes involved during the term of my employment, nor will I engage in any other activities that conflict with my obligations to the Company.

**2. Confidential Information**

(a) **Company Information.** I agree at all times during the term of my employment (my ***"Relationship with tlte Company")*** and thereafter to hold in strictest confidence, and not to use except for the benefit of the Company or to disclose to any third party without written authorization of the Board of Directors of the Company, any Confidential Information of the Company. I understand that ***"Confidential Information"*** means any Company proprietary information, technical data, trade secrets or know-how, including, but not limited to, research, business plans, product plans, products, services, customer lists and customers (including, but not limited to, customers of the Company on whom I called or with whom I became acquainted during the term of my Relationship with the Company), market research, works of original authorship, intellectual property (including, but not limited to, unpublished works and undisclosed patents), photographs, negatives, digital images, software, computer programs, ideas, developments, inventions (whether or not patentable), processes, formulas, technology, designs, drawings and engineering, hardware configuration information, forecasts, strategies, marketing, finances or other business information disclosed to me by the Company either directly or indirectly in writing, orally or by drawings or observation or inspection of parts or equipment. I further understand that Confidential Information does not include any of the foregoing items that has become publicly known and made generally available through no wrongful act of mine or of others who were under confidentiality obligations as to the item or items involved.

(b) **Other Employer Information.** I agree that I will not, during my Relationship with the Company, improperly use or disclose any proprietary information or trade secrets of any former or concurrent employer or other person or entity and that I will not bring onto the premises of the Company any unpublished document or proprietary information belonging to any such employer, person or entity unless consented to in writing by such employer, person or entity.

(c) **Third Party Information.** I recognize that the Company has received and in the future will receive from third parties their confidential or proprietary information subject to a duty on the Company's part to maintain the confidentiality of such information and to use it only for certain limited purposes. I agree to hold all such confidential or proprietary information in the strictest confidence and

not to disclose it to any person, firm or corporation or to use it except as necessary in carrying out my work for the Company consistent with the Company's agreement with such third party.

**3. Intellectual Property**

(a) **Assignment of Intellectual Property.** I agree that I will promptly make full written disclosure to the Company, will hold in trust for the sole right and benefit of the Company, and hereby assign to the Company, or its designee, all my right, title and interest in and to any original works of **authorship, domain names, inventions, concepts, improvements, processes, methods or trade secrets,** whether or not patentable or registrable under copyright or similar laws, that I may solely or jointly conceive or develop or reduce to practice, or cause to be conceived or developed or reduced to practice, during the period of time I am in the service of the Company (collectively referred to as ***"Intellectual Properly")*** and that (i) are developed using the equipment, supplies, facilities or Confidential Information of the Company, (ii) result from or are suggested by work performed by me for the Company, or (iii) relate to the Company business or to the actual or demonstrably anticipated research or development of the Company. The Intellectual Property will be the sole and exclusive property of the Company. I further acknowledge that all original works of authorship that are made by me (solely or jointly with others) within the scope of and during the period of my Relationship with the Company and that are protectable by copyright are "works made for hire," as that term is defined in the United States Copyright Act. To the extent any Intellectual Property is not deemed to be work made for hire, then I will and hereby do assign all my right, title and interest in such Intellectual Property to the Company, except as provided in Section 3(e).

(b) **Patent and Copyright Registrations.** I agree to assist the Company, or its designee, at the Company's expense, in every proper way to secure the Company's rights in the Intellectual Property and any copyrights, patents, trademarks, domain names or other intellectual property rights relating thereto in any and all countries, including the disclosure to the Company of all pertinent information and data with respect thereto and the execution of all applications, specifications, oaths, assignments and other instruments that the Company shall deem necessary in order to apply for and obtain such rights and in order to assign and convey to the Company and its successors, assigns and nominees the sole and exclusive right, title and interest in and to such Intellectual Propetty, and any copyrights, patents, trademarks, domain names or other intellectual property rights relating thereto. I further agree that my obligation to execute or cause to be executed, when it is in my power to do so, any such instrument or papers shall continue after the termination of this Intellectual Property Agreement. If the Company is unable because of my mental or physical incapacity or for any other reason to secure my assistance in perfecting the rights transferred in this Intellectual Property Agreement, then I hereby irrevocably designate and appoint the Company and its duly authorized officers and agents as my agent and attorney in fact, to act for and in my behalf and stead to execute and file any such applications and to do all other lawfully permitted acts to further the prosecution and issuance of letters patent and copyright, trademark or domain name registrations thereon with the same legal force and effect as if executed by me. The designation and appointment of the Company and its duly authorized officers and agents as my agent and attorney in fact shall be deemed to be coupled with an interest and therefore irrevocable.

**(c) Maintenance of Records.** I agree to keep and maintain adequate and current written records of all Intellectual Property made by me (solely or jointly with others) during the term of my Relationship with the Company. The records will be in the form of notes, sketches, drawings, works of original authorship, photographs, negatives or digital images or in any other format that may bespecified by the Company. The records will be available to and remain the sole prope1ty of the Company at all **times.**

(d) **Intellectual Property Retained and Licensed.** I provide below a list of all original works **ofauthorship, inventions, developments, improvements, trademarks, designs, domain names, processes,** methods and trade secrets that were made by me prior to my Relationship with the Company (collectively referred to as***"Prior Intel/ectua/ Property"),*** that belong to me, that relate to the Company's proposed business, products or research and development, and that are not assigned to the Company hereunder; or, if no such list is attached, I represent that there is no such Prior Intellectual Property. If in the course of my Relationship with the Company, I incorporate into Company property any Prior

Intellectual Property owned by me or in which I have an interest, the Company is hereby granted and shall have a nonexclusive, royalty-free, irrevocable, perpetual, worldwide license to make, have made, modify, use and sell such Prior Intellectual Property as part of or in connection with such Company property.

Prior Intellectual Property:

| Title | Date | Identifying number or Brief Description |
|---|---|---|
| | | |

(e) **Exception to Assignments.** I understand that the provisions of this Intellectual Property **Agreement** requiring assignment of Intellectual Property to the Company are limited to Section 2870 of the California Labor Code, which is attached hereto as **Appendix A,** and do not apply to any intellectual property that (i) I develop entirely on my own time; and (ii) I develop without using Company equipment, supplies, facilities or trade secret information; and (iii} does not result from any work performed by me for the Company; and (iv) does not relate at the time of conception or reduction to practice to the Company's current or anticipated business, or to its actual or demonstrably anticipated research or development. Any such intellectual property will be owned entirely by me, even if developed by me during the time period in which I am employed by the Company. I will advise the Company promptly in writing of any intellectual property that I believe meets the criteria for exclusion set forth herein and is not otherwise disclosed pursuant to Section 3(d) above.

(t) **Return of Company Documents.** I agree that, at the time of leaving the employ of the Company, I will deliver to the Company (and will not keep in my possession, recreate or deliver to anyone else) any and all works of original authorship, domain names, original registration certificates, photographs, negatives, digital images, devices, records, data, notes, reports, proposals, lists, correspondence, specifications, drawings, blueprints, sketches, materials, equipment or other documents or property, or reproductions of any aforementioned items, developed by me pursuant to my Relationship with the Company or otherwise belonging to the Company or its successors or assigns.

**4. Notification of New Employer**

In the event that I leave the employ of the Company, I hereby grant consent to notification by the Company to my new employer or consulting client of my rights and obligations under this Intellectual Property Agreement.

**5. No Solicitation of Employees**

In consideration for my Relationship with the Company and other valuable consideration, receipt of which is hereby acknowledged, I agree that during the period ofmy Relationship with the Company as an employee, consultant, officer and/or director and for a period of twelve (12) months thereafter, I shall not solicit the employment of any person who shall then be employed by the Company (as an employee or consultant) or who shall have been employed by the Company (as an employee or consultant) within the prior two (2) -month period, on behalf of myself or any other person, firm, corporation, association or other entity, directly or indirectly.

**6. Representations**

I represent that my performance of all the terms of this Intellectual Property Agreement will not breach any agreement to keep in confidence proprietary infonnation acquired by me in confidence or in trust prior to my Relationship with the Company. I have not entered into, and I agree I will not enter

into, any oral or written agreement in conflict herewith. I agree to execute any proper oath or verify any proper document required to carry out the terms of this Intellectual Property Agreement.

**7. Equitable Relief**

The Company and I each agree that disputes relating to or arising out of a breach of the covenants contained in this Intellectual Property Agreement may cause the Company or me, as applicable, to suffer irreparable harm and to have no adequate remedy at law. In the event of any such breach or default by a party, or any threat of such breach or default, the other party will be entitled to injunctive relief, specific performance and other equitable relief. The pat1ies further agree that no bond or other security shall be required in obtaining such equitable relief and hereby consents to the issuance of such injunction and to the ordering of specific performance.

**8. General Provisions**

(a) **Governing Law; Consent to Personal Jurisdiction.** This Intellectual Property Agreement will be governed by the laws of the State of California as they apply to contracts entered into and wholly to be performed within such state. I hereby expressly consent to the nonexclusive personal jurisdiction and venue of the state and federal for any lawsuit filed there by either party arising from or relating to this Intellectual Property Agreement.

(b) **Entire Agreement.** This Intellectual Property Agreement sets forth the entire agreement and understanding between the Company and me relating to the subject matter herein and merges all prior discussions between us. No modification of or amendment to this Intellectual Property Agreement, or any waiver of any rights under this Intellectual Property Agreement, will beeffective unless in writing signed by the party to be charged. Any subsequent change or changes in my duties, salary or compensation will not affect the validity or scope of this Intellectual Property Agreement.

(c) **Severability.** If one or more of the provisions in this Intellectual Property Agreement are deemed void by law, then the remaining provisions will continue in full force and effect.

(d) **Successors and Assigns.** This Intellectual Property Agreement will be binding upon my heirs, executors, administrators and other legal representatives and will be for the benefit of the Company and its successors and assigns.

[Signature Page Follows]

IN WITNESS WHEREOF, the undersigned has executed this Proprietary Information and Inventions Agreement as of November I 0, 20 I 5.

By: C Name: Catherine Turkel Address: 19 Suprema Drive
Newport Coast, CA 92657

*11/11,('161J*

WITNESS:
By: _____
Name: Gregory J. Flesher 11/10/2015
Address: 19900 MacArthur Blvd., Suite 550
Irvine, CA 92612

**APPENDIX A**

**CALIFORNIA LABOR CODE SECTION 2870**

Application of provision that employee shall assign or offer to assign rights in invention to employer.

(a) Any provision in an employment agreement which provides that an employee shall assign, or offer to assign, any of his or her rights in an invention to his or her employer shall not apply to an invention that the employee developed entirely on his or her own time without using the employer's equipment, supplies, facilities, or trade secret information except for those inventions that either:

(l) Relate at the time of conception or reduction to practice of the invention to the employer's business, or actual or demonstrably anticipated research or development of the employer.

(2) Result from any work performed by the employee for the employer.

(b) To the extent a provision in an employment agreement purports to require an employee to assign an invention otherwise excluded from being required to be assigned under subdivision (a), the provision is against the public policy of this state and is unenforceable.

**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 following Registration Statements:

(1) Registration Statement (Form S-3 Nos. 333-226286 and 333-218949) of Novus Therapeutics, Inc.,

(2) Registration Statement (Form S-8 No. 333-216432 and No. 333-200413) pertaining to the 2014 Stock Incentive Plan and 2014 Employee Stock Purchase Plan of Tokai Pharmaceuticals, Inc.;

(3) Registration Statement (Form S-8 Nos. 333-210058 and 333-203032) pertaining to 2014 Stock Incentive Plan of Tokai Pharmaceuticals, Inc.;

of our report dated March 27, 2019, with respect to the consolidated financial statements of Novus Therapeutics, Inc. included in this Annual Report (Form 10-K) of Novus Therapeutics, Inc. for the year ended December 31, 2018.

/s/ Ernst & Young LLP

Irvine, California
March 27, 2019

**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 27, 2019

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 27, 2019

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, 2018 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 27, 2019

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, 2018 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 27, 2019

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