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, 2016

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: 001-37524

vTv Therapeutics Inc.

(Exact name of registrant as specified in its charter)

Delaware	**47-3916571**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
4170 Mendenhall Oaks Pkwy **High Point, NC**	**27265**
(Address of principal executive offices)	**(Zip Code)**

(336) 841-0300

(Registrant's telephone number, including area code)

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

Title of each Class	**Name of each exchange on which registered**
Class A Common Stock (Par Value $0.01)	NASDAQ Global 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 Exchange 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 and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

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

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of Registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. ☒

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

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

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

The aggregate market value of the registrant's Common Stock held by non-affiliates on June 30, 2016 (based on the closing sale price as reported on the NASDAQ) was $42,277,696.

Indicate the number of shares outstanding of each of the Registrant's classes of common stock, as of February 24, 2017.

Class of Stock	Shares Outstanding
Class A common stock, par value $0.01 per share	9,693,254
Class B common stock, par value $0.01 per share	23,119,246

DOCUMENTS INCORPORATED BY REFERENCE

The information required by Part III (Items 10, 11, 12, 13 and 14) of this form 10-K, to the extent not set forth herein, is incorporated herein by reference to the Registrant's definitive Proxy Statement for the 2017 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission no later than 120 days after December 31, 2016.

vTv THERAPEUTICS INC. AND SUBSIDIARIES
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FOR THE FISCAL YEAR ENDED DECEMBER 31, 2016

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

As used in this Annual Report on Form 10-K, the "Company", the "Registrant", "we" or "us" refer to vTv Therapeutics Inc., "vTv LLC" refers to vTv Therapeutics LLC, "vTvx Holdings I" or "TTP" refer to vTvx Holdings I LLC (formerly known as TransTech Pharma, LLC), "vTvx Holdings II" or "HPP" refer to vTvx Holdings II LLC (formerly known as High Point Pharmaceuticals, LLC) and "vTv Therapeutics Holdings" refers to vTv Therapeutics Holdings LLC. The following discussion and analysis of our financial condition and results of operations should be read in conjunction with our financial statements and related notes that appear elsewhere in this report. In addition to historical financial information, the following discussion contains forward-looking statements that reflect our plans, estimates, assumptions and beliefs. Our actual results could differ materially from those discussed in the forward-looking statements. Factors that could cause or contribute to these differences include those discussed below and elsewhere in this report under "Part I—Item 1A, Risk Factors." Forward-looking statements include information concerning our possible or assumed future results of operations, business strategies and operations, financing plans, potential growth opportunities, potential market opportunities, potential results of our drug development efforts or trials, and the effects of competition. Forward-looking statements include all statements that are not historical facts and can be identified by terms such as "anticipates," "believes," "could," "seeks," "estimates," "expects," "intends," "may," "plans," "potential," "predicts," "projects," "should," "will," "would" or similar expressions and the negatives of those terms. Given these uncertainties, you should not place undue reliance on these forward-looking statements. Also, forward-looking statements represent our management's plans, estimates, assumptions and beliefs only as of the date of this report. Except as required by law, we assume no obligation to update these forward-looking statements publicly or to update the reasons actual results could differ materially from those anticipated in these forward-looking statements, even if new information becomes available in the future.

PART I

ITEM 1. BUSINESS

Overview

We are a clinical-stage biopharmaceutical company engaged in the discovery and development of orally administered small molecule drug candidates to fill significant unmet medical needs. We have a powerful pipeline of clinical drug candidates, led by our programs for the treatment of Alzheimer's disease ("AD") and type 2 diabetes. Our drug candidate for the treatment of AD, *azeliragon* (*TTP488*), is an orally administered, small molecule antagonist targeting the receptor for advanced glycation endproducts ("RAGE"), for which we have commenced patient enrollment and have successfully completed the enrollment of sub-study A in a Phase 3 clinical trial (the "STEADFAST Study") under a Food and Drug Administration ("FDA") agreed Special Protocol Assessment ("SPA"). Our type 2 diabetes drug candidates include *TTP399*, an orally administered, liver-selective glucokinase activator ("GKA"), for which we have completed a Phase 2b clinical trial (the "AGATA Study") in August 2016, and *TTP273*, an orally administered, non-peptide agonist that targets the glucagon-like peptide-1 receptor ("GLP-1r"), for which we have completed a Phase 2 clinical trial (the "LOGRA Study") in December 2016. We have three additional programs in various stages of preclinical and clinical development for the prevention of muscle weakness and the treatment of inflammatory disorders.

Our Pipeline

We discovered our drug candidates internally using our proprietary drug discovery platform, TTP Translational Technology. The following table summarizes our current leading drug candidates and their respective stages of development:

Each of our most advanced drug candidates is the subject of patent and patent applications for composition of matter and method of use in major markets worldwide. Our patents in the U.S. are expected to provide us with intellectual property protection through 2029 for *azeliragon*, 2030 for *TTP399* and 2034 for *TTP273*, in each case, assuming we obtain the maximum possible extensions.

Our Strategy

Our goal is to leverage our powerful pipeline of orally administered, small molecule drug candidates to deliver novel, differentiated therapies to fill significant unmet medical needs. As key components of our strategy, we intend to:

- ***Continue Phase 3 enrollment and seek regulatory approval of azeliragon as a potential disease-modifying treatment for patients with mild AD***. We initiated the STEADFAST Study in April 2015 after receiving positive results from an analysis of data collected in our Phase 2b clinical trial of *azeliragon* in mild-to-moderate AD patients. The STEADFAST Study is being conducted under an FDA-agreed SPA and will serve as a registration trial for regulatory approval in the United States. We have successfully completed the enrollment of sub-study A of the STEADFAST Study and we expect to report topline data from sub-study A in early 2018 and from sub-study B in the second half of 2018. If results from sub-study A are favorable, we plan to initiate discussions with the FDA regarding an NDA for *azeliragon* in early 2018 and submit the NDA in late 2018 or early 2019. Additionally, the FDA granted Fast Track designation to *azeliragon* based on its potential as a disease-modifying therapy.
- ***Evaluate strategic collaborations for the commercialization of azeliragon***. We plan to seek strategic collaborations for the commercialization of and marketing of *azeliragon* in the United States and the rest of the world.
- ***Seek strategic collaborations for the continued development and commercialization of our type 2 diabetes programs***. With the positive topline results from our Phase 2 clinical trials of *TTP399* and *TTP273* in 2016, we plan to seek strategic collaborations with other pharmaceutical companies for the continued development of these investigational drug candidates as well as their potential commercialization and marketing in the United States and the rest of the world. We believe both compounds have the potential to establish significant market share in the type 2 diabetes market.

- ***Continue development of additional pipeline programs and seek strategic development partners for those programs***. We intend to continue developing our other drug candidates, while simultaneously evaluating strategic collaborations as they may arise.

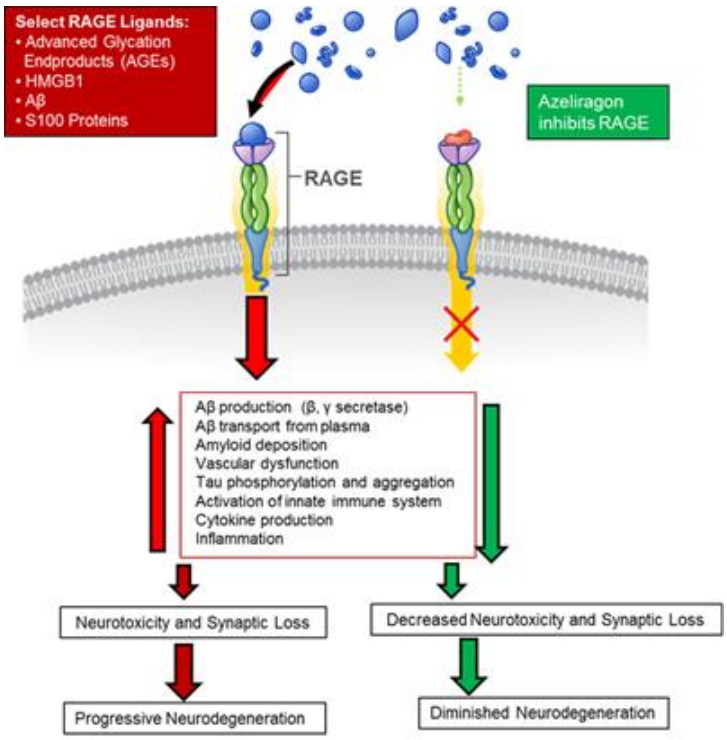
Our Alzheimer's Program – *Azeliragon*

Alzheimer's Disease and the Role of RAGE in its Onset

AD is a progressive neurodegenerative disorder that slowly destroys memory and thinking skills, and eventually the ability to carry out simple tasks. Its symptoms include cognitive dysfunction, memory abnormalities, progressive impairment in activities of daily living and a host of behavioral and neuropsychiatric symptoms. The exact cause of AD is unknown, however, genetic and environmental factors are established contributors. Amyloid Beta ("Aβ") plaques and neurofibrillary tangles of tau protein in the brain are believed to be the main causes of the disease, leading to loss of neuronal connectivity in the brain.

RAGE is an immunoglobulin-like cell surface receptor that is overexpressed in brain tissues of patients with AD. We believe that RAGE is an important cellular cofactor that binds ligands that are implicated in multiple etiologies of AD, including Aβ transport into the brain, the phosphorylation of tau, chronic inflammation, vascular dysfunction, metabolic dysregulation and neurotoxicity. These effects are attenuated following antagonism of the RAGE receptor.

Post-mortem studies in AD patients reveal increased RAGE expression in neuronal, microglial and endothelial cells when compared to similar subjects without AD. Cells around senile plaques express higher levels of RAGE during disease progression. Furthermore, expressed levels of RAGE are correlated with the severity of the disease. The data observed in human AD patients is consistent with the multiple pre-clinical *in-vitro* and *in-vivo* animal models studied by third parties that show RAGE is overexpressed in brain tissue of AD subjects. Taken together, we believe that literature provides substantial support for RAGE inhibition as a validated and promising therapeutic approach in the treatment of AD.



Current Treatments of Alzheimer's Disease and Their Limitations

Currently, there are no disease-modifying treatments approved for the treatment of AD, and there are only two classes of approved therapies for the treatment of symptoms of AD: acetylcholinesterase inhibitors ("AChEIs") and glutamatergic modulators. AChEIs are designed to slow the degradation of acetylcholine, helping to preserve neuronal communication and function temporarily, but do not

slow or halt neuronal death. Glutamatergic modulators are designed to block sustained, low-level activation of the N-methyl-D-aspartate ("NMDA") receptor without inhibiting the normal function of the receptor in memory and cognition, providing temporary symptomatic relief.

The currently available treatments combat the symptoms of AD rather than the underlying cause, or etiology, and as a result, AD continues to progress in these patients despite treatment. Similarly, the use of antidepressants and antipsychotics are often prescribed off-label to treat the symptoms of severe AD when patients suffer from agitation, aggressive behaviors, psychosis and depression. Recent drug candidates under development include those focused on Aβ synthesis or clearance from the brain, the phosphorylation of tau protein, chronic inflammation, vascular dysfunction, metabolic dysregulation and neurotoxicity.

Our Solution: Azeliragon

Azeliragon is an orally administered, small molecule investigational drug candidate that has the potential to be among the first FDA approved disease-modifying AD therapeutics due to its novel mechanism of action of inhibiting RAGE. Because of that potential, *azeliragon* has been awarded Fast Track designation by the FDA. The FDA grants Fast Track designation to facilitate the development and expedite the review of drugs intended to treat serious diseases or conditions and fill an unmet medical need. We have demonstrated that *azeliragon* is a potent and selective inhibitor of RAGE and, in an analysis of data collected in our Phase 2b clinical trial, *azeliragon* slowed the progression of cognitive decline in mild and mild-to-moderate AD patients. *Azeliragon* has the potential to offer a novel modality in AD therapeutics, and we are not aware of any other clinical-stage drugs targeting RAGE. Because there are currently no approved disease-modifying treatments for AD and since currently approved treatments are focused on symptom relief, we believe that *azeliragon* represents a potential new approach for the treatment of AD. In addition, we believe that in order to successfully treat and combat the physiological progression of AD, a disease-modifying therapeutic must act on multiple causes, or etiologies, of the disease. Unlike development stage disease-modifying treatments that target a singular cause of AD, *azeliragon* is designed to inhibit RAGE, which affects multiple aspects of AD etiology, including Aβ transport into the brain, the phosphorylation of tau, chronic inflammation, vascular dysfunction, metabolic dysregulation and neurotoxicity. To date, we have completed six Phase 1 and three Phase 2 clinical trials of *azeliragon*.

Ongoing Phase 3 STEADFAST Study

We initiated our Phase 3 clinical trial, the STEADFAST Study, in April 2015 pursuant to an SPA with the FDA and we have successfully completed the enrollment of sub-study A. The STEADFAST Study, which is being conducted in the United States as well as certain foreign jurisdictions, is a randomized, double-blind, parallel group, 18-month trial in patients with mild AD, which is the population that showed greater benefit from *azeliragon* in an analysis of our Phase 2b trial with patients on standard of care of AChEIs and/or memantine. For the purposes of the STEADFAST Study, patients with a Mini-Mental State Examination ("MMSE") score of 21 to 26 are considered to have mild AD. The study is conducted under a single protocol and will enroll 800 patients in total, divided equally across two independent 400-patient sub-studies, in which each subject will receive either a 5 mg/day dose of *azeliragon* or placebo, randomized on a one-to-one basis, added to the standard of care. The sub-studies are independently powered to demonstrate statistically significant differences in co-primary endpoints at month 18. The STEADFAST Study, if successful, will serve as the basis for filing an NDA in the United States and may also serve as a pivotal trial for marketing applications in other jurisdictions. Patients completing the STEADFAST Study may be able to participate in an open-label extension trial until the earlier of the commercial availability of *azeliragon*, if approved or 24 months from the date of their last visit.

The co-primary endpoints for the STEADFAST Study, the change from baseline in the Alzheimer's Disease Assssment Scale-Cognitive Subscale ("ADAS-COG_{11}") and the Clinical Dementia Rating Scale Sum of Boxes ("CDR-SB") scores, are designed to establish efficacy by demonstrating a slowing in the loss of cognition and function in AD patients treated with *azeliragon*. We are evaluating multiple secondary endpoints, including the key secondary endpoint of MRI brain volumetric measures. We believe that MRI imaging for volumetric measures has the potential to demonstrate modification of the underlying disease by *azeliragon*. Sub-study A completed enrollment in September 2016 and topline results are expected in early 2018. We expect to complete enrollment in sub-study B in June 2017, and topline results from sub-study B are expected in late 2018. If results from sub-study A are favorable, we plan to initiate discussions with the FDA regarding an NDA for *azeliragon* in early 2018 and submit the NDA in late 2018 or early 2019.

Completed Phase 2b Trial (TTP488-203)

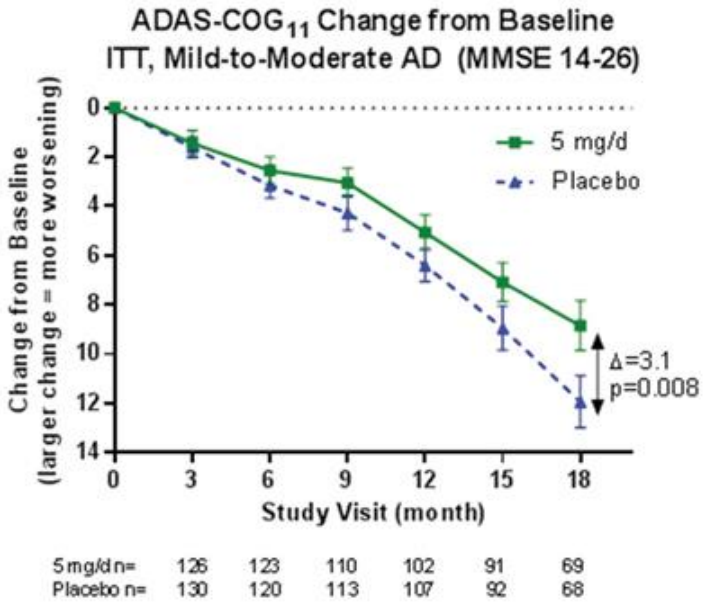
Efficacy in Mild-to-Moderate AD Patients

Our completed Phase 2b clinical trial of *azeliragon*, TTP488-203, was a randomized, double blind, placebo-controlled, 18-month trial assessing the safety and efficacy of *azeliragon* in 399 patients with mild-to-moderate AD, the intent-to-treat ("ITT") population. *Azeliragon* or placebo was added to the standard of care, AChEIs and/or memantine. Patients were randomized to receive an oral dose of 20 mg/day of *azeliragon*, 5 mg/day of *azeliragon* or placebo. Patients in the high dose *azeliragon* arm initially received 60 mg/day of *azeliragon* for six days followed by a daily 20 mg dose, while patients in the low dose arm initially received 15 mg/day of *azeliragon* for

six days followed by a 5 mg/day dose. The study was done in partnership with Pfizer and the Alzheimer's Disease Cooperative Study ("ADCS").

The primary endpoint of the study was to impede the progression of AD over 18 months as measured by the change from baseline in ADAS-COG$_{11}$ score. The secondary endpoints included the changes in global, functional, cognitive and behavioral attributes as measured by CDR-SB, the Alzheimer's Disease Cooperative Study Activities of Daily Living ("ADCS-ADL"), MMSE and Neuropsychiatric Inventory ("NPI").

Azeliragon, at the 5 mg/day dose, met its pre-specified ADAS-COG$_{11}$ endpoint demonstrating a statistically significant 3.1 point difference (p = 0.008) versus placebo at 18 months in patients with mild-to-moderate AD. The results of the primary ADAS-COG$_{11}$ endpoint are summarized in the figure below.

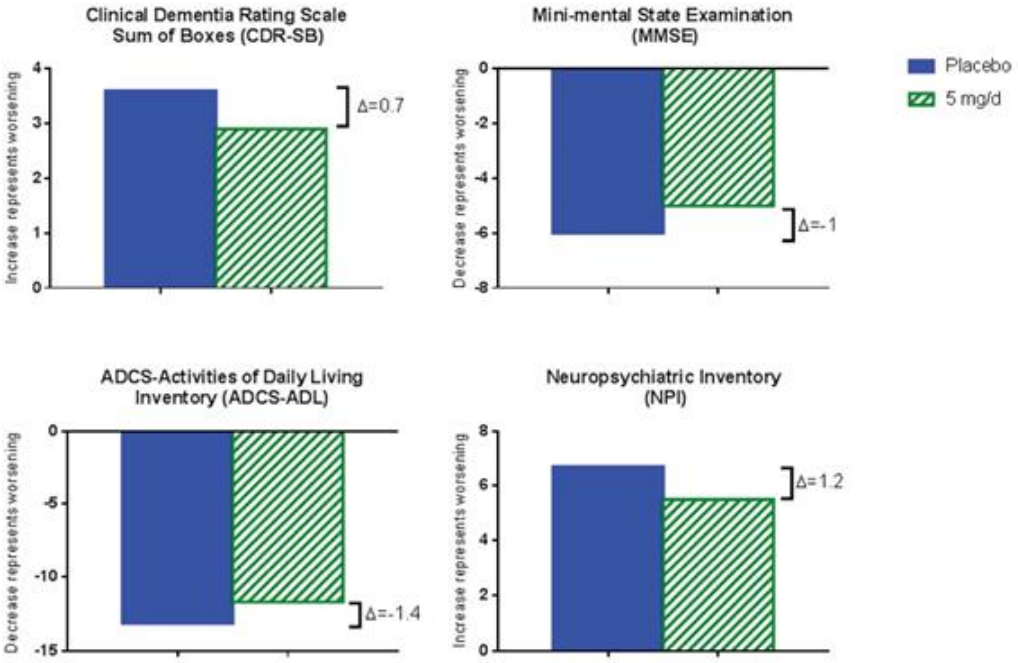


The above analysis utilizes the analysis of covariance, or ANCOVA, to determine statistical significance, with multiple imputation method to handle missing data, as specified in the protocol for the trial. Additional preplanned statistical analyses of the primary endpoint data, including complete cases ANCOVA, last observation carried forward ANCOVA, generalized estimating equations and mixed model repeated measures, demonstrated that, in each analysis, *azeliragon* produces statistically significant differences from placebo on ADAS-COG$_{11}$ ($p<0.05$).

The results for global, functional, cognitive and behavioral secondary endpoints after 18 months were also favorable despite the study not being powered to show significance. In each of the CDR-SB, ADCS-ADL, MMSE and NPI, patients in the 5 mg/day dose arm of *azeliragon* demonstrated numerical improvement compared to the placebo arm. In particular, the CDR-SB score improved by 0.7, the ADCS-ADL score improved by 1.4, the MMSE score improved by 1.0 and the NPI score improved by 1.2. In addition, the 5 mg/day treatment arm of *azeliragon* exhibited a statistically significant decrease in the incidence of psychiatric adverse events, including a statistically significant decrease in anxiety symptoms.

The results of the secondary endpoints in the ITT population are summarized in the following figures, which, in each case, illustrate a potential benefit of *azeliragon* versus placebo.

***Azeliragon* Effects on Global,**
Functional, Behavioral and Cognitive Secondary Endpoints
ITT, Mild-to-Moderate AD (MMSE 14-26)



Prior to the completion of the analyses described above, a pre-specified interim safety analysis was conducted when 50% of subjects had completed the six-month visit. The 5 mg/day and placebo groups had no safety concerns. The high dose group was found to be associated with an increased incidence of confusion, falls and greater ADAS-COG_{11} decline than placebo and was discontinued. The 5 mg/day and placebo groups were allowed to continue without modification after all subjects were re-consented. The cognitive impairment and side effects in the high dose group were demonstrated to be reversible after discontinuing the study drug.

A second pre-specified interim analysis, which did not include the population receiving the discontinued 20 mg/day dose, was conducted approximately 12 months after all subjects were randomized to compare only the 5 mg/day dose versus placebo for futility and safety. While this second pre-specified interim analysis also raised no concerns regarding safety in the low-dose group, the criterion for futility was met, and the Data Safety Monitoring Board ("DSMB"), recommended discontinuation of the study. Pfizer elected then to discontinue the study. The futility analysis was conducted using data from only 84 patients, rather than the full population of 266 patients, and the data used in the analysis had not yet undergone rigorous database monitoring and error correction. Prior to the final database lock but after the decision to discontinue the study, data entry and scoring errors were found and corrected. Subsequent to the final database lock, we and independent statisticians attempted to replicate the results of Pfizer's futility analysis but were unable to do so.

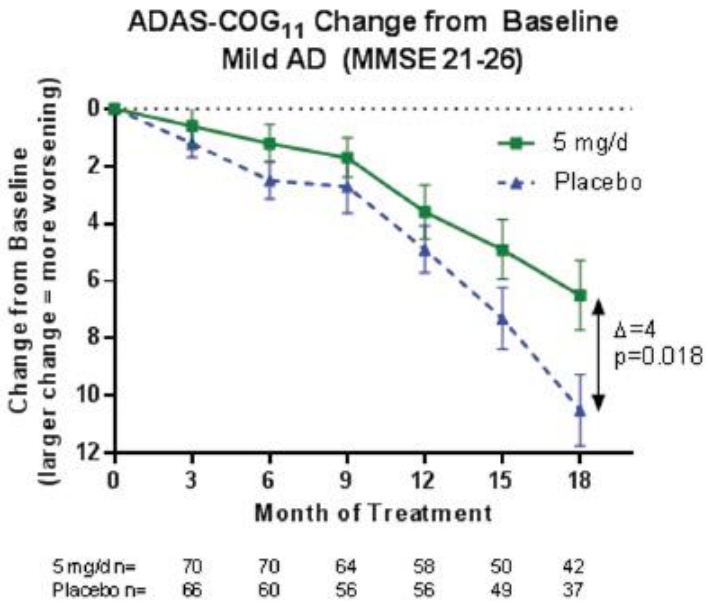
In accordance with the protocol-specified statistical analysis plan, Pfizer and the ADCS performed the analysis of the 5 mg/day dose with respect to the primary ADAS-COG_{11} endpoint and the secondary endpoints, which produced the positive results described above. Additional analyses that we conducted subsequently also produced results consistent with the results of the protocol-specified analysis. Pfizer reverted the program to us in September 2011 and retains no residual economic rights in the program.

Efficacy in Mild AD Patients

Azeliragon at the 5 mg/day dose showed more pronounced efficacy in the mild AD sub-population (MMSE score 21-26) compared to patients with moderate AD (MMSE score 14-20). In the mild AD sub-population including 73 subjects randomized to

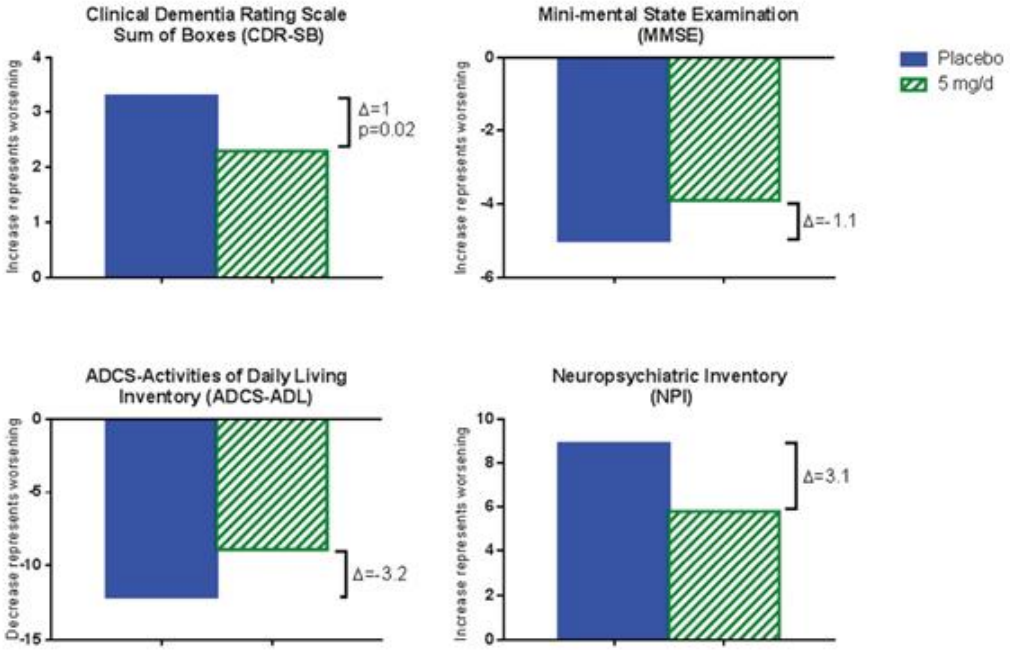
receive drug, *azeliragon* exhibited a statistically significant 4.0-point difference (p=0.018) in the ADAS-COG$_{11}$ score relative to the placebo arm, which included 68 subjects. In addition, while the study was not powered to show statistical significance in global, functional, behavioral and cognitive secondary endpoints, the mild AD sub-population demonstrated more pronounced favorable effects in those endpoints, including a statistically significant 1.0-point difference in the CDR-SB score (p=0.02) compared to the placebo group. The additional secondary endpoints demonstrated numerical improvements of 3.2 for the ADCS-ADL score, 1.1 for the MMSE score and 3.1 for the NPI score.

The results of the primary ADAS-COG$_{11}$ endpoint in the mild AD population are summarized in the figure below.



The results of the secondary endpoints in the mild AD population are summarized in the following figures, which, in each case, illustrate potential benefits of *azeliragon* versus placebo.

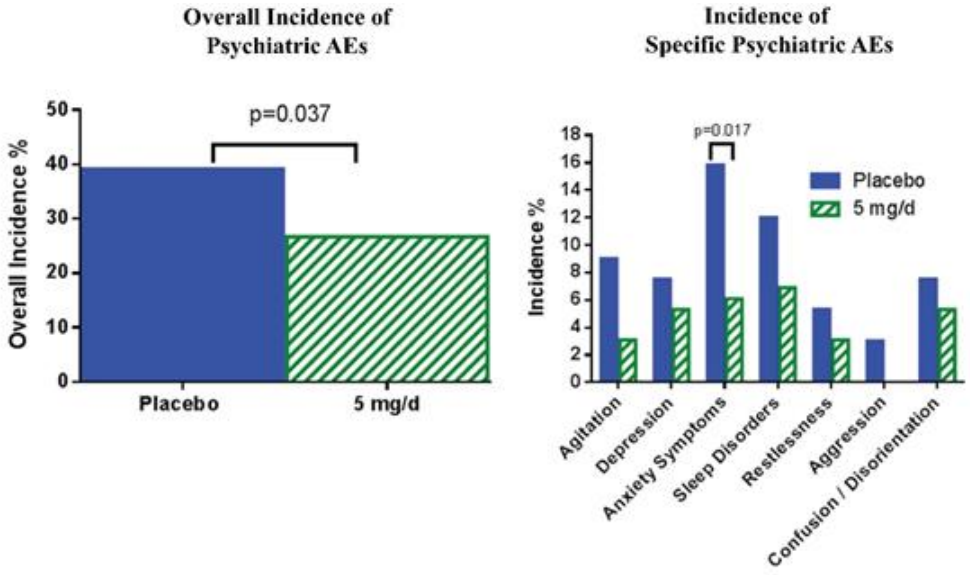
***Azeliragon* Effects on Global,**
Functional, Behavioral and Cognitive Secondary Endpoints
Mild AD (MMSE 21-26)



Adverse Events (Mild to Moderate AD Patients)

Among the most frequent adverse events ("AEs") in patients who received the high dose (20 mg/day) of *azeliragon* were falls (30 / 22.2%), urinary tract infection ("UTI") (24 / 17.8%), diarrhea (20 / 14.8%), fatigue (19 / 14.1%), dizziness (12 / 8.9%), confusional state (10 / 7.4%) and headache (9 / 6.7%). Falls and UTI were also among the most frequent AEs in patients who received the low dose (5 mg/day) of *azeliragon* and placebo. The incidences of falls and UTI in the low-dose treatment group were 26 (19.8%) and 21 (16.0%), respectively; the incidences of falls and UTI among patients who received placebo were 26 (19.7%) and 17 (12.9%), respectively.

Of particular note, there was a statistically significant lower incidence of psychiatric AEs in patients receiving 5 mg/day compared to placebo. This was evidenced by a statistically significant lower incidence of anxiety symptoms, along with numerically lower incidence of agitation, depression, sleep disorders, restlessness, aggression and confusion/disorientation.



No marked mean vital signs results or changes from baseline were observed in the active treatment groups compared to subjects who received placebo. There were no significant differences in laboratory blood or urine parameters or ECG changes between the three groups. No MRI findings of amyloid-associated imaging abnormalities ("ARIA") were seen.

The high dose (20 mg/day) *azeliragon* arm was discontinued due to an increased incidence of confusion, falls, and an apparent accelerated cognitive decline suggested by a greater change over time in ADAS-COG_{11} score at a pre-specified interim analysis by an independent DSMB. There were no safety concerns evident in the 5 mg/day dose or placebo and these groups were permitted to continue the trial following re-consenting of subjects. The cognitive impairment and side effects in the 20 mg/day dose were demonstrated to be reversible after discontinuing the study drug. The trajectory of the ADAS-COG_{11} change from baseline curve over time not only showed the reversal of the transient cognitive worsening but ultimately crossed the placebo curve suggesting a possible underlying effect on the disease process. The mechanism behind the central nervous system ("CNS") toxicity is unclear, but there were no signs of increased brain atrophy, no change in CSF and plasma levels of Aβ, and no detected amyloid-related imaging abnormalities in the high-dose group.

Our Diabetes Programs – Glucokinase Activator and GLP-1r Agonist

Diabetes Overview

A person suffering from type 2 diabetes does not produce or properly use insulin (a hormone necessary for allowing uptake of sugar from the bloodstream so that it may be converted into energy). In type 2 diabetes, the secretion of insulin from the pancreas and the action of insulin on tissues such as fat and muscle are both abnormal. Type 2 diabetics produce insulin, but insulin production and use both decrease over time as the disease progresses, ultimately requiring insulin administration to manage the disease. Obesity is generally considered the major contributor to the development of type 2 diabetes. As the global obesity epidemic expands, the increase in the number of type 2 diabetes patients has and is expected to continue. With the increasing incidence and prevalence of type 2 diabetes, we believe there is a significant unmet medical need for treatment alternatives with improved efficacy and safety.

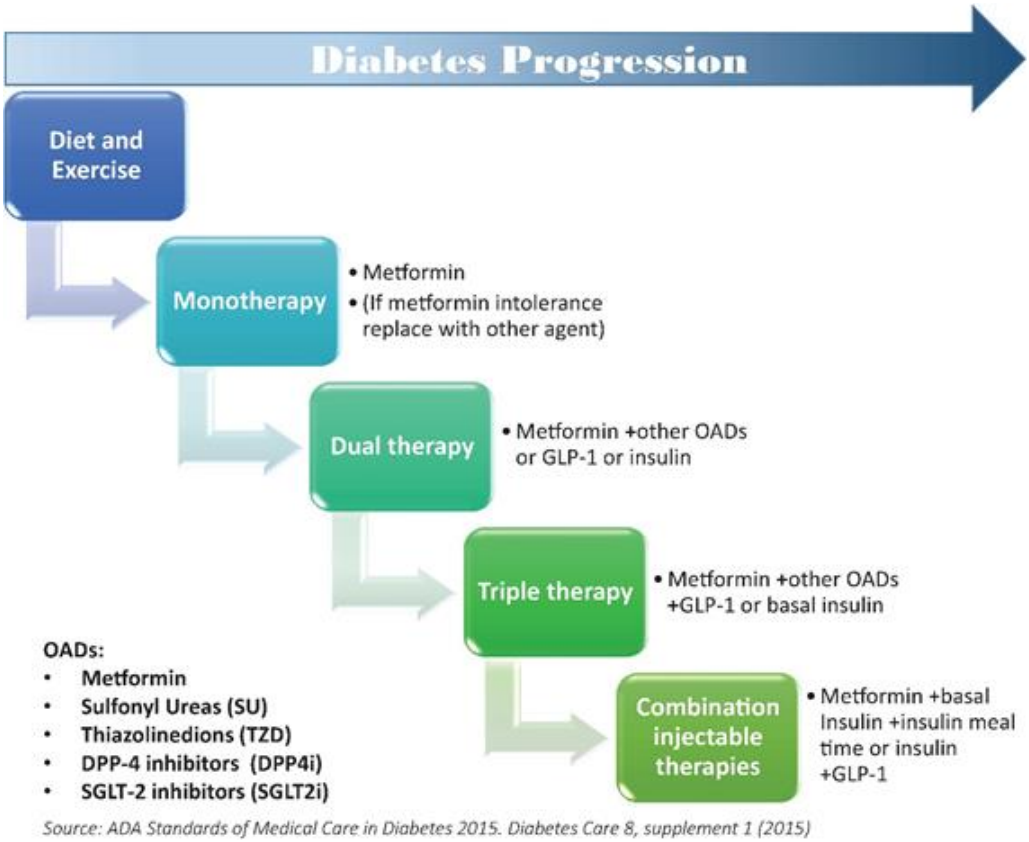
Current Treatments for Diabetes and Their Limitations

The current treatment paradigm for diabetes focuses on lifestyle changes, including weight loss, if applicable, as well as medications to manage blood glucose levels. Obesity is generally considered the major contributor to the development of type 2 diabetes, and weight loss alone is associated with improvements in glycemic parameters. Optimal glycemic control is the treatment goal in diabetic patients to prevent the risk of long-term microvascular complications. There are currently several classes of drugs approved to improve glycemic control in patients with diabetes, including injectable drugs and oral anti-diabetic drugs ("OADs"). Existing

injectable therapies include most forms of insulin therapy and GLP-1r agonists. Existing OADs include metformin, sulfonylureas and thiazolidinediones, with the addition of two new classes in the past few years, DPP-4 and SGLT-2 inhibitors, driving the OAD market's growth. Despite the range of available therapies, diabetic patients have difficulty achieving and maintaining consistent glycemic control, defined as $HbA_{1c} < 7\%$ as recommended by the American Diabetes Association, and eventually progress to insulin use. Failure to attain or maintain glycemic control over time raises a patient's risk of disease progression with the attendant loss of control and progression to potentially serious complications, such as cardiovascular disease, blindness, kidney failure, and nerve damage. We believe the continued and significant unmet medical need for diabetes treatments is demonstrated by the commercial success of DPP-4 inhibitors, a new class of OADs which were first approved in the United States in 2006 and achieved annual sales of $5.2 billion in 2013.

We expect our diabetes investigational drug candidates, if approved, to compete in the non-insulin therapy market, currently comprised of OADs and injectable GLP-1r agonists. OADs are the preferred first line treatment by physicians (primary care and endocrinologists), payors and patients given their ease of use, convenience and no training requirements. The goal of these therapies is to delay the progression to insulin dependence (see the figure below). Despite the availability of multiple oral therapies and the introduction of new oral therapies (DPP-4 and SGLT-2 inhibitors) with novel mechanisms, which are used both as monotherapy and in combination with other agents, there remains a lack of differentiation and inadequate efficacy. While GLP-1r agonists are generally considered to have superior efficacy compared with OADs, primary care physicians and patients continue to prefer oral agents for their ease of use and improved patient compliance versus injectables. There remains an unmet medical need in the OAD class for a drug that mimics the superiority of GLP-1r agonists and reduces the incidence of hypoglycemia.

Progression of type 2 diabetes and treatment intensification using commonly prescribed oral and injectable diabetes drugs is summarized below.



Source: ADA Standards of Medical Care in Diabetes 2015. Diabetes Care 8, supplement 1 (2015)

Our Solutions: Glucokinase Activator and GLP-1r Agonist

With the increasing incidence and prevalence of type 2 diabetes, we believe there is a significant unmet medical need for treatment alternatives with improved efficacy and safety. We have chosen two different approaches for the treatment of diabetes: activation of GK,

through our drug candidate *TTP399*, and stimulation of GLP-1r, through our drug candidate *TTP273*. If approved, we believe *TTP399* and *TTP273* could offer attractive alternatives as OADs for the treatment of type 2 diabetes.

Glucokinase Activator

The Role of GK Activation in Diabetes

GK acts as the physiological glucose sensor, changing its conformation, activity and/or intracellular location in parallel with changes in glucose concentrations. GK has two main distinctive characteristics that make it a good choice for blood glucose control. First, its expression is mostly limited to tissues that require glucose-sensing (mainly liver and pancreatic β-cells). Second, GK is able to sense changes in serum glucose levels and modulate changes in liver glucose metabolism that in turn regulate the balance between hepatic glucose production and glucose consumption, and modulate changes in insulin secretion by the β-cells.

Studies in humans, along with numerous animal studies, showing that mutations in the gene encoding GK can cause both hyperglycemia (diabetes mellitus) and hypoglycemia (glucose levels below normal) depending on the mutation, confirm the critical role of GK in the regulation of glucose control. The concept of GK activation for the treatment of diabetes is attractive because it has proven to be effective and safe in normalizing glycemia in animal models of type 2 diabetes by a mechanism entirely distinct from the action of antidiabetic therapies currently on the market. Moreover, several lines of evidence have suggested that development of type 2 diabetes is related to functional impairment of the GK enzyme. Thus, GK activation may be a way to overcome an important underlying cause of type 2 diabetes progression and hence halt or delay the course of the disease.

Many competitors have tried to develop drugs that act as GKAs. Previously identified GKAs evaluated in the clinic for the treatment of type 2 diabetes demonstrate improved glucose control; however, these GKAs showed increased incidence of hypoglycemia and hyperlipidemia and an apparent lack of durability. These liabilities have been correlated to hyperstimulation of the β-cells in a glucose independent manner and/or the accumulation of lipids in the liver, consistent with the disruption of GK and the glucokinase regulatory protein (“GKRP”) interaction by these GKAs. Thus, liver-selective compounds that do not activate GK in pancreatic β-cells or affect the GK-GKRP interaction in the liver are expected to demonstrate a superior profile in comparison to previously identified GKAs.

TTP399

TTP399 is an orally administered, small molecule, liver-selective GKA in development as a new potential OAD for the treatment of type 2 diabetes with a novel mechanism of action: liver-selective activation of GK that seeks to provide intensive glycemic control without inducing significant hypoglycemia. If approved, we believe *TTP399* would compete primarily with other OADs, including DPP-4 and SGLT-2 inhibitors. Our trials for *TTP399* suggest that our approach to GK activation has the potential to avoid the tolerability issues associated with other GKAs, such as activation of GK in the pancreas, stimulation of insulin secretion independent of glucose, hypoglycemia, increased lipids and liver toxicity. Further, we believe that *TTP399*, if approved, has the potential to normalize HbA_{1c} levels without having contraindication for renal impairment and with little risk of pancreatitis. Based on data from Phase 1 and 2 trials to date, we believe that *TTP399*, if approved, has the potential to be a first-in-class OAD due to its liver-selectivity and novel mechanism of action. We are continuing to explore options for further development of this product alone or in collaboration with a partner.

We have completed nine Phase 1 and two Phase 2 clinical trials of *TTP399*. In our Phase 1 and 2 clinical trials, *TTP399* was well tolerated with negligible incidence of hypoglycemia.

Completed Phase 2b AGATA Study

In August 2016, we completed a Phase 2b clinical trial of *TTP399*, the AGATA Study, which was a six-month trial to demonstrate proof-of-concept that the benefits from *TTP399* could be sustained over time. The AGATA Study was a multi-center adaptive Phase 2b, randomized, double-blind, placebo- and active- (sitagliptin) controlled, parallel group trial to evaluate the safety and efficacy of *TTP399* following six months of administration in 190 subjects with type 2 diabetes on a stable dose of metformin. Patients had a baseline HbA_{1c} of 7.0 - 9.5%. The AGATA Study included subjects across four arms, including two doses of *TTP399* (400 mg and 800 mg), sitagliptin, which is a DPP-4 inhibitor, and placebo.

The primary endpoint of the AGATA Study was the change from baseline in HbA_{1c} at six months. The secondary endpoints, included subject achievement of $HbA_{1c} < 7\%$ at six months, subject achievement of $HbA_{1c} < 6.5\%$ at six months, plasma glucose, lipids (triglycerides, total cholesterol, HDL cholesterol, and LDL cholesterol), insulin, lactate, C-peptide, glucagon, GLP-1 and body weight.

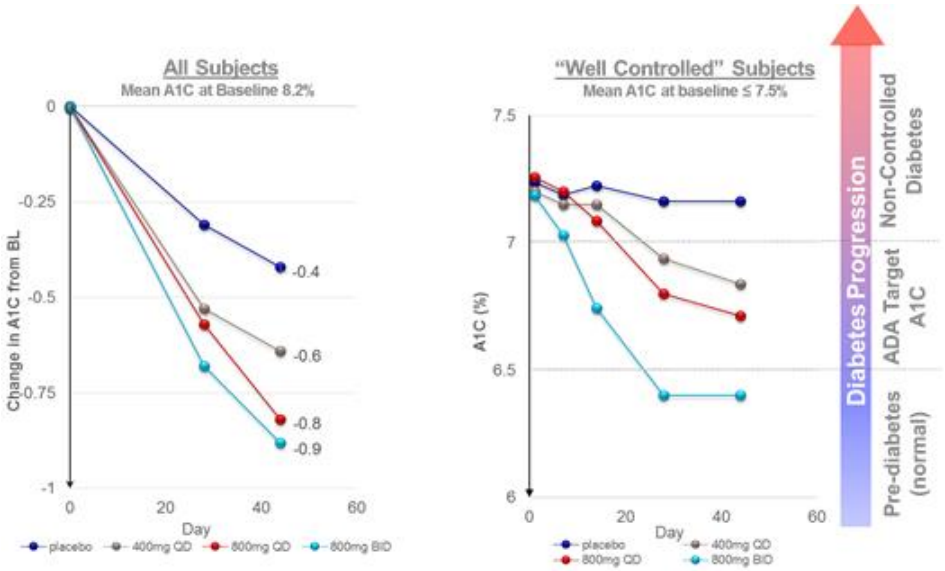
In the trial, *TTP399* demonstrated achievement of the primary endpoint of statistically significant change from baseline in HbA_{1c} at six months of daily administration of 800 mg of *TTP399*. The reduction in HbA1c was dose-dependent and sustained throughout the duration of the study. *TTP399* was also found to be well-tolerated.

Completed Phase 2a Clinical Trial (TTP399-201)

We completed a six-week Phase 2a clinical trial of *TTP399*, a randomized, double-blind, parallel-group, placebo-controlled, multiple dose study in 120 type 2 diabetes patients whose glycemic parameters were not well-controlled on metformin. The trial was designed to assess the pharmacokinetics, pharmacodynamics, safety and tolerability of *TTP399* and was conducted at 11 centers in the United States. Patients were randomized into four arms: 29 received *TTP399* 400 mg twice a day ("BID"), 31 received *TTP399* 800 mg once a day ("QD"), 30 received *TTP399* 800 mg BID and 30 received placebo. All patients remained on consistent doses of metformin throughout the trial. HbA_{1c} was generally consistent across arms in the trial with an average of approximately 8.2%.

In the trial, *TTP399* demonstrated a statistically significant reduction in HbA_{1c} levels in all *TTP399* dose groups compared with placebo, without induction of hypoglycemia or hyperlipidemia and with no induction of insulin secretion in patients with type 2 diabetes. Moreover, *TTP399* normalized glycemia, defined as $HbA_{1c} \leq 6.5\%$, after only six weeks of treatment. Specifically, within the high dose arm of *TTP399*, approximately 86% of patients with HbA_{1c} levels $\leq 7.5\%$ at baseline achieved blood glucose normalization, defined as $HbA_{1c} \leq 6.5\%$, after six weeks of treatment, while 50% of patients with HbA_{1c} levels $\leq 8\%$ at baseline achieved normalization after six weeks. For all doses combined, approximately 40% of patients with HbA_{1c} levels $\leq 7.5\%$ at baseline achieved blood glucose normalization while 25% of patients with HbA_{1c} levels $\leq 8\%$ at baseline achieved normalization. None of the patients receiving placebo reached HbA_{1c} normalization.

The results showing the reduction in HbA_{1c} in all subjects and the subgroup with HbA_{1c} levels $\leq 7.5\%$ at baseline are summarized in the following figures:



Clinical results also showed a statistically significant effect on both postprandial glucose, fasting glucose, average daily glucose and no increases on fasting plasma lipids or plasma lactate.

TTP399 was generally safe and well tolerated at all doses in the trial. The proportion of patients reporting at least one AE was between 42% to 63% in the *TTP399* groups compared to 40% in the placebo group. There was no notable imbalance in the reporting of any AE between the active trial and the placebo. There were no AEs that led to discontinuation of study drug. There was no dose-responsive increase in the percentages of subjects with at least one AE. One subject in the 800 mg QD group experienced a moderate severe AE of diverticulitis on Day 15 that was considered not related to study drug. No action was taken with study drug, and the event resolved ten days later.

GLP-1r Agonist

The Role of GLP-1r Activation in Diabetes

GLP-1r is a class B, G protein-coupled receptor that regulates important physiological and pathological processes related to type 2 diabetes. GLP-1r stimulation as a therapeutic modality has been validated by the approval of peptide GLP-1r agonists, such as exendin-4 (Byetta) and liraglutide (Victoza). Subcutaneous administration of these peptides lowers blood glucose, decreases HbA_{1c} levels and reduces weight. However the injectable method of administration has limited their use. This injectible class of peptides is associated

with gastrointestinal side effects (nausea and vomiting). Despite the clinical success observed with the injectable peptides, no orally available GLP-1r agonists have demonstrated similar success to date.

TTP273

TTP273 is a potential first-in-class, orally administered, small molecule, non-peptide GLP-1r agonist. Our past proof-of-concept study with our first generation product, *TTP054*, demonstrated reductions in HbA_{1c} similar to marketed GLP-1r agonists, and our trials indicated that *TTP273* may have acceptable tolerability, as shown through low incidence of gastrointestinal AEs and no antibody formation. We believe an orally administered GLP-1r agonist that mimics the metabolic effects of GLP-1r showing enhanced glycemic control, an improved lipid profile and weight loss, without causing the gastrointestinal side effects typical of this class of compounds, would offer a competitive advantage compared to GLP-1r targeted treatment options currently available. For these reasons, we believe *TTP273* has the potential to expand the use of GLP-1r agonists for the treatment of type 2 diabetes.

We have completed two Phase 1 clinical trials and one Phase 2 clinical trial of *TTP273*. Additionally, we have completed nine Phase 1 clinical trials and one Phase 2 clinical trial of *TTP054*, which was a predecessor orally administered GLP-1r agonist. In our Phase 1 and Phase 2 clinical trials, *TTP273* and *TTP054* have been well tolerated with negligible incidences of nausea and vomiting. Based on the results of our completed Phase 1 and 2 clinical trials of *TTP273* and *TTP054*, we believe our orally administered GLP-1r agonists have the potential to provide both superior efficacy and tolerability versus peptide GLP-1r analogues.

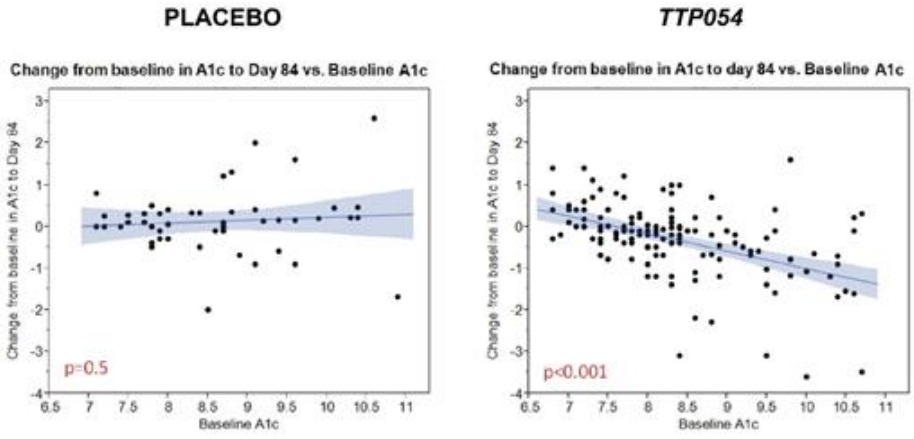
Completed Phase 2 LOGRA Study

Our completed Phase 2 LOGRA study of *TTP273* was a 12-week study conducted in 30 centers in the United States in 174 patients with Type 2 diabetes on stable doses of metformin. In the LOGRA study, the patients were randomized to receive either placebo or *TTP273* at doses of 150 mg once or twice daily. Patients in the once and twice daily treatment arms had mean placebo-subtracted HbA1c differences of -0.86 percent and -0.71 percent, respectively. HbA1c increased by 0.15 percent in patients randomized to placebo. Although the study was not powered to demonstrate weight loss, trends were observed with patients losing on average 0.9 kg and 0.6 kg in the once and twice daily arms, respectively. We are continuing to analyze the full study results.

Completed Phase 2 Study (TTP054-201)

Our completed Phase 2 clinical trial of *TTP054* was a randomized, double-blind, parallel-group, placebo-controlled, 12-week, multiple dose study in 187 randomized type 2 diabetic patients who were not well-controlled on metformin. The trial was designed to assess the safety and efficacy of *TTP054*. The trial was conducted at 19 centers in the United States. Patients were randomized into four arms: 28 to receive *TTP054* 200 mg/day, 51 to receive *TTP054* 400 mg/day, 56 to receive *TTP054* 800 mg/day and 52 to receive placebo. The primary efficacy endpoint of the trial was change from baseline in HbA_{1c} as compared to placebo. The secondary endpoints included change from baseline in fasting plasma glucose, subject achievement of HbA_{1c} <7%, change from baseline in body weight, and subject achievement of body weight loss ≥ 2%.

Our proof-of-concept trial showed statistically significant change in the average level of blood sugar as measured by HbA_{1c} from baseline as compared to placebo. In the trial, there was a reduction of 1% HbA_{1c} in the target population (A_{1c} 8-10%) This reduction was consistent with published data for marketed GLP-1 mimetics (exenatide) in studies of similar duration.



These clinical trials showed that our investigational GLP-1r agonists had negligible incidences of AEs and no increased risk of hypoglycemia when compared to placebo. In our completed Phase 2 trial of *TTP054*, a total of 178 AEs were reported by 69 of 184 patients, or 38%. The proportion of patients reporting at least one AE was highest in the *TTP054* 800 mg/day dose group at 45% versus 40% in the placebo group. The proportion of patients that reported at least one AE were lowest in the 400 mg and 200 mg dose groups at 27% and 37%, respectively.

Overall, in our Phase 2 trial, *TTP054* was well-tolerated. There were no hypoglycemia AEs, and GI AEs, including nausea and vomiting, were minimal and similar in incidence and severity in active and placebo groups. There were five subjects with AEs that were considered serious and led to discontinuation from the study. Among these subjects, only two AEs occurred in *TTP054*-treated subjects (increases in LFTs without increased bilirubin) and were considered related to *TTP054*. All of these AEs resolved with no sequelae.

TTP273 was generally well-tolerated in our completed Phase 1 clinical trials, with no severe AEs reported after up to 14 days of dosing. There was no apparent dose relationship and no hypoglycemic incidents.

Additional Pipeline Opportunities

Oncology – Hexokinase II Inhibitors

The field of tumor metabolism seeks to exploit the unique ways in which cancer cells take up and utilize nutrients in order to grow and proliferate. Cancer cells have altered cellular metabolic pathways to acquire and utilize these nutrients and redirect them to provide the necessary building blocks for growth. When these metabolic pathways are blocked, cancer cells are essentially starved of critical nutrients and stop growing or die, whereas normal cells are largely unaffected.

Most cancer cells have increased uptake of the sugar glucose relative to surrounding normal cells. This phenomenon forms the basis for the widely used tumor imaging procedure known as 18F-2-deoxyglucose (FDG)/PET. Tumors take up more FDG, a radioactive glucose analog, than the surrounding normal tissue and this differential can be visualized with PET imaging. Not only do tumors take up more glucose, they also utilize the nutrient in a unique way. Tumors convert glucose into lactic acid in a process known as aerobic glycolysis or the “Warburg effect,” a route rarely utilized in normal cells. This unique uptake and processing of glucose by tumors relative to normal tissue creates an opportunity to selectively target tumors by cutting off their ability to use this fuel.

In many cancers, hexokinase II is overexpressed and has been linked to more aggressive and invasive tumors. Pre-clinical studies in mice have confirmed that the reduction of hexokinase II activity through genetic deactivation (siRNA knockdown studies) results in a significant reduction of tumor growth. Our hexokinase inhibitors may provide an opportunity to inhibit the unique way cancer cells utilize glucose, and the overall Warburg effect, which could potentially result in new treatments for cancer.

Calithera Biosciences, Inc. (“Calithera”) has exclusive, worldwide rights to our hexokinase II inhibitors for research, development and commercialization. We have received an initial license fee from Calithera, and Calithera will pay us potential development and regulatory milestone payments and royalty payments under the agreement. See *Intellectual Property – License Agreements – Calithera* later in this section for further details.

Other Candidates

We are also developing a portfolio of additional investigational drug candidates for the prevention of muscle weakness associated with prolonged mechanical ventilation and critical injury, as well as the treatment of inflammatory disorders. Such candidates include: (1) a novel PDE4 inhibitor (HPP737) with a low potential for emesis which may allow an expanded therapeutics scope than currently marketed products in Psoriasis and Atopic Dermatitis; and (2) a PPAR-δ agonist (HPP593) that exhibits beneficial effects on lipid profile and slowed muscle loss associated with immobilization in Phase 1 clinical studies. These additional candidates have been through varying stages of preclinical and Phase 1 testing and we have submitted investigational new drug applications (“INDs”) for certain of them to the FDA. While our primary focus is on the clinical trials involving azeliragon, TTP399 and TTP273, we plan to continue to evaluate opportunities for furthering the development of these other compounds in our pipeline. Such development many be done internally or through partnering relationships.

Our Proprietary Technology Platform

We use a proprietary drug discovery platform that facilitates the discovery of novel drug candidates in a time- and cost-efficient manner. Using this discovery technology, we have completed the discovery phase for some of our most promising candidate drugs in weeks and months, as compared to an industry average of two to three years, and with this technology, we expect to similarly be able to reduce the discovery phase for any future potential drug candidates.

TTP Translational Technology

We developed a proprietary drug discovery platform called TTP Translational Technology, which we use to discover novel small molecule therapeutics for major diseases and to validate biological pathways and targets. All of the small molecule drug candidates in our pipeline (other than *HPP593*) were discovered using TTP Translational Technology.

TTP Translational Technology is a fully integrated drug discovery process, amenable to automation, which works to translate genomic and proteomic data into safe and effective small molecule therapeutics in high-throughput fashion, bypassing most of the classical requirements and bottlenecks in drug discovery. We have used this technology to discover drugs for our internal pipeline and in research collaborations with other pharmaceutical and biotechnology companies.

Our Integrated Platform

TTP Translational Technology consists of three modules that are fully integrated with an informatics system that captures data from each optimization cycle of the drug discovery process. This informatics system is built with a sophisticated architecture that supports various computing platforms and provides automatic archiving and storage capabilities. The three modules comprising TTP Translational Technology are:

- **TTPredict** provides modeling tools, simulations, statistical and analysis algorithms and visualization in one package. The resulting molecular discovery process couples high throughput *in silico* and *in biologico* screening data with extensive automation in a parallel and integrated fashion in order to rapidly develop hypotheses concerning novel protein structures and potential ligand binding sites. The system uses high-throughput virtual docking, ranking and screening and employs multiple scoring methods. These operations are encompassed within component modules known as TTPostGene, TTPSite, TTPDock and TTPSelect.
- **TTPSpace** is a proprietary library of diverse, drug-like, well characterized compounds (TTProbes and related compound libraries) that can be used in our automated drug discovery processes. We have the capacity to synthesize hundreds if not thousands of well-characterized compounds per day in milligram quantities. TTProbes are an ensemble of functionally diverse, structurally unique and nested low molecular weight molecules exemplifying key recognition elements that enable an immediate interpretation and subsequent extrapolation of the geometric, stereo-electronic and physiochemical requirements for binding to target proteins. These molecular probes deliver a focused yet adjustable technique for lead discovery or target validation, especially when coupled to the computational capabilities embodied in TTPredict. TTProbes are tools for rapid biological target validation, bypassing the often time-consuming process of classical pharmacology requirements, quickly producing data about essential binding elements between biological targets and small molecule modulators. Selectivity and specificity data is generated much earlier compared to hits against a classical library, while minimizing negative prior art issues.
- **TTPScreen** consists of novel translational biology techniques, including genomic and high-content imaging processes and proprietary tools built with a sophisticated architecture that supports various computing platforms and utilizes dynamic scripting and parallel execution, allowing management of large amounts of biological data generated from high-throughput screening, including complex experimental protocols, flexible and dynamic assay layouts, multiple IC50 determinations, interactive profiling and kinetic studies. TTPScreen allows full utilization and access to all the available biological and chemical data and information in a highly integrated fashion.

TTP Translational Technology reduces manual tasks, provides rapid validation, lead discovery and optimization of novel clinical candidates, reduces prior art issues associated with leads pulled from classical sources and is capable of addressing the need and demand for complex, non-traditional biological targets such as protein-protein interactions.

Our average time from biological concept through completion of Phase 1 trials is about four to five years, which is half of the industry average, helping to lower costs and enhance the speed of drug development. Our development methods can be used to identify targets in various therapeutic areas and are scalable to support a large number of programs.

Third-Party Suppliers and Manufacturers

We do not own or operate, and currently have no plans to establish, any manufacturing facilities. We currently rely, and expect to continue to rely, on third parties to manufacture clinical supplies of our drug candidates and for our other research and discovery programs.

Intellectual Property

Patents

The IP portfolio for *azeliragon* includes a patent family covering *azeliragon* as a composition of matter, a patent family covering polymorphs of *azeliragon* and a patent family covering select methods of treatment using *azeliragon*. *Azeliragon* as a composition of

matter is covered by issued patents in the United States, Europe, Japan, Canada, Australia, China and Hong Kong. The issued U.S. patent covering *azeliragon* as a composition of matter is expected to expire in 2029, assuming we obtain the maximum possible extension. Patents covering *azeliragon* as a composition of matter outside the United States will expire no earlier than 2023 and may expire much later as a result of patent term extensions based on patent office delays, regulatory delays, or a combination thereof.

The IP portfolio for *TTP399* includes a patent family covering *TTP399* as a composition of matter, a patent family covering combinations of *TTP399* and metformin, a patent family covering combinations of *TTP399* and DPP-4 inhibitors or GLP-1r agonists, and patent families covering two different solid formulations of *TTP399*. The patent family covering *TTP399* as a composition of matter was filed in multiple jurisdictions around the world including the United States, Europe, Japan and Canada. The issued U.S. patent covering *TTP399* as a composition of matter is expected to expire in 2030, assuming we obtain the maximum possible extension. Patents covering *TTP399* as a composition of matter outside the United States will expire no earlier than 2025 and may expire much later as a result of patent term extensions based on patent office delays, regulatory delays, or a combination thereof. Some patents and patent applications covering *TTP399* as a composition of matter are licensed from Novo Nordisk A/S, while others are owned by us.

The IP portfolio for the GLP-1r program includes a patent family covering *TTP054* as a composition of matter, a patent family covering *TTP273* as a composition of matter, a patent family covering specific salts of *TTP054*, a patent family covering combinations of *TTP054*, or *TTP273*, and metformin, and a patent family covering methods of synthesizing precursors to *TTP054* and *TTP273*. The patent family covering *TTP054* as a composition of matter was filed in multiple jurisdictions around the world including the United States, Europe, Japan and Canada. The issued U.S. patent covering *TTP054* as a composition of matter is expected to expire in 2034, assuming we obtain the maximum possible extension. Patents covering *TTP054* as a composition of matter outside the United States will expire no earlier than 2029 and may expire much latter as a result of patent term extensions based on patent office delays, regulatory delays, or a combination thereof. The patent family covering *TTP273* as a composition of matter was filed in multiple jurisdictions around the world including the United States, Europe, Japan and Canada. The issued U.S. patent covering *TTP273* as a composition of matter is expected to expire in 2034, assuming we obtain the maximum possible extension. Patents covering *TTP273* as a composition of matter outside the United States will expire no earlier than 2030 and may expire much later as a result of patent term extensions based on patent office delays, regulatory delays or a combination thereof.

Trade Secrets

In addition to patents, we rely on trade secrets and know-how to develop and maintain our competitive position. For example, significant aspects of our TTP Translational Technology are based on unpatented trade secrets and know-how. Trade secrets and know-how can be difficult to protect, and a number of the individual components of our TTP Translational Technology are now commercially available. We seek to protect our proprietary technology and processes, in part, by entering into confidentiality agreements and invention assignment agreements with our employees, consultants, scientific advisors, contractors and commercial partners. These agreements are designed to protect our proprietary information and, in the case of the invention assignment agreements, to grant us ownership of technologies that are developed by employees or through a relationship with a third party. We also seek to preserve the integrity and confidentiality of our data and trade secrets by maintaining physical security of our premises and physical and electronic security of our information technology systems. While we have confidence in these individuals, organizations and systems, agreements or security measures may be breached, and we may not have adequate remedies for any breach. In addition, our trade secrets may otherwise become publicly known or be independently discovered by competitors. To the extent that our contractors use or incorporate intellectual property owned by others in their work for us, disputes may arise as to the rights in related or resulting know-how and inventions.

License Agreements

Calithera

In March 2015, we entered into a License and Research Agreement with Calithera (the “Calithera License Agreement”), under which Calithera obtained an exclusive, worldwide, sublicensable license to develop and commercialize certain of our hexokinase II inhibitors for any therapeutics, prophylactic, preventative or diagnostic use.

Under the terms of the Calithera License Agreement, Calithera paid us an initial license fee of $600,000, and will pay us potential development and regulatory milestone payments totaling up to $30.5 million for the first licensed product. We are eligible for an additional $77.0 million in potential sales-based milestones, as well as royalty payments, at mid-single digit royalty rates, based on tiered sales of the first commercialized licensed product. In addition, Calithera agreed to fund up to $1.1 million during the first 12 months of the Calithera License Agreement for the costs associated with up to four of our full-time employee equivalents to develop additional hexokinase inhibitors under which the Company has recognized a total of $0.3 million through December 31, 2016. If Calithera develops additional licensed products, after achieving regulatory approval of the first licensed product, Calithera would owe additional regulatory milestone payments and additional royalty payments based on sales of such additional licensed products.

Except for the research program funded by Calithera with us, Calithera will be responsible for the worldwide development and commercialization of the licensed products, at its cost, is required to use commercially reasonable efforts with respect to such development and commercialization activities, and must meet certain specified diligence obligations. Calithera holds the first right to prosecute and to enforce all licensed patents under the Calithera License Agreement throughout the world, and we will retain certain step-in prosecution and enforcement rights.

The Calithera License Agreement, unless terminated earlier, will continue on a product-by-product and country-by-country basis until expiration of the royalty obligations Calithera owes to us on such licensed product, which extend until the later of the expiration of certain patent or data exclusivity rights covering such licensed product in such country or ten years after the first commercial sale of such product in such country. Either party may terminate the Calithera License Agreement for the other party's uncured material breach. Calithera may terminate the Calithera License Agreement at will upon prior written notice. Either party may terminate the Calithera License Agreement for the other party's insolvency.

Novo Nordisk

In February 2007, we entered into an Agreement Concerning Glucokinase Activator Project with Novo Nordisk A/S (the "Novo License Agreement") whereby we obtained an exclusive, worldwide, sublicensable license under certain Novo Nordisk intellectual property rights to discover, develop, manufacture, have manufactured, use and commercialize products for the prevention, treatment, control, mitigation or palliation of human or animal diseases or conditions. As part of this license grant, we obtained certain worldwide rights to Novo Nordisk's GKA program, including rights to preclinical and clinical compounds such as *TTP399*. Under the terms of the Novo License Agreement, we have additional potential developmental and regulatory milestone payments totaling up to $115.0 million for approval of a product. We are also obligated for an additional $75.0 million in potential sales-based milestones, as well as royalty payments, at mid-single digit royalty rates, based on tiered sales of commercialized licensed products.

Columbia University

In May 2015, we entered into a New Exclusive License Agreement (the "Columbia License Agreement") with The Trustees of Columbia University in the City of New York ("Columbia") whereby we obtained a worldwide, exclusive license, with the right to grant sublicenses under certain Columbia RAGE-related patent rights to discover, develop, manufacture, use, sell, have sold, import, have made, offer to sell, rent, or lease RAGE-inhibiting small molecules, including *azeliragon*. We also obtained a worldwide right to use certain RAGE-related research information and material. Under the terms of the Columbia License Agreement, we are required to pay an annual fee of $0.1 million, a potential milestone payment of $0.8 million and royalty payments at low-single digit royalty rates based on the net sales of licensed products. At the end of 2021, any fees and payments under the agreement will end, and we will have an irrevocable license to the RAGE-related patent rights, research information and material.

Competition

The biopharmaceutical industry is characterized by intense competition and rapid innovation. Our potential competitors include large pharmaceutical and biotechnology companies, specialty pharmaceutical companies and generic drug companies. We believe the key competitive factors that will affect the development and commercial success of our drug candidates are efficacy, safety and tolerability profile, mechanism of action, control and predictability, convenience of dosing and price and reimbursement.

Many of the companies against which we may compete have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical trials, obtaining regulatory approvals and marketing approved products than we do. Smaller or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and establishing clinical trial sites and patient registration for clinical trials, as well as in acquiring technologies complementary to, or necessary for, our programs.

Potential Competing Products – Alzheimer's Disease

There are currently no approved disease-modifying treatments for AD in the United States, as existing therapies treat only the symptoms of the disease, rather than targeting the underlying mechanisms. The approved symptomatic AD therapies in the United States fall into two classes, AChEIs and glutamatergic modulators. If *azeliragon* is approved, its mechanism of action may be complementary to existing standard of care, as well as that of drug candidates with differentiated mechanisms currently in development as potential disease modifying treatments for AD, including anti-Aβ monoclonal antibodies, BACE inhibitors, tau aggregation inhibitors and monoamine oxidase-b inhibitors. This will allow the opportunity for co-administration with these other drug candidates if they are successfully developed. We are not aware of any other clinical-stage RAGE inhibitors investigational products being developed for the treatment of AD.

Potential Competing Products – Type 2 Diabetes

If approved, we expect that our type 2 diabetes investigational drug candidates will compete with currently available non-insulin medication products for type 2 diabetes. These products include the following:

- Injectable GLP-1r agonists, such as exenatide or liraglutide, which mimic a naturally occurring hormone that stimulates the pancreas to secrete insulin when blood glucose levels are high.
- DPP-4 inhibitors, such as sitagliptin or saxagliptin, are a class of drugs that work by blocking the enzyme that normally degrades GLP-1.
- Sulfonylureas and meglitinides, which are classes of drugs that act on the pancreatic cells to stimulate the secretion of insulin.
- Thiazolidinediones, such as pioglitizone, and biguanides, such as metformin, which lower blood glucose by improving the sensitivity of cells to insulin, or diminishing insulin resistance.
- Alpha-glucosidase inhibitors, which lower the amount of glucose absorbed from the intestines, thereby reducing the rise in blood glucose that occurs after a meal.
- SGLT-2 inhibitors, such as dapagliflozin and canagliflozin, are a class of medications that lower blood glucose by increasing glucose excretion in urine.

In addition to existing marketed products, there are a number of product candidates currently in development focusing on the same mechanisms as our programs for the treatment of type 2 diabetes, including:

- **Glucokinase activators:** Advinus Therapeutics Ltd., Yabao Pharmaceutical Co, Inc., Pegbio Co. Ltd., Hua Medicine Ltd. and Teijin Pharma Limited are among the companies evaluating glucokinase activators in clinical or preclinical studies.
- **Oral GLP-1r agonists:** Diabetology Ltd., Heptares Therapeutics Ltd., Novo Nordisk, Oramed Pharmaceuticals Inc., Poxel SA and Receptos, Inc. are among the companies evaluating oral GLP-1r agonists in clinical or preclinical studies.

We believe that our investigational drug candidates may offer key potential advantages over these competitive products that could enable our drug candidates, if approved, to capture meaningful market share from our competitors. Nevertheless, many of our potential competitors have substantially greater financial, technical and human resources than we do, as well as greater experience in the discovery and development of drug candidates, obtaining FDA and other regulatory approvals of products and the commercialization of those products. Accordingly, our competitors may be more successful than us in obtaining regulatory approval for drugs and achieving widespread market acceptance. Our competitors' drugs may be more effective, or more effectively marketed and sold, than any drug candidate we may commercialize and may render our drug candidates obsolete or non-competitive before we can recover the expenses of their development and commercialization. We anticipate that we will face intense and increasing competition as new drugs enter the market, existing treatments come off patent, and more advanced technologies become available. Finally, the development of new treatment methods for the diseases we are targeting could render our drug candidates non-competitive or obsolete.

Collaboration Revenue and Customers

The majority of our collaboration revenue and accounts receivable are related to the Calithera License Agreement described above. Currently, we do not believe the amounts of revenue generated under the Calithera License Agreement are material to us, since the compounds subject to the Calithera License Agreement are in the pre-clinical stage, and we are focused primarily on our Phase 3 clinical trial, the STEADFAST Study, with respect to *azeliragon*, and our Phase 2 diabetes investigational products in particular *TTP399* and *TTP273*.

Government Regulation and Product Approval

Government authorities in the United States at the federal, state and local level extensively regulate, among other things, the research, development, testing, manufacture, quality control, approval, labeling, packaging, storage, record-keeping, promotion, advertising, distribution, marketing, export and import of products such as those we are developing. Our drug candidates must receive final approval from the FDA before they may legally be marketed in the United States.

U.S. Drug Development Process

In the United States, the FDA regulates drugs under the Federal Food, Drug, and Cosmetic Act, "FDCA", and implementing regulations. The process of obtaining regulatory approvals and ensuring compliance with appropriate federal, state, local and foreign statutes and regulations requires the expenditure of substantial time and financial resources. Failure to comply with the applicable U.S. requirements at any time during the product development process, approval process, or after approval, may subject an applicant to administrative or judicial sanctions. These sanctions could include the FDA's refusal to approve pending applications, withdrawal of an

approval, a hold on clinical trials, warning letters, product seizures, product detention, total or partial suspension of production or distribution, injunctions, fines, refusals of government contracts, restitution, disgorgement or civil or criminal penalties. The process required by the FDA before a drug may be marketed in the United States generally involves the following:

- completion of preclinical laboratory tests and animal studies according to Good Laboratory Practices or other regulations, as well as formulation studies;
- submission to the FDA of an IND which must become effective before human clinical trials may begin;
- performance of adequate and well-controlled human clinical trials according to Good Clinical Practices, or GCP, to establish the safety and efficacy of the proposed drug for its intended use;
- submission to the FDA of an NDA for a new drug;
- satisfactory completion of an FDA inspection of the manufacturing facility or facilities at which the drug is produced to assess compliance with cGMP to assure that the facilities, methods and controls are adequate to preserve the drug's identity, strength, quality and purity; and
- FDA review and approval of the NDA.

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

Once a pharmaceutical drug candidate is identified for development, it enters the preclinical testing stage. The preclinical testing stage includes laboratory evaluations of product chemistry, toxicity, formulation and stability, as well as animal studies. An IND sponsor must submit the results of the preclinical tests, together with manufacturing information, analytical data and any available clinical data or literature, to the FDA as part of the IND. The sponsor must also include a protocol detailing, among other things, the objectives of the initial clinical trial, the parameters to be used in monitoring safety and the effectiveness criteria to be evaluated if the initial clinical trial lends itself to an efficacy evaluation. Preclinical testing may continue even after the IND is submitted. The IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA places the clinical trial on a clinical hold within that 30-day time period. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical trial can begin. Clinical holds also may be imposed by the FDA at any time before or during trials due to safety concerns or non-compliance.

All clinical trials must be conducted under the supervision of one or more qualified investigators in accordance with GCP regulations. These regulations include the requirement that all research subjects provide informed consent. Further, an institutional review board ("IRB"), must review and approve the plan for any clinical trial before it commences at any institution. An IRB considers, among other things, whether the risks to individuals participating in the trials are minimized and are reasonable in relation to anticipated benefits. The IRB also approves the information regarding the clinical trial and the consent form that must be provided to each clinical trial subject or his or her legal representative and must monitor the clinical trial until completed. Once an IND is in effect, each new clinical protocol and any amendments to the protocol must be submitted to the IND for FDA review, and to the IRBs for approval.

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

- *Phase 1*. The drug candidate is initially introduced into healthy human subjects and tested for tolerance, absorption, metabolism, distribution and excretion. In the case of some products for severe or life-threatening diseases, especially when the product may be too inherently toxic to ethically administer to healthy volunteers, the initial human testing may be conducted in patients having the specific disease.
- *Phase 2*. Phase 2 trials involve investigations in a limited patient population to identify possible adverse effects and safety risks, to preliminarily evaluate the efficacy of the drug candidate for specific targeted diseases and to determine optimal dosage and schedule.
- *Phase 3*. Clinical trials are undertaken to further evaluate dosage, clinical efficacy and safety in a larger patient population, generally at geographically dispersed clinical trial sites. These trials are intended to establish the overall risk/benefit ratio of the drug candidate and provide an adequate basis for regulatory approval and product labeling.

Post-approval studies, also called Phase 4 trials, may be conducted after initial marketing approvals. These studies are used to obtain additional experience from the treatment of patients in the intended therapeutic indication and may be required by the FDA as part of the approval process.

Progress reports detailing the results of the clinical trials must be submitted annually to the FDA and safety reports must be submitted to the FDA and the investigators for serious and unexpected side effects. Phase 1, Phase 2 and Phase 3 testing may not be completed successfully within any specified period, if at all. The FDA or the sponsor may suspend or terminate a clinical trial at any time on various grounds, including a finding that the research subjects or patients are being exposed to an unacceptable health risk.

Similarly, an IRB can suspend or terminate approval of a clinical trial at its institution on various grounds, including if the research subjects are being exposed to an unacceptable health risk.

Concurrent with clinical trials, companies usually complete additional animal studies and must also develop additional information about the chemistry and physical characteristics of the product and finalize a process for manufacturing the product in commercial quantities in accordance with cGMP requirements. The manufacturing process must be capable of consistently producing quality batches of the drug candidate and, among other things, the manufacturer must develop methods for testing the identity, strength, quality and purity of the final product. Additionally, appropriate packaging must be selected and tested and stability studies must be conducted to demonstrate that the drug candidate does not undergo unacceptable deterioration over its shelf life.

Special Protocol Assessment

The special protocol assessment, or SPA, process is designed to facilitate the FDA's review and approval of drugs by allowing the FDA to evaluate the proposed design and size of Phase 3 clinical trials that are intended to form the primary basis for determining a drug product's efficacy. Upon specific request by a clinical trial sponsor, the FDA will evaluate the protocol and respond to a sponsor's questions regarding, among other things, primary efficacy endpoints, trial design and data analysis plans, within 45 days of receipt of the request.

The FDA ultimately assesses whether the protocol design and planned analysis of the trial are acceptable to support regulatory approval of the drug candidate with respect to effectiveness of the indication studied. All agreements and disagreements between the FDA and the sponsor regarding an SPA must be clearly documented in an SPA letter or the minutes of a meeting between the sponsor and the FDA.

Even if the FDA agrees to the design, execution and analyses proposed in protocols reviewed under the SPA process, the FDA may revoke or alter its agreement under the following circumstances:

- public health concerns emerge that were unrecognized at the time of the protocol assessment, or the director of the review division determines that a substantial scientific issue essential to determining safety or efficacy has been identified after testing has begun;
- a sponsor fails to follow a protocol that was agreed upon with the FDA; or
- the relevant data, assumptions or information provided by the sponsor in a request for SPA change, are found to be false statements or misstatements, or are found to omit relevant facts.

A documented SPA may be modified, and such modification will be deemed binding on the FDA review division, except under the circumstances described above, if FDA and the sponsor agree in writing to modify the protocol and such modification is intended to improve the study. We have obtained an SPA with the FDA for our Phase 3 STEADFAST Study of *azeliragon*. Agreement by the FDA to an SPA does not guarantee that the results of a study conducted in accordance with the agreement will be successful or that other issues that arise may impede approval of the investigational product.

United States Review and Approval Processes

The results of product development, preclinical studies and clinical trials, along with descriptions of the manufacturing process, analytical tests conducted on the drug, proposed labeling and other relevant information, are submitted to the FDA as part of an NDA, requesting approval to market the product. The submission of an NDA is subject to the payment of substantial user fees which may be waived under certain limited circumstances.

FDA Review of New Drug Applications

The FDA reviews all NDAs submitted to ensure that they are sufficiently complete for substantive review before it accepts them for filing. The FDA has 60 days to make this determination. The FDA may request additional information rather than accept an NDA for filing. In this event, the NDA must be re-submitted with the additional information. The re-submitted application also is subject to review for completeness before the FDA accepts it for filing. Once the submission is accepted for filing, the FDA begins an in-depth substantive review. Under the goals and policies agreed to by the FDA under the Prescription Drug User Fee Act ("PDUFA"), the FDA has ten months from the date the application is accepted for filing in which to complete the initial review of a standard NDA and respond to the applicant and six months for a priority NDA. The FDA does not always meet its PDUFA goal dates for standard and priority NDAs. The FDA reviews an NDA to determine, among other things, whether a product is safe and effective for its intended use and whether the chemistry, manufacturing and control documentation is adequate to assure and preserve the product's identity, strength, quality and purity. Before approving an NDA, the FDA 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. The FDA may refer the NDA to

an advisory committee for review, evaluation and recommendation as to whether the application should be approved and under what conditions. An advisory committee is a panel of independent experts who provide advice and recommendations when requested by the FDA on matters of importance that come before the agency. The FDA is not bound by the recommendation of an advisory committee.

The approval process is difficult and unpredictable and the FDA may refuse to approve an NDA if the applicable regulatory criteria are not satisfied or may require additional clinical data or other data and information.

Even if such data and information are submitted, the FDA may ultimately decide that the NDA does not satisfy the criteria for approval. Data obtained from clinical trials are not always conclusive and the FDA may interpret data differently than we interpret the same data. The FDA will issue a complete response letter if the agency decides not to approve the NDA in its present form. The complete response letter usually describes all of the specific deficiencies that the FDA identified in the NDA. The deficiencies identified may be minor, for example, requiring labeling changes, or major, for example, requiring additional clinical trials. Additionally, the complete response letter may include recommended actions that the applicant might take to conform the application to a condition suitable for approval. If a complete response letter is issued, the applicant may either resubmit the NDA, addressing all of the deficiencies identified in the letter, withdraw the application, or request an opportunity for a hearing.

If a product receives regulatory approval, the approval may be significantly limited to specific diseases and dosages or the indications for use may otherwise be limited, which could restrict the commercial value of the product. Further, the FDA may require that certain contraindications, warnings or precautions be included in the product labeling. In addition, the FDA may require Phase 4 testing which involves clinical trials designed to further assess a drug's safety and effectiveness after NDA approval and may require testing and surveillance programs to monitor the safety of approved products that have been commercialized.

Special FDA Expedited Review and Approval Programs

The FDA has various programs, including Fast Track designation, accelerated approval and priority review, that are intended to expedite or simplify the process for the development and FDA review of drugs that are intended for the treatment of serious or life threatening diseases or conditions and demonstrate the potential to address unmet medical needs. The purpose of these programs is to provide important new drugs to patients earlier than under standard FDA review procedures.

To be eligible for a Fast Track designation, the FDA must determine, based on the request of a sponsor, that a product is intended to treat a serious or life threatening disease or condition and demonstrates the potential to address an unmet medical need. The FDA may determine that a product will fill an unmet medical need if it is expected to provide a therapy where none exists or provide a therapy that may be potentially superior to existing therapy based on efficacy or safety factors. Fast Track designation allows for more frequent FDA meetings and communications and eligibility for accelerated approval and/or priority review if certain criteria are met.

The FDA may give a priority review designation to drugs that offer major advances in treatment, or provide a treatment where no adequate therapy exists. A priority review means that the goal for the FDA to review an application is six months, rather than the standard review of ten months from the date of filing of the NDA. Most products that are eligible for Fast Track designation are also likely to be considered appropriate to receive a priority review.

In addition, products studied for their safety and effectiveness in treating serious or life-threatening diseases or conditions and that provide meaningful therapeutic benefit over existing treatments may be eligible to receive accelerated approval and may be approved on the basis of adequate and well-controlled clinical trials establishing that the drug product has an effect on a surrogate endpoint that is reasonably likely to predict clinical benefit, or on a clinical endpoint that can be measured earlier than irreversible morbidity or mortality, that is reasonably likely to predict an effect on irreversible morbidity or mortality or other clinical benefit, taking into account the severity, rarity or prevalence of the condition and the availability or lack of alternative treatments. As a condition of approval, the FDA may require a sponsor of a drug receiving accelerated approval to perform post-marketing studies to verify and describe the predicted effect on irreversible morbidity or mortality or other clinical endpoint, and the drug may be subject to accelerated withdrawal procedures.

Moreover, under the Food and Drug Administration Safety and Innovation Act, or FDASIA, enacted in 2012, a sponsor can request designation of a drug candidate as a "breakthrough therapy." A breakthrough therapy is defined as a drug that is intended, alone or in combination with one or more other drugs, to treat a serious or life-threatening disease or condition, and preliminary clinical evidence indicates that the drug may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints, such as substantial treatment effects observed early in clinical development. Drugs designated as breakthrough therapies are also eligible for accelerated approval. The FDA must take certain actions, such as holding timely meetings and providing advice, intended to expedite the development and review of an application for approval of a breakthrough therapy.

Even if a product qualifies for one or more of these programs, the FDA may later decide that the product no longer meets the conditions for qualification or decide that the time period for FDA review or approval will not be shortened. We have obtained Fast Track designation for *azeliragon* for the treatment of dementia of the Alzheimer's type.

Patent Term Restoration and Marketing Exclusivity

Depending upon the timing, duration and specifics of FDA marketing approval of our drug 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 (a) one-half the time between the effective date of an IND and the submission date of an NDA plus (b) the time between the submission date of an NDA and the approval of that application. Only one patent applicable to an approved drug 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 approval of the drug. The PTO, in consultation with the FDA, reviews and approves the application for any patent term extension or restoration.

Data and market exclusivity provisions under the FDCA can also delay the submission or the approval of certain applications. The FDCA provides a five-year period of non-patent data and marketing exclusivity within the United States to the first applicant to obtain approval of an NDA for a new chemical entity. A drug is a new chemical entity if the FDA has not previously approved any other new drug containing the same active pharmaceutical ingredient, or active moiety, which is the molecule or ion responsible for the action of the drug substance. During the exclusivity period, the FDA may not accept for review an abbreviated new drug application, or ANDA, or a Section 505(b)(2) NDA submitted by another company that references the previously approved drug with exclusivity. Section 505(b)(2) generally permits the submission of an NDA where at least some of the information required for approval comes from clinical trials not conducted by or for the applicant and for which the applicant has not obtained a right of reference. However, an ANDA or Section 505(b)(2) application may be submitted after four years if it contains a Paragraph IV certification claiming that the patents covering the drug are either invalid or not infringed by the drug described in the ANDA or 505(b)(2) application. We would expect that our lead investigational drug candidates would qualify for data exclusivity.

The FDCA also provides three years of marketing exclusivity for an NDA, Section 505(b)(2) NDA or supplement to an existing NDA if new clinical investigations, other than bioavailability studies, that were conducted or sponsored by the applicant are deemed by the FDA to be essential to the approval of the application. Such clinical trials may, for example, support new indications, dosages, routes of administration or strengths of an existing drug, or a new use. This exclusivity, which is sometimes referred to as clinical investigation exclusivity, prevents the FDA from approving an ANDA or an application under Section 505(b)(2) for the same conditions of use associated with the new clinical investigations before the expiration of three years from the date of approval. Such three-year exclusivity, however, would not prevent the approval of another application if the applicant submits a Section 505(b)(1) NDA and has conducted its own adequate, well-controlled clinical trials demonstrating safety and efficacy, nor would it prevent approval of an ANDA or Section 505(b)(2) application for a product that did not incorporate the exclusivity-protected changes of the approved drug product. We expect that our Alzheimer's and diabetes investigational products in development would all qualify for clinical investigation exclusivity.

Post-Approval Requirements

Any drugs for which we receive FDA approval are subject to continuing regulation by the FDA, including, among other things, record-keeping requirements, reporting of adverse effects with the product, providing the FDA with updated safety and efficacy information, product sampling and distribution requirements, complying with certain electronic records and signature requirements and complying with FDA promotion and advertising requirements. In September 2007, the Food and Drug Administration Amendments Act of 2007 was enacted, giving the FDA enhanced post-marketing authority, including the authority to require post-marketing studies and clinical trials, labeling changes based on new safety information, and implementation of risk evaluation and mitigation strategies ("REMS") programs as mandated by the FDA. The FDA strictly regulates labeling, advertising, promotion and other types of information on 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. Further, manufacturers of drugs must continue to comply with cGMP requirements, which are extensive and require considerable time, resources and ongoing investment to ensure compliance. In addition, certain changes to the manufacturing process generally require prior FDA approval before being implemented and other types of changes to the approved product, such as adding new indications and additional labeling claims, are also subject to prior FDA review and approval.

Drug manufacturers and other entities involved in the manufacturing and distribution of approved drugs are required to register their establishments with the FDA and certain state agencies, and are subject to periodic unannounced inspections by the FDA and certain state agencies for compliance with cGMP and other laws. The cGMP requirements apply to all stages of the manufacturing process, including the production, processing, sterilization, packaging, labeling, storage and shipment of the drug. Manufacturers must

establish validated systems to ensure that products meet specifications and regulatory standards, and test each product batch or lot prior to its release.

The FDA may restrict market availability or withdraw a product approval if compliance with regulatory standards is not maintained or if problems occur after the product reaches the market. Discovery of previously unknown problems with a product subsequent to its approval may result in restrictions on the product or even complete withdrawal of the product from the market. Further, the failure to maintain compliance with regulatory requirements may result in administrative or judicial actions, such as fines, warning letters, holds on clinical trials, product seizures, product detention or refusal to permit the import or export of products, refusal to approve pending applications or supplements, restrictions on marketing or manufacturing, injunctions or civil or criminal penalties.

From time to time, legislation is drafted, introduced and passed in Congress that could significantly change the statutory provisions governing the approval, manufacturing and marketing of products regulated by the FDA. For example, in July 2012, FDASIA was enacted, which, among other things, expanded drug supply chain requirements and strengthened FDA's response to drug shortages. In addition to new legislation, the FDA regulations and policies are often revised or reinterpreted by the agency in ways that may significantly affect our business and our drug candidates. It is impossible to predict whether further legislative or FDA regulation or policy changes will be enacted or implemented and what the impact of such changes, if any, may be.

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 mandatory revisions to the approved labeling to add new safety information; imposition of post-market studies or clinical trials to assess new safety risks; or imposition of distribution or other restrictions under a REMS program. Other potential consequences include, among other things:

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

Foreign Regulation

In addition to regulations in the United States, we are subject to a variety of foreign regulations governing clinical trials and may become subject to additional foreign regulations pertaining to commercial sales and distribution of our drug candidates to the extent we choose to clinically evaluate or sell any products outside of the United States. Whether or not we obtain FDA approval for a product, we must obtain approval of a product by the comparable regulatory authorities of foreign countries before we can commence clinical trials or marketing of the product in those countries. The approval process varies from country to country and the time may be longer or shorter than that required for FDA approval. The requirements governing the conduct of clinical trials, product licensing, pricing and reimbursement vary greatly from country to country. As in the United States, post-approval regulatory requirements, such as those regarding product manufacture, marketing, or distribution would apply to any product that is approved for sale outside the United States.

Third-Party Payor Coverage and Reimbursement

Significant uncertainty exists as to the coverage and reimbursement status of any of our drug candidates for which we obtain regulatory approval. In both the United States and foreign markets, our ability to commercialize our drug candidates successfully, and to attract commercialization partners for our drug candidates, depends in significant part on the availability of adequate financial coverage and reimbursement from third-party payors, including, in the United States, governmental payors such as the Medicare and Medicaid programs, managed care organizations, and private health insurers. Medicare is a federally funded program managed by the Centers for Medicare and Medicaid Services, or CMS, through local administrative contractors that administer coverage and reimbursement for certain healthcare items and services furnished to certain individuals aged 65 or older, disabled or suffering from end-stage renal disease. Medicaid is an insurance program for certain categories of patients whose income and assets fall below state defined levels and who are otherwise uninsured that is both federally and state funded and managed by each state. The federal government sets general guidelines for Medicaid and each state creates specific regulations that govern its individual program. Each payor has its own process and standards for determining whether it will cover and reimburse a procedure or particular product. The Medicare and Medicaid programs increasingly are used as models for how private payors and other governmental payors develop their coverage and reimbursement policies for drugs and biologics. Therefore, achieving favorable coverage and reimbursement from government payors is usually a significant gating issue for successful introduction of a new product. The competitive position of some of our products will depend, in part, upon the extent of coverage and adequate reimbursement for such products and for the procedures in which such products are used.

Prices at which we or our customers seek reimbursement for our drug candidates can be subject to challenge, reduction or denial by the government and other payors and may require us to pay significant rebates.

The U.S. Congress and state legislatures may, from time to time, propose and adopt initiatives aimed at cost containment, which could impact our ability to sell our drug candidates profitably. For example, in March 2010, President Obama signed into law the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, which we refer to collectively as the Affordable Care Act, a sweeping law intended to broaden access to health insurance, reduce or constrain the growth of healthcare spending, enhance remedies against fraud and abuse, add new transparency requirements for healthcare and health insurance industries, impose new taxes and fees on the health industry and impose additional health policy reforms. Effective October 1, 2010, the Affordable Care Act revised the definition of "average manufacturer price" for reporting purposes, which could increase the amount of Medicaid drug rebates to states once the provision is effective. Further, the law imposes a significant annual fee on companies that manufacture or import branded prescription drug products. The Affordable Care Act also addressed a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted or injected, increased the minimum Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program and extended the rebate program to individuals enrolled in Medicaid managed care organizations, and established a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturer's outpatient drugs to be covered under Medicare Part D. Substantial new provisions affecting compliance have also been enacted, which may require us to modify our business practices with healthcare practitioners. We will not know the full effects of the Affordable Care Act until applicable federal and state agencies issue final regulations or guidance under the new law. Although it is too early to determine the effect of the Affordable Care Act, the new law appears likely to continue the pressure on pharmaceutical pricing, especially under the Medicare program, and may also increase our regulatory burdens and operating costs. However, due to the presidential transition in 2017, the future of the Affordable Care Act is uncertain.

In addition, other legislative changes have been proposed and adopted in the United States since the Affordable Care Act was enacted. On August 2, 2011, the Budget Control Act of 2011 among other things, created measures for spending reductions by Congress. A Joint Select Committee on Deficit Reduction, tasked with recommending a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction to several government programs. These automatic reductions include aggregate reductions of Medicare payments to providers of 2% per fiscal year, which went into effect in April 2013 and, due to subsequent legislative amendments to the statute, will remain in effect through 2024 unless additional Congressional action is taken. We expect that additional state and federal healthcare reform measures will be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services, which could result in reduced demand for our drug candidates or additional pricing pressures.

The cost of pharmaceuticals continues to generate substantial governmental, media and other third-party payor interest. We expect that the pharmaceutical industry will experience pricing pressures due to the trend toward managed healthcare, the increasing influence of managed care organizations and additional legislative proposals. Our results of operations could be adversely affected by current and future healthcare reforms.

Some third-party payors also require pre-approval of coverage for new or innovative devices or drug therapies before they will reimburse healthcare providers that use such therapies. While we cannot predict whether any proposed cost-containment measures will be adopted or otherwise implemented in the future, the announcement or adoption of these proposals could have a material adverse effect on the pricing for our drug candidates and our ability to operate profitably.

Other Healthcare Laws and Compliance Requirements

In the United States, our activities are potentially subject to regulation by various federal, state and local authorities in addition to the FDA, including CMS, other divisions of the United States Department of Health and Human Services (e.g., the Office of Inspector General), the United States Department of Justice and individual United States Attorney offices within the Department of Justice, and state and local governments. The laws we are subject to include, without limitation, state and federal anti-kickback, fraud and abuse, false claims, privacy and security and physician sunshine laws and regulations.

The Food, Drug and Cosmetic Act ("FDCA") is the statute that provides the FDA with authority to oversee the safety and approval of pharmaceutical products. The FDCA vests authority with FDA to conduct inspections sponsors conducting pharmaceutical development, such as vTv, to protect the rights, safety and welfare of clinical trial subjects, ensure the accuracy and reliability of clinical trial data, and verify compliance with FDA regulations. The FDCA sets forth the standards for approval of new and generic drugs, as well as setting forth the prohibition on marketing investigational products that have not been approved by the FDA as safe and effective. The government (FDA and SEC) use the FDCA to ensure that companies do not mislead the medical, patient or investor communities about investigational products prior to their approval. To that end, the FDCA prohibits "off-label promotion" of any investigational or approved product for any uses, doses or populations, except that set forth in the full prescribing information approved by the FDA.

While physicians can prescribe a product for any dose, purpose or population in their medical judgment, manufacturers can only market products for their FDA-approved dose, purpose and population. There are significant civil and criminal penalties that attach to violations of the FDCA, including strict liability misdemeanors for responsible corporate officers, even if such officers were not involved in or aware of the underlying wrongdoing.

The federal Anti-Kickback Statute prohibits, among other things, any person from knowingly and willfully offering, soliciting, receiving or providing remuneration, directly or indirectly, to induce either the referral of an individual, for an item or service or the purchasing or ordering of a good or service, for which payment may be made under federal healthcare programs such as the Medicare and Medicaid programs. The Anti-Kickback Statute is subject to evolving interpretations. In the past, the government has enforced the Anti-Kickback Statute to reach large settlements with healthcare companies based on sham consulting and other financial arrangements with physicians. A person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation. In addition, 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 federal False Claims Act. The majority of states also have anti-kickback laws which establish similar prohibitions and in some cases may apply to items or services reimbursed by any third-party payor, including commercial insurers.

Additionally, the civil False Claims Act prohibits knowingly presenting or causing the presentation of a false, fictitious or fraudulent claim for payment to the United States government. Actions under the False Claims Act may be brought by the Attorney General or as a qui tam action by a private individual in the name of the government. Violations of the False Claims Act can result in very significant monetary penalties and treble damages. The federal government is using the False Claims Act, and the accompanying threat of significant liability, in its investigation and prosecution of pharmaceutical and biotechnology companies throughout the country, for example, in connection with the promotion of products for unapproved uses and other sales and marketing practices. The government has obtained multi-million and multi-billion dollar settlements under the False Claims Act in addition to individual criminal convictions under applicable criminal statutes. Given the significant size of actual and potential settlements, it is expected that the government will continue to devote substantial resources to investigating healthcare providers' and manufacturers' compliance with applicable fraud and abuse laws.

The federal Health Insurance Portability and Accountability Act of 1996 ("HIPAA") also created new federal criminal statutes that prohibit among other actions, knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program, including private third-party payors, knowingly and willfully embezzling or stealing from a healthcare benefit program, willfully obstructing a criminal investigation of a healthcare offense, and knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false, fictitious or fraudulent statement in connection with the delivery of or payment for healthcare benefits, items or services. Similar to the federal Anti-Kickback Statute, a person or entity does not need to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation.

There has also been a recent trend of increased federal and state regulation of payments made to physicians and other healthcare providers. The Affordable Care Act, among other things, imposes new reporting requirements on drug manufacturers for payments made by them to physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members (also known as the Sunshine Act). Failure to submit required information may result in civil monetary penalties of up to an aggregate of $150,000 per year (or up to an aggregate of $1 million per year for "knowing failures"), for all payments, transfers of value or ownership or investment interests that are not timely, accurately and completely reported in an annual submission. Drug manufacturers are required to submit reports to the government by the 90th day of each subsequent calendar year. Certain states also mandate implementation of compliance programs, impose restrictions on drug manufacturer marketing practices and/or require the tracking and reporting of gifts, compensation and other remuneration to physicians. While we are not currently subject to the reporting requirements of the Sunshine Act, we are committed to complying with industry standards and best practices, and only paying fair market value for services provided by healthcare professionals and others.

We may also be subject to data privacy and security regulation by both the federal government and the states in which we conduct our business. HIPAA, as amended by the Health Information Technology and Clinical Health Act ("HITECH"), and their respective implementing regulations, including the final omnibus rule published on January 25, 2013, imposes specified requirements relating to the privacy, security and transmission of individually identifiable health information. Among other things, HITECH makes HIPAA's privacy and security standards directly applicable to "business associates," defined as independent contractors or agents of covered entities that create, receive, maintain or transmit protected health information in connection with providing a service for or on behalf of a covered entity. HITECH also increased the civil and criminal penalties that may be imposed against covered entities, business associates and possibly other persons, and gave state attorneys general new authority to file civil actions for damages or injunctions in federal courts to enforce the federal HIPAA laws and seek attorney's fees and costs associated with pursuing federal civil actions. In addition, state laws govern the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways, thus complicating compliance efforts.

Based on the conduct of some of our clinical trials oversees, we are also subject to the Foreign Corrupt Practices Act that prohibits payments to foreign public officials relating to official acts. In addition to its prohibition on bribery of foreign government officials, the Act requires companies to maintain accurate records and have vigorous internal controls. The DOJ and SEC have made FCPA enforcement a high priority. In addition, other anti-corruption laws such as the UK Bribery Act are even broader than the FCPA in that they apply to bribes offered to any person, not just government officials. There are significant criminal and civil penalties and fines that attach to violations of the FCPA.

Employees

As of December 31, 2016, we had 51 employees, of which at least 24 hold graduate degrees (including 18 doctorate degrees) and 32 are engaged in full-time research and development activities. None of our employees are represented by a labor union, and we consider our employee relations to be good.

Our Corporate Information

We were incorporated under the laws of the State of Delaware in 2015. Our principal executive offices are located at 4170 Mendenhall Oaks Pkwy, High Point, NC 27265, and our telephone number is (336) 841-0300.

ITEM 1A. RISK FACTORS

Risks Relating to Our Financial Position and Need for Additional Capital

We have incurred significant losses since inception and anticipate that we will incur continued losses for the foreseeable future. We may never achieve or maintain profitability.

We are a clinical-stage biopharmaceutical company with limited operating history. We have never been profitable and do not expect to be profitable in the foreseeable future. We have incurred net losses in each year since beginning to develop our drug candidates, including net losses of approximately $16.4 million, $27.5 million and $36.1 million for the years ended December 31, 2016, 2015 and 2014, respectively. As of December 31, 2016, we had a total members' deficit of approximately $215.5 million. In addition, we have not commercialized any products and have never generated any revenue from the commercialization of any product. We have devoted most of our financial resources to research and development, including our preclinical development activities and clinical trials. We expect to incur significant additional operating losses for the next several years, at least, as we conduct our research and development activities, advance drug candidates through clinical development, complete clinical trials, seek regulatory approval and, if we receive FDA approval, commercialize our products. Furthermore, the costs of advancing drugs into each succeeding clinical phase tend to increase substantially over time. The total costs to advance any of our drug candidates to marketing approval in even a single jurisdiction would be substantial. Because of the numerous risks and uncertainties associated with pharmaceutical product development, we are unable to accurately predict the timing or amount of increased expenses or when, or if, we will be able to begin generating revenue from the commercialization of products or achieve or maintain profitability. We expect to incur increased expenses as we continue our parallel group 18-month 800-patient Phase 3 trial of *azeliragon*, known as the STEADFAST Study, begin outsourcing of the commercial manufacturing of *azeliragon* for any indications for which we receive regulatory approval, advance our other drug candidates and expand our research and development programs. Furthermore, our ability to successfully develop, commercialize and license our products and generate product revenue is subject to substantial additional risks and uncertainties, as described under "—Risks Relating to the Development and Regulatory Approval of Our Drug Candidates" and "—Risks Relating to the Commercialization of Our Drug Candidates." As a result, we expect to continue to incur net losses and negative cash flows for the foreseeable future. These net losses and negative cash flows have had, and will continue to have, an adverse effect on our stockholders' equity and working capital. The amount of our future net losses will depend, in part, on the rate of future growth of our expenses and our ability to generate revenues. In addition, we may not be able to enter into any collaborations that will generate significant cash. If we are unable to develop and commercialize one or more of our drug candidates either alone or with collaborators, or if revenues from any drug candidate that receives marketing approval are insufficient, we will not achieve profitability. Even if we do achieve profitability, we may not be able to sustain or increase profitability. If we are unable to achieve and then maintain profitability, the value of our equity securities will be materially and adversely affected.

Currently, we have no products approved for commercial sale, and to date we have not generated any revenue from product sales. As a result, our ability to generate revenue from products, curtail our losses and reach profitability is unproven, and we may never generate substantial product revenue.

We have no products approved for commercialization and have never generated any revenue from the commercialization of any product. Our ability to generate revenue and achieve profitability depends on our ability, alone or with strategic collaboration partners, to successfully complete the development of, and obtain the regulatory and marketing approvals necessary to commercialize one or more of our product candidates. We do not anticipate generating revenue from product sales for several years. Our ability to generate future revenue from product sales depends heavily on our success in many areas, including but not limited to:

- completing research and nonclinical and clinical development of our product candidates;
- obtaining regulatory and marketing approvals for product candidates for which we complete clinical studies;
- establishing collaborations for the development of certain of our drug candidates;
- establishing and maintaining supply and manufacturing relationships with third parties that can provide adequate, in both amount and quality, products and services to support clinical development and the market demand for our product candidates, if approved;
- launching and commercializing product candidates for which we obtain regulatory and marketing approval, either directly or with a collaborator or distributor;
- obtaining market acceptance of our product candidates as viable treatment options;
- obtaining favorable formulary placement with government and third party payors that allows for favorable reimbursement;
- addressing any competing technological and market developments;
- negotiating favorable terms in any collaboration, licensing, or other arrangements into which we may enter;
- maintaining, protecting and expanding our portfolio of intellectual property rights; and
- attracting, hiring and retaining qualified personnel.

Even if one or more of the product candidates that we develop is approved for commercial sale, we anticipate incurring significant costs associated with commercializing any approved product candidate. Our expenses could increase beyond expectations if we are required by the FDA or other regulatory authorities to perform clinical and other studies in addition to those that we currently anticipate. Even if we are able to generate revenues from the sale of any approved products, we may not become profitable and may need to obtain additional funding to continue operations.

We will need additional capital to complete the STEADFAST Study and to complete the development and commercialization of azeliragon and our other drug candidates. If we are unable to raise sufficient capital for these purposes, we would be forced to delay, reduce or eliminate our product development programs.

Developing pharmaceutical products, including conducting preclinical studies and clinical trials, is expensive. We expect our research and development expenses to increase in connection with our ongoing activities, particularly as we continue the STEADFAST Study, undertake additional clinical trials of our other drug candidates and continue to work on our other research programs. Our current capital and the funds available to us under our venture loan and security agreement (the "Loan Agreement") with Horizon Technology Finance Corporation and Silicon Valley Bank (together, the "Lenders") dated October 28, 2016 will not be sufficient for us to complete the STEADFAST Study and the development of our other drug candidates. As such, we will need to raise substantial additional capital to complete the development and commercialization of *azeliragon*. We may fund a portion of the STEADFAST Study through licensing or other monetization of our other drug candidates, including *TTP399* and *TTP273*. If we are unable to successfully license our other drug candidates, we may need to raise additional capital to finance the completion of the STEADFAST Study through equity offerings, debt financings, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements.

If the FDA or other regulators require that we perform additional studies beyond those we currently expect, or if there are any delays in completing our clinical trials or the development of any of our drug candidates, our expenses could increase beyond what we currently anticipate and the timing of any potential product approval may be delayed. We have no commitments or arrangements for any additional financing to fund our research and development programs other than those available to us through the second and third tranches of our Loan Agreement. We also will need to raise substantial additional capital in the future to complete the development and commercialization of *azeliragon* for additional indications and for developing our other drug candidates. Because successful development of our drug candidates is uncertain, we are unable to estimate the actual funds required to complete research and development and commercialize and license our products under development.

Until we can generate a sufficient amount of revenue from our drug candidates, if ever, we expect to finance future cash needs through equity offerings, debt financings, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements. Additional funds may not be available when we need them on terms that are acceptable to us, or at all. If adequate funds are not available, we may be required to delay, reduce the scope of or eliminate one or more of our research or development programs. We may seek to access the public or private capital markets whenever conditions are favorable, even if we do not have an immediate need for additional capital at that time. If worldwide economic conditions and the international equity and credit markets deteriorate and return to depressed states, it will be more difficult for us to obtain additional equity or credit financing, when needed.

Our future capital requirements will depend on many factors, including:

- the progress, costs, results and timing of the STEADFAST Study, and the clinical development of *azeliragon*;
- the willingness of the FDA to accept the STEADFAST Study, as well as our other completed and planned clinical and preclinical studies and other work, as the basis for review and approval of *azeliragon*;
- the outcome, costs and timing of seeking and obtaining FDA and any other regulatory approvals;
- the number and characteristics of drug candidates that we pursue, including our drug candidates in preclinical development;
- the ability of our drug candidates to progress through clinical development successfully;
- our need to expand our research and development activities;
- the costs associated with securing, establishing and maintaining commercialization capabilities;
- the costs of acquiring, licensing or investing in businesses, products, drug candidates and technologies;
- our ability to maintain, expand and defend the scope of our intellectual property portfolio, including the amount and timing of any payments we may be required to make, or that we may receive, in connection with the licensing, filing, prosecution, defense and enforcement of any patents or other intellectual property rights;
- our need and ability to hire additional management and scientific and medical personnel;
- the effect of competing technological and market developments;
- our need to implement additional internal systems and infrastructure, including financial and reporting systems; and
- the economic and other terms, timing and success of our existing licensing arrangements and any collaboration, licensing or other arrangements into which we may enter in the future.

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

Until such time, if ever, as we can generate substantial revenue, we may finance our cash needs through a combination of equity offerings, debt financings, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements. We do not currently have any committed external source of funds other than those provided through our Loan Agreement. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the interest of our stockholders will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our 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.

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

Our significant amount of debt could adversely affect our business, operating results and financial condition and prevent us from fulfilling our debt-related obligations.

We have a significant amount of debt. As of December, 31, 2016, the total principal amount of our debt was $12.5 million, all of which was incurred under the Loan Agreement. The Loan Agreement provides up to $25.0 million in funding for our strategic initiatives and ongoing clinical trials. This funding is available to us in three tranches, the first of which was borrowed upon closing in the amount of $12.5 million. Subject to certain customary funding conditions, the second tranche of $7.5 million and the third tranche of $5.0 million are available for borrowing by us no later than March 31, 2017 and June 30, 2017, respectively. Availability of the third tranche is also subject to receipt of an executed term sheet setting forth certain agreed upon upfront and clinical and regulatory milestone payments for the licensing or purchase of one of our main drug candidates.

The Loan Agreement is secured by a first priority security interest in substantially all of our assets other than our intellectual property. Subject to certain conditions related to our Phase 3 clinical trial of *azeliragon*, we may be required to grant a security interest in our intellectual property. We have agreed not to pledge or otherwise encumber our intellectual property assets, subject to certain exceptions. The level and nature of our indebtedness could, among other things:

- make it difficult for us to obtain any necessary financing in the future;
- limit our flexibility in planning for or reacting to changes in our business;
- reduce funds available for use in our operations and other strategic initiatives;
- impair our ability to incur additional debt because of restrictive covenants or the liens on our assets that secure our current debt;
- hinder our ability to raise equity capital, because in the event of a liquidation of our business, debt holders receive a priority before equity holders;
- make us more vulnerable in the event of a downturn in our business; and
- place us at a possible competitive disadvantage relative to less leveraged competitors and competitors that have better access to capital resources.

In addition, if we do not meet certain conditions set forth in the Loan Agreement, we will not be able to borrow the third tranche, which could materially harm our financial condition. We may also incur significantly more debt in the future, which will increase each of the risks described above related to our indebtedness.

Restrictions and covenants in the Loan Agreement limit our ability to take certain actions and impose consequences in the event of failure to comply.

The Loan Agreement contains a number of significant restrictions and covenants that limit our ability (subject in each case to limited exceptions) to, among other things,

- convey, sell, lease, transfer or otherwise dispose of certain of our assets;
- engage in any business other than the businesses we currently engage in or reasonably related thereto;
- liquidate or dissolve;
- make certain management changes;
- undergo certain change of control events;
- create, incur, assume or be liable with respect to certain indebtedness;
- grant certain liens;
- pay dividends and make certain other restricted payments;
- make certain investments; and
- enter into any material transactions with any affiliates, with certain exceptions.

These covenants affect our operating flexibility by, among other things, restricting our ability to incur expenses and indebtedness that could otherwise be used to fund the costs of executing our business strategy and to grow our business, as well as to fund general corporate purposes. Our ability to comply with these covenants may be affected by events beyond our control and we may not be able to meet these covenants. A breach under the Loan Agreement would permit our lenders to accelerate amounts outstanding thereunder. We may not have sufficient funds at the time of any such breach to repay, in full or in part, the borrowings under the Loan Agreement.

We have a limited operating history and we expect a number of factors to cause our operating results to fluctuate on a quarterly and annual basis, which may make it difficult to predict our future performance.

We are a clinical stage biopharmaceutical company with a limited operating history. Our operations to date have been primarily limited to developing our technology and undertaking preclinical studies and clinical trials of *azeliragon* and our other drug candidates. We have not yet obtained regulatory approvals for *azeliragon* or any of our other drug candidates. Consequently, any statements about our future success or viability are not based on any substantial operating history or commercialized products. Our financial condition and operating results have varied significantly in the past and will continue to fluctuate from quarter-to-quarter or year-to-year due to a variety of factors, many of which are beyond our control. As a result, we may never successfully develop and commercialize a product, which could lead to a material adverse effect on the value of any investment in our securities.

Risks Relating to the Development and Regulatory Approval of Our Drug Candidates

Clinical drug development involves a lengthy and expensive process with an uncertain outcome, and failure can occur at any stage of clinical development. Because the results of earlier clinical trials are not necessarily predictive of future results, any drug candidate we advance through various stages of clinical trials or development may not have favorable results in later stages of clinical trials or development or receive regulatory approval.

Clinical testing is expensive and can take many years to complete, and its outcome is inherently uncertain. Failure can occur at any stage of clinical development. Clinical trials may produce negative or inconclusive results, and we may decide, or regulators may require us, to conduct additional clinical or preclinical trials. In addition, data obtained from trials are susceptible to varying interpretations, and regulators may not interpret our data as favorably as we do, which may delay, limit or prevent regulatory approval. For example, although treatment in our Phase 2b clinical trial in mild-to-moderate AD patients was discontinued early due to the findings of an interim futility analysis conducted approximately 12 months after all subjects were randomized, subsequent statistical analyses conducted in accordance with the protocol-specified statistical analysis plan found a statistically significant improvement, as described further under "Business—Our Alzheimer's Program − *Azeliragon*—Completed Phase 2b Trial (TTP488-203)." Furthermore, an analysis of *azeliragon* in the subgroup of AD patients with MMSE scores of 21-26 (which are the mild AD patients that are the subjects of our Phase 3 STEADFAST Study) found that *azeliragon* had more pronounced efficacy in that subgroup. While we have reached an agreement with the FDA for our Phase 3 trial of *azeliragon* under a special protocol assessment, or SPA, there can be no assurance that the results of this Phase 3 trial will be consistent with the findings of our analyses. Success in preclinical testing and early clinical trials does not ensure that later clinical trials will generate the same results or otherwise provide adequate data to demonstrate the efficacy and safety of a drug candidate. Frequently, drug candidates that have shown promising results in early clinical trials have subsequently suffered significant setbacks in later clinical trials. In addition, the design of a clinical trial can determine whether its results will support approval of a product and flaws in the design of a clinical trial may not become apparent until the clinical trial is well advanced. While members of our management team have experience in designing clinical trials, our company has limited experience in designing clinical trials, and we may be unable to design and execute a clinical trial to support regulatory approval. Further, clinical trials of potential products often reveal that it is not practical or feasible to continue development efforts. For example, if the results of the STEADFAST Study do not achieve the primary efficacy endpoints or demonstrate safety, the prospects for approval of *azeliragon* would be materially and adversely affected. If *azeliragon* or our other drug candidates are found to be unsafe or lack efficacy, we will not be able to obtain regulatory approval for them and our business would be materially harmed.

While we have negotiated a special protocol assessment, or SPA, agreement with the FDA relating to the STEADFAST Study, this agreement does not guarantee approval of azeliragon or any other particular outcome from regulatory review of the study or the drug candidate.

We have reached agreement with the FDA to conduct the STEADFAST Study, our Phase 3 trial of *azeliragon* pursuant to an SPA agreement. The FDA's SPA process is designed to facilitate the FDA's review and approval of drugs by allowing the FDA to evaluate the proposed design and size of Phase 3 trials that are intended to form the primary basis for determining a drug product's efficacy. Upon specific request by a clinical trial sponsor, the FDA will evaluate the protocol and respond to a sponsor's questions regarding, among other things, primary efficacy endpoints, trial design and data analysis plans, within 45 days of receipt of the request. The FDA ultimately assesses whether the protocol design and planned analysis of the trial are acceptable to support regulatory approval of the drug candidate with respect to its effectiveness against the indication studied. All agreements and disagreements between the FDA and the sponsor regarding an SPA must be clearly documented in an SPA letter or the minutes of a meeting between the sponsor and the FDA. Nevertheless, an SPA agreement does not guarantee approval of a drug candidate, and even if the FDA agrees to the design, execution and analysis proposed in protocols reviewed under the SPA process, the FDA may revoke or alter its agreement in certain circumstances. In particular, an SPA agreement is not binding on the FDA if public health concerns emerge that were unrecognized at the time of the SPA agreement, other new scientific concerns regarding product safety or efficacy arise, the sponsor company fails to comply with the agreed upon trial protocols, or the relevant data, assumptions or information provided by the sponsor in a request for the SPA change or are found to be false or omit relevant facts. In addition, even after an SPA agreement is finalized, the SPA agreement may be modified, and such modification will be deemed binding on the FDA review division, except under the circumstances described above, if the FDA and the sponsor agree in writing to modify the protocol and such modification is intended to improve the study. The

FDA retains significant latitude and discretion in interpreting the terms of the SPA agreement and the data and results from any study that is the subject of the SPA agreement.

In addition to the risk that the FDA may decide that we have not met conditions for approval notwithstanding the terms of the SPA, our Phase 3 trial of *azeliragon* may not be completed in material accordance with the SPA agreement and the data generated may not meet the endpoints that have been agreed in the SPA to represent adequate evidence of effectiveness, and, for those or other reasons, may not result in any FDA approval for *azeliragon*. We expect that the FDA will review our compliance with the protocol under our SPA agreement and that it will conduct inspections of some of the more than 100 sites where the clinical trial will be conducted. Each of the clinical trial sites may not pass such FDA inspections, and negative inspection results could significantly delay or prevent any potential approval for *azeliragon*. Even if we believe that the data collected from the Phase 3 trial demonstrate adequate evidence of efficacy in accordance with the SPA, if the FDA revokes or alters its agreement under the SPA, or if the FDA interprets the data collected from the clinical trial differently than we do, the FDA may not deem the data sufficient to support an application for regulatory approval, which could materially adversely affect our business, financial condition and results of operations.

We cannot be certain that azeliragon or any of our other drug candidates will receive regulatory approval, and without regulatory approval we will not be able to market our drug candidates and generate revenue from products. Any delay in the regulatory review or approval of azeliragon or any of our other drug candidates will materially and adversely affect our business.

We have invested a significant portion of our efforts and financial resources in the development of *azeliragon*, our most advanced drug candidate. Our ability to generate revenue related to product sales, which we do not expect will occur for at least the next several years, if ever, will depend on the successful development and regulatory approval of our drug candidates. We may conduct the STEADFAST Study only to learn that *azeliragon* is not a safe or effective treatment, in which case the STEADFAST Study may not lead to regulatory approval for *azeliragon*. Similarly, our clinical development programs for our other drug candidates may not lead to regulatory approval from the FDA and similar foreign regulatory agencies. This failure to obtain regulatory approvals would prevent our drug candidates from being marketed and would prevent us from generating revenue from our drug candidates, which would have a material and adverse effect on our business.

All of our drug candidates require regulatory review and approval prior to commercialization, and generally, only a small percentage of pharmaceutical products under development are ultimately approved for commercial sale. This is particularly true in the area of treatments for Alzheimer's disease, where pharmaceutical development has been particularly challenging. Moreover, any delays in the regulatory review or approval of our drug candidates would delay market launch, increase our cash requirements and result in additional operating losses.

The process of obtaining FDA and other required regulatory approvals, including foreign approvals, often takes many years and can vary substantially based upon the type, complexity and novelty of the products involved. Furthermore, this approval process is extremely complex, expensive and uncertain, and failure to comply with applicable regulatory requirements can, among other things, result in the suspension of regulatory approval as well as possible civil and criminal sanctions. We may be unable to submit any new drug application, or an NDA, in the United States or any marketing approval application in foreign jurisdictions for any of our products. If we submit an NDA including any amended NDA or supplemental NDA, to the FDA seeking marketing approval for any of our drug candidates, the FDA must decide whether to accept or reject the submission for filing. We cannot be certain that any of these submissions will be accepted for filing and reviewed by the FDA, or that the marketing approval application submissions to any other regulatory authorities will be accepted for filing and review by those authorities. We cannot be certain that we will be able to respond to any regulatory requests during the review period in a timely manner, or at all, without delaying potential regulatory action. We also cannot be certain that any of our drug candidates will receive favorable recommendations from any FDA advisory committee or foreign regulatory bodies or be approved for marketing by the FDA or foreign regulatory authorities. In addition, delays in approvals or rejections of marketing applications may be based upon many factors, including regulatory requests for additional analyses, reports, data and studies, regulatory questions regarding data and results, changes in regulatory policy during the period of product development and the emergence of new information regarding *azeliragon* or our other drug candidates.

Data obtained from preclinical studies and clinical trials are subject to different interpretations, which could delay, limit or prevent regulatory review or approval of any of our drug candidates. Furthermore, regulatory attitudes towards the data and results required to demonstrate safety and efficacy can change over time and can be affected by many factors, such as the emergence of new information, including on other products, policy changes and agency funding, staffing and leadership. We do not know whether future changes to the regulatory environment will be favorable or unfavorable to our business prospects.

In addition, the environment in which our regulatory submissions may be reviewed changes over time. For example, average review times at the FDA for NDAs have fluctuated over the last ten years, and we cannot predict the review time for any of our submissions with any regulatory authorities. Review times can be affected by a variety of factors, including budget and funding levels and statutory, regulatory and policy as well as personnel changes at the FDA. Moreover, in light of widely publicized events concerning the safety risk of certain drug products, regulatory authorities, members of the U.S. Government Accountability Office, medical

professionals and the general public have raised concerns about potential drug safety issues. These events have resulted in the withdrawal of drug products, revisions to drug labeling that further limit use of the drug products and establishment of REMS, measures that may, for instance, place restrictions on the distribution of new drug products. The increased attention to drug safety issues may result in a more cautious approach by the FDA to clinical trials. Data from clinical trials may receive greater scrutiny with respect to safety, which may make the FDA or other regulatory authorities more likely to delay or terminate clinical trials before completion, or require longer or additional clinical trials that may result in substantial additional expense and a delay or failure in obtaining approval or may result in approval for a more limited indication than originally sought.

In addition, approval policies, regulations, or the type and amount of clinical data necessary to gain approval may change during the course of a drug candidate's clinical development and may vary among jurisdictions, and approval in one jurisdiction does not guarantee approval in any other jurisdiction. Our drug candidates could fail to receive regulatory approval for many reasons, including the following:

- the FDA or comparable foreign regulatory authorities may disagree with the design or implementation of our clinical trials;
- we may be unable to demonstrate to the satisfaction of the FDA or comparable foreign regulatory authorities that a drug candidate is safe and effective for its proposed indication;
- the results of clinical trials may not meet the level of statistical significance required by the FDA or comparable foreign regulatory authorities for approval;
- we may be unable to demonstrate that a drug candidate's clinical and other benefits outweigh its safety risks;
- the FDA or comparable foreign regulatory authorities may disagree with our interpretation of data from preclinical studies or clinical trials;
- the data collected from clinical trials of our drug candidates may not be sufficient to support the submission of an NDA or other submission or to obtain regulatory approval in the United States or elsewhere;
- the FDA or comparable foreign regulatory authorities may fail to approve the manufacturing processes or facilities of third-party manufacturers with which we contract for clinical and commercial supplies;
- the FDA or comparable foreign regulatory authorities may fail to approve the companion diagnostics we contemplate developing with partners; and
- the approval policies or regulations of the FDA or comparable foreign regulatory authorities may significantly change in a manner rendering our clinical data insufficient for approval.

This lengthy approval process as well as the unpredictability of future clinical trial results may result in our failing to obtain regulatory approval to market our drug candidates, which would significantly harm our business, results of operations and prospects.

In addition, even if we were to obtain approval, regulatory authorities may approve any of our drug candidates for fewer or more limited indications than we request, may not approve the price we intend to charge for our products, may grant approval contingent on the performance of costly post-marketing clinical trials, or may approve a drug candidate with a label that does not include the labeling claims necessary or desirable for the successful commercialization of that drug candidate. For example, even if *azeliragon* receives regulatory approval, it may not be approved by the FDA as a disease modifying treatment. To date, the FDA has not approved any drugs for the treatment of AD as disease modifying. Any of the foregoing scenarios could materially harm the commercial prospects for our drug candidates.

Changes in law, including as a result of the recent elections in the U.S., could have a negative impact on the approval of our drug candidates.

The FDA has established regulations, guidelines and policies to govern the drug development and approval process, as have foreign regulatory authorities. Any change in regulatory requirements resulting from the adoption of new legislation, regulations or policies may require us to amend existing clinical trial protocols or add new clinical trials to comply with these changes. Such amendments to existing protocols or clinical trial applications or the need for new ones, may significantly and adversely affect the cost, timing and completion of the clinical trials for our drug candidates. In addition, the FDA's policies may change and additional government regulations may be issued that could prevent, limit or delay regulatory approval of our drug candidates, or impose more stringent product labeling and post-marketing testing and other requirements. The recent elections in the U.S. could result in significant changes in, and uncertainty with respect to, legislation, regulation and government policy that could significantly impact our business and the health care industry. While it is not possible to predict whether and when any such changes will occur, specific proposals discussed during and after the election that could have a material impact on us include, but are not limited to, the repeal of the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act of 2010 and enactment of the 21st Century Cures Act. If we are slow or unable to adapt to any such changes, our business, prospects and ability to achieve or sustain profitability would be adversely affected.

Delays in the commencement, enrollment and completion of our clinical trials could result in increased costs to us and delay or limit our ability to obtain regulatory approval for azeliragon and our other drug candidates.

Delays in the commencement, enrollment and completion of clinical trials could increase our product development costs or limit the regulatory approval of our drug candidates. We commenced the STEADFAST Study in April 2015 and have successfully completed the enrollment of sub-study A; however, this clinical trial and reports of data from the study may not be completed on schedule, if at all. In addition, we do not know whether planned clinical trials of *azeliragon* in additional indications and of our other drug candidates will begin on time or will be completed on schedule or at all. The commencement, enrollment and completion of the STEADFAST Study or other clinical trials can be delayed for a variety of reasons, including:

- inability to reach agreements on acceptable terms with prospective CROs and trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs and trial sites;
- regulatory objections to commencing a clinical trial;
- 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 indication as our drug candidates;
- withdrawal of clinical trial sites from our clinical trials as a result of changing standards of care or the ineligibility of a site to participate in our clinical trials;
- inability to obtain institutional review board, or IRB, approval to conduct a clinical trial;
- difficulty recruiting and enrolling subjects to participate in clinical trials for a variety of reasons, including willingness of subjects to undergo required study procedures, meeting the enrollment criteria for our study and competition from other clinical trial programs for the same indication as our drug candidates;
- inability to recruit and retain subjects in clinical trials due to the treatment protocol, personal issues, side effects from the therapy or lack of efficacy; and
- difficulty in importing and exporting clinical trial materials and study samples.

Patient enrollment, a significant factor in the timing of clinical trials, is affected by many factors including the size and nature of the patient population, the proximity of patients to clinical sites, the eligibility criteria for the trial, the design of the clinical trial, competing clinical trials and clinicians' and patients' perceptions as to the potential advantages of the drug being studied in relation to other available therapies, including any new drugs that may be approved for the indications we are investigating. Furthermore, we rely on CROs and clinical trial sites to ensure the proper and timely conduct of our clinical trials and while we have agreements governing their committed activities, we have limited influence over their actual performance.

We could also encounter delays if a clinical trial is suspended or terminated by us, by the IRBs of the institutions in which such trials are being conducted, by the DSMB, for such trial or by the FDA or other regulatory authorities. Such authorities may impose such a suspension or termination due to a number of factors, including:

- failure to conduct the clinical trial in accordance with regulatory requirements or our clinical protocols;
- failure to pass inspection of the clinical trial operations or trial sites by the FDA or other regulatory authorities;

- failure of any contract manufacturing organizations, or CMOs, that we use to comply with current Good Manufacturing Practices, or cGMPs;
- unforeseen safety issues or any determination that a clinical trial presents unacceptable health risks;
- failure to demonstrate benefit from using the drug;
- changes in the regulatory requirement and guidance; or
- lack of adequate funding to continue the clinical trial due to unforeseen costs resulting from enrollment delays, requirements to conduct additional trials and studies, increased expenses associated with the services of our CROs and other third parties or other reasons.

Moreover, principal investigators for our clinical trials may serve as scientific advisors or consultants to us from time to time and receive compensation in connection with such services. Under certain circumstances, we may be required to report some of these relationships to the FDA. The FDA may conclude that a financial relationship between us and a principal investigator has created a conflict of interest or otherwise affected interpretation of the study. The FDA may therefore question the integrity of the data generated at the applicable clinical trial site and the utility of the clinical trial itself may be jeopardized. This could result in a delay in approval, or rejection, of our marketing applications by the FDA and may ultimately lead to the denial of marketing approval of one or more of our product candidates.

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

We have never completed a Phase 3 clinical trial or submitted an NDA before and may be unable to do so for azeliragon and other drug candidates we are developing.

The conduct of Phase 3 clinical trials and the submission of a successful NDA is a complicated process. As a team,we have never conducted a Phase 3 clinical trial before, have limited experience in preparing, submitting and prosecuting regulatory filings, and have not submitted an NDA before. Consequently, we may be unable to successfully and efficiently execute and complete these planned clinical trials in a way that leads to NDA submission and approval of *azeliragon* and other drug candidates we are developing. We may require more time and incur greater costs than our competitors and may not succeed in obtaining regulatory approvals of drug candidates that we develop. Failure to commence or complete, or delays in, our planned clinical trials would prevent or delay commercialization of *azeliragon* and other drug candidates we are developing.

Our drug candidates may cause serious adverse events or undesirable side effects which may delay or prevent marketing approval, or, if approval is received, require them to be taken off the market, require them to include safety warnings or otherwise limit their sales.

Serious adverse events or undesirable side effects from *azeliragon* or any of our other drug candidates could arise either during clinical development or, if approved, after the approved product has been marketed. The results of future clinical trials, including the STEADFAST Study, may show that our drug candidates cause serious adverse events or undesirable side effects, which could interrupt, delay or halt clinical trials, resulting in delay of, or failure to obtain, marketing approval from the FDA and other regulatory authorities or could result in a more restrictive label if our drug candidates are approved. For example, in a Phase 2 study, patients treated with *azeliragon* at a dose of 20 mg/day experienced a higher level of adverse events including confusion and falls that ultimately led to discontinuation of the study at that dose, but such elevated levels of adverse events were not observed at the 5 mg/day dose.

If *azeliragon* or any of our other drug candidates cause serious adverse events or undesirable side effects either during clinical development, or after marketing approval, if obtained:

- regulatory authorities, IRBs, or the DSMB may impose a clinical hold, or we may decide on our own to suspend or terminate a study, which could result in substantial delays and adversely impact our ability to continue development of the product;
- regulatory authorities may require the addition of labeling statements, specific warnings, contraindications or field alerts to study subjects, investigators, physicians or pharmacies;
- we may be required to change the product design or the way the product is administered, conduct additional clinical trials or change the labeling of the product;

- we may be required to implement a REMS, which could result in substantial cost increases or signification limitations on distribution or have a negative impact on our ability to successfully commercialize the product;
- we may be required to limit the patients who can receive the product;
- we may be subject to limitations on how we promote the product;
- sales of the product may decrease significantly;
- regulatory authorities may require us to take our approved product off the market;
- we may be subject to litigation or product liability claims; and
- our reputation may suffer.

Any of these events could prevent us from obtaining approval, or achieving or maintaining market acceptance of the affected product, if approved, or could substantially increase commercialization costs and expenses, which in turn could delay or prevent us from generating significant revenues from the sale of our products.

Azeliragon and our other drug candidates employ novel mechanisms of action and may never be approved or accepted by their intended markets.

Azeliragon and a number of our other drug candidates have novel mechanisms of action. *Azeliragon* targets RAGE, a novel mechanism of action for the treatment of AD. We are not aware of any other products under development that target RAGE. Our future success depends on our ability to complete the STEADFAST Study of *azeliragon* successfully, obtain market approval for and successfully commercialize *azeliragon*, as well as our ability to develop and market other drug candidates. The scientific discoveries that form the basis of our drug candidates are relatively new. We are not aware of any other drugs for the treatment of AD that have the same mechanism of action as *azeliragon* and even if *azeliragon* is approved, physicians may not be willing to use it. If we do not successfully develop and commercialize drug candidates based upon our technological approach, we may not become profitable and the value of our common stock may decline.

Evidence of the effectiveness of *azeliragon* in humans is limited to data generated in a single Phase 2b study and to the group of patients in that study receiving the lower, 5 mg/day, dose of the drug. Patients in that study who received the higher, 20 mg/day, dose of the drug tended to experience adverse events. The FDA has granted Fast Track designation to our *azeliragon* development program based on our pre-clinical (animal) studies and not based on our Phase 2b study. The results of the Phase 2b study may not be replicated in our Phase 3 STEADFAST Study, and the FDA may not approve *azeliragon* for commercial use.

In addition, regulatory approval of novel drug candidates such as *azeliragon* and our other drug candidates using novel mechanisms of action can be more expensive and take longer than other, more well-known or extensively studied pharmaceutical or biopharmaceutical products, due to our and regulatory agencies' lack of experience with them. We are not aware of the FDA reviewing any other products targeting RAGE as a mechanism of action to date. This lack of experience may lengthen the regulatory review process, require us to conduct additional studies or clinical trials, increase our development costs, lead to changes in regulatory positions and interpretations, delay or prevent approval and commercialization of these drug candidates or lead to significant post-approval limitations or restrictions.

We have conducted, and may in the future conduct, clinical trials for certain of our product candidates at sites outside the United States, and the FDA may not accept data from trials conducted in such locations.

We are conducting a portion of the STEADFAST Study and may in the future choose to conduct one or more of our clinical trials outside the United States. Although the FDA may accept data from clinical trials conducted outside the United States, acceptance of this data is subject to certain conditions imposed by the FDA. For example, the clinical trial must be well designed and conducted and performed by qualified investigators in accordance with ethical principles. The trial population must also adequately represent the U.S. population, and the data must be applicable to the U.S. population and U.S. medical practice in ways that the FDA deems clinically meaningful. Generally, the patient population for any clinical trials conducted outside of the United States must be representative of the population for whom we intend to seek approval in the United States. In addition, while these clinical trials are subject to the applicable local laws, FDA acceptance of the data will be dependent upon its determination that the trials also complied with all applicable U.S. laws and regulations. There can be no assurance that the FDA will accept data from trials conducted outside of the United States. If the FDA does not accept the data from any of our clinical trials that we determine to conduct outside the United States, it would likely result in the need for additional trials, which would be costly and time-consuming and could delay or permanently halt the development of a product candidate.

In addition, the conduct of clinical trials outside the United States could have a significant impact on us. Risks inherent in conducting international clinical trials include:

- foreign regulatory requirements that could restrict or limit our ability to conduct our clinical trials;
- administrative burdens of conducting clinical trials under multiple foreign regulatory schema;
- foreign exchange fluctuations; and
- diminished protection of intellectual property in some countries.

Risks Relating to the Commercialization of Our Drug Candidates

If any of our drug candidates for which we receive regulatory approval do not achieve broad market acceptance, the revenues that are generated from their sales will be limited.

The commercial success of *azeliragon* and our other drug candidates, if approved, will depend upon the acceptance of these products among physicians, healthcare payors, patients and others in the medical community. The degree of market acceptance of our drug candidates will depend on a number of factors, including:

- limitations or warnings contained in a product's FDA-approved labeling;
- changes in the standard of care or the availability of alternative therapies for the targeted indications for any of our drug candidates;
- limitations in the approved indications for our drug candidates;
- demonstrated clinical safety and efficacy compared to other products;
- lack of significant adverse side effects;
- education, sales, marketing and distribution support;
- availability and degree of coverage and reimbursement from third-party payors;
- timing of market introduction and perceived effectiveness of competitive products;
- cost-effectiveness;
- availability of alternative therapies at similar or lower cost, including generics, biosimilar and over-the-counter products;
- adverse publicity about our drug candidates or favorable publicity about competitive products;
- convenience and ease of administration of our products;
- potential product liability claims; and
- government-imposed pricing restrictions.

If our drug candidates are approved, but do not achieve an adequate level of acceptance by physicians, healthcare payors, patients and others in the medical community, sufficient revenue may not be generated from these products, and we may not become or remain profitable. In addition, efforts to educate the medical community and third-party payors on the benefits of our drug candidates may require significant resources and may not be successful.

We do not have the capability to sell, distribute and market our drug candidates. If we are unable to establish an effective sales force and marketing infrastructure, or enter into acceptable third-party sales and marketing or licensing arrangements, we may not be able to commercialize our drug candidates successfully.

We do not have the capability to sell, distribute and market our drug candidates. We will need to build a commercial organization or secure a strategic partner to commercialize *azeliragon* and our other drug candidates. If we are unable to build a commercial infrastructure or secure a strategic collaboration, our business and results of operations will be materially and adversely affected. Development of an internal commercial organization will require substantial resources and will be time consuming. These costs may be incurred in advance of any approval of our drug candidates. In addition, we may not be able to hire a sales force in the United States that is sufficient in size or has adequate expertise in the markets that we intend to target. If we are unable to establish a sales and marketing capability, our operating results may be adversely affected. If we seek to enter into sales and marketing or licensing arrangements with

third parties for the marketing and sale of any approved products, we may be unable to enter into any such arrangements on acceptable terms, or at all.

Even if our drug candidates receive regulatory approval, we will still be subject to ongoing obligations and continued regulatory review, which may result in significant additional expense, and we may still face future development and regulatory difficulties.

Even if regulatory approval is obtained for any of our drug candidates, regulatory authorities may still impose significant restrictions on a product's indicated uses or marketing or impose ongoing requirements for potentially costly post-approval studies. Given the number of high profile adverse safety events with certain drug products, regulatory authorities may require, as a condition of approval, costly REMS, which may include safety surveillance, restricted distribution and use, patient education, enhanced labeling, expedited reporting of certain adverse events, pre-approval of promotional materials and restrictions on direct-to-consumer advertising. For example, any labeling approved for any of our drug candidates may include a restriction on the term of its use, or it may not include one or more of our intended indications or patient populations. Furthermore, any new legislation addressing drug safety issues could result in delays or increased costs during the period of product development, clinical trials and regulatory review and approval, as well as increased costs to assure compliance with any new post-approval regulatory requirements.

Our drug candidates will also be subject to ongoing regulatory requirements for the labeling, packaging, storage, advertising, promotion, record-keeping and submission of safety and other post-market information. In addition, sellers of approved products, manufacturers and manufacturers' facilities are required to comply with extensive FDA requirements, including ensuring that quality control and manufacturing procedures conform to cGMP. As such, we and our CMOs are subject to continual review and periodic inspections to assess compliance with cGMP and the terms and conditions of approvals. Accordingly, we and others with whom we work must continue to expend time, money and effort in all areas of regulatory compliance, including manufacturing, production and quality control. We will also be required to report certain adverse reactions and production problems, if any, to the FDA, and to comply with certain requirements concerning advertising and promotion for our products. Promotional communications with respect to prescription drugs are subject to a variety of legal and regulatory restrictions and must be consistent with the information in the product's approved label. As such, we may not promote our products for indications or uses for which they do not have approval.

If a regulatory agency discovers problems with a product, such as adverse events of unanticipated severity or frequency, or problems with the facility where the product is manufactured, or objects to the promotion, marketing or labeling of a product, it may impose restrictions on that product or us, including requiring withdrawal of the product from the market. If our drug candidates fail to comply with applicable regulatory requirements, a regulatory agency may:

- issue warning letters or untitled letters;
- mandate modifications to promotional materials or require us to disseminate corrective information to healthcare practitioners or other parties;
- require us to enter into a consent decree or permanent injunction, which can include imposition of various fines, reimbursements for inspection costs, required due dates for specific actions and penalties for noncompliance;
- impose other civil or criminal penalties;
- suspend or withdraw regulatory approval;
- suspend any ongoing clinical trials;
- refuse to approve pending applications or supplements to approved applications filed by us;
- impose restrictions on operations, including costly new manufacturing requirements; or
- seize or detain products or require a product recall.

The FDA's policies may change, and additional government regulations may be enacted that could prevent, limit or delay regulatory approval of our drug candidates. If we are slow or unable to adapt to changes in existing requirements or the adoption of new requirements or policies, or if we are not able to maintain regulatory compliance, we may lose any marketing approval that we may have obtained, which would adversely affect our business, prospects and ability to achieve or sustain profitability.

We expect that our existing and future drug candidates will face competition, and most of our competitors have significantly greater resources than we do.

The biopharmaceutical industry is characterized by intense competition and rapid innovation. Our potential competitors include large pharmaceutical and biotechnology companies, specialty pharmaceutical companies, generic or biosimilar drug companies, universities and other research institutions. Our drug candidates, if successfully developed and approved, will compete in crowded and competitive markets. In order to compete with approved products, our drug candidates will need to demonstrate compelling advantages.

We believe the key competitive factors that will affect the development and commercial success of our drug candidates are efficacy, safety and tolerability profile, mechanism of action, control and predictability, convenience of dosing and price and reimbursement. Our most advanced drug candidate, *azeliragon*, is being developed for use in the treatment of patients with mild AD receiving a standard of care with an aceytlcholinesterase inhibitor and/or memantine. If approved for this indication, new competitors may emerge and *azeliragon* may face competition from several therapies currently in clinical development that address different mechanisms of action than *azeliragon*. Potential competitors with products in late stage clinical development are Biogen Inc, with its drug candidate aducanumab, Roche with its drug candidate gantenerumab, and Merck & Co., with its drug candidate MK-8931. Our drug candidates *TTP399* and *TTP273*, compounds for treating type 2 diabetes, would compete with both currently available non-insulin medication products and marketed non-insulin anti-diabetic agents that are in clinical development. Competition is high among novel drug classes for the treatment of type 2 diabetes. Products that are currently available that may compete with *TTP399* and *TTP273* include DPP-4 inhibitors, such as sitagliptin or saxagliptin, and SGLT-2 inhibitors, such as dapagliflozin and canagliflozin. Companies with GKAs in early clinical development that may compete with *TTP399* include Advinus Therapeutics Ltd., Yabao Pharmaceutical Co, Inc., Pegbio Co. Ltd., Hua Medicine Ltd. and Teijin Pharma Limited. *TTP273* would face competition from GLP-1r agonists that are being developed and are currently available, including an oral semaglutide being developed by Novo Nordisk A/S, Trulicity, which is marketed by Eli Lilly and Company, Tanzeum, which is marketed by GlaxoSmithKline plc, Bydureon, which is marketed by AstraZeneca plc, and Victoza, which is marketed by Novo Nordisk A/S.

Many of our potential competitors have substantially greater:

- resources, including capital, personnel and technology;
- research and development capability;
- clinical trial expertise;
- regulatory expertise;
- intellectual property rights, including patent rights;
- expertise in obtaining, maintaining, defending and enforcing intellectual property rights, including patent rights;
- manufacturing and distribution expertise; and
- sales and marketing expertise.

In addition, academic and government institutions are increasingly likely to enter into exclusive licensing agreements with commercial enterprises, including our competitors, to market commercial products based on technology developed at such institutions. Many of these competitors have significant products approved or in development that could be competitive with our products.

Accordingly, our competitors may be more successful than us in obtaining regulatory approval for drugs and achieving widespread market acceptance. Our competitors' drugs may be more effective, less costly, or more effectively marketed and sold, than any drug candidate we may commercialize and may render our drug candidates obsolete or non-competitive before we can recover the expenses of their development and commercialization. We anticipate that we will face intense and increasing competition as new drugs enter the market and advanced technologies become available. Finally, the development of new treatment methods for the diseases we are targeting could render our drug candidates non-competitive or obsolete.

Healthcare cost containment initiatives and the growth of managed care may limit our revenues and profitability.

Our ability to commercialize our products successfully may be negatively affected by the ongoing efforts of governmental and third-party payors to contain the cost of health care. In the United States, there have been and continue to be a number of legislative initiatives to contain healthcare costs. For example, in March 2010, the Patient Protection and Affordable Care Act of 2010, as amended by the Health Care and Education Reconciliation Act, or collectively, the Affordable Care Act, was passed, which substantially changes the way health care is financed by both governmental and private insurers, and significantly impacts the U.S. pharmaceutical industry. The Affordable Care Act, among other things, addressed a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for drugs that are inhaled, infused, instilled, implanted or injected, increased the minimum Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program and extended the rebate program to individuals enrolled in Medicaid managed care organizations, established annual fees and taxes on manufacturers of certain branded prescription drugs, and established a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturer's outpatient drugs to be covered under Medicare Part D.

In addition, other legislative changes have been proposed and adopted in the United States since the Affordable Care Act was enacted. On August 2, 2011, the Budget Control Act of 2011 among other things, created measures for spending reductions by Congress.

A Joint Select Committee on Deficit Reduction, tasked with recommending a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction to several government programs. These automatic reductions include aggregate reductions of Medicare payments to providers of 2% per fiscal year, which went into effect in April 2013 and, due to subsequent legislative amendments to the statute, will remain in effect through 2024 unless additional Congressional action is taken. On January 2, 2013, the American Taxpayer Relief Act of 2012 was signed into law, which, among other things, further reduced Medicare payments to several providers, including hospitals, imaging centers and cancer treatment centers. We expect that additional state and federal healthcare reform measures will be adopted in the future, any of which could limit the amounts that federal and state governments will pay for healthcare products and services, which could result in reduced demand for our drug candidates or additional pricing pressures.

Both governmental and third-party payers are challenging the cost of healthcare products and services, denying or limiting coverage and reimbursement amounts for new therapeutic products, for FDA-approved products considered experimental or investigational or used for disease indications without FDA marketing approval. Any restrictions in coverage or reductions in reimbursement rates under government programs often result in reductions in reimbursement rates by insurance companies and other third-party payors.

Even if we succeed in bringing *azeliragon* or any of our other drug candidates to the market, we may not be considered cost-effective, and governmental or third-party payor coverage and reimbursement might not be available or sufficient. If adequate governmental or third-party coverage or reimbursement is not available, we may not be able to maintain price levels sufficient to realize an appropriate return on our investment in research and product development. In addition, legislation and regulations affecting the pricing of pharmaceuticals may change in ways adverse to us before or after any of our proposed products are approved for marketing.

Therefore, adverse changes in third-party payor coverage and reimbursement and/or new state and federal healthcare reform measures that may be adopted in the future could have a material adverse effect on our businesses, financial conditions and results of operations.

Our current and future relationships with healthcare professionals, principal investigators, consultants, customers (actual and potential) and third-party payors in the United States and elsewhere may be subject, directly or indirectly, to applicable healthcare laws and regulations.

Healthcare providers, physicians and third-party payors in the United States and elsewhere will play a primary role in the recommendation and prescription of any drug candidates for which we obtain marketing approval. Our current and future arrangements with healthcare professionals, principal investigators, consultants, customers (actual and potential) and third-party payors may expose us to broadly applicable fraud and abuse and other healthcare laws, including, without limitation:

- the Food, Drug and Cosmetic Act ("FDCA") is the statute that provides the FDA with authority to oversee the safety and approval of pharmaceutical products. The FDCA vests authority with FDA to conduct inspections sponsors conducting pharmaceutical development, such as vTv, to protect the rights, safety and welfare of clinical trial subjects, ensure the accuracy and reliability of clinical trial data, and verify compliance with FDA regulations. The FDCA sets forth the standards for approval of new and generic drugs, as well as setting forth the prohibition on marketing investigational products that have not been approved by the FDA as safe and effective. The government (FDA and SEC) use the FDCA to ensure that companies do not mislead the medical, patient or investor communities about investigational products prior to their approval. To that end, the FDCA prohibits "off-label promotion" of any investigational or approved product for any uses, doses or populations, except that set forth in the full prescribing information approved by the FDA. While physicians can prescribe a product for any dose, purpose or population in their medical judgment, manufacturers can only market products for their FDA-approved dose, purpose and population. There are significant civil and criminal penalties that attach to violations of the FDCA, including strict liability misdemeanors for responsible corporate officers, even if such officers were not involved in or aware of the underlying wrongdoing;
- the federal Anti-Kickback Statute, which prohibits, among other things, persons from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward, or in return for, either the referral of an individual for, or the purchase, lease, order or recommendation of, any good, facility, item or service, for which payment may be made, in whole or in part, under federal and state healthcare programs such as Medicare and Medicaid. A person or entity does not need to have actual knowledge of the statute or specific intent to violate it to have committed a violation. In addition, the Affordable Care Act provided 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 False Claims Act;
- federal civil and criminal false claims laws, including the federal False Claims Act, which impose criminal and civil penalties, including civil whistleblower actions, against individuals or entities for, among other things, knowingly presenting, or causing to be presented, to the federal government, including the Medicare and Medicaid programs, 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 Foreign Corrupt Practices Act that prohibits payments to foreign public officials relating to official acts. In addition to its prohibition on bribery of foreign government officials, the Act requires companies to maintain accurate records and have vigorous internal controls. The DOJ and SEC have made FCPA enforcement a high priority. In addition, other anti-corruption laws such as the UK Bribery Act are even broader than the FCPA in that they apply to bribes offered to any person, not just government officials. There are significant criminal and civil penalties and fines that attach to violations of the FCPA;
- the civil monetary penalties statute, which imposes penalties against any person or entity who, among other things, is determined to have presented or caused to be presented a claim to a federal health program that the person knows or should know is for an item or service that was not provided as claimed or is false or fraudulent;
- HIPAA, which created new federal criminal statutes that prohibit knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program or obtain, by means of false or fraudulent pretenses, representations or promises, any of the money or property owned by, or under the custody or control of, any healthcare benefit program, regardless of the payor (e.g., public or private), knowingly and willfully embezzling or stealing from a healthcare benefit program, willfully obstructing a criminal investigation of a healthcare offense and knowingly and willfully falsifying, concealing or covering up by any trick or device a material fact or making any materially false statements in connection with the delivery of, or payment for, healthcare benefits, items or services relating to healthcare matters. A person or entity does not need to have actual knowledge of the statute or specific intent to violate it to have committed a violation;
- HIPAA, as amended by HITECH, and their respective implementing regulations, which impose obligations on covered entities, including healthcare providers, health plans, and healthcare clearinghouses, as well as their respective business associates that create, receive, maintain or transmit individually identifiable health information for or on behalf of a covered entity, with respect to safeguarding the privacy, security and transmission of individually identifiable health information;
- the federal Physician Payments Sunshine Act and its implementing regulations, which imposed annual reporting requirements for certain manufacturers of drugs, devices, biologicals and medical supplies for payments and "transfers of value" provided to physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members; and
- analogous state and foreign laws, such as state anti-kickback and false claims laws, which may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers; state laws that require pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government or otherwise restrict payments that may be made to healthcare providers; state and foreign laws that require drug manufacturers to report information related to payments and other transfers of value to physicians and other healthcare providers or marketing expenditures; and state and foreign laws governing the privacy and security of health information in certain circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

Efforts to ensure that our future business arrangements with third parties will comply with applicable healthcare laws and regulations may involve substantial costs. It is possible that governmental authorities will conclude that our business activities, including our relationships with physician consultants, some of whom may prescribe our product candidates, if approved, in the future, may not comply with current or future statutes, regulations or case law involving applicable fraud and abuse or other healthcare laws. 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, including, without limitation, damages, fines, imprisonment, exclusion from participation in government healthcare programs, such as Medicare and Medicaid, and the curtailment or restructuring of our operations, which could significantly harm our business.

If we try to obtain approval to commercialize any products outside the United States, many of the same risks that apply to obtaining approvals in the United States will likely apply to such a process, and even if we obtain approval to commercialize any such products outside of the United States, a variety of risks associated with international operations could materially adversely affect our business.

If we try to obtain approval to commercialize any of our products outside the United States, many of the same risks with respect to obtaining such approvals in the United States will apply to that process. If *azeliragon* or any of our other drug candidates are approved for commercialization outside of the United States, we intend to enter into agreements with third parties to market them on a worldwide basis or in more limited geographical regions. In that event, we expect that we will be subject to additional risks related to entering into international business relationships, including:

- different regulatory requirements for drug approvals;
- reduced protection for intellectual property rights, including trade secret and patent rights;
- existing tariffs, trade barriers and regulatory requirements and expected or unexpected changes;
- economic weakness, including inflation, or political instability in foreign economies and markets;

- compliance with tax, employment, immigration and labor laws for employees living or traveling abroad;
- foreign taxes, including withholding of payroll taxes;
- foreign currency fluctuations, which could result in increased operating expenses and reduced revenues, and other obligations incident to doing business in another country;
- workforce uncertainty in countries where labor unrest is more or less common than in the United States;
- production shortages resulting from any events affecting raw material supply or manufacturing capabilities abroad;
- business interruptions resulting from geopolitical actions, including war and terrorism, or natural disasters including earthquakes, hurricanes, floods and fires; and
- difficulty in importing and exporting clinical trial materials and study samples.

Risks Relating to Our Dependence on Third Parties

We may not succeed in establishing and maintaining collaborative relationships, which may significantly limit our ability to develop and commercialize our drug candidates successfully, if at all.

We intend to seek collaborative relationships for the development and commercialization of our drug candidates, including *azeliragon*. Failure to obtain a collaborative relationship for *azeliragon*, particularly in the European Union and for other markets requiring extensive sales efforts, may significantly impair the potential for this drug candidate. We also will need to enter into collaborative relationships to provide funding to support our other research and development programs. The process of establishing and maintaining collaborative relationships is difficult, time-consuming and involves significant uncertainty, including:

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

For example, we previously licensed the development of *azeliragon* to Pfizer Inc. in 2006, before Pfizer determined not to pursue the development of the program and we reacquired *azeliragon* in 2011, and Forest Laboratories had previously licensed our GKA programs, including *TTP399*, but decided to return the GKA programs to us in 2013, shortly before its acquisition by Actavis plc. Any collaborative partners we enter into agreements with in the future may also shift their priorities and resources away from our drug candidates or seek to renegotiate or terminate their relationships with us.

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

establish and maintain collaborative relationships on acceptable terms or to successfully transition terminated collaborative agreements, we may have to delay or discontinue further development of one or more of our drug candidates, undertake development and commercialization activities at our own expense or find alternative sources of capital.

We rely on third parties to conduct, supervise and monitor certain of our clinical trials, and if those third parties perform in an unsatisfactory manner, it may harm our business.

We rely on contract research organizations ("CROs") and clinical trial sites to ensure the proper and timely conduct of certain of our clinical trials, including the STEADFAST Study. While we have agreements governing their activities, and continue to monitor their compliance with those agreements as well as federal standards and regulations, we have limited influence over their actual performance. We will control only certain aspects of our CROs' activities. Nevertheless, we will be responsible for ensuring that our clinical trials are conducted in accordance with the applicable protocol, legal, regulatory and scientific standards and our reliance on the CROs does not relieve us of our regulatory responsibilities.

We and our CROs are required to comply with the FDA's good clinical practices requirements ("GCPs") for conducting, recording and reporting the results of clinical trials to assure that data and reported results are credible and accurate and that the rights, integrity and confidentiality of clinical trial participants are protected. The FDA enforces these GCPs through periodic inspections of trial sponsors, principal investigators and clinical trial sites. If we or our CROs fail to comply with applicable GCPs, the clinical data generated in our clinical trials may be deemed unreliable and the FDA may require us to perform additional clinical trials before approving any marketing applications. Upon inspection, the FDA may determine that our clinical trials did not comply with GCPs. In addition, our clinical trials conducted by third parties will require a sufficiently large number of test subjects to evaluate the safety and effectiveness of a drug candidate. Accordingly, if our CROs fail to comply with these regulations or fail to recruit a sufficient number of patients, our clinical trials may be delayed or we may be required to repeat such clinical trials, which would delay the regulatory approval process.

Our CROs are not our employees, and although we monitor their activities related to our trials, we are not able to control whether or not they devote sufficient time and resources to our clinical trials. If our CROs do not successfully carry out their contractual duties or obligations, fail to meet expected deadlines, or if the quality or accuracy of the clinical data they obtain is compromised due to the failure to adhere to our clinical protocols or regulatory requirements, or for any other reasons, our clinical trials may be extended, delayed or terminated, and we may not be able to obtain regulatory approval for, or successfully commercialize our drug candidates. As a result, our financial results and the commercial prospects for such drug candidates would be harmed, our costs could increase, and our ability to generate revenues could be delayed.

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

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

We do not have multiple sources of supply for the components used in *azeliragon* and our other drug candidates. We also do not have long-term supply agreements with any of our suppliers. We are currently evaluating drug manufacturers that will produce the commercial supply of both the drug substance and drug product of *azeliragon*. It is our expectation that only one supplier of drug substance and one supplier of product will be qualified as vendors with the FDA. If for any reason we are unable to obtain drug substance or drug product from the manufacturers we select, we would have to seek to obtain these from other manufacturers. We may not be able to establish additional sources of supply for our drug candidates, or may be unable to do so on acceptable terms. Such suppliers are subject to regulatory requirements, covering manufacturing, testing, quality control and record keeping relating to our drug candidates and subject to ongoing inspections by the regulatory agencies. Failure by any of our suppliers to comply with applicable regulations may result in long delays and interruptions.

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

As part of any marketing approval, a manufacturer and its processes are required to be qualified by the FDA prior to commercialization. If supply from the approved supplier is interrupted, there could be a significant disruption in commercial supply. An alternative vendor would need to be qualified through an NDA amendment or supplement which could result in further delay. The FDA or other regulatory agencies outside of the United States may also require additional studies if a new supplier is relied upon for

commercial production. Switching vendors may involve substantial costs and is likely to result in a delay in our desired clinical and commercial timelines.

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

We intend to rely on third-party manufacturers to produce our drug candidates. If we experience problems with any of these suppliers, the manufacturing of our drug candidates or products could be delayed.

We do not have the capability to manufacture our drug candidates and do not intend to develop that capability. In order to continue to develop our drug candidates, apply for regulatory approvals and ultimately commercialize products, we need to develop, contract for or otherwise arrange for the necessary manufacturing capabilities. The facilities used by our CMOs to manufacture our drug candidates must be approved by the FDA pursuant to inspections that will be conducted after we submit our NDA to the FDA. We do not control the manufacturing process of, and are completely dependent on, our contract manufacturing partners for compliance with the regulatory requirements, known as cGMPs, for manufacture of both active drug substances and finished drug products. If our CMOs cannot successfully manufacture material that conforms to our specifications and the regulatory requirements of the FDA or others, they will not be able to secure and/or maintain regulatory approval for their manufacturing facilities. In addition, although we monitor our suppliers and their compliance with our contractual terms and federal laws and regulations, we do not control the ability of our contract manufacturers to maintain adequate quality control, quality assurance and qualified personnel. If the FDA or a comparable foreign regulatory authority does not approve these facilities for the manufacture of our drug candidates or if it withdraws any such approval in the future, we may need to find alternative manufacturing facilities, which would significantly impact our ability to develop, obtain regulatory approval for or market our drug candidates, if approved.

In addition, there are a limited number of manufacturers that operate under the FDA's cGMP regulations capable of manufacturing our drug candidates. As a result, we may have difficulty finding manufacturers for our drug candidates with adequate capacity for our needs. If we are unable to arrange for third-party manufacturing of our drug candidates on a timely basis, or to do so on commercially reasonable terms, we may not be able to complete development of our drug candidates or market them.

Reliance on third-party manufacturers entails risks to which we might not be subject if we manufactured drug candidates ourselves, including:

- the limited number of manufacturers that could produce our drug candidates for us;
- the inability to meet our product specifications and quality requirements consistently;
- inability to access production facilities on a timely basis;
- inability or delay in increasing manufacturing capacity;
- manufacturing and product quality issues related to scale-up of manufacturing;
- costs and validation of new equipment and facilities required for commercial level activity;
- a failure to satisfy the FDA's cGMP requirements and similar foreign standards on a consistent basis;
- the inability to negotiate manufacturing agreements with third parties under commercially reasonable terms;
- termination or nonrenewal of manufacturing agreements with third parties in a manner or at a time that is costly or damaging to us;
- the reliance on a single sources of supply which, if unavailable, would delay our ability to complete our clinical trials or to sell any product for which we have received marketing approval;
- the lack of qualified backup suppliers for supplies that are currently purchased from a single source supplier;
- carrier disruptions or increased costs that are beyond our control; and
- the failure to deliver products under specified storage conditions and in a timely manner.

Any of these risks could cause the delay of clinical trials, regulatory submissions, required approvals or commercialization of our products, cause us to incur higher costs and prevent us from commercializing our drug candidates successfully. Manufacturing of our drug candidates and any approved products could be disrupted or halted if our third-party manufacturers do not comply with cGMP or foreign manufacturing standards, even if the compliance failure does not relate to our drug candidates or approved products. Furthermore, if any of our drug candidates are approved and our third-party manufacturers fail to deliver the required commercial quantities of finished product on a timely basis and at commercially reasonable prices and we are unable to find one or more

replacement manufacturers capable of production at a substantially equivalent cost, in substantially equivalent volumes and quality and on a timely basis, we would likely be unable to meet demand for our products and could lose potential revenue. It may take several years to establish an alternative source of supply for our drug candidates and to have any such new source approved by the FDA or a foreign regulator.

Risks Relating to Our Intellectual Property

It is difficult and costly to protect our proprietary rights, and we may not be able to ensure their protection.

Our commercial success will depend in part on our ability to:

- apply for, obtain, maintain and enforce patents;
- protect trade secrets; and
- operate without infringing upon the proprietary rights of others.

We will be able to protect our proprietary technology from unauthorized use by third parties only to the extent that such proprietary rights are covered by regulatory exclusivity, valid and enforceable patents or are effectively maintained as trade secrets. Any non-confidential disclosure to or misappropriation by third parties of our confidential or proprietary information could enable competitors to quickly duplicate or surpass our technological achievements, thus eroding our competitive position in our market.

As of December 31, 2016, we were the owner of record of at least 55 issued U.S. patents and at least 240 issued non-U.S. patents, as well as the licensee of at least 11 issued U.S. patents and at least 59 issued non-U.S. patents. As of December 31, 2016, we were actively pursuing 17 U.S. patent applications, of which three are provisional and 14 are non-provisional, two international patent applications and at least 129 non-U.S. patent applications in twelve or more jurisdictions as the owner of record, in addition to one non-U.S. patent application under license.

The patent application process, also known as patent prosecution, is expensive and time-consuming, and we and our current or future licensors and licensees may not be able to prepare, file and prosecute all necessary or desirable patent applications at a reasonable cost or in a timely manner. It is also possible that we or our current licensors, or any future licensors or licensees, will fail to identify patentable aspects of inventions made in the course of development and commercialization activities before it is too late to obtain patent protection on them. Therefore, these and any of our patents and applications may not be prosecuted and enforced in a manner consistent with the best interests of our business. It is possible that defects of form in the preparation or filing of our patents or patent applications may exist, or may arise in the future, for example with respect to proper priority claims or inventorship. If we or our current licensors or licensees, or any future licensors or licensees, fail to establish, maintain or protect such patents and other intellectual property rights, such rights may be reduced or eliminated. If our current licensors or licensees, or any future licensors or licensees, are not fully cooperative or disagree with us as to the prosecution, maintenance or enforcement of any patent rights, such patent rights could be compromised. If there are material defects in the form or preparation of our patents or patent applications, such patents or applications may be invalid and unenforceable. Any of these outcomes could impair our ability to prevent competition from third parties, which may harm our business.

The patent applications that we own or license may fail to result in issued patents in the United States or in other countries. Even if patents do issue on such patent applications, third parties may challenge the validity, enforceability or scope thereof, which may result in such patents being narrowed, invalidated or held unenforceable. For example, U.S. patents can be challenged by any person before the new USPTO Patent Trial and Appeals Board at any time within the one year period following that person’s receipt of an allegation of infringement of the patents. Patents granted by the European Patent Office may be similarly opposed by any person within nine months from the publication of the grant. Similar proceedings are available in other jurisdictions, and in the United States, Europe and other jurisdictions third parties can raise questions of validity with a patent office even before a patent has granted. Furthermore, even if they are unchallenged, our patents and patent applications may not adequately protect our intellectual property or prevent others from designing around our claims. If the breadth or strength of protection provided by the patents and patent applications we hold or pursue with respect to our product candidates is successfully challenged, then our ability to commercialize such product candidates could be negatively affected, and we may face unexpected competition that could harm our business. Further, if we encounter delays in our clinical trials, the period of time during which we or our collaborators could market our product candidates under patent protection would be reduced.

The degree of future protection of our proprietary rights is uncertain. Patent protection may be unavailable or severely limited in some cases and may not adequately protect our rights or permit us to gain or keep our competitive advantage. For example:

- we might not have been the first to invent or the first to file the inventions covered by each of our pending patent applications and issued patents;
- others may be able to make, use, sell, offer to sell or import products that are similar to our products or product candidates but that are not covered by the claims of our patents; others may independently develop similar or alternative technologies or duplicate any of our technologies;
- the proprietary rights of others may have an adverse effect on our business;
- any proprietary rights we do obtain may not encompass commercially viable products, may not provide us with any competitive advantages or may be challenged by third parties;
- any patents we obtain or our in-licensed issued patents may not be valid or enforceable; or
- we may not develop additional technologies or products that are patentable or suitable to maintain as trade secrets.

If we or our current licensors or licensees, or any future licensors or licensees, fail to prosecute, maintain and enforce patent protection for our product candidates, our ability to develop and commercialize our product candidates could be harmed and we might not be able to prevent competitors from making, using and selling competing products. This failure to properly protect the intellectual property rights relating to our product candidates could harm our business, financial condition and operating results. Moreover, our competitors may independently develop equivalent knowledge, methods and know-how.

Even where laws provide protection, costly and time-consuming litigation could be necessary to enforce and determine the scope of our proprietary rights, and the outcome of such litigation would be uncertain. If we or one of our collaborators were to initiate legal proceedings against a third party to enforce a patent covering the product candidate, the defendant could assert an affirmative defense or counterclaim that our patent is not infringed, invalid and/or unenforceable. In patent litigation in the United States, defendant defenses and counterclaims alleging noninfringement, invalidity and/or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, including lack of novelty, anticipation or obviousness, and lack of written description, definiteness or enablement. Patents may be unenforceable if someone connected with prosecution of the patent withheld material information from the USPTO, or made a misleading statement, during prosecution. The outcomes of proceedings involving assertions of invalidity and unenforceability are unpredictable. It is possible that prior art of which we and the patent examiner were unaware during prosecution exists, which would render our patents invalid. Moreover, it is also possible that prior art may exist that we are aware of, but that we do not believe are relevant to our current or future patents, that could nevertheless be determined to render our patents invalid. If a defendant were to prevail on a legal assertion of invalidity and/or unenforceability of our patents covering one of our product candidates, we would lose at least part, and perhaps all, of the patent protection on such product candidate. Such a loss of patent protection would harm our business. Moreover, our competitors could counterclaim in any suit to enforce our patents that we infringe their intellectual property. Furthermore, some of our competitors have substantially greater intellectual property portfolios, and resources, than we do.

Our ability to stop third parties from using our technology or making, using, selling, offering to sell or importing our products is dependent upon the extent to which we have rights under valid and enforceable patents that cover these activities. If any patent we currently or in the future may own or license is deemed not infringed, invalid or unenforceable, it could impact our commercial success. We cannot predict the breadth of claims that may be issued from any patent applications we currently or may in the future own or license from third parties.

To the extent that consultants or key employees apply technological information independently developed by them or by others to our product candidates, disputes may arise as to who has the proprietary rights to such information and product candidates, and certain of such disputes may not be resolved in our favor. Consultants and key employees that work with our confidential and proprietary technologies are required to assign all intellectual property rights in their inventions and discoveries created during the scope of their work to our company. However, these consultants or key employees may terminate their relationship with us, and we cannot preclude them indefinitely from dealing with our competitors.

If we are unable to prevent disclosure of our trade secrets or other confidential information to third parties, our competitive position may be impaired.

We also may rely on trade secrets to protect our technology, especially where we do not believe patent protection is appropriate or obtainable. Our ability to stop third parties from obtaining the information or know-how necessary to make, use, sell, offer to sell or import our products or practice our technology is dependent in part upon the extent to which we prevent disclosure of the trade secrets that cover these activities. Trade secret rights can be lost through disclosure to third parties. Although we use reasonable efforts to

protect our trade secrets, our employees, consultants, contractors, outside scientific collaborators and other advisors may unintentionally or willfully disclose our trade secrets to third parties, resulting in loss of trade secret protection. Moreover, our competitors may independently develop equivalent knowledge, methods and know-how, which would not constitute a violation of our trade secret rights. Enforcing a claim that a third party is engaged in the unlawful use of our trade secrets is expensive, difficult and time consuming, and the outcome is unpredictable. In addition, recognition of rights in trade secrets and a willingness to enforce trade secrets differs in certain jurisdictions.

Changes to the patent law in the United States and other jurisdictions could diminish the value of patents in general, thereby impairing our ability to protect our products.

As is the case with other biopharmaceutical companies, our success is heavily dependent on intellectual property, particularly patents. Obtaining and enforcing patents in the biopharmaceutical industry involve both technological and legal complexity and is therefore costly, time consuming and inherently uncertain. Recent patent reform legislation in the United States and other countries, including the Leahy-Smith America Invents Act, or Leahy-Smith Act, signed into law on September 16, 2011, could increase those uncertainties and costs. 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, redefine prior art and provide more efficient and cost-effective avenues for competitors to challenge the validity of patents. In addition, the Leahy-Smith Act has transformed the U.S. patent system into a “first to file” system. The first-to-file provisions, however, only became effective on March 16, 2013. Accordingly, it is not yet 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 make it more difficult to obtain patent protection for our inventions and increase the uncertainties and costs surrounding the prosecution of our or our collaborators’ patent applications and the enforcement or defense of our or our collaborators’ issued patents, all of which could harm our business, results of operations and financial condition.

The U.S. Supreme Court has ruled on several patent cases in recent years, either narrowing the scope of patent protection available in certain circumstances or weakening the rights of patent owners in certain situations. Additionally, there have been recent proposals for additional changes to the patent laws of the United States and other countries that, if adopted, could impact our ability to obtain patent protection for our proprietary technology or our ability to enforce our proprietary technology. Depending on future actions by the U.S. Congress, the U.S. courts, the USPTO and the relevant law-making bodies in other countries, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future.

If we are sued for infringing intellectual property rights of third parties, it will be costly and time consuming, and an unfavorable outcome in that litigation could harm our business.

Our commercial success depends significantly on our ability to operate without infringing, violating or misappropriating the patents and other proprietary rights of third parties. Our own technologies may infringe, violate or misappropriate the patents or other proprietary rights of third parties, or we may be subject to third-party claims of such infringement. Numerous U.S. and foreign issued patents and pending patent applications owned by third parties, exist in the fields in which we are developing our product candidates. Because some patent applications may be maintained in secrecy until the patents are issued, because publication of patent applications is often delayed, and because publications in the scientific literature often lag behind actual discoveries, we cannot be certain that we were the first to invent the technology or that others have not filed patent applications for technology covered by our pending applications. We may not be aware of patents that have already issued that a third party might assert are infringed by our product candidates. It is also possible that patents of which we are aware, but which we do not believe are relevant to our product candidates, could nevertheless be found to be infringed by our product candidates. Moreover, we may face Inter Partes Review (“IPR”) proceedings before the PTO or patent infringement claims from non-practicing entities that have no relevant product revenue and against whom our own patent portfolio may thus have no deterrent effect. In the future, we may agree to indemnify our manufacturing partners against certain intellectual property claims brought by third parties.

Intellectual property litigation involves many risks and uncertainties, and there is no assurance that we will prevail in any lawsuit brought against us. Third parties making claims against us for infringement, violation or misappropriation of their intellectual property rights may seek and obtain injunctive or other equitable relief, which could effectively block our ability to further develop and commercialize our product candidates. Further, if a patent infringement suit were brought against us, we could be forced to stop or delay research, development, manufacturing or sales of the product or product candidate that is the subject of the suit. Defense of these claims, regardless of their merit, would cause us to incur substantial expenses and, would be a substantial diversion of resources from our business. In the event of a successful claim of any such infringement, violation or misappropriation, we may need to obtain licenses from such third parties and we and our partners may be prevented from pursuing product development or commercialization and/or may be required to pay damages. We cannot be certain that any licenses required under such patents or proprietary rights would be made available to us, or that any offer to license would be made available to us on commercially reasonable terms. If we cannot obtain such licenses, we and our collaborators may be restricted or prevented from manufacturing and selling products employing our technology. These adverse results, if they occur, could adversely affect our business, results of operations and prospects, and the value of our shares.

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

The biotechnology and pharmaceutical industries have been characterized by extensive litigation regarding patents and other intellectual property rights. The defense and prosecution of contractual or intellectual property lawsuits, USPTO interference or derivation proceedings, European Patent Office oppositions and related legal and administrative proceedings in the United States, Europe and other countries, involve complex legal and factual questions. As a result, such proceedings may be costly and time-consuming to pursue and their outcome is uncertain.

Litigation may be necessary to:

- protect and enforce our patents and any future patents issuing on our patent applications;
- enforce or clarify the terms of the licenses we have granted or may be granted in the future;
- protect and enforce trade secrets, know-how and other proprietary rights that we own or have licensed, or may license in the future; or
- determine the enforceability, scope and validity of the proprietary rights of third parties and defend against alleged patent infringement.

Competitors may infringe our intellectual property. As a result, we may be required to file infringement claims to stop third-party infringement or unauthorized use. This can be expensive, particularly for a company of our size, and time-consuming. In addition, in an infringement proceeding, a court may decide that a patent of ours is not valid or is unenforceable, or may refuse to stop the other party from using the technology at issue on the grounds that our patent claims do not cover its technology or that the factors necessary to grant an injunction against an infringer are not satisfied. An adverse determination of any litigation or other proceedings could put one or more of our patents at risk of being invalidated, interpreted narrowly, or amended such that they do not cover our product candidates. Moreover, such adverse determinations could put our patent applications at risk of not issuing, or issuing with limited and potentially inadequate scope to cover our product candidates or to prevent others from marketing similar products.

IPR, interference, derivation or other proceedings brought at the USPTO, may be necessary to determine the priority or patentability of inventions with respect to our patent applications or those of our licensors or potential collaborators. Litigation or USPTO proceedings brought by us may fail or may be invoked against us by third parties. Even if we are successful, domestic or foreign litigation or USPTO or foreign patent office proceedings may result in substantial costs and distraction to our management. We may not be able, alone or with our licensors or potential collaborators, to prevent misappropriation of our proprietary rights, particularly in countries where the laws may not protect such rights as fully as in the United States.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation or other proceedings, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation or other proceedings. In addition, during the course of this kind of litigation or proceedings, there could be public announcements of the results of hearings, motions or other interim proceedings or developments or public access to related documents. If investors perceive these results to be negative, the market price for our common stock could be significantly harmed.

Some of our competitors may be able to sustain the costs of patent-related disputes, including patent litigation, more effectively than we can because they have substantially greater resources. In addition, any uncertainties resulting from the initiation and continuation of any litigation could have a material adverse effect on our ability to raise the funds necessary to continue our operations.

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

Filing, prosecuting and defending patents on our product candidates in all countries throughout the world would be prohibitively expensive. The requirements for patentability may differ in certain countries, particularly in developing countries. Moreover, our ability to protect and enforce our intellectual property rights may be adversely affected by unforeseen changes in foreign intellectual property laws. Additionally, laws of some countries outside of the United States do not afford intellectual property protection to the same extent as the laws of the United States. Many companies have encountered significant problems in protecting and defending intellectual property rights in certain foreign jurisdictions. The legal systems of some countries, particularly developing countries, do not favor the enforcement of patents and other intellectual property rights. This could make it difficult for us to stop the infringement of our patents or the misappropriation of our other intellectual property rights. For example, many foreign countries have compulsory licensing laws under which a patent owner must grant licenses to third parties. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the United States. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and, further, may export otherwise infringing products to territories where we have patent protection, if our ability to enforce our patents to stop infringing activities is inadequate. These products may compete

with our products, and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

Proceedings to enforce our patent rights in foreign jurisdictions, whether or not successful, could result in substantial costs and divert our efforts and resources from other aspects of our business. Furthermore, while we intend to protect our intellectual property rights in major markets for our products, we cannot ensure that we will be able to initiate or maintain similar efforts in all jurisdictions in which we may wish to market our products. Accordingly, our efforts to protect our intellectual property rights in such countries may be inadequate.

If we do not obtain patent term extensions for our drug candidates, the length of our patent exclusivity will be shorter which may harm our business materially.

Depending upon the timing, duration and specifics of any FDA marketing approval of our drug candidates, one or more of our U.S. patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, or Hatch-Waxman Act. The Hatch-Waxman Act permits a patent extension term of up to five years as compensation for patent term lost during the FDA regulatory review process. A patent term extension cannot extend the remaining term of a patent beyond a total of 14 years from the date of product approval, only one patent applicable to each regulatory review period may be granted an extension, and only those claims covering the approved drug, a method for using it or a method for manufacturing it may be extended. However, we may not be granted an extension because of, for example, failing to exercise due diligence during the testing phase or regulatory review process, failing to apply within applicable deadlines, failing to apply prior to expiration of relevant patents or otherwise failing to satisfy applicable requirements. Moreover, the applicable time period or the scope of patent protection afforded could be less than we request. For example, patents providing intellectual property protection for *azeliragon* are scheduled to expire in 2023, but if we obtain the maximum possible extension in the United States, a period of patent extension for the approved *azeliragon* product could extend into 2029. If we are unable to obtain patent term extension or the term of any such extension is less than we request, our competitors may obtain approval of competing products following the original expiration dates of our patents, and our business may be materially harmed.

Risks Relating to Employee Matters and Managing Growth

We will need to expand our operations and increase the size of our company, and we may experience difficulties in managing growth.

As we advance our drug candidates through preclinical studies and clinical trials and develop new drug candidates, we will need to increase our product development, scientific and administrative headcount to manage these programs. If we commercialize our products, we may need to expand our staff further, particularly in sales and marketing. See "—Risks Relating to the Commercialization of Our Drug Candidates." We do not presently have the capability to sell, distribute and market our drug candidates. If we are unable to establish an effective sales force and marketing infrastructure, or enter into acceptable third-party sales and marketing or licensing arrangements, we may not be able to commercialize our drug candidates successfully. In addition, to meet our obligations as a public company, we will need to increase our general and administrative capabilities. Our management, personnel and systems currently in place may not be adequate to support this future growth. Our need to effectively manage our operations, growth and various projects requires that we:

- successfully attract and recruit new employees with the expertise and experience we will require;
- manage our clinical programs effectively, which we anticipate being conducted at numerous clinical sites;
- develop a marketing, distribution and sales infrastructure if we seek to market our products directly, or successfully partner with a third party organization that will oversee those efforts; and
- continue to improve our operational, manufacturing, financial and management controls, reporting systems and procedures.

If we are unable to successfully manage this growth and increased complexity of operations, our business may be adversely affected.

We may not be able to manage our business effectively if we are unable to attract and retain key personnel.

We may not be able to attract or retain qualified management, finance, scientific and clinical personnel in the future due to the intense competition for qualified personnel among biotechnology, pharmaceutical and other businesses. If we are not able to attract and retain necessary personnel to accomplish our business objectives, we may experience constraints that will significantly impede the achievement of our development objectives, our ability to raise additional capital and our ability to implement our business strategy.

Our industry has experienced a high rate of turnover of management personnel in recent years. We are highly dependent on the development, regulatory, commercialization and business development expertise of our executive officers and key employees. If we lose one or more of our executive officers or key personnel, our ability to implement our business strategy successfully could be seriously harmed. Any of our executive officers or key employees may terminate their employment at any time. Replacing executive officers and key employees may be difficult, will be costly and may take an extended period of time because of the limited number of individuals in our industry with the mix of skills and experience required to develop, gain regulatory approval of and commercialize products successfully. Competition to hire from this limited pool is intense, and we may be unable to hire, train, retain or motivate these additional key personnel. Our failure to attract and retain key personnel could materially harm our business.

Failure to build our finance infrastructure and improve our accounting systems and controls could impair our ability to comply with the financial reporting and internal controls requirements for publicly traded companies.

As a public company, we will operate in an increasingly demanding regulatory environment, which requires us to comply with applicable provisions of the Sarbanes-Oxley Act of 2002 and the related rules and regulations of the Securities and Exchange Commission, expanded disclosure requirements, accelerated reporting requirements and more complex accounting rules. Company responsibilities required by the Sarbanes-Oxley Act include establishing corporate oversight and adequate internal control over financial reporting and disclosure controls and procedures. Effective internal controls are necessary for us to produce reliable financial reports and are important to help prevent financial fraud.

We may need to hire additional finance personnel and build our financial infrastructure as the compliance obligations of operating as a public company, including complying with the applicable requirements of Section 404 of the Sarbanes-Oxley Act, increase. We may be unable to do so on a timely basis.

Until we are able to expand our finance and administrative capabilities and establish necessary financial reporting infrastructure, we may not be able to prepare and disclose, in a timely manner, our financial statements and other required disclosures or comply with the applicable provisions of the Sarbanes-Oxley Act or existing or new reporting requirements. If we cannot provide reliable financial reports or prevent fraud, our business and results of operations could be harmed and investors could lose confidence in our reported financial information.

Our employees, independent contractors, principal investigators, CROs, consultants and collaborators may engage in misconduct or other improper activities, including noncompliance with legal, compliance or regulatory standards and requirements.

We are exposed to the risk that our employees, independent contractors, principal investigators, CROs, consultants and collaborators may engage in fraudulent conduct or other illegal activity. Misconduct by these parties could include intentional, reckless and/or negligent conduct or unauthorized activities that violate the regulations of the FDA and non-U.S. regulators, including those laws requiring the reporting of true, complete and accurate information to the FDA and non-U.S. regulators, healthcare fraud and abuse laws and regulations in the United States and abroad, or laws that require the reporting of true and accurate financial information and data. In particular, sales, marketing and business arrangements in the healthcare industry are subject to extensive laws and regulations intended to prevent fraud, misconduct, kickbacks, self-dealing, pre-market promotion, and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, sales commission, customer incentive programs and other business arrangements. These activities also include the improper use or disclosure of information obtained in the course of clinical trials, which could result in regulatory sanctions and cause serious harm to our reputation. We have adopted new comprehensive compliance policies, and revised our code of conduct, but it is not always possible to identify and deter employee or non-employee misconduct, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to comply with these laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business, including the imposition of significant civil, criminal and administrative penalties, damages, monetary fines, possible exclusion from participation in Medicare, Medicaid and other federal healthcare programs, contractual damages, reputational harm, diminished profits and future earnings, and curtailment of our operations.

Other Risks Relating to Our Business

We may use our financial and human resources to pursue a particular research program or drug candidate and fail to capitalize on programs or drug candidates that may be more profitable or for which there is a greater likelihood of success.

Because we have limited financial and human resources, we intend to focus primarily on the regulatory approval of *azeliragon*, including the completion of the STEADFAST Study. As a result, we may forego or delay pursuit of opportunities with other drug candidates or for other indications that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities. Our spending on existing and future drug candidates for specific indications may not yield any commercially viable products. If we do not accurately evaluate the commercial

potential or target market for a particular drug candidate, we may relinquish valuable rights to that drug candidate through strategic alliance, licensing or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such drug candidate, or we may allocate internal resources to a drug candidate in a therapeutic area in which it would have been more advantageous to enter into a partnering arrangement.

If product liability lawsuits are brought against us, we may incur substantial liabilities and may be required to limit commercialization of any future products we develop.

We face an inherent risk of product liability as a result of the clinical testing of our drug candidates and will face an even greater risk if we commercialize any products. For example, we may be sued if any product we develop allegedly causes injury or is found to be otherwise unsuitable during product testing, manufacturing, marketing or sale. Any such product liability claims may include allegations of defects in manufacturing, defects in design, a failure to warn of dangers inherent in the product, negligence, strict liability and a breach of warranties. Claims could also be asserted under state consumer protection acts. If we cannot successfully defend ourselves against product liability claims, we may incur substantial liabilities or be required to limit commercialization of our products. Even a successful defense would require significant financial and management resources. Regardless of the merits or eventual outcome, liability claims may result in:

- decreased demand for *azeliragon* or any future drug candidates or products we develop;
- injury to our reputation and significant negative media attention;
- withdrawal of clinical trial participants or delay or cancellation of clinical trials;
- costs to defend the related litigation;
- a diversion of management's time and our resources;
- substantial monetary awards to trial participants or patients;
- regulatory investigations, product recalls, withdrawals or labeling, marketing or promotional restrictions;
- loss of revenue;
- the inability or delay in our ability to commercialize any products we develop; and
- a decline in our share price.

Our inability to obtain and maintain sufficient product liability insurance at an acceptable cost and scope of coverage to protect against potential product liability claims could prevent or inhibit the commercialization of *azeliragon* or any future products we develop. We currently carry clinical trial liability insurance in the amount of $10.0 million in the aggregate. Although we maintain such insurance, any claim that may be brought against us could result in a court judgment or settlement in an amount that is not covered, in whole or in part, by our insurance or that is in excess of the limits of our insurance coverage. Our insurance policies also have various exclusions and deductibles, and we may be subject to a product liability claim for which we have no coverage. We will have to pay any amounts awarded by a court or negotiated in a settlement that exceed our coverage limitations or that are not covered by our insurance, and we may not have, or be able to obtain, sufficient capital to pay such amounts. Moreover, in the future, we may not be able to maintain insurance coverage at a reasonable cost or in sufficient amounts to protect us against losses. If and when we obtain approval for marketing *azeliragon*, or another product, we intend to expand our insurance coverage to include the sale of *azeliragon*, or the other new product, however, we may be unable to obtain this liability insurance on commercially reasonable terms.

Our operations involve hazardous materials, which could subject us to significant liabilities.

Our research and development processes involve the controlled use of hazardous materials, including medical waste. Our operations produce hazardous waste products. We cannot eliminate the risk of accidental contamination or discharge or injury from these materials. Federal, state and local laws and regulations govern the use, manufacture, storage, handling and disposal of these materials. We could be subject to civil damages in the event of exposure of individuals to hazardous materials. In addition, claimants may sue us for injury or contamination that results from our use of these materials and our liability may exceed our total assets. We have general liability and umbrella insurance of up to $6.0 million per occurrence, with an annual aggregate limit of $7.0 million, which excludes pollution liability. This coverage may not be adequate to cover all claims related to our hazardous materials. Furthermore, if we were to be held liable for a claim involving hazardous materials, this liability could exceed our insurance coverage, if any, and our other financial resources. Compliance with environmental and other laws and regulations may be expensive and current or future regulations may impair our research, development or production efforts.

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

We do not carry insurance for all categories of risk that our business may encounter. Some of the policies we currently maintain include general liability, employment practices liability, property, auto, workers' compensation, umbrella, clinical trial and directors' and officers' insurance. We do not know, however, if we will be able to maintain existing insurance with adequate levels of coverage. Any significant uninsured liability may require us to pay substantial amounts, which would adversely affect our cash position and results of operations.

The market for our proposed products is rapidly changing and competitive, and new drugs and new treatments that may be developed by others could impair our ability to maintain and grow our businesses and remain competitive.

The pharmaceutical and biotechnology industries are subject to rapid and substantial technological change. Developments by others may render proposed products noncompetitive or obsolete, or we may be unable to keep pace with technological developments or other market factors. Technological competition from pharmaceutical and biotechnology companies, universities, governmental entities and others diversifying into the field is intense and is expected to increase.

As a company with nominal revenues engaged in the development of drug technologies, our resources are limited, and we may experience technical challenges inherent in such technologies. Competitors have developed or are in the process of developing technologies that are, or in the future may be, the basis for competition. Some of these technologies may have an entirely different approach or means of accomplishing similar therapeutic effects compared to our proposed products. Our competitors may develop drugs that are safer, more effective or less costly than our proposed products and, therefore, present a serious competitive threat to us.

The potential widespread acceptance of therapies that are alternatives to ours may limit market acceptance of our drug candidates, even if commercialized. Some of our targeted diseases and conditions can also be treated by other medication. These treatments may be widely accepted in medical communities and have a longer history of use or be offered at a more competitive price. The established use of these competitive drugs may limit the potential for our technologies, formulations and products to receive widespread acceptance if commercialized.

Therefore, changes in the market for our products and the availability of new or alternative treatments could have a material adverse effect on our businesses, financial conditions and results of operations.

Our business and operations would suffer in the event of computer system failures, cyber-attacks or a deficiency in our cyber-security.

Despite the implementation of security measures, our internal computer systems, and those of third parties on which we rely, are vulnerable to damage from computer viruses, malware, natural disasters, terrorism, war, telecommunication and electrical failures, cyber-attacks or cyber-intrusions over the Internet, attachments to emails, persons inside our organization or persons with access to systems inside our organization. The risk of a security breach or disruption, particularly through cyber-attacks or cyber-intrusion, including by computer hackers, foreign governments and cyber terrorists, has generally increased as the number, intensity and sophistication of attempted attacks and intrusions from around the world have increased. If such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our drug development programs. For example, the loss of clinical trial data from completed or ongoing or planned clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. Also, confidential patient and other information may be compromised in a cyber-attack or cyber-intrusion. To the extent that any disruption or security breach was to result in a loss of or damage to our data or applications, or inappropriate disclosure of confidential or proprietary information, we could incur material legal claims and liability, damage to our reputation, and the further development of our drug candidates could be delayed.

We may be subject to foreign exchange fluctuations.

Our functional and reporting currency is the United States dollar. A portion of our expenditures are in foreign currencies, most notably in Canadian dollars, and therefore we are subject to foreign currency fluctuations, which may, from time to time, impact our financial position and results.

Risks Related to our Common Stock

MacAndrews & Forbes Incorporated ("MacAndrews") has substantial influence over our business, and their interests may differ from our interests or those of our other stockholders.

MacAndrews holds, directly or indirectly, a majority of our combined voting power. Due to its ownership and rights under our investor rights agreement, amended and restated certificate of incorporation and amended and restated bylaws, MacAndrews has the power to control us and our subsidiaries, including the power to:

- nominate a majority of our directors, elect a majority of our directors and appoint our executive officers, set our management policies and exercise overall control over our company and subsidiaries;
- determine the composition of the committees on our Board of Directors;
- agree to sell or otherwise transfer a controlling stake in our company; and
- determine the outcome of substantially all actions requiring stockholder approval, including transactions with related parties, corporate reorganizations, acquisitions and dispositions of assets and dividends.

The interests of MacAndrews may differ from our interests or those of our other stockholders and the concentration of control in MacAndrews will limit other stockholders' ability to influence corporate matters. The concentration of ownership and voting power with MacAndrews may also delay, defer or even prevent an acquisition by a third party or other change of control of our company and may make some transactions more difficult or impossible without the support of MacAndrews, even if such events are in the best interests of our other stockholders. The concentration of voting power with MacAndrews may have an adverse effect on the price of our Class A common stock. Our company may take actions that our other stockholders do not view as beneficial, which may adversely affect our results of operations and financial condition and cause the value of our Class A common stock to decline.

Our directors who have relationships with MacAndrews may have conflicts of interest with respect to matters involving our company.

The majority of our directors are affiliated with MacAndrews. These persons will have fiduciary duties to us and in addition will have duties to MacAndrews. In addition, our amended and restated certificate of incorporation provides that none of MacAndrews, any of our non-employee directors who are employees, affiliates or consultants of MacAndrews or its affiliates (other than us or our subsidiaries) or any of their respective affiliates will be liable to us or our stockholders for breach of any fiduciary duty by reason of the fact that any such individual directs a corporate opportunity to MacAndrews or its affiliates instead of us, or does not communicate information regarding a corporate opportunity to us that such person or affiliate has directed to MacAndrews or its affiliates. As a result, such circumstances may entail real or apparent conflicts of interest with respect to matters affecting both us and MacAndrews, whose interests, in some circumstances, may be adverse to ours. In addition, as a result of MacAndrews' indirect ownership interest, conflicts of interest could arise with respect to transactions involving business dealings between us and MacAndrews or their affiliates, including potential business transactions, potential acquisitions of businesses or properties, the issuance of additional securities, the payment of dividends by us and other matters.

We do not anticipate paying cash dividends on our Class A common stock, and accordingly, stockholders must rely on stock appreciation for any return on their investment.

We have never declared or paid any cash dividend on our Class A common stock and do not anticipate paying cash dividends on our Class A common stock in the future. In addition, our Loan Agreement includes restrictive covenants which prevent us from paying dividends to our stockholders. As a result, the only return to stockholders will be appreciation in the price of our Class A common stock, which may never occur. Investors seeking cash dividends should not invest in our Class A common stock.

Our share price may be volatile, which could subject us to securities class action litigation and result in substantial losses for our stockholders.

The market price of shares of our Class A common stock could be subject to wide fluctuations in response to many risk factors listed in this section, and others beyond our control, including:

- results and timing of our clinical trials and receipt of data from the trials;
- results of clinical trials of our competitors' products;
- failure or discontinuation of any of our research programs;
- delays in the development or commercialization of our potential products;
- regulatory actions with respect to our products or our competitors' products;

- actual or anticipated fluctuations in our financial condition and operating results;
- actual or anticipated changes in our growth rate relative to our competitors;
- actual or anticipated fluctuations in our competitors' operating results or changes in their growth rate;
- competition from existing products or new products that may emerge;
- announcements by us or our competitors of significant acquisitions, strategic partnerships, joint ventures, collaborations or capital commitments;
- issuance of new or updated research or reports by securities analysts;
- fluctuations in the valuation of companies perceived by investors to be comparable to us;
- share price and volume fluctuations attributable to inconsistent trading volume levels of our shares;
- additions or departures of key management or scientific personnel;
- disputes or other developments related to proprietary rights, including patents, litigation matters and our ability to obtain, maintain, defend or enforce proprietary rights relating to our products and technologies;
- announcement or expectation of additional financing efforts;
- sales of our Class A common stock by us, our insiders or our other stockholders;
- issues in manufacturing our potential products;
- market acceptance of our potential products;
- market conditions for biopharmaceutical stocks in general; and
- general economic and market conditions.

Furthermore, the stock markets have experienced extreme price and volume fluctuations that have affected and continue to affect the market prices of equity securities of many companies. These fluctuations often have been unrelated or disproportionate to the operating performance of those companies. These broad market and industry fluctuations, as well as general economic, political and market conditions such as recessions, interest rate changes or international currency fluctuations, may negatively impact the market price of shares of our Class A common stock. In addition, such fluctuations could subject us to securities class action litigation, which could result in substantial costs and divert our management's attention from other business concerns, which could potentially harm our business. As a result of this volatility, our stockholders may not be able to sell their common stock at or above the price at which they purchased their shares.

An active trading market for our Class A common stock may not be sustained.

Our shares of Class A common stock began trading on The NASDAQ Global Market on July 30, 2015. Given the limited trading history of our Class A common stock, there is a risk that an active trading market for our shares will not be sustained, which could put downward pressure on the market price of our Class A common stock and thereby affect the ability of our stockholders to sell their shares.

The trading market for our Class A common stock will be influenced by the research and reports that equity research analysts publish about us and our business.

The price of our stock could decline if one or more equity research analysts downgrade our stock or issue other unfavorable commentary or research. If one or more equity research analysts ceases coverage of our company or fails to publish reports on us regularly, demand for our stock could decrease, which in turn could cause our stock price or trading volume to decline.

A substantial portion of our total outstanding shares may be sold into the market at any time. This could cause the market price of our Class A common stock to drop significantly, even if our business is doing well.

The market price of our Class A common stock could decline as a result of sales of a large number of shares of our Class A common stock or the perception that such sales could occur. These sales, or the possibility that these sales may occur, also might make it more difficult for us to sell equity securities in the future at a time and price that we deem appropriate.

As of December 31, 2016, MacAndrews and its affiliates hold 23,084,267 non-voting common units of vTv LLC ("vTv Units") and the same number of shares of vTv Therapeutics Inc. Class B common stock as well as an aggregate of 2,400,666 shares of our Class

A common stock. As a result, MacAndrews and its affiliates hold shares representing approximately 77.7% of the combined voting power of our outstanding common stock. Pursuant to the terms of the Exchange Agreement among the Company, vTv LLC and the holders of vTv Units party thereto (the "Exchange Agreement"), vTv Units (along with the corresponding number of shares of our Class B common stock) will be exchangeable for (i) shares of our Class A common stock on a one-for-one basis or (ii) cash (based on the market price of the shares of Class A common stock), at our option (as the managing member of vTv Therapeutics LLC). Shares of our Class A common stock issuable upon an exchange of vTv Units as described above would be considered "restricted securities," as that term is defined in Rule 144 under the Securities Act, unless the exchange is registered under the Securities Act.

On August 13, 2015, we filed a registration statement under the Securities Act registering 3,250,000 shares of our Class A common stock reserved for issuance under our 2015 Plan. Additionally, we have issued 152,580 warrants to purchase our Class A common stock to our lenders as part of our Loan Agreement and have an obligation to issue additional warrants to our Lenders should we borrow additional funds under this agreement. Further, we have entered into an investor rights agreement with an affiliate of MacAndrews providing certain governance and registration rights.

Future sales and issuances of our Class A common stock or rights to purchase Class A common stock, including pursuant to our equity incentive plans, the exercise of outstanding warrants or pursuant to the Loan Agreement, could result in additional dilution of the percentage ownership of our stockholders and could cause our stock price to fall.

We expect that significant additional capital will be needed in the future to continue our planned operations. To the extent we raise additional capital by issuing equity securities, our stockholders may experience substantial dilution. We may sell Class A common stock, convertible securities or other equity securities. In addition, under the Loan Agreement the Lenders have the right to purchase shares of our Class A common stock from us, at a discounted price, with a value up to $1.0 million in the event that we conduct a public offering in which we receive cash proceeds of at least $10.0 million. If we sell Class A common stock, convertible securities or other equity securities, the percentage ownership of our stockholders will be diluted. In addition, new investors could gain rights superior to our existing stockholders.

We are an "emerging growth company," and are taking advantage of reduced disclosure requirements applicable to "emerging growth companies," which could make our Class A common stock less attractive to investors.

We are an "emerging growth company," as defined in the Jumpstart Our Business Startups Act of 2012 (the "JOBS Act"), and, for as long as we continue to be an "emerging growth company," we intend to take advantage of certain exemptions from various reporting requirements applicable to other public companies but not to "emerging growth companies," including, but not limited to, not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements, and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. We could be an "emerging growth company" for up to five years from the date of our initial public offering, or until the earliest of (i) the last day of the first fiscal year in which our annual gross revenues exceed $1 billion, (ii) the date that we become a "large accelerated filer" as defined in Rule 12b-2 under the Exchange Act, which would occur if the market value of our Class A common stock that is held by non-affiliates exceeds $700 million as of the last business day of our most recently completed second fiscal quarter, or (iii) the date on which we have issued more than $1 billion in non-convertible debt during the preceding three year period. We cannot predict if investors will find our Class A common stock less attractive if we choose to rely on these exemptions. If some investors find our Class A common stock less attractive as a result of any choices to reduce future disclosure, there may be a less active trading market for our Class A common stock and our stock price may be more volatile.

We will incur significantly increased costs and devote substantial management time as a result of operating as a public company particularly after we are no longer an "emerging growth company."

As a public company, we will incur significant legal, accounting and other expenses that we did not incur as a private company. For example, we are required to comply with certain of the requirements of the Sarbanes-Oxley Act and the Dodd-Frank Wall Street Reform and Consumer Protection Act, as well as rules and regulations subsequently implemented by the Securities and Exchange Commission, and NASDAQ, our stock exchange, including the establishment and maintenance of effective disclosure and financial controls and changes in corporate governance practices. We expect that compliance with these requirements will increase our legal and financial compliance costs and will make some activities more time consuming and costly. In addition, our management and other personnel will need to divert attention from operational and other business matters to devote substantial time to these public company requirements. In particular, we expect to incur significant expenses and devote substantial management effort toward ensuring compliance with the requirements of Section 404 of the Sarbanes-Oxley Act. In that regard, we currently do not have an internal audit function.

However, for as long as we remain an "emerging growth company" as defined in the JOBS Act, we intend to take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not "emerging growth

companies" including, but not limited to, not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements, and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. We intend to take advantage of these reporting exemptions until we are no longer an "emerging growth company."

Under the JOBS Act, "emerging growth companies" can delay adopting new or revised accounting standards until such time as those standards apply to private companies. We have irrevocably elected not to avail ourselves of this exemption from new or revised accounting standards and, therefore, we will be subject to the same new or revised accounting standards as other public companies that are not "emerging growth companies."

After we are no longer an "emerging growth company," we expect to incur additional management time and cost to comply with the more stringent reporting requirements applicable to companies that are deemed accelerated filers or large accelerated filers, including complying with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act.

We are exempt from certain corporate governance requirements since we are a "controlled company" within the meaning of the NASDAQ rules, and as a result our stockholders will not have the protections afforded by these corporate governance requirements.

MacAndrews controls more than 50% of our combined voting power. As a result, we are considered a "controlled company" for the purposes of NASDAQ rules and corporate governance standards, and therefore are permitted to elect not to comply with certain NASDAQ corporate governance requirements, including those that would otherwise require our Board of Directors to have a majority of independent directors and require that we either establish compensation and nominating and corporate governance committees, each comprised entirely of independent directors, or otherwise ensure that the compensation of our executive officers and nominees for directors are determined or recommended to the Board of Directors by the independent members of the Board of Directors. Accordingly, holders of our Class A common stock do not have the same protections afforded to stockholders of companies that are subject to all of the NASDAQ rules and corporate governance standards, and the ability of our independent directors to influence our business policies and affairs may be reduced.

Provisions in our charter and bylaws and provisions of Delaware law may delay or prevent our acquisition by a third party, which might diminish the value of our common stock.

Our amended and restated certificate of incorporation and amended and restated bylaws contain several provisions that may make it more difficult or expensive for a third party to acquire control of us without the approval of the Board of Directors. These provisions also may delay, prevent or deter a merger, acquisition, tender offer, proxy contest or other transaction that might otherwise result in our stockholders receiving a premium over the market price for their common stock. The provisions include, among others:

- a prohibition on actions by written consent of the stockholders;
- authorized but unissued shares of common stock and preferred stock that will be available for future issuance;
- the ability of our Board of Directors to increase the size of the Board of Directors and fill vacancies without a stockholder vote;
- provisions that have the same effect as a modified version of Section 203 of the Delaware General Corporation Law, an antitakeover law (as further described below); and
- advance notice requirements for stockholder proposals and director nominations.

Section 203 of the Delaware General Corporation Law may affect the ability of an "interested stockholder" to engage in certain business combinations, including mergers, consolidations or acquisitions of additional shares, for a period of three years following the time that the stockholder becomes an "interested stockholder." An "interested stockholder" is defined to include persons owning directly or indirectly 15% or more of the outstanding voting stock of a corporation. We have elected in our amended and restated certificate of incorporation not to be subject to Section 203 of the Delaware General Corporation Law. Nevertheless, the amended and restated certificate of incorporation contains provisions that have the same effect as Section 203 of the Delaware General Corporation Law, except that they provide that MacAndrews and its various successors and affiliates (and transferees of any of them) will not be deemed to be "interested stockholders," regardless of the percentage of our stock owned by them, and accordingly will not be subject to such restrictions.

The provisions of our amended and restated certificate of incorporation and amended and restated bylaws, the significant common stock ownership of MacAndrews and the ability of the Board of Directors to create and issue a new series of preferred stock or implement a stockholder rights plan could discourage potential takeover attempts and reduce the price that investors might be willing to pay for shares of our common stock in the future, which could reduce the market price of our common stock.

We will be required to pay M&F TTP Holdings Two LLC ("M&F") for certain tax benefits we may claim. In certain circumstances, payments under the Tax Receivable Agreement may be accelerated and/or significantly exceed the actual tax benefits we realize.

The only asset of the Company is its interest in vTv LLC. Class B common stock, together with the corresponding number of vTv Units, may be exchanged for shares of our Class A common stock, or for cash, at our option (as the managing member of vTv LLC). These exchanges of Class B common stock, together with the corresponding number of vTv LLC Units, may result in increases in the tax basis of the assets of vTv LLC that otherwise would not have been available. Such increases in tax basis are likely to increase (for tax purposes) depreciation and amortization deductions and therefore reduce the amount of income tax we would otherwise be required to pay in the future and may also decrease gain (or increase loss) on future dispositions of certain assets to the extent the increased tax basis is allocated to those assets. The IRS may challenge all or part of these tax basis increases and a court could sustain such a challenge.

We have entered into a Tax Receivable Agreement with vTv Therapeutics Holdings (an entity which was dissolved in October 2015, but to which M&F became a successor) that will provide for the payment by us to M&F (or certain of its transferees or other assignees) of 85% of the amount of cash savings, if any, in U.S. federal, state and local income tax or franchise tax that we actually realize (or, in some circumstances, we are deemed to realize) as a result of (a) the exchange of Class B common stock, together with the corresponding number of vTv Units, for shares of our Class A common stock (or for cash), (b) tax benefits related to imputed interest deemed to be paid by us as a result of the Tax Receivable Agreement and (c) certain tax benefits attributable to payments under the Tax Receivable Agreement. Although the actual increase in tax basis and the amount and timing of any payments under the Tax Receivable Agreement will vary depending upon a number of factors, including the timing of exchanges, the price of shares of our Class A common stock at the time of the exchange, the nature of the assets, the extent to which such exchanges are taxable, the tax rates then applicable, and the amount and timing of our income, we expect that the payments that we may make to M&F could be substantial.

M&F generally will not reimburse us for any payments that may previously have been made under the Tax Receivable Agreement even if the IRS subsequently disallows the tax basis increase or any other relevant tax item. Instead, any excess cash payments made by us to M&F will be netted against any future cash payments that we might otherwise be required to make under the terms of the Tax Receivable Agreement. However, we might not determine that we have effectively made an excess cash payment to M&F for a number of years following the initial time of such payment. As a result, in certain circumstances we could make payments to M&F under the Tax Receivable Agreement in excess of our cash tax savings. Our ability to achieve benefits from any tax basis increase and the payments to be made under the Tax Receivable Agreement, will depend upon a number of factors, including the timing and amount of our future income and the nature of our assets.

To the extent that we are unable to make payments under the Tax Receivable Agreement for any reason, such payments will be deferred and will accrue interest until paid. In addition, the Tax Receivable Agreement provides that, upon a merger, asset sale or other form of business combination or certain other changes of control or if, at any time, we elect an early termination of the Tax Receivable Agreement, our (or our successor's) obligations under the Tax Receivable Agreement with respect to exchanged or acquired Class B common stock, together with the corresponding number of vTv Units (whether exchanged or acquired before or after such change of control or early termination), would be required to be paid significantly in advance of the actual realization, if any, of any future tax benefits and would be based on certain assumptions, including that we would have sufficient taxable income to fully utilize the deductions arising from the increased tax deductions and tax basis and other benefits related to entering into the Tax Receivable Agreement, and, in the case of certain early termination elections, that any Class B common stock, together with the corresponding number of vTv Units, that have not been exchanged will be deemed exchanged for the market value of the Class A common stock at the time of termination. Consequently, it is possible that the actual cash tax savings realized by us may be significantly less than the corresponding Tax Receivable Agreement payments.

The only asset of the Company is its interest in vTv LLC, and accordingly it will depend on distributions from vTv LLC to pay taxes and expenses, including payments under the Tax Receivable Agreement. vTv LLC's ability to make such distributions may be subject to various limitations and restrictions.

The Company is a holding company, has no material assets other than its ownership of vTv Units and has no independent means of generating revenue or cash flow. vTv LLC is treated as a partnership for U.S. federal income tax purposes and, as such, is not subject to any entity-level U.S. federal income tax. Instead, taxable income will be allocated to holders of its common units, including us. As a result, we will incur U.S. federal, state and local income taxes on our allocable share of any net taxable income of vTv LLC. Under the terms of vTv LLC's Amended and Restated LLC Agreement, vTv LLC will be obligated to make tax distributions to holders of its common units, including us. In addition to tax expenses, we will also incur expenses related to our operations, including expenses under the Tax Receivable Agreement, which could be significant. We intend, as its managing member, to cause vTv LLC to make distributions in an amount sufficient to allow us to pay our taxes and operating expenses, including any payments due under the Tax Receivable Agreement. However, vTv LLC's ability to make such distributions may be subject to various limitations and restrictions including, but not limited to, restrictions on distributions that would either violate any contract or agreement to which vTv LLC is then a party, including the Loan Agreement or any other potential debt agreements, or any applicable law, or that would have the effect of rendering vTv LLC insolvent. If vTv LLC does not distribute sufficient funds for us to pay our taxes or other liabilities, we may have to borrow funds, which could adversely affect our liquidity and subject us to various restrictions imposed by any such lenders. To the extent that

we are unable to make payments under the Tax Receivable Agreement for any reason, such payments will be deferred and will accrue interest until paid.

Our organizational structure confers certain benefits upon M&F and certain of its successors and assigns that will not benefit Class A common stockholders to the same extent as it will benefit M&F.

Our organizational structure, including the fact that M&F owns more than 50% of the voting power of our outstanding voting stock and owns part of its economic interest in our business through vTv LLC, confers certain benefits upon M&F that will not benefit the holders of our Class A common stock to the same extent as it will benefit M&F. For example, the Tax Receivable Agreement will provide for the payment by us to M&F (or certain of its transferees or other assignees) of 85% of the amount of cash savings, if any, in U.S. federal, state and local income tax or franchise tax that we actually realize (or, in some circumstances, we are deemed to realize) as a result of (a) the exchange of Class B common stock, together with the corresponding number of vTv Units, for shares of our Class A common stock (or for cash), (b) tax benefits related to imputed interest deemed to be paid by us as a result of the Tax Receivable Agreement and (c) certain tax benefits attributable to payments under the Tax Receivable Agreement. Although we will retain 15% of the amount of such tax benefits, it is possible that the interests of M&F may in some circumstances conflict with our interests and the interests of our other stockholders. For example, M&F may have different tax positions from us, especially in light of the Tax Receivable Agreement, that could influence their decisions regarding whether and when we should dispose of assets, whether and when we should incur new or refinance existing indebtedness, and whether and when we should terminate the Tax Receivable Agreement and accelerate our obligations thereunder. In addition, the determination of future tax reporting positions, the structuring of future transactions and the handling of any future challenges by any taxing authority to our tax reporting positions may take into consideration M&F's tax or other considerations, which may differ from the considerations of us or our other stockholders. To the extent that M&F is dissolved or liquidated, MacAndrews and/or its affiliates will succeed to the rights and obligations of M&F under the Tax Receivable Agreement, and the same considerations described above apply to any such successor parties.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our corporate headquarters and lab facilities are located in High Point, North Carolina, where we lease 43,040 square feet of mixed laboratory and office space in the Mendenhall Oaks office park. The lease agreement for this space continues through June 2018.

We believe that our existing facilities are adequate for our current and expected future needs. We may seek to negotiate new leases or look for additional or alternate space for our operations. We believe that appropriate alternative space is readily available at similar rents.

ITEM 3. LEGAL PROCEEDINGS

We are not currently a party to any material legal proceedings.

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 Class A common stock began trading on the NASDAQ Global Select Market on July 30, 2015 under the symbol "VTVT". Prior to such time, there was no public market for our Class A common stock. The following table sets forth the high and low sale prices per share for our Class A common stock, as reported on the NASDAQ Global Select Market for the periods indicated since our IPO:

	High	Low
Calendar Quarter – 2015		
Third Quarter (commencing July 30, 2015)	$ 14.00	$ 5.27
Fourth Quarter	8.22	5.72

	High	Low
Calendar Quarter – 2016		
First Quarter	$ 7.68	$ 5.00
Second Quarter	7.06	4.84
Third Quarter	7.50	5.28
Fourth Quarter	7.25	4.65

Dividend Policy

No cash dividends have ever been declared or paid on the common equity to date by the Company. Our ability to pay dividends is restricted by our Loan Agreement. See "Management's Discussion and Analysis of Financial Conditions and Results of Operations – Liquidity and Capital Resources" in Item 7.

Holders

As of February 24, 2017, there were approximately 25 holders of record of our Class A common stock and 9 holders of record of our Class B common stock. Because almost all of the shares of our Class A common stock are held by brokers, nominees and other institutions on behalf of shareholders, we are unable to estimate the total number of shareholders represented by these record holders.

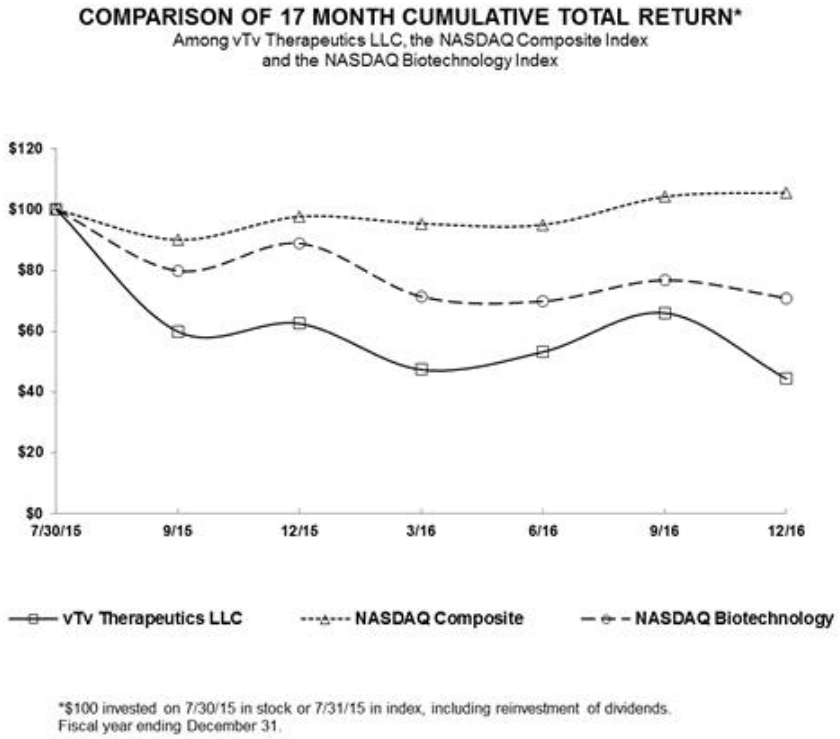
Securities Authorized for Issuance under Equity Compensation Plans

The following table summarizes information about our equity compensation plans as of December 31, 2016. The only awards that have been granted under the plan below are in the form of option awards related to our Class A common stock:

Plan Category	Number of Securities to be Issued Upon Exercise of Outstanding Options, Warrants and Rights (a)	Weighted-average Exercise Price of Outstanding Options, Warrants and Rights (b)	Number of Securities Remaining Available for Future Issuance Under Equity Compensation Plans (excluding securities reflected in column (a)) (c)
Equity compensation plans approved by security holders			
2015 Omnibus Equity Incentive Plan	1,096,101	$ 10.68	2,153,899
Equity compensation plans not approved by security holders			
Total	1,096,101		2,153,899

Performance Graph

The following graph shows a comparison from July 30, 2015 (the date our Class A common stock commenced trading on The NASDAQ Global Market) through December 31, 2016 of the cumulative total return for our Class A common stock, the NASDAQ Biotechnology Index and the NASDAQ Composite Index. The graph assumes an initial investment of $100 on July 30, 2015. The comparisons in the graph are not intended to forecast or be indicative of possible future performance of our common stock.



Issuer Purchases of Equity Securities

There have been no repurchases of the Company's common stock during the fourth fiscal quarter of fiscal 2016.

ITEM 6. SELECTED FINANCIAL DATA

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

	Year Ended December 31,			
(dollars in thousands, except for per share data)	**2016**	**2015**	**2014**	**2013**
Statement of operations data:				
Revenue	$ 634	$ 519	$ 1,549	$ 976
Research and development	45,748	29,584	18,729	25,434
General and administrative	9,906	9,077	11,717	11,375
Total operating expenses	55,654	38,661	30,446	36,809
Loss from operations	(55,020)	(38,142)	(28,897)	(35,833)
Other expense, net	(333)	(2,965)	(7,204)	(12,370)
Net loss attributable to noncontrolling interest	(39,001)	(13,609)	—	—
Net loss attributable to vTv Therapeutics Inc.	(16,352)	(27,498)	(36,101)	(48,203)
Net loss per share, basic and diluted (1)	$ (1.71)	$ (3.32)		
Weighted average number of shares outstanding, basic and diluted	9,545,527	8,276,520		

Balance sheet data:	**2016**	**2015**	**2014**	**2013**
Cash and cash equivalents	$ 51,505	$ 88,003	$ 1,384	$ 1,089
Working capital	40,683	81,460	(5,253)	(85,160)
Total assets	54,495	91,532	12,951	15,504
Current liabilities	11,434	7,726	6,864	87,584
Long-term debt, net of current portion	11,058	—	29,420	2,265
Other liabilities, net of current portion	433	245	37,387	18
Redeemable convertible preferred units	—	—	438,086	229,370
Redeemable noncontrolling interest	122,515	161,531	—	—
Total stockholders'/members' deficit	(90,945)	(77,970)	(498,806)	(303,733)

(1) Loss per share is not presented for the years ended December 31, 2014 and 2013 as the Company did not have any economic interests prior to the date of the IPO and Reorganization Transactions through which it was given ownership in vTv LLC. Losses prior to the IPO and Reorganization Transactions would have been allocated to the original members of TTP and HPP. Loss per share for the year ended December 31, 2015 includes the 2015 losses recognized both prior and subsequent to the IPO and Reorganization Transactions. See "Management's Discussion and Analysis of Financial Condition and Results of Operations" for additional information regarding the IPO and Refinancing Transactions.

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

The following discussion and analysis should be read in conjunction with "Selected Financial Data" and our consolidated financial statements and related notes included elsewhere in this Annual Report on Form 10-K. This discussion and analysis contains forward-looking statements based upon current beliefs, plans and expectations that involve risks, uncertainties and assumptions, such as statements regarding our plans, objectives, expectations, intentions and projections. Our actual results and the timing of selected events could differ materially from those anticipated in these forward-looking statements as a result of several factors, including those set forth in Part I, Item 1A, "Risk Factors" in this Annual Report on Form 10-K. See the sections entitled "Risk Factors" and "Cautionary Note Regarding Forward-Looking Statements."

Company Overview

We are a clinical-stage biopharmaceutical company engaged in the discovery and development of orally administered small molecule drug candidates to fill significant unmet medical needs. We have a powerful pipeline of clinical drug candidates, led by our programs for the treatment of Alzheimer's disease ("AD") and type 2 diabetes. Our drug candidate for the treatment of AD, *azeliragon*

(*TTP488*), is an orally administered, small molecule antagonist targeting the receptor for advanced glycation endproducts ("RAGE"), for which we have commenced patient enrollment and successfully completed the enrollment of sub-study A in a Phase 3 clinical trial (the "STEADFAST Study") under a Food and Drug Administration ("FDA") agreed Special Protocol Assessment ("SPA"). Our type 2 diabetes drug candidates include *TTP399*, an orally administered, liver-selective glucokinase activator ("GKA"), for which we have completed our Phase 2b clinical trial (the "AGATA Study"), and *TTP273*, an orally administered, non-peptide agonist that targets the glucagon-like peptide-1 receptor ("GLP-1r"), for which we have completed a Phase 2 clinical trial (the "LOGRA Study") in December 2016. We have three additional programs in various stages of preclinical and clinical development for the prevention of muscle weakness and the treatment of inflammatory disorders.

Subsequent to our initial public offering (the "IPO") and the related reorganization transactions (the "Reorganization Transactions"), vTv Therapeutics Inc. (the "Company", the "Registrant", "we" or "us") is a holding company, and its principal asset is a controlling equity interest in vTv Therapeutics LLC ("vTv LLC"), the Company's principal operating subsidiary. The Company has determined that vTv LLC is a variable-interest entity ("VIE") for accounting purposes and that vTv Therapeutics Inc. is the primary beneficiary of vTv LLC because (through its managing member interest in vTv LLC and the fact that the senior management of vTv Therapeutics Inc. is also the senior management of vTv LLC) it has the power to direct all of the activities of vTv LLC, which include those that most significantly impact vTv LLC's economic performance. vTv Therapeutics Inc. has therefore consolidated vTv LLC's results under the VIE accounting model in its Consolidated Financial Statements.

As the Reorganization Transactions were considered to be among entities under common control, the Consolidated Financial Statements for periods prior to the IPO and Reorganization Transactions have been adjusted to combine vTvx Holdings I LLC (formerly known as TransTech Pharma, LLC, "TTP"or "vTvx Holdings I") and vTvx Holdings II LLC (formerly known as and High Point Pharmaceuticals, LLC, "HPP" or "vTvx Holdings II" and, collectively with TTP or vTvx Holdings I, the "Predecessors") for presentation purposes.

To date, we have devoted substantially all of our resources to our research and development efforts relating to our investigational drug candidates, including conducting clinical trials with our drug candidates, providing general and administrative support for these operations and protecting our intellectual property. We do not have any products approved for sale and have not generated any revenue from drug sales. From our inception through December 31, 2016, we (including our Predecessors) have funded our operations primarily through:

- a series of private placements of preferred equity from 1999 through 2006 totaling $109.3 million;
- the receipt of $23.4 million from completed research collaborations with Novo Nordisk, A/S Merck and Boehringher Ingelheim from 2001 to 2006;
- the receipt of $169.2 million of upfront, milestone and research fees during 2006 to 2010 under a license and research agreement with Pfizer, Inc., which was terminated in 2011;
- the receipt of $55.7 million of upfront, milestone and research expense reimbursements from 2010 to 2013 under a license agreement for our GKA programs with an affiliate of Forest Laboratories, Inc., which was terminated in 2013;
- various borrowings totaling $114.7 million from November 2011 through March 2014 from entities affiliated with MacAndrews & Forbes Incorporated ("MacAndrews"), which were converted to Series F and Series B preferred units of TTP and HPP, our predecessors;
- borrowings of $46.6 million from April 2014 through June 2015 from entities affiliated with MacAndrews;
- the completion of the IPO in August 2015, which raised proceeds of $104.4 million from the sale of our Class A common stock, par value $0.01 per share (the "Class A Common Stock"), net of offering costs; and
- the receipt of $12.5 million from a venture loan and security agreement (the "Loan Agreement") with Horizon Technology Finance Corporation and Silicon Valley Bank (together, the "Lenders") in October 2016, under which the Company may borrow up to an additional $12.5 million subject to certain conditions.

We expect to continue to incur significant expenses and increasing operating losses for at least the next several years. We anticipate that our expenses will increase substantially as we:

- continue the development of our lead drug candidate, *azeliragon*, for the treatment of AD;
- seek to obtain regulatory approvals for *azeliragon*;
- prepare for the potential commercialization of *azeliragon*;
- begin outsourcing of the commercial manufacturing of *azeliragon* for any indications for which we receive regulatory approval;

- expand our research and development activities and advance our clinical programs, including our type 2 diabetes programs *TTP399* and *TTP273*; and
- maintain, expand and protect our intellectual property portfolio.

We do not expect to generate revenue from drug sales unless and until we successfully complete development and obtain marketing approval for one or more of our drug candidates, which we expect will take a number of years and will be subject to significant uncertainty. Accordingly, we anticipate that we will need to raise additional capital in addition to the net proceeds of the IPO and the Loan Agreement prior to the commercialization of *azeliragon* or any of our other drug candidates. Until such time that we can generate substantial revenue from product sales, we expect to finance our operating activities through a combination of equity offerings, debt financings, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements. Nevertheless, we may be unable to raise additional funds or enter into such other arrangements when needed, on favorable terms or at all, which would have a negative impact on our liquidity and financial condition and could force us to delay, reduce the scope or eliminate one or more of our research and development programs or commercialization efforts. Failure to receive additional funding could cause us to cease operations, in part or in full.

Financial Overview

Revenue

To date, we have not generated any revenue from drug sales. All of our revenue to date has been primarily derived from up-front proceeds and research fees under collaboration and license agreements and government grants.

In the future, we may generate revenue from a combination of product sales, license fees, milestone payments and royalties from the sales of products developed under licenses of our intellectual property. We expect that any revenue we generate will fluctuate from quarter to quarter as a result of the timing and amount of license fees, milestone and other payments, and the amount and timing of payments that we receive upon the sale of our products, to the extent any are successfully commercialized. If we fail to complete the development of our drug candidates in a timely manner or obtain regulatory approval for them, our ability to generate future revenue and our results of operations and financial position will be materially adversely affected.

Research and Development Expenses

Since our inception, we have focused our resources on our research and development activities, including conducting preclinical studies and clinical trials, manufacturing development efforts and activities related to regulatory filings for our drug candidates. We recognize research and development expenses as they are incurred. Our direct research and development expenses consist primarily of external costs such as fees paid to investigators, consultants, central laboratories and clinical research organizations (“CRO”s), in connection with our clinical trials, and costs related to acquiring and manufacturing clinical trial materials. Our indirect research and development costs consist primarily of salaries, benefits and related overhead expenses for personnel in research and development functions and depreciation of leasehold improvements, laboratory equipment and computers. Since we typically use our employee and infrastructure resources across multiple research and development programs such costs are not allocated to the individual projects.

From the inception of our Predecessors, through December 31, 2016, we have incurred approximately $502.2 million in research and development expenses.

Our research and development expenses by project for the years ended December 31, 2016, 2015 and 2014 were as follows (in thousands):

	Years Ended December 31,		
	2016	2015	2014
Direct research and development expense:			
Azeliragon	$ 29,430	$ 14,079	$ 3,458
TTP399	2,598	4,114	823
TTP273	3,838	3,189	724
Other projects	1,353	1,149	2,262
Indirect research and development expense	8,529	7,053	11,462
Total research and development expense	$ 45,748	$ 29,584	$ 18,729

We plan to increase our research and development expenses for the foreseeable future as we continue the development of *azeliragon* and to further advance the development of our other drug candidates, subject to the availability of additional funding.

The successful development of our clinical and preclinical drug candidates is highly uncertain. At this time, we cannot reasonably estimate the nature, timing or costs of the efforts that will be necessary to complete the remainder of the development of any of our clinical or preclinical drug candidates or the period, if any, in which material net cash inflows from these drug candidates may commence. This is due to the numerous risks and uncertainties associated with the development of our drug candidates, including:

- the uncertainty of the scope, rate of progress and expense of our ongoing, as well as any additional, clinical trials and other research and development activities;
- the potential benefits of our candidates over other therapies;
- our ability to market, commercialize and achieve market acceptance for any of our drug candidates that we are developing or may develop in the future;
- future clinical trial results;
- our ability to enroll patients in our clinical trials;
- the timing and receipt of any regulatory approvals; and
- the filing, prosecuting, defending and enforcing of patent claims and other intellectual property rights, and the expense of doing so.

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

General and Administrative Expenses

General and administrative expenses consist primarily of salaries, benefits and related costs for employees in executive, finance, corporate development, human resources and administrative support functions. Other significant general and administrative expenses include accounting and legal services, expenses associated with obtaining and maintaining patents, cost of various consultants, occupancy costs and information systems.

Our general and administrative expenses have increased and will continue to increase as we operate as a public company and commercialize our drug candidates. Such increases have been driven by higher costs for director and officer liability insurance, costs related to the hiring of additional personnel and increased fees for outside consultants, lawyers and accountants. We also expect to incur additional costs in future periods as we continue to establish our investor relations function, implement a system of internal control over financial reporting and a system of disclosure controls and procedures that are compliant with applicable requirements and with corporate governance requirements and other rules of the stock exchange on which we are listed and other similar requirements applicable to public companies.

Interest Expense, Net

For periods prior to the IPO and Reorganization Transactions, interest expense, net primarily consists of interest expense attributable to certain obligations that were not assumed by vTv Therapeutics Inc. through the Reorganization Transactions. Beginning in October 2016, interest expense, net primarily consists of our cash and non-cash interest expense related to our Loan Agreement. Cash interest on the Loan Agreement is recognized at a floating interest rate equal to 10.5% plus the amount by which the one-month London Interbank Offer Rate (“LIBOR”) exceeds 0.5%. Non-cash interest expense represents the amortization of the costs incurred in connection with the Loan Agreement, the allocated fair value of the warrants to purchase shares of our Class A Common Stock issued in connection with the Loan Agreement (the “Warrants”) and the accretion of the final interest payment (which will be paid in cash upon loan maturity), all of which are recognized in our Consolidated Statement of Operations using the effective interest method.

Other Income (Expense), Net

Other income (expense), net primarily consists of expenses related to our capital structure prior to the IPO and Reorganization Transactions, such as expense related to interest expense on related party debt obligations and the change in the fair value of an obligation to make distributions to a former officer in exchange for the repurchase of the officer’s predecessor company units (the “Contingent Distributions”). Such expenses will no longer be recognized by us after fiscal 2015 as the related instruments were not assumed by vTv Therapeutics Inc. through the Reorganization Transactions.

Results of Operations

Comparison of the year ended December 31, 2016 and 2015

The following table sets forth certain information concerning our results of operations for the periods shown:

(dollars in thousands) Statement of operations data:	Twelve Months Ended December 31, 2016	2015	Change
Revenue	$ 634	$ 519	$ 115
Operating expenses:			
Research and development	45,748	29,584	16,164
General and administrative	9,906	9,077	829
Total operating expenses	55,654	38,661	16,993
Operating loss	(55,020)	(38,142)	(16,878)
Interest income	87	40	47
Interest expense	(398)	(108)	(290)
Other expense, net	(22)	(2,897)	2,875
Loss before income taxes	(55,353)	(41,107)	(14,246)
Income tax provision	—	—	—
Net loss before noncontrolling interest	(55,353)	(41,107)	(14,246)
Less: net loss attributable to noncontrolling interest	(39,001)	(13,609)	(25,392)
Net loss attributable to vTv Therapeutics Inc.	$ (16,352)	$ (27,498)	$ 11,146

Revenues

Revenues were $0.6 million and $0.5 million for the years ended December 31, 2016 and 2015, respectively. The revenue earned during the years ended December 31, 2016 and 2015 was primarily attributable to the global license agreement that we entered into with Calithera Biosciences, Inc. (“Calithera”) in March 2015. In connection with this agreement we recognized as revenue an initial license fee of $0.6 million and reimbursement costs associated with the time devoted by our employees to develop additional hexokinase inhibitors.

Research and Development Expenses

Research and development expenses were $45.7 million and $29.6 million for the years ended December 31, 2016 and 2015, respectively. The increase in research and development expenses during the period of $16.2 million, or 54.6%, was primarily due to:

- An increase in clinical trial costs of $15.4 million for *azeliragon* in 2016, which was mainly driven by an increase of $9.1 million related to the STEADFAST Study due to higher enrollment and related activities in 2016; an increase of $3.3 million in costs related to a drug-to-drug interaction and other supporting studies in 2016; and an increase of $2.5 million related to compound manufacturing costs for drug product to support the STEADFAST Study;
- A decrease in clinical trial costs of $1.5 million for *TTP399* in 2016, which was mainly driven by lower costs for the AGATA Study due to its completion in August 2016 and decreases in compound manufacturing costs from 2015 because the drug product for the AGATA Study was sourced in 2015;
- An increase in clinical trial costs of $0.6 million for *TTP273* in 2016, due to an increase of $2.5 million driven by the clinical trial costs incurred in 2016 related to the LOGRA Study, which began in January 2016, that outweighed the reduction in compound manufacturing costs of $1.9 million driven by the manufacture of the drug product for the trial in 2015; and
- An increase in other research and development costs of $1.5 million, primarily driven by an increase in compensation costs as headcount was increased to support the management of the clinical trials mentioned above, and the expense related to share-based awards.

General and Administrative Expenses

General and administrative expenses were $9.9 million and $9.1 million for the years ended December 31, 2016 and 2015, respectively. The increase in general and administrative expenses during this period of $0.8 million, or 9.1%, was primarily due to a $2.1 million increase in compensation costs related to the addition of personnel to support our compliance with public company requirements and the expense related to share-based awards. Such increase was offset by reductions in legal and professional service expenses of $1.4 million as such expenses were higher in 2015 as we prepared for our IPO.

Interest Expense, Net

Interest expense, net was $0.4 million and $0.1 million for the years ended December 31, 2016 and 2015, respectively. Interest expense recognized in 2016 relates to our Loan Agreement which was entered into in late October 2016 and which bears interest at 10.5% plus the amount by which the one-month LIBOR exceeds 0.5%.

Other Expense, Net

Other expense, net primarily consisted of expenses related to our capital structure prior to the IPO and Reorganization Transactions, such as related party interest expense and other expense related to the change in the fair value of contingent distribution liability. Such expenses will no longer be recognized by us after fiscal 2015 as many of the related instruments were not assumed by vTv Therapeutics Inc. through the Reorganization Transactions. Included in this amount is interest expense, net recognized for transactions with related parties under these prior agreements in 2015 was $1.7 million. In addition, we recognized other income of $0.7 million as a result of the decrease in the fair value of the contingent distribution liability during the year ended December 31, 2015.

Comparison of the Years Ended December 31, 2015 and 2014

The following table sets forth certain information concerning our results of operations for the periods shown:

(dollars in thousands) Statement of operations data:	Year Ended 2015	2014	Change
Revenue	$ 519	$ 1,549	$ (1,030)
Operating expenses:			
Research and development	29,584	18,729	10,855
General and administrative	9,077	11,717	(2,640)
Total operating expenses	38,661	30,446	8,215
Operating loss	(38,142)	(28,897)	(9,245)
Interest income	40	4	36
Interest expense	(108)	(286)	178
Other expense, net	(2,897)	(6,922)	4,025
Loss before income taxes	(41,107)	(36,101)	(5,006)
Income tax provision	—	—	—
Net loss before noncontrolling interest	(41,107)	(36,101)	(5,006)
Less: net loss attributable to noncontrolling interest	(13,609)	—	(13,609)
Net loss attributable to vTv Therapeutics Inc.	$ (27,498)	$ (36,101)	$ 8,603

Revenues

Revenues were $0.5 million and $1.5 million for the years ended December 31, 2015 and 2014, respectively. The revenue earned during the year ended December 31, 2015 was attributable to the global license agreement that we entered into with Calithera in March 2015. The revenue earned during the year ended December 31, 2014 primarily related to clinical trial services provided by High Point Clinical Trials Center, LLC (“HPCTC”), a wholly-owned subsidiary (prior to December 31, 2014) to outside third party customers. HPCTC was transferred to a former officer and director on December 30, 2014.

Research and Development Expenses

Research and development expenses were $29.6 million and $18.7 million for the years ended December 31, 2015 and 2014, respectively. The increase in research and development expenses during the period of $10.9 million, or 58.0%, was primarily due to:

- An increase in clinical trial costs of $10.6 million for *azeliragon* in 2015, which was mainly driven by the increase cost due to the initiation of the Phase 3 STEADFAST Study;
- An increase in clinical trial costs of $3.3 million for *TTP399* in 2015, which was mainly driven by the initiation of the AGATA Study in 2015, coupled with the costs to manufacture the related compounds for use in such trial;
- An increase in clinical trial costs of $2.5 million for *TTP273* in 2015, which was mainly driven by both compound manufacturing costs and other costs incurred in preparation for the initiation of the LOGRA Study in January 2016; and
- A decrease in other research and development costs of $4.4 million due to a reduction in the number of chemists and biologists focused on early stage discovery as well as personnel and facility costs associated with HPCTC, which was transferred to a former officer and director on December 30, 2014.

General and Administrative Expenses

General and administrative expenses were $9.1 million and $11.7 million for the years ended December 31, 2015 and 2014, respectively. The decrease in general and administrative expenses during this period of $2.6 million, or 22.5%, was primarily due to a decrease in compensation costs of approximately $3.4 million, which was largely driven by expense recognized in 2014 related to the departure of a former officer and director. Such decrease was offset by higher professional and insurance costs associated with our transition to a public company in the latter half of fiscal 2015.

Other Expense, Net

Other expense, net primarily consisted of expenses related to our capital structure prior to the IPO and Reorganization Transactions, such as related party interest expense and other expense related to the change in the fair value of contingent distribution liability. Such expenses will no longer be recognized by us after fiscal 2015 as many of the related instruments were not assumed by vTv Therapeutics Inc. through the Reorganization Transactions. For the years ended December 31, 2015 and 2014, related party interest expense was $1.7 million and $5.7 million, respectively, representing a decrease of $4.0 million. The decrease in interest expense was driven primarily by a $4.8 million decrease in the amortization of debt discount recognized by us, offset by an increase in related party interest expense for 2015 due to an increase in the amounts outstanding under the related agreements for seven months prior to the Reorganization Transactions. In addition, we recognized as other income $0.7 million as a result of the decrease in the fair value of the contingent distribution liability during the year ended December 31, 2015.

Liquidity and Capital Resources

We anticipate that we will continue to incur losses for at least the next several years as we continue our clinical trials. We believe that we will continue to meet our liquidity requirements through the first quarter of 2018 which is when we expect to receive results for Part A of our STEADFAST Study. However, we expect that our research and development and general and administrative expenses will continue to increase and, as a result, we expect that we will need additional capital to continue to fund our operations. In October 2016, we entered into a $25.0 million loan agreement (the "Loan Agreement") with Horizon Technology Finance Corporation and Silicon Valley Bank (together, the "Lenders"), which is described in more detail below. Additionally, based on the positive results seen from our AGATA and LOGRA studies, we have begun discussions with other pharmaceutical companies regarding possible partnering opportunities for our GKA and GLP-1r programs which we believe may provide additional cash for use in our operations and the continuation of the clinical trials for our drug candidates.

Debt Transaction

On October 28, 2016, we and vTv LLC entered into the Loan Agreement under which we borrowed $12.5 million initially. Subject to certain customary funding conditions, the second tranche of $7.5 million and the third tranche of $5.0 million are available for borrowing by us no later than March 31, 2017 and June 30, 2017, respectively. Availability of the third tranche is also subject to receipt of an executed term sheet setting forth certain agreed upon upfront and clinical and regulatory milestone payments for the licensing or purchase of one of our main drug candidates. Each loan tranche bears interest at a floating rate equal to 10.5% plus the amount by which the one-month London Interbank Offer Rate ("LIBOR") exceeds 0.5%.

We have agreed to repay the first tranche of $12.5 million on an interest only basis monthly until May 1, 2018, followed by equal monthly payments of principal plus accrued interest through the scheduled maturity date for the first tranche loan on May 1, 2020. In addition, a final payment for the first tranche loan equal to $0.8 million will be due on May 1, 2020, or such earlier date specified in the Loan Agreement. We have agreed to repay any amounts advanced under the second and third tranches of $7.5 million and $5.0 million, respectively, in 18 monthly payments of interest only followed by 24 equal monthly payments of principal plus accrued interest through the scheduled maturity date for such loans, which is 42 months following the date we draw down the second or third tranche loans, as applicable. In addition, a final payment equal to $0.5 million will be due on the scheduled maturity date for the second tranche loan and a final payment of $0.3 million will be due on the scheduled maturity date for the third tranche loan, or on such earlier date specified in the Loan Agreement.

If we repay all or a portion of the loan prior to the applicable maturity date, we will pay the Lenders a prepayment penalty fee, based on a percentage of the then outstanding principal balance equal to 4.0% during the first 18 months following the funding of the second tranche and 2.0% thereafter.

In connection with the Loan Agreement, we issued and are obligated to issue to the Lenders warrants to purchase shares of our Class A common stock. On October 28, 2016, we issued Warrants to purchase 152,580 shares of our Class A common stock at a per share exercise price of $6.39 per share, which aggregate exercise price represents 6.0% of the principal amount borrowed under the first tranche of the Loan Agreement and 3.0% of the amount available under the second tranche of the Loan Agreement. Additionally, to the extent the second tranche is borrowed under the Loan Agreement, we are obligated to issue to the Lenders Warrants with respect to a number of shares such that the aggregate exercise price of such warrants is equal to 3.0% of the principal amount of the second tranche upon funding of the second tranche. To the extent that the third tranche is borrowed under the Loan Agreement, we are obligated to issue to the Lenders Warrants with respect to a number of shares such that the aggregate exercise price of such warrants is equal to 6.0% of third loan tranche upon funding of the third tranche. In each instance, the Warrants have or will have an exercise price equal to the lower of (a) the volume weighted average price per share of our Class A common stock, as reported on the principal stock exchange on which our Class A common stock is listed, for 10 trading days prior to the issuance of the applicable Warrants or (b) the closing price of a share of our Class A common stock on the trading day prior to the issuance of the applicable Warrants. The Warrants will expire seven years from their date of issuance.

The Loan Agreement includes customary affirmative and restrictive covenants, including, but not limited to, restrictions on the payment of dividends or other equity distributions and the incurrence of debt or liens upon the assets of the Company or its subsidiaries. The Loan Agreement does not contain any financial maintenance covenants. The Loan Agreement includes customary events of default, including payment defaults, covenant defaults and material adverse change default. Upon the occurrence of an event of default and following any applicable cure periods, a default interest rate of an additional 5% will be applied to the outstanding loan balances, and the Lenders may declare all outstanding obligations immediately due and payable and take such other actions as set forth in the Loan Agreement.

Cash Flows

	Year Ended December 31,	
(dollars in thousands)	**2016**	**2015**
Net cash used in operating activities	$ (48,209)	$ (36,946)
Net cash used in investing activities	(83)	(79)
Net cash provided by financing activities	11,794	123,644
Net (decrease) increase in cash and cash equivalents	$ (36,498)	$ 86,619

Operating Activities

For the year ended December 31, 2016, our net cash used in operating activities increased $11.3 million from the prior year. The increased use of cash was primarily driven by the increased spending on our clinical trial for *azeliragon* during 2016. These increased uses of cash were offset by changes in working capital, which were primarily driven by increases in accounts payable balances due to the timing of payments related to our clinical trial expenses.

Investing Activities

For the years ended December 31, 2016 and 2015, net cash used in investing activities was insignificant.

Financing Activities

For the year ended December 31, 2016, net cash provided by financing activities was $11.8 million compared to net cash provided by financing activities of $123.6 million for the year ended December 31, 2015, resulting in a decrease of $111.8 million. Proceeds from debt financings decreased $7.5 million from 2015 to 2016. Additionally, during 2016, we received cash proceeds of $104.4 million related to our IPO.

Future Funding Requirements

To date, we have not generated any revenue from drug product sales. We do not know when, or if, we will generate any revenue from drug product sales. We do not expect to generate revenue from drug sales unless and until we obtain regulatory approval of and commercialize *azeliragon* or any of our other drug candidates. At the same time, we expect our expenses to continue in connection with our ongoing development activities, particularly as we continue the research, development and clinical trials of, and seek regulatory approval for, our drug candidates. In addition, subject to obtaining regulatory approval of any of our drug candidates, we expect to incur significant commercialization expenses for product sales, marketing, manufacturing and distribution. We anticipate that we will need

substantial additional funding in connection with our continuing operations. We will also continue to use cash to fund expenses related to our compliance with requirements applicable to us as a sponsor engaged in pre-clinical and clinical research, and a listed public company.

Based upon our current operating plan, we believe that our existing cash and cash equivalents and funds available to us under our Loan Agreement will enable us to fund our operating expenses and capital requirements through the first quarter of 2018 which is when we expect to receive results for Part A of our STEADFAST Study. We intend to use our existing cash and cash equivalents to fund the STEADFAST Study, and any additional clinical or preclinical studies necessary to support and to submit an application for *azeliragon*. However, our current cash, cash equivalents and funds available to us under our Loan Agreement will not be sufficient for us to complete the STEADFAST Study, and we will need to raise additional capital to complete the development, regulatory submission and commercialization of *azeliragon*. We are and plan to continue to pursue partnering arrangements with other pharmaceutical companies for our GKA and GLP-1r programs which may provide additional capital if consummated. We have based our estimates on assumptions that may prove to be wrong, and we may use our available capital resources sooner than we currently expect. Because of the numerous risks and uncertainties associated with the development and commercialization of our drug candidates, we are unable to estimate the amounts of increased capital outlays and operating expenditures necessary to complete the development of our drug candidates.

Our future capital requirements will depend on many factors, including:

- the progress, costs, results and timing of the STEADFAST Study, and the clinical development of *azeliragon*;
- the willingness of the FDA to accept the STEADFAST Study, as well as our other completed and planned clinical and preclinical studies and other work, as the basis for review and approval of *azeliragon*;
- the outcome, costs and timing of seeking and obtaining FDA and any other regulatory approvals;
- the number and characteristics of drug candidates that we pursue, including our drug candidates in preclinical development;
- the ability of our drug candidates to progress through clinical development successfully;
- our need to expand our research and development activities;
- the costs associated with securing, establishing and maintaining commercialization capabilities;
- the costs of acquiring, licensing or investing in businesses, products, drug candidates and technologies;
- our ability to maintain, expand and defend the scope of our intellectual property portfolio, including the amount and timing of any payments we may be required to make, or that we may receive, in connection with the licensing, filing, prosecution, defense and enforcement of any patents or other intellectual property rights;
- our need and ability to hire additional management and scientific and medical personnel;
- the effect of competing technological and market developments;
- our need to implement additional internal systems and infrastructure, including financial and reporting systems;
- the economic and other terms, timing and success of our existing licensing arrangements and any collaboration, licensing or other arrangements into which we may enter in the future; and
- the amount of any payments we are required to make to M&F in the future under the Tax Receivable Agreement.

Until such time, if ever, as we can generate substantial revenue from drug sales, we expect to finance our cash needs through a combination of equity offerings, debt financings, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements. We do not currently have any committed external source of funds other than those available to us through the Loan Agreement. To the extent that we raise additional capital through the sale of equity or convertible debt securities, the ownership interests of our common stockholders will be diluted, and the terms of these securities may include liquidation or other preferences that adversely affect the rights of our common stockholders. Debt financing and preferred equity financing, if available, may involve agreements that include covenants that will further limit or restrict our ability to take specific actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through collaborations, strategic alliances or marketing, distribution or licensing arrangements with third parties, we may be required to relinquish valuable rights to our technologies, future revenue streams or drug candidates or grant licenses on terms that may not be favorable to us.

Disclosures About Contractual Obligations and Commitments

The following table summarizes our contractual obligations at December 31, 2016 (in thousands):

	Total	Less Than 1 Year	1 - 3 Years	3 - 5 Years	More Than 5 Years
Principal payments under Loan Agreement	$ 12,500	$ —	$ 12,500	$ —	$ —
Interest on Loan Agreement (1)	3,992	1,365	2,627	—	—
Operating lease commitments	721	471	250	—	—
Total contractual obligations	$ 17,213	$ 1,836	$ 15,377	$ —	$ —

(1) Interest payments associated with the Loan Agreement are projected based on interest rates in effect as of December 31, 2016 assuming no variable rate fluctuations going forward. An increase in the interest rates applicable to our Loan Agreement by 1% would result in an additional $0.1 million of annual cash interest expense. In addition to the estimated monthly cash interest payments, the projected interest payments stated above also include the 6% final interest payment to be paid upon the maturity of the debt obligation.

Additionally, we enter into contracts in the normal course of business with CROs for clinical trials and clinical supply manufacturing and with vendors for preclinical research studies and other services and products for operating purposes, which generally provide for termination or cancellation within 30 days of notice, and therefore are not included in the table above. Additionally, we have entered into employment agreements with our Chief Executive Officer, Chief Financial Officer and Chief Medical Officer that require the funding of specific payments, if certain events occur, such as a change in control or the termination of their employment without cause. These potential payment obligations are not included in the table above.

Off-Balance Sheet Arrangements

During the periods presented we did not have, nor do we currently have, any off-balance sheet arrangements as defined under SEC rules.

Discussion of Critical Accounting Policies

Our management's discussion and analysis of our financial condition and results of operations is based on our financial statements, which we have prepared in accordance with generally accepted accounting principles in the United States ("GAAP"). The preparation of our financial statements requires us to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities at the date of our financial statements, as well as the reported revenues and expenses during the reported periods. We evaluate these estimates and judgments on an ongoing basis. We base our estimates on historical experience and on various other factors that we believe are 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 from these estimates under different assumptions or conditions.

While our significant accounting policies are more fully described in Note 2, "Summary of Significant Accounting Policies," to our audited financial statements, we believe that the following accounting policies related to revenue recognition, research and development, income taxes, and share-based compensation are the most critical for fully understanding and evaluating our financial condition and results of operations.

Basis of Presentation

Subsequent to our IPO and Reorganization Transactions, the Company is a holding company, and its principal asset is a controlling equity interest in vTv LLC, the Company's principal operating subsidiary. The Company has determined that vTv LLC is a VIE for accounting purposes and that the Company is the primary beneficiary of vTv LLC because (through its managing member interest in vTv LLC and the fact that the senior management of the Company is also the senior management of vTv LLC) it has the power to direct all of the activities of vTv LLC, which include those that most significantly impact vTv LLC's economic performance. The Company has therefore consolidated vTv LLC's results under the VIE accounting model in its consolidated financial statements.

As the Reorganization Transactions were considered to be among entities under common control, the Consolidated Financial Statements for periods prior to the IPO and Reorganization Transactions have been adjusted to combine vTvx Holdings I and vTvx Holdings II for presentation purposes.

Revenue Recognition

We use the revenue recognition guidance established by ASC Topic 605, "Revenue Recognition." We recognize revenue when there is persuasive evidence of an arrangement, the service has been provided to the customer, the collection of the fee is reasonably assured and the amount of the fee to be paid by the customer is fixed or determinable. In determining the accounting for collaboration and alliance agreements, we follow the provisions of ASC Topic 605, Subtopic 25, "Multiple Element Arrangements" ("ASC 605-25"). ASC 605-25 provides guidance on whether an arrangement that involves multiple revenue-generating activities or deliverables should be divided into separate units of accounting for revenue recognition purposes and, if division is required, how the arrangement consideration should be allocated among the separate units of accounting. If a deliverable has value on a standalone basis, we treat the deliverable as a separate unit of accounting. If the arrangement constitutes separate units of accounting according to the separation criteria of ASC 605-25, the consideration received is allocated among the separate units of accounting and the applicable revenue recognition criteria must be applied to each unit. We determine how to allocate amounts received under agreements among the separate units based on the respective selling price of each unit. If the arrangement constitutes a single unit of accounting, the revenue recognition policy must be determined for the entire arrangement and the consideration received is recognized over the period of inception through the date the last deliverable within the single unit of accounting is expected to be delivered.

Collaboration research and development revenue is earned and recognized as research is performed and related expenses are incurred. Non-refundable upfront fees are recorded as deferred revenue and recognized into revenue as license fees and milestones from collaborations on a straight-line basis over the estimated period of our substantive performance obligations. If we do not have substantive performance obligations, we recognize non-refundable upfront fees into revenue through the date the deliverable is satisfied.

Revenue for non-refundable payments based on the achievement of milestone events under collaboration agreements is recognized in accordance with ASC Topic 605, Subtopic 28, "Milestone Method" ("ASC 605-28"). Milestone events under our collaboration agreements may include research, development, regulatory, commercialization, or sales events. Under ASC 605-28, a milestone payment is recognized as revenue when the applicable event is achieved if the event meets the definition of a milestone and the milestone is determined to be substantive. ASC 605-28 defines a milestone event as an event having all of the following characteristics: (1) there is substantive uncertainty regarding achievement of the milestone event at the inception of the arrangement; (2) the event can only be achieved based, in whole or in part, on either our performance or a specific outcome resulting from our performance; and (3) if achieved, the event would result in additional payment due to us. We also treat events that can only be achieved based, in whole or in part, on either a third party's performance or a specific outcome resulting from a third party's performance as milestone events if the criteria of ASC 605-28 are otherwise satisfied.

Research and development costs that are reimbursable under collaboration agreements are recorded in accordance with ASC Topic 605, Subtopic 45, "Principal Agent Considerations." Amounts reimbursed under a cost sharing arrangement are reflected as a reduction of research and development expense.

Our wholly-owned subsidiary (prior to December 31, 2014), HPCTC, entered into contractual arrangements with sponsors wanting to conduct a trial on a drug and recognized study revenue when (i) the identified single subject visit has been completed or (ii) in some cases, all visits required in the trial by the subject matter have been completed, consistent with the requirements of the contractual arrangements.

Research and Development

Major components of research and development costs include cash compensation, depreciation and amortization expense on research and development property and equipment, costs of preclinical studies, clinical trials and related clinical manufacturing, costs of drug development, costs of materials and supplies, facilities cost, overhead costs, regulatory and compliance costs, and fees paid to consultants and other entities that conduct certain research and development activities on our behalf. Costs incurred in research and development are expensed as incurred.

We record accruals based on estimates of the services received, efforts expended and amounts owed pursuant to contracts with numerous contract research organizations. In the normal course of business, we contract with third parties to perform various clinical study activities in the ongoing development of potential products. The financial terms of these agreements are subject to negotiation and variation from contract to contract and may result in uneven payment flows. Payments under the contracts depend on factors such as the achievement of certain events and the completion of portions of the clinical study or similar conditions. The objective of our accrual policy is to match the recording of expenses in our financial statements to the actual services received and efforts expended. As such, expense accruals related to clinical studies are recognized based on our estimate of the degree of completion of the event or events specified in the specific clinical study.

We record nonrefundable advance payments we make for future research and development activities as prepaid expenses. Prepaid expenses are recognized as expense in the statements of operations as we receive the related goods or services.

Income Taxes

In connection with the IPO, vTv Therapeutics Inc. was formed. From August 1, 2015, vTv Therapeutics Inc. has been subject to corporate level income taxes. Prior to July 30, 2015, TTP and HPP were taxed as partnerships and all their income and deductions flowed through and were subject to tax at the partner level.

As a result of the Reorganization Transactions, vTv Therapeutics Inc. acquired vTv Units and is required to recognize deferred tax assets and liabilities for the difference between the financial reporting and tax basis of its investment in vTv LLC.

Our income tax expense, deferred tax assets and liabilities and reserves for unrecognized tax benefits reflect management's best assessment of estimated future taxes to be paid. We are subject to income taxes in both the United States and various state jurisdictions. Significant judgments and estimates are required in determining the consolidated income tax expense.

We account for income taxes under the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events included in the financial statements. Under this method, we determine deferred tax assets and liabilities on the basis of differences between the financial statement and tax bases of assets and liabilities by using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income in the period in which the enactment date occurs.

We recognize deferred tax assets to the extent we believe these assets are more-likely-than-not to be realized. In making such a determination, we consider all available positive and negative evidence, including future reversals of existing taxable temporary differences, projected future taxable income, tax planning strategies and recent results of operations.

We record uncertain tax positions on the basis of a two-step process in which (1) we determine whether it is more-likely-than-not that the tax positions will be sustained on the basis of the technical merits of the position and (2) for those tax positions meeting the more-likely-than-not recognition threshold, we recognize the largest amount of tax benefit that is more than 50% likely to be realized upon ultimate settlement with the related tax authority.

Interest and penalties related to income taxes are included in the benefit (provision) for income taxes in our Consolidated Statement of Operations. We have not incurred any significant interest or penalties related to income taxes in any of the periods presented.

Share-Based Compensation

Compensation expense for share-based compensation awards issued is based on the fair value of the award at the date of grant, and compensation expense is recognized for those awards earned over the service period. The grant date fair value of the awards is estimated using the Black-Scholes option pricing formula. Due to the lack of sufficient historical trading information with respect to our own shares, we estimate expected volatility based on a portfolio of selected stocks of companies believed to have market and economic characteristics similar to our own. The risk-free rate is based on the U.S. Treasury yield curve in effect at the time of grant. Due to a lack of historical exercise data, we estimate the expected life of its outstanding stock options using the simplified method specified under Staff Accounting Bulletin Topic 14.D.2. We also estimate the amount of share-based awards that are expected to be forfeited based on historical employee turnover rates.

Effect of Recent Accounting Pronouncements

See discussion of recent accounting pronouncements in Note 2, "Summary of Significant Accounting Policies", to the Consolidated Financial Statements in Item 15 of Part IV of this Annual Report on Form 10-K.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Interest Rate Risk

Our Loan Agreement bears interest at a floating rate equal to 10.5% plus the amount by which the one-month London Interbank Offer Rate ("LIBOR") exceeds 0.5%. A one percent increase in the variable rate of interest on the Loan Agreement would increase interest expense by approximately $0.1 million annually based on the amounts currently outstanding. We do not currently hedge our interest rate exposure.

Market Risk

Our exposure to market risk is limited to our cash, cash equivalents and marketable securities, all of which have maturities of one year or less. The goals of our investment strategy are preservation of capital, fulfillment of liquidity needs and fiduciary control of cash

and investments. We also seek to maximize income from our investments without assuming significant risk. To achieve our goals, we maintain a portfolio of cash equivalents and investments in a variety of securities that management believes to be of high credit quality. The securities in our investment portfolio are not leveraged, are classified as available for sale and are, due to their short-term nature, subject to minimal interest rate risk. Because of the short-term maturities of our investments, we do not believe that an increase in market rates would have a material negative impact on the value of our investment portfolio.

Foreign Currency Risk

We do not have any material foreign currency exposure.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

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

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

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Under the supervision and with the participation of our Chief Executive Officer and Chief Financial Officer, management has evaluated the effectiveness of the design and operation of our disclosure controls and procedures (as defined in Rules 13a-15(e) or 15d-15(e) of the Securities Exchange Act of 1934) as of December 31, 2016. Based upon that evaluation, our Chief Executive Officer and Chief Financial Officer concluded that, as of December 31, 2016, our disclosure controls and procedures were effective in causing material information relating to us (including our consolidated subsidiaries) to be recorded, processed, summarized and reported by management on a timely basis and to ensure the quality and timeliness of our public disclosures with SEC disclosure obligations.

Our management, including our Chief Executive Officer and Chief Financial Officer, does not expect that our disclosure controls and procedures will prevent all errors and all fraud. A control system, no matter how well conceived and operated, can provide only reasonable, not absolute, assurance that the objectives of the control system are met. Further, the design of a control system must reflect the fact that there are resource constraints, and the benefits of controls must be considered relative to their costs. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, with the Company have been detected. These inherent limitations include the realities that judgments in decision-making can be faulty and that breakdowns can occur because of simple error and mistake. Additionally, controls can be circumvented by the individual acts of some persons, by collusion of two or more people or by management override of controls.

The design of any system of controls also is based in part upon certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions. Over time, a control may become inadequate because of changes in conditions or because the degree of compliance with the policies or procedures may deteriorate. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and may not be detected.

Management’s Annual Report on Internal Control Over Financial Reporting

This Annual Report on Form 10-K does not include a report of management’s assessment regarding our internal control over financial reporting (as defined in Rule 13a-15(f) under the Exchange Act) or an attestation report of our independent registered accounting firm due to a transition period established by rules of the Securities and Exchange Commission for newly public companies.

Changes to Internal Control over Financial Reporting

There have been no changes in our internal control over financial reporting during our most recent fiscal quarter that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Website Availability of Reports and other Corporate Governance Information

The Company maintains a comprehensive corporate governance program, including Corporate Governance Guidelines for its Board of Directors, Board Guidelines for Assessing Director Independence and charters for its Audit Committee, Nominating and Corporate Governance Committee and Compensation Committee. The Company maintains a corporate investor relations website, www.vtvtherapeutics.com, where stockholders and other interested persons may review, without charge, among other things, corporate governance materials and certain SEC filings, which are generally available on the same business day as the filing date with the SEC on the SEC's website http://www.sec.gov.

ITEM 9B. OTHER INFORMATION

None.

PART III

Certain information required by Part III is omitted from this Annual Report on Form 10-K and incorporated by reference to our Proxy Statement for our 2017 Annual Meeting of Stockholders to be filed pursuant to Regulation 14A of the Securities Exchange Act of 1934, as amended, or the Exchange Act. If the Proxy Statement is not filed within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, the omitted information will be included in an amendment to this Annual Report on Form 10-K filed not later than the end of such 120-day period.

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this item is incorporated by reference to our Proxy Statement for the 2017 Annual Meeting of Stockholders to be filed with the SEC within 120 days of the fiscal year ended December 31, 2016.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item is incorporated by reference to our Proxy Statement for the 2017 Annual Meeting of Stockholders to be filed with the SEC within 120 days of the fiscal year ended December 31, 2016.

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

The information required by this item is incorporated by reference to our Proxy Statement for the 2017 Annual Meeting of Stockholders to be filed with the SEC within 120 days of the fiscal year ended December 31, 2016.

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

The information required by this item is incorporated by reference to our Proxy Statement for the 2017 Annual Meeting of Stockholders to be filed with the SEC within 120 days of the fiscal year ended December 31, 2016.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information required by this item is incorporated by reference to our Proxy Statement for the 2017 Annual Meeting of Stockholders to be filed with the SEC within 120 days of the fiscal year ended December 31, 2016.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

(a)(1) Financial Statements

The following documents are included on pages F-1 through F-24 attached hereto and are filed as part of this Annual Report on Form 10-K.

(a)(2) Financial Statement Schedules

Not applicable

(a)(3) List of Exhibits

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

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) 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.

Date: February 24, 2017

VTV THERAPEUTICS INC.
(Registrant)

By: /s/ Stephen L. Holcombe
Stephen L. Holcombe
President and Chief Executive Officer

By: /s/ Rudy C. Howard
Rudy C. Howard
Chief Financial Officer

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

/s/ Jeffrey B. Kindler Jeffrey B. Kindler	Executive Chairman	February 24, 2017
/s/ Stephen L. Holcombe Stephen L. Holcombe	President and Chief Executive Officer (Principal Executive Officer)	February 24, 2017
/s/ Rudy C. Howard Rudy C. Howard	Chief Financial Officer (Principal Financial and Accounting Officer)	February 24, 2017
/s/ Steven M. Cohen Steven M. Cohen	Director	February 24, 2017
/s/ John A. Fry John A. Fry	Director	February 24, 2017
/s/ Paul M. Meister Paul M. Meister	Director	February 24, 2017
/s/ Craig C. Parker Craig C. Parker	Director	February 24, 2017
/s/ Paul G. Savas Paul G. Savas	Director	February 24, 2017
/s/ Noel J. Spiegel Noel J. Spiegel	Director	February 24, 2017

EXHIBIT INDEX

Exhibit Number	Description
3.1	Amended and Restated Certificate of Incorporation (incorporated by reference from Exhibit 3.1 to the Company's Form 8-K, filed August 4, 2015 (File No. 001-37524)).
3.2	Amended and Restated By-laws (incorporated by reference from Exhibit 3.2 to the Company's Form 8-K, filed August 4, 2015 (File No. 001-37524)).
4.1*	Form of Warrant to Purchase Class A Common Stock.
10.1	Reimbursement of Fees and Expenses Letter Agreement, dated July 16, 2015, by and between vTv Therapeutics Inc. and MacAndrews & Forbes Group, LLC (incorporated by reference from Exhibit 10.6 to Amendment No. 5 to the Company's Registration Statement on Form S-1, filed July 23, 2015 (File No. 333-204951)).
10.2	Reorganization Agreement, dated as of July 29, 2015, among vTv Therapeutics Inc., vTv Therapeutics LLC, vTvx Holdings I LLC, vTvx Holdings II LLC and vTv Therapeutics Holdings LLC (incorporated by reference from Exhibit 10.1 to the Company's Form 8-K, filed August 4, 2015 (File No. 001-37524)).
10.3	Amended and Restated Limited Liability Company Agreement of vTv Therapeutics LLC, dated July 29, 2015 (incorporated by reference from Exhibit 10.2 to the Company's Form 8-K, filed August 4, 2015 (File No. 001-37524)).
10.4	Investor Rights Agreement, dated as of July 29, 2015, among vTv Therapeutics Inc., vTv Therapeutics Holdings LLC and other stockholders party thereto from time to time (incorporated by reference from Exhibit 10.3 to the Company's Form 8-K, filed August 4, 2015 (File No. 001-37524)).
10.5	Exchange Agreement, dated as of July 29, 2015, among vTv Therapeutics LLC, vTv Therapeutics Inc. and vTv Therapeutics Holdings LLC (incorporated by reference from Exhibit 10.4 to the Company's Form 8-K, filed August 4, 2015 (File No. 001-37524)).
10.6	Tax Receivable Agreement, dated as of July 29, 2015, among vTv Therapeutics Inc. and the other persons named therein (incorporated by reference from Exhibit 10.5 to the Company's Form 8-K, filed August 4, 2015 (File No. 001-37524)).
10.7	Form of Indemnification Agreement (incorporated by reference from Exhibit 10.7 to Amendment No. 4 to the Company's Registration Statement on Form S-1, dated July 20, 2015 (File No. 333-204951)).
10.8†	Executive Chairman Agreement, dated as of July 16, 2015, by and between vTv Therapeutics Inc. and Jeff Kindler (incorporated by reference from Exhibit 10.13 to Amendment No. 4 to the Company's Registration Statement on Form S-1, filed July 20, 2015 (File No. 333-204951)).
10.9†	Employment Agreement, dated as of July 16, 2015, by and between vTv Therapeutics LLC and Stephen Holcombe, and for certain limited purposes specified therein, vTv Therapeutics Inc. (incorporated by reference from Exhibit 10.14 to Amendment No. 4 to the Company's Registration Statement on Form S-1, filed July 20, 2015 (File No. 333-204951)).
10.10†	Employment Agreement, dated as of July 16, 2015, by and between vTv Therapeutics LLC and Rudy Howard, and for certain limited purposes specified therein, vTv Therapeutics Inc. (incorporated by reference from Exhibit 10.15 to Amendment No. 4 to the Company's Registration Statement on Form S-1, filed July 20, 2015 (File No. 333-204951)).
10.11†	vTv Therapeutics Inc. 2015 Omnibus Equity Incentive Plan (incorporated by reference from Exhibit 10.6 to the Company's Form 8-K, filed August 4, 2015 (File No. 001-37524)).
10.12†	vTv Therapeutics Inc. Form of Nonqualified Option Award Agreement (incorporated by reference from Exhibit 10.7 to the Company's Form 8-K, filed August 4, 2015 (File No. 001-37524)).

Exhibit Number	Description
10.13†	Employment Agreement, dated as of December 1, 2015, by and between vTv Therapeutics LLC and Larry Altstiel, and for certain limited purposes specified therein, vTv Therapeutics Inc. (incorporated by reference from Exhibit 10.13 to the Company's Form 10-K, filed March 4, 2016 (Filed No. 001-37524)).
10.14††	Agreement Concerning Glucokinase Activator Project, dated as of February 20, 2007, by and between Novo Nordisk A/S and TransTech Pharma, Inc. (incorporated by reference from Exhibit 10.9 to Amendment No. 1 to the Company's Registration Statement on Form S-1, dated June 19, 2015 (File No. 333-204951)).
10.15††	New Exclusive License Agreement, dated May 14, 2015, by and between The Trustees of Columbia University in the City of New York and TransTech Pharma, LLC (incorporated by reference from Exhibit 10.9 to Amendment No. 1 to the Company's Registration Statement on Form S-1, dated July 13, 2015 (File No. 333-204951)).
10.16††	License and Research Agreement, dated as of March 5, 2015, by and between Calithera Biosciences,Inc. and High Point Pharmaceuticals, LLC and TransTech Pharma, LLC. (incorporated by reference from Exhibit 10.10 to Amendment No. 3 to the Company's Registration Statement on Form S-1, dated June 19, 2015 (File No. 333-204951)).
10.17††*	Venture Loan and Security Agreement dated as of October 28, 2016 by and among the Company, vTv Therapeutics LLC, Horizon Technology Finance Corporation and Silicon Valley Bank.
21.1*	Subsidiaries of vTv Therapeutics Inc.
23.1*	Consent of Ernst & Young LLP, Independent Registered Accounting Firm.
31.1*	Certification of President and Chief Executive Officer required by Rule 13a-14(a)/15d-14(a) under the Securities Exchange Act of 1934, as amended, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2*	Certification of Chief Financial Officer required by Rule 13a-14(a)/15d-14(a) under the Securities Exchange Act of 1934, as amended, as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1*	Certification of President and Chief Executive Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2*	Certification of Chief Financial Officer pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
101.INS*	XBRL Instance Document
101.SCH*	XBRL Taxonomy Extension Schema
101.CAL*	XBRL Taxonomy Extension Calculation Linkbase
101.DEF*	XBRL Taxonomy Extension Definition Document
101.LAB*	XBRL Taxonomy Extension Label Linkbase
101.PRE*	XBRL Taxonomy Extension Presentation Linkbase

† Management contract or compensatory plan or arrangement
†† Confidential treatment received with respect to portions of this exhibit.
* Filed herewith.

INDEX TO FINANCIAL STATEMENTS

The financial statements and other disclosures contained in this report include those of vTv Therapeutics Inc. ("we", the "Company" or the "Registrant"), which is the registrant, and those of vTv Therapeutics LLC ("vTv LLC"), which became the principal operating subsidiary of the Registrant in a series of reorganizational transactions that were completed (the "Reorganization Transactions") in connection with our initial public offering (the "IPO"), which was completed on August 4, 2015. As the Reorganization Transactions were considered to be among entities under common control, the Consolidated Financial Statements for periods prior to the IPO and Reorganization Transactions have been adjusted to combine TransTech Pharma, LLC ("TTP"), which was renamed vTvx Holdings I LLC ("vTvx Holdings I"), and High Point Pharmaceuticals, LLC ("HPP"), which was renamed vTvx Holdings II LLC ("vTvx Holdings II") (each of which was previously a separate entity), for presentation purposes. Unless the context suggests otherwise, references in this Annual Report on Form 10-K to the "Company", "we", "us" and "our" refer (1) prior to the IPO and Reorganization Transactions, to TTP and HPP and (2) after our IPO and Reorganization Transactions, to vTv Therapeutics Inc. and its consolidated subsidiaries. For more information regarding the transactions described above, see Note 1, "Description of Business and Basis of Presentation," to our financial statements contained in this Annual Report on Form 10-K.

Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders of vTv Therapeutics Inc.

We have audited the accompanying consolidated balance sheets of vTv Therapeutics Inc. as of December 31, 2016 and 2015, and the related consolidated statements of operations, changes in redeemable convertible units, redeemable noncontrolling interest, stockholders' and members' deficit, and cash flows for each of the three years in the period ended December 31, 2016. These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. We were not engaged to perform an audit of the Company's internal control over financial reporting. Our audits included consideration of internal control over financial reporting as a basis for designing audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the consolidated financial position of vTv Therapeutics Inc. at December 31, 2016 and 2015, and the consolidated results of its operations and its cash flows for each of the three years in the period ended December 31, 2016, in conformity with U.S. generally accepted accounting principles.

/s/ Ernst & Young LLP

Raleigh, North Carolina
February 24, 2017

vTv Therapeutics Inc.
Consolidated Balance Sheets
(dollars in thousands, except per share data)

	December 31, 2016	December 31, 2015
Assets		
Current assets:		
Cash and cash equivalents	$ 51,505	$ 88,003
Accounts receivable, net	—	69
Prepaid expenses and other current assets	612	1,114
Total current assets	52,117	89,186
Property and equipment, net	444	624
Other long-term assets	1,934	1,722
Total assets	$ 54,495	$ 91,532
Liabilities, Redeemable Noncontrolling Interest and Stockholders' Deficit		
Current liabilities:		
Accounts payable and accrued expenses	$ 11,413	$ 6,627
Accounts payable and accrued expenses - related party	—	880
Deferred revenue	21	219
Total current liabilities	11,434	7,726
Notes payable	11,058	—
Other liabilities	433	245
Total liabilities	22,925	7,971
Commitments and contingencies		
Redeemable noncontrolling interest	122,515	161,531
Stockholders' deficit:		
Class A Common Stock, $0.01 par value; 100,000,000 shares authorized, 9,693,254 and 9,156,686 shares outstanding as of December 31, 2016 and December 31, 2015, respectively	97	92
Class B Common Stock, $0.01 par value; 100,000,000 shares authorized, 23,119,246 and 23,655,814 shares outstanding as of December 31, 2016 and December 31, 2015, respectively	232	237
Additional paid-in capital	124,212	117,686
Accumulated deficit	(215,486)	(195,985)
Total stockholders' deficit attributable to vTv Therapeutics Inc.	(90,945)	(77,970)
Total liabilities, redeemable noncontrolling interest and stockholders' deficit	$ 54,495	$ 91,532

The accompanying notes are an integral part of the consolidated financial statements.

vTv Therapeutics Inc.
Consolidated Statements of Operations
(in thousands, except per share data)

	Years Ending December 31,		
	2016	**2015**	**2014**
Revenue	$ 634	$ 519	$ 1,549
Operating expenses:			
Research and development	44,953	27,237	17,378
Research and development – related party	795	2,347	1,351
General and administrative	9,906	9,077	11,717
Total operating expenses	55,654	38,661	30,446
Operating loss	(55,020)	(38,142)	(28,897)
Other loss	(22)	(838)	(503)
Other expense – related party	—	(392)	(623)
Interest income	87	40	4
Interest expense	(398)	(108)	(286)
Interest expense, net – related party	—	(1,667)	(5,727)
Investment loss – related party	—	—	(69)
Loss before income taxes and noncontrolling interest	(55,353)	(41,107)	(36,101)
Income tax provision	—	—	—
Net loss before noncontrolling interest	(55,353)	(41,107)	(36,101)
Less: net loss attributable to noncontrolling interest	(39,001)	(13,609)	—
Net loss attributable to vTv Therapeutics Inc.	$ (16,352)	$ (27,498)	$ (36,101)
Net loss per share of vTv Therapeutics Inc. Class A Common Stock, basic and diluted	$ (1.71)	$ (3.32)	
Weighted-average number of vTv Therapeutics Inc. Class A Common Stock, basic and diluted	9,545,527	8,276,520	

The accompanying notes are an integral part of the consolidated financial statements.

vTv Therapeutics Inc.

Consolidated Statements of Changes in Redeemable Convertible Units, Redeemable Noncontrolling Interest, Stockholders' and Members' Deficit
(in thousands, except per share data)

	Redeemable Convertible Preferred Units	Redeemable Noncontrolling Interest	Members' Deficit	Class A Common Stock		Class B Common Stock		Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Deficit
				Shares	Amount	Shares	Amount			
Balances at December 31, 2013	**$ 229,370**	**$ —**	**$ (303,733)**	**—**	**$ —**	**—**	**$ —**	**$ —**	**$ —**	**$ (303,733)**
Net loss	—	—	(36,101)	—	—	—	—	—	—	(36,101)
Issuance of TTP Series F redeemable convertible preferred units – related party	52,697	—	21,303	—	—	—	—	—	—	21,303
Deemed contribution from a related party in a debt extinguishment	—	—	18,733	—	—	—	—	—	—	18,733
Issuance of HPP Series B redeemable convertible preferred units – related party	3,726	—	(3,726)	—	—	—	—	—	—	(3,726)
Repurchase of TTP Series F preferred, HPP Series B preferred, HPP and TTP common member units and warrants – related party	(57,005)	—	14,016	—	—	—	—	—	—	14,016
Change in redemption value of TTP redeemable convertible preferred units	209,298	—	(209,298)	—	—	—	—	—	—	(209,298)
Balances at December 31, 2014	**438,086**	**—**	**(498,806)**	**—**	**—**	**—**	**—**	**—**	**—**	**(498,806)**
Net loss prior to the Reorganization Transactions	—	—	(22,111)	—	—	—	—	—	—	(22,111)
Change in redemption value of TTP redeemable convertible preferred units	75,077	—	(75,077)	—	—	—	—	—	—	(75,077)
Effect of Reorganization Transactions	(513,163)	(2,997)	595,994	—	—	25,000,000	250	—	—	596,244
Issuance of Class A Common Stock in initial public offering, net of offering costs	—	—	—	7,812,500	79	—	—	104,366	—	104,445
Net loss subsequent to Reorganization Transactions	—	(13,609)	—	—	—	—	—	—	(5,387)	(5,387)
Share-based compensation recognized subsequent to Reorganization Transactions	—	—	—	—	—	—	—	859	—	859
Exchange of Class B Common Stock for Class A Common Stock	—	(12,461)	—	1,344,186	13	(1,344,186)	(13)	12,461	—	12,461
Change in redemption value of noncontrolling interest	—	190,598	—	—	—	—	—	—	(190,598)	(190,598)
Balances at December 31, 2015	**—**	**161,531**	**—**	**9,156,686**	**92**	**23,655,814**	**237**	**117,686**	**(195,985)**	**(77,970)**
Net loss	—	(39,001)	—	—	—	—	—	—	(16,352)	(16,352)
Share-based compensation	—	—	—	—	—	—	—	2,641	—	2,641
Issuance of warrants to purchase Class A Common Stock	—	—	—	—	—	—	—	721	—	721
Exchange of Class B Common Stock for Class A Common Stock	—	(3,164)	—	536,568	5	(536,568)	(5)	3,164	—	3,164
Change in redemption value of noncontrolling interest	—	3,149	—	—	—	—	—	—	(3,149)	(3,149)
Balances at December 31, 2016	**$ —**	**$ 122,515**	**$ —**	**9,693,254**	**$ 97**	**23,119,246**	**$ 232**	**$ 124,212**	**$ (215,486)**	**$ (90,945)**

The accompanying notes are an integral part of the consolidated financial statements.

vTv Therapeutics Inc.
Consolidated Statements of Cash Flows
(in thousands)

	Years Ended December 31,		
	2016	2015	2014
Cash flows from operating activities:			
Net loss before noncontrolling interest	$ (55,353)	$ (41,107)	$ (36,101)
Adjustments to reconcile net loss before noncontrolling interest to net cash used in operating activities:			
(Gain) loss on disposal of PP&E, net	(2)	(7)	34
Depreciation expense	265	501	864
Share-based compensation expense	2,641	859	—
Change in fair value of contingent distribution	—	695	—
Amortization of debt discount	154	—	—
Amortization of debt discount – related party	—	—	4,773
Non-cash interest expense – distribution payable	—	27	—
Amortization of deferred financing costs	—	—	145
Impairment loss on carrying value of land	—	48	488
Bad debt (recovery) expense – related party	—	(3)	633
Impairment loss of marketable securities – related party	—	—	30
Change in fair value of marketable securities – related party	—	—	39
Changes in assets and liabilities:			
Accounts receivable	69	(69)	(733)
Prepaid expenses and other assets	502	(1,020)	62
Employee loans receivable – related party	49	12	(43)
Receivable due from a related party	—	—	(623)
Note receivable	—	(20)	(231)
Other long-term assets	(261)	(1,598)	(4)
Accounts payable and accrued expenses	4,786	2,930	(2,324)
Accounts payable and accrued expenses – related party	(880)	2,458	2,144
Deferred revenue	(198)	219	—
Other liabilities	19	(871)	68
Net cash used in operating activities	(48,209)	(36,946)	(30,779)
Cash flows from investing activities:			
Proceeds from sale of assets	4	25	334
Expenses paid related to disposal of HPCTC – related party	—	—	(140)
Purchases of property and equipment	(87)	(104)	(33)
Net cash (used in) provided by investing activities	(83)	(79)	161
Cash flows from financing activities:			
Proceeds from issuance of vTv Therapeutics Inc. Class A Common Stock sold in initial public offering, net of offering costs	—	105,773	—
Proceeds from debt issuance	12,500	—	—
Repurchase of TTP preferred common member units and warrants – related party	—	—	(2,500)
Debt issuance costs	(673)	—	—
Payment of offering costs – related party	—	(1,329)	—
Proceeds from debt issuance – related party	—	19,289	33,561
Repayment of long-term obligations	(33)	(89)	(148)
Net cash provided by financing activities	11,794	123,644	30,913
Net (decrease) increase in cash and cash equivalents	(36,498)	86,619	295
Cash and equivalents, beginning of period	88,003	1,384	1,089
Cash and equivalents, end of period	$ 51,505	$ 88,003	$ 1,384
Supplemental cash flow information:			
Cash paid for interest	$ 242	$ 75	$ 142
Non-cash activities:			
Change in carrying value of net assets and liabilities not transferred to vTv Therapeutics, LLC as part of the Reorganization Transactions	$ —	$ 2,747	$ —
Change in redemption value of noncontrolling interest	$ 3,149	190,598	$ —
Exchange of vTv Therapeutics Inc. Class B Common Stock and vTv Therapeutics, LLC member units for vTv Therapeutics Inc. Class A Common Stock	$ 3,164	12,461	$ —
Issuance of warrants to purchase vTv Therapeutics Inc. Class A Common Stock	$ 923		
Repurchase of TTP and HPP preferred units, common membership units and warrants, in exchange for HPCTC and other liabilities, net of cash exchanged – related party	$ —	$ —	$ 40,351
Deemed contribution from related party in a debt extinguishment – related party	$ —	$ —	$ 18,733
Issuance of TTP Series F redeemable preferred units in exchange for debt – related party	$ —	$ —	$ 74,000

The accompanying notes are an integral part of the consolidated financial statements.

Note 1: Description of Business and Basis of Presentation

Description of Business

vTv Therapeutics Inc. (the "Company," the "Registrant," "we" or "us"), was incorporated in the state of Delaware in April 2015. The Company was formed to discover and develop orally administered small molecule drug candidates to fill significant unmet medical needs.

Initial Public Offering

On August 4, 2015, vTv Therapeutics Inc. consummated its initial public offering ("IPO") of 7,812,500 shares of its Class A common stock, par value $0.01 per share ("Class A Common Stock"), at a price of $15.00 per share. The IPO raised net proceeds of approximately $109.0 million after underwriting discounts and commissions but before expenses. vTv Therapeutics Inc. used the net proceeds of the IPO to acquire nonvoting common units ("vTv Units") of vTv Therapeutics LLC ("vTv LLC"), an entity created to hold substantially all of the assets and operations of vTvx Holdings I LLC (formerly known as TransTech Pharma, LLC, "TTP" or "vTvx Holdings I") and vTvx Holdings II LLC (formerly known as High Point Pharmaceuticals, LLC, "HPP" or "vTvx Holdings II" and together with vTvx Holdings I, the "Predecessors"), which assets and operations were transferred to such entity in a series of pre-IPO reorganization transactions (the "Reorganization Transactions"). vTv LLC is an entity under common control with vTv Therapeutics Inc. The Company intends to use the net proceeds from the IPO to fund clinical development, studies, and trials for its various products and other drug candidates, for working capital and other general corporate purposes.

Reorganization Transactions

During July 2015, TTP and HPP were renamed vTvx Holdings I LLC and vTvx Holdings II LLC, respectively. Concurrent with the IPO, the Company then entered into the following Reorganization Transactions, through which the operations of vTvx Holdings I and vTvx Holdings II were combined into vTv LLC:

(1) vTvx Holdings I and vTvx Holdings II contributed substantially all of their assets, including all of their personnel and operations (the "Contributed Assets"), to a newly formed holding company, vTv Therapeutics Holdings LLC ("vTv Therapeutics Holdings"), in return for interests of vTv Therapeutics Holdings. Assets that were not contributed included restricted cash, certain receivables unrelated to the combined operations and land included in property and equipment, net. Liabilities that were not assumed included debt, a contingent distribution payable and other related party liabilities. All assets and liabilities that were not contributed or assumed remained with vTvx Holdings I and vTvx Holdings II and are not reflected in the Consolidated Balance Sheets as of December 31, 2016 and 2015;

(2) vTv Therapeutics Holdings contributed the Contributed Assets to vTv LLC, a newly formed Delaware limited liability company, and, for administrative convenience, vTv Therapeutics Holdings directed that the assets be transferred directly to vTv LLC on behalf of vTv Therapeutics Holdings;

(3) vTv Therapeutics Inc. amended and restated its certificate of incorporation and by-laws to provide for two classes of common stock:

  (a) Class A Common Stock, which represents economic interests and has one vote per share, and

  (b) Class B common stock, par value $0.01 per share ("Class B Common Stock"), which represents no economic interests and has one vote per share;

(4) vTv LLC amended and restated its limited liability company agreement (the "Amended and Restated LLC Agreement") to provide that it has two classes of membership units:

  (a) One managing member unit, which represents no economic interests and has 100% of the voting power of vTv LLC; and

  (b) Non-voting vTv Units, which represent economic interests;

(5) vTv LLC issued the managing member unit to vTv Therapeutics Inc.;

(6) vTv LLC issued 25,000,000 vTv Units to vTv Therapeutics Holdings; and

(7) vTv Therapeutics Inc. issued 25,000,000 shares of Class B Common Stock, which represents no economic interests in the Company but has the right to cast one vote per share, to vTv Therapeutics Holdings which correspond to each vTv Unit held by vTv Therapeutics Holdings.

Below is a summary of the principal documents entered into in connection with the Reorganization Transactions:

Exchange Agreement - Pursuant to the terms of the Exchange Agreement, but subject to the Amended and Restated LLC Agreement of vTv LLC, the vTv Units (along with a corresponding number of shares of the Class B Common Stock) are exchangeable for (i) shares of the Class A Common Stock on a one-for-one basis or (ii) cash (based on the fair market value of the Class A Common Stock as determined pursuant to the Exchange Agreement), at the option of vTv Therapeutics Inc. (as the managing member of vTv LLC), subject to customary conversion rate adjustments for stock splits, stock dividends and reclassifications. Any decision to require an exchange for cash rather than shares of Class A Common Stock will ultimately be determined by the entire board of directors of vTv Therapeutics Inc. (the "Board of Directors"). On October 5, 2015, vTv Therapeutics Holdings was dissolved, and various holders of Class B Common Stock became parties to the Exchange Agreement.

Tax Receivable Agreement - The Tax Receivable Agreement among the Company, M&F TTP Holdings Two LLC, as successor in interest to vTv Therapeutics Holdings ("M&F") and M&F TTP Holdings LLC provides for the payment by the Company to M&F (or certain of its transferees or other assignees) of 85% of the amount of cash savings, if any, in U.S. federal, state and local income tax or franchise tax that the Company actually realizes (or, in some circumstances, the Company is deemed to realize) as a result of (a) the exchange of Class B Common Stock, together with the corresponding number of vTv Units, for shares of the Company's Class A Common Stock (or for cash), (b) tax benefits related to imputed interest deemed to be paid by the Company as a result of the Tax Receivable Agreement and (c) certain tax benefits attributable to payments under the Tax Receivable Agreement.

Investor Rights Agreement - The Company is party to an investor rights agreement with M&F, as successor in interest to vTv Therapeutics Holdings (the "Investor Rights Agreement"). The Investor Rights Agreement provides M&F with certain demand, shelf and piggyback registration rights with respect to its shares of Class A Common Stock and also provides M&F with certain governance rights, depending on the size of its holdings of Class A Common Stock. Under the Investor Rights Agreement, M&F was initially entitled to nominate a majority of the members of the Board of Directors and designate the members of the committees of the Board of Directors.

On October 1, 2015, vTvx Holdings I and vTvx Holdings II merged with and into vTv Therapeutics Holdings, with vTv Therapeutics Holdings continuing as the surviving limited liability company. On October 5, 2015, vTv Therapeutics Holdings was dissolved and made a liquidating distribution of shares of Class B Common Stock and the corresponding vTv Units to its members. As a result of the dissolution, M&F TTP Holdings LLC became the successor to vTv Therapeutics Holdings under the Investor Rights Agreement, the Exchange Agreement and the Tax Receivable Agreement pursuant to the terms of each respective agreement, and various other holders of Class B Common Stock became parties to the Exchange Agreement. On December 28, 2015, M&F TTP Holdings LLC contributed its shares of Class B Common Stock and the corresponding vTv Units to its subsidiary, M&F, which became the successor to M&F TTP Holdings LLC under the Investor Rights Agreement, Exchange Agreement and Tax Receivable Agreement pursuant to the terms of each respective agreement.

Reclassifications

To facilitate comparison of information across periods, certain reclassifications have been made to prior period amounts to conform to the current period's presentation.

Principles of Consolidation

Subsequent to the IPO and the Reorganization Transactions, vTv Therapeutics Inc. is a holding company, and its principal asset is a controlling equity interest in vTv LLC, the Company's principal operating subsidiary, which is a clinical-stage biopharmaceutical company engaged in the discovery and development of orally administered small molecule drug candidates to fill significant unmet medical needs.

The Company has determined that vTv LLC is a variable-interest entity ("VIE") for accounting purposes and that vTv Therapeutics Inc. is the primary beneficiary of vTv LLC because (through its managing member interest in vTv LLC and the fact that the senior management of vTv Therapeutics Inc. is also the senior management of vTv LLC) it has the power and benefits to direct all of the activities of vTv LLC, which include those that most significantly impact vTv LLC's economic performance. vTv Therapeutics Inc. has therefore consolidated vTv LLC's results pursuant to Accounting Standards Codification Topic 810, "Consolidation" in its consolidated financial statements. Various holders own non-voting interests in vTv LLC, representing a 70.5% economic interest in

vTv LLC, effectively restricting vTv Therapeutics Inc.'s interest to 29.5% of vTv LLC's economic results, subject to increase in the future, should vTv Therapeutics Inc. purchase additional vTv Units or should the holders of vTv Units decide to exchange such units (together with shares of Class B Common Stock) for shares of Class A Common Stock (or cash) pursuant to the Exchange Agreement. vTv Therapeutics Inc. has provided financial and other support to vTv LLC in the form of its purchase of vTv Units with the net proceeds of the IPO in 2015 and its agreeing to be a co-borrower under the Venture Loan and Security Agreement (the "Loan Agreement") with Horizon Technology Finance Corporation and Silicon Valley Bank (together, the "Lenders") which was entered into in 2016. vTv Therapeutics Inc. will not be required to provide financial or other support for vTv LLC outside of its obligations pertaining to the Loan Agreement as a co-borrower. However, vTv Therapeutics Inc. will control its business and other activities through its managing member interest in vTv LLC, and its management is the management of vTv LLC. The creditors of vTv LLC do not have any recourse to the general credit of vTv Therapeutics Inc except as allowed under the provisions of the Loan Agreement. Nevertheless, because vTv Therapeutics Inc. will have no material assets other than its interests in vTv LLC, any financial difficulties at vTv LLC could result in vTv Therapeutics Inc. recognizing a loss.

As the Reorganization Transactions were considered to be among entities under common control, the Consolidated Financial Statements for periods prior to the IPO and Reorganization Transactions have been adjusted to combine the historical financial statements of TTP and HPP (which were previously separate entities) for presentation purposes. The historical combined financial statements of these entities include assets and liabilities not transferred to the Company as part of the Reorganization Transactions as discussed above.

Note 2: Summary of Significant Accounting Policies

Use of Estimates

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

On an ongoing basis, the Company evaluates its estimates, including those related to the grant date fair value of equity awards, the fair value of warrants to purchase shares of its Class A Common Stock, the fair value of the Class B Common Stock, the useful lives of property and equipment, the fair value of the Company's membership units, the fair value of redeemable preferred units, and the fair value of the Company's debt, among others. The Company bases its estimates on historical experience and on various other assumptions that it believes to be reasonable, the results of which form the basis for making judgments about the carrying value of assets and liabilities.

Concentration of Credit Risk

Financial instruments that potentially expose the Company to concentrations of credit risk consist principally of cash on deposit with multiple financial institutions. The balances of these cash accounts frequently exceed insured limits.

There were no accounts receivable at December 31, 2016 and the balance of accounts receivable at December 31, 2015 was not significant.

Two customers represented 100% of the revenue earned during the years ended December 31, 2016 and 2015. Three customers represented 98% of the revenue during the year ended December 31, 2014.

Cash and Cash Equivalents

The Company considers any highly liquid investments with an original maturity of three months or less to be cash and cash equivalents.

Collaboration Revenue and Accounts Receivable

The majority of the Company's collaboration revenue and accounts receivable is related to an exclusive global license agreement (the "License Agreement") which the Company entered into on March 6, 2015 with Calithera Biosciences, Inc. ("Calithera"), granting Calithera exclusive world-wide rights to research, develop and commercialize the Company's portfolio of hexokinase II inhibitors. Under the terms of the License Agreement, Calithera paid the Company an initial license fee of $0.6 million and may in the future pay potential development and regulatory milestone payments totaling up to $30.5 million for the first licensed product, an additional $77.0 million in potential sales-based milestones, as well as royalty payments, based on tiered sales of the first commercialized licensed product. In addition, Calithera agreed to fund up to $1.1 million during the first 12 months of the License Agreement for the costs associated with up to four full-time employees for the Company to develop additional hexokinase inhibitors

under which the Company has recognized a total of $0.3 million from the inception of the contract through December 31, 2016. If Calithera develops additional licensed products, after achieving regulatory approval of the first licensed product, Calithera would owe additional regulatory milestone payments and additional royalty payments based on sales of such additional licensed products.

Accounts receivable are stated at net realizable value. On a periodic basis, the Company evaluates its accounts receivable and establishes an allowance based on its history of collections and write-offs and the current status of all receivables.

Property and Equipment and other Long-lived Assets

The Company records property and equipment at cost less accumulated depreciation. Costs of renewals and improvements that extend the useful lives of the assets are capitalized. Maintenance and repairs are expensed as incurred. Depreciation is determined on a straight-line basis over the estimated useful lives of the assets, which generally range from three to ten years. Leasehold improvements are depreciated over the shorter of the useful life of the asset or the term of the related lease. Upon retirement or disposition of assets, the costs and related accumulated depreciation are removed from the accounts with the resulting gains or losses, if any, reflected in results of operations.

The estimated useful lives of property and equipment are as follows:

Asset Category	Useful Life (in years)
Laboratory equipment	7
Computers and hardware	3-5
Furniture and office equipment	3-7
Software	3
Leasehold improvements	Shorter of useful life or remaining term of lease

The Company periodically assesses it property and equipment and other long-lived assets for impairment in accordance with the relevant accounting guidance. During 2014, the Company determined that certain of its land assets met the criteria for held-for-sale accounting treatment after making the decision to sell the property. Accordingly, the Company adjusted the carrying value of such assets to the amount of the expected proceeds less costs of disposal, which was lower than the original carrying value. One of these properties was sold during the year ended December 31, 2015 and the other properties were not assumed by the Company as part of the Reorganization Transactions. There were no assets held for sale at December 31, 2016 or 2015.

Revenue Recognition

The Company uses the revenue recognition guidance established by ASC Topic 605, “Revenue Recognition.” The Company recognizes revenue when 1) persuasive evidence of an arrangement exists; 2) the service has been provided to the customer; 3) collection of the fee is reasonably assured; and 4) the amount of the fee to be paid by the customer is fixed or determinable. In determining the accounting for collaboration and alliance agreements, the Company follows the provisions of ASC Topic 605, Subtopic 25, “Multiple-Element Arrangements” (“ASC 605-25”) and ASC 808 (“Collaborative Arrangements”). ASC 605-25 provides guidance on whether an arrangement that involves multiple revenue-generating activities or deliverables should be divided into separate units of accounting for revenue recognition purposes and, if division is required, how the arrangement consideration should be allocated among the separate units of accounting. If a deliverable has value on a stand-alone basis, the Company treats the deliverable as a separate unit of accounting. If the arrangement constitutes separate units of accounting according to the separation criteria of ASC 605-25, the consideration received is allocated among the separate units of accounting and the applicable revenue recognition criteria is applied to each unit. The Company determines how to allocate amounts received under agreements among the separate units based on the respective selling price of each unit. If the arrangement constitutes a single unit of accounting, the revenue recognition policy must be determined for the entire arrangement and the consideration received is recognized over the period of inception through the date the last deliverable within the single unit of accounting is expected to be delivered.

Collaboration research and development revenue is earned and recognized as research is performed and related expenses are incurred. Non-refundable upfront fees are recorded as deferred revenue and recognized into revenue as license fees and milestones from collaborations on a straight-line basis over the estimated period of the Company’s substantive performance obligations. If the Company does not have substantive performance obligations, it recognizes non-refundable upfront fees into revenue ratably over the period during which the product deliverable is provided to the customer.

Revenue for non-refundable payments based on the achievement of milestone events under collaborative arrangements is recognized in accordance with ASC Topic 605, Subtopic 28, “Milestone Method” (“ASC 605-28”). Milestone events under the Company’s collaboration agreements may include research, development, regulatory, commercialization, and sales events. Under ASC 605-28, a milestone payment is recognized as revenue when the applicable event is achieved if the event meets the definition of a

milestone and the milestone is determined to be substantive. ASC 605-28 defines a milestone event as an event having all of the following characteristics: (1) substantive uncertainty regarding achievement of the milestone event exists at the inception of the arrangement; (2) the event can only be achieved based, in whole or in part, on either the Company's performance or a specific outcome resulting from the Company's performance; and (3) if achieved, the event will result in additional payment due to the Company. The Company also treats events that can only be achieved based, in whole or in part, on either a third party's performance or a specific outcome resulting from a third party's performance as milestone events if the criteria of ASC 605-28 are otherwise satisfied.

Research and development costs that are reimbursable under collaboration agreements are recorded in accordance with ASC Topic 605, Subtopic 45, "Principal-Agent Considerations." Amounts reimbursed under a cost-sharing arrangement are reflected as reductions of research and development expense.

Fair Value of Financial Instruments

The Company uses a three-tier fair value hierarchy to classify and disclose all assets and liabilities measured at fair value on a recurring basis, as well as assets and liabilities measured at fair value on a non-recurring basis, in periods subsequent to their initial measurement. The hierarchy requires the Company to use observable inputs when available, and to minimize the use of unobservable inputs, when determining fair value. The three tiers are defined as follows:

- Level 1—Observable inputs that reflect quoted market prices (unadjusted) for identical assets or liabilities in active markets;
- Level 2—Observable inputs other than quoted prices in active markets that are observable either directly or indirectly in the marketplace for identical or similar assets and liabilities; and
- Level 3—Unobservable inputs that are supported by little or no market data, which require the Company to develop its own assumptions.

Research and Development

Major components of research and development costs include cash compensation, depreciation expense on research and development property and equipment, costs of preclinical studies, clinical trials and related clinical manufacturing, costs of drug development, costs of materials and supplies, facilities cost, overhead costs, regulatory and compliance costs, and fees paid to consultants and other entities that conduct certain research and development activities on the Company's behalf. Research and development costs are expensed as incurred.

The Company records accruals based on estimates of the services received, efforts expended and amounts owed pursuant to contracts with numerous contract research organizations. In the normal course of business, the Company contracts with third parties to perform various clinical study activities in the ongoing development of potential products. The financial terms of these agreements are subject to negotiation and variation from contract to contract and may result in uneven payment flows. Payments under the contracts depend on factors such as the achievement of certain events and the completion of portions of the clinical study or similar conditions. The objective of the Company's accrual policy is to match the recording of expenses in its financial statements to the actual services received and efforts expended. As such, expense accruals related to clinical studies are recognized based on the Company's estimate of the degree of completion of the event or events specified in the specific clinical study.

The Company records nonrefundable advance payments it makes for future research and development activities as prepaid expenses. Prepaid expenses are recognized as expense in the Consolidated Statements of Operations as the Company receives the related goods or services.

Patent Costs

Patent costs, including related legal costs, are expensed as incurred and recorded within general and administrative operating expenses on the Consolidated Statements of Operations.

Income Taxes

In connection with the IPO, vTv Therapeutics Inc. was formed. From August 1, 2015, vTv Therapeutics Inc. has been subject to corporate level income taxes. Prior to July 30, 2015, TTP and HPP were taxed as partnerships and all their income and deductions flowed through and were subject to tax at the partner level.

As a result of the Reorganization Transactions, vTv Therapeutics Inc. acquired vTv Units and is required to recognize deferred tax assets and liabilities for the difference between the financial reporting and tax basis of its investment in vTv LLC.

The Company's income tax expense, deferred tax assets and liabilities and reserves for unrecognized tax benefits reflect management's best assessment of estimated future taxes to be paid. The Company is subject to income taxes in both the United States and various state jurisdictions. Significant judgments and estimates are required in determining the consolidated income tax expense.

The Company accounts for income taxes under the asset and liability method, which requires the recognition of deferred tax assets and liabilities for the expected future tax consequences of events included in the financial statements. Under this method, the Company determines deferred tax assets and liabilities on the basis of differences between the financial statement and tax bases of assets and liabilities by using enacted tax rates in effect for the year in which the differences are expected to reverse. The effect of a change in tax rates on deferred tax assets and liabilities is recognized in income in the period in which the enactment date occurs.

The Company recognizes deferred tax assets to the extent it believes these assets are more-likely-than-not to be realized. In making such a determination, the Company considers all available positive and negative evidence, including future reversals of existing taxable temporary differences, projected future taxable income, tax planning strategies and recent results of operations.

The Company records uncertain tax positions on the basis of a two-step process in which (1) it determines whether it is more-likely-than-not that the tax positions will be sustained on the basis of the technical merits of the position and (2) for those tax positions meeting the more-likely-than-not recognition threshold, it recognizes the largest amount of tax benefit that is more than 50% likely to be realized upon ultimate settlement with the related tax authority.

Interest and penalties related to income taxes are included in the benefit (provision) for income taxes in the Company's Consolidated Statement of Operations. The Company has not incurred any significant interest or penalties related to income taxes in any of the periods presented.

Redeemable Convertible Preferred Units and Noncontrolling Interest

The Company initially recorded the redeemable convertible preferred units of the Predecessors at their fair values at issuance, net of issuance costs. All of the redeemable convertible preferred units were presented outside of permanent members' deficit as the units were redeemable at holders' option at the greater of (a) such series' liquidation value (i.e., the original cost for each unit of such series (as adjusted for any unit split, unit dividend or other similar events)) plus all declared and unpaid distributions on such series and (b) such series' fair market value (plus all declared but unpaid distributions on such series). The Company's policy is to record changes in the redemption value of the redeemable convertible preferred units immediately as they occur and adjust the carrying value to equal the redemption value at each reporting period.

Similarly, the Company records the redeemable noncontrolling interest represented by the vTv Units and the Class B Common stock at the higher of (1) its initial fair value plus accumulated earnings/losses associated with the noncontrolling interest or (2) the redemption value as of the balance sheet date.

See discussion and additional detail of the redeemable noncontrolling interest at Note 9.

Segment and Geographic Information

Operating segments are defined as an enterprise's components (business activities from which it earns revenue and incurs expenses) for which discrete financial information is (1) available; and (2) is regularly reviewed by the chief operating decision maker ("CODM") in deciding how to allocate resources and in assessing performance. The Company's CODM is its President and Chief Executive Officer. The Company's business operates in one reportable segment comprised of one operating segment.

Share-Based Compensation

Compensation expense for share-based compensation awards issued is based on the fair value of the award at the date of grant, and compensation expense is recognized for those awards earned over the service period. The grant date fair value of the awards is estimated using the Black-Scholes option pricing formula. Due to the lack of sufficient historical trading information with respect to its own shares, the Company estimates expected volatility based on a portfolio of selected stocks of companies believed to have market and economic characteristics similar to its own. The risk-free rate is based on the U.S. Treasury yield curve in effect at the time of grant. Due to a lack of historical exercise data, the Company estimates the expected life of its outstanding stock options using the simplified method specified under Staff Accounting Bulletin Topic 14.D.2. The Company also estimates the amount of share-based awards that are expected to be forfeited based on historical employee turnover rates.

Comprehensive Income

The Company does not have any components of other comprehensive income recorded within its Consolidated Financial Statements, and, therefore, does not separately present a statement of comprehensive income in its Consolidated Financial Statements.

Recently Issued Accounting Pronouncements

In May 2014, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2014-09, "Revenue From Contracts With Customers", that outlines a single comprehensive model for entities to use in accounting for revenue arising from contracts with customers and supersedes most current revenue recognition guidance, including industry-specific guidance. The ASU is based on the core principle that an entity should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods or services. This ASU also requires disclosures sufficient to enable users to understand the nature, amount, timing, and uncertainty of revenue and cash flows arising from contracts with customers, including qualitative and quantitative disclosures about contracts with customers, significant judgments and changes in judgments, and assets recognized from the costs to obtain or fulfill a contract. Entities have the option of using either a full retrospective or a modified retrospective approach for the adoption of the new standard. In addition, in March, April, and May 2016, the FASB issued final amendments to clarify the implementation guidance for principal versus agent considerations, identifying performance obligations and the accounting for licenses of intellectual property, and narrow-scope improvements and practical expedients, respectively. This ASU is effective for fiscal years beginning after December 15, 2017 including interim periods within that reporting period. To date, the Company has not generated any revenue from drug sales and its ability to recognize revenue from its collaboration and licensing agreements is contingent upon its ability to enter into such agreements in the future or the clinical success of investigational drug products subject to its current agreements, as such, the Company will continue to evaluate this guidance to determine the Company's adoption method and the effect it will have on the Company's Consolidated Financial Statements based on its potential future revenue sources.

In February 2015, the FASB issued ASU 2015-02, "Amendments to the Consolidation Analysis", which significantly changes the consolidation analysis required under GAAP and will require companies to reevaluate all previous consolidation conclusions. The Company adopted the provisions of this guidance in the first quarter of 2016. The adoption of this statement did not have a significant impact on the Company's Consolidated Financial Statements.

In April 2015, the FASB issued ASU No. 2015-05, "Intangibles—Goodwill and Other—Internal-Use Software (Subtopic 350-40): Customer's Accounting for Fees Paid in a Cloud Computing Arrangement", ("ASU 2015-05"). The amendments in this update provide guidance to customers about whether a cloud computing arrangement includes a software license. If a cloud computing arrangement includes a software license, then the customer should account for the software license element of the arrangement consistent with the acquisition of other software licenses. If a cloud computing arrangement does not include a software license, the customer should account for the arrangement as a service contract. The Company adopted this guidance in the first quarter of 2016 on a prospective basis for all arrangements entered into or materially modified after the effective date. The adoption of this guidance did not have a significant impact on the Company's Consolidated Financial Statements.

In November 2015, the FASB issued ASU No. 2015-17, "Income Taxes (Topic 740) – Balance Sheet Classification of Deferred Taxes" ("ASU 2015-17"). The amendments in this update simplify the presentation of deferred income taxes by requiring that deferred tax liabilities and assets be classified as noncurrent in a classified statement of financial position. This ASU is effective for financial statements issued for annual periods beginning after December 15, 2016, and interim periods within those annual periods. Early adoption is permitted as of the beginning of an interim or annual reporting period. The Company adopted this guidance in the first quarter of 2016 and did not retrospectively adjust prior period presentation. The adoption of this guidance did not have a significant impact on the Company's Consolidated Financial Statements as the Company's deferred tax assets were already classified as non-current.

In February 2016, the FASB issued ASU No. 2016-02, "Lease (Topic 842)" ("ASU 2016-02"), which increases transparency and comparability among companies accounting for lease transactions. The most significant change of this update will require the recognition by a lessee of lease assets and liabilities on its balance sheet for operating lease arrangements with lease terms greater than 12 months. This update will require a modified retrospective application which includes a number of optional practical expedients related to the identification and classification of leases commenced before the effective date. This ASU is effective for fiscal years and interim periods within those fiscal years, beginning after December 18, 2018. The adoption of this guidance will result in the recognition of additional assets and liabilities related to the Company's operating leases within its Consolidated Balance Sheets.

In March 2016, the FASB issued ASU No. 2016-09, "Compensation – Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting" ("ASU 2016-09"), which simplifies several aspects of the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, and classification on the statement of cash flows. This ASU is effective for annual periods beginning after December 15, 2016, and interim periods within those annual periods. The Company is currently evaluating the guidance to determine the effect it will have on the Company's Consolidated Financial Statements.

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Note 3: Share-Based Compensation

In conjunction with the IPO, the Board of Directors and sole stockholder adopted a long-term equity incentive plan, the vTv Therapeutics Inc. 2015 Omnibus Equity Incentive Plan (the "Plan"). The Plan provides for the grant of stock options, restricted stock, restricted stock units and other awards based on our Class A Common Stock to management, other key employees, consultants and non-employee directors on terms and subject to conditions as established by our Compensation Committee. In settlement of its obligations under this plan, the Company will issue new shares of Class A Common Stock. The maximum number of shares of our Class A Common Stock that has been approved and may be subject to awards under the Plan is 3.25 million, subject to adjustment in accordance with terms of the Plan.

During the years ended December 31, 2016 and 2015, the Company issued non-qualified stock option awards to certain employees, consultants and non-employee directors of the Company. These awards generally vest ratably over a three year period and expire after a term of ten years from the date of grant. For the years ended December 31, 2016 and 2015, the Company recognized $2.6 million and $0.9 of compensation expense related to share-based awards, respectively. Given that the Company has established a full valuation allowance against its deferred tax assets, the Company has recognized no tax benefit related to these awards. As of December 31, 2016, the Company had total unrecognized stock-based compensation expense of approximately $4.3 million, which is expected to be recognized on a straight-line basis over a weighted average period of 1.7 years. The weighted average grant date fair value for all option grants during the years ended December 31, 2016 and 2015 was $4.05 and $8.15 per option, respectively. As all of the outstanding awards were out-of-the-money at December 31, 2016, the aggregate intrinsic value of the in-the-money awards outstanding as of December 31, 2016 was $0.

The Company uses the Black-Scholes option pricing model to calculate the fair value of stock options granted. The fair value of stock options granted was estimated using the following assumptions during the years ended December 31, 2016 and 2015:

	2016	2015
Expected volatility	81.57% - 87.23%	83.84% - 88.23%
Expected life of option, in years	5.0 - 6.0	5.8 - 9.6
Risk-free interest rate	1.22% - 1.45%	1.72% - 2.25%
Expected dividend yield	0.00%	0.00%

The following table summarizes the activity related to the stock option awards for the year ended December 31, 2016 (in thousands, except per share amounts):

	Number of Shares	Weighted-Average Exercise Price
Awards outstanding at December 31, 2015	971,934	$ 11.31
Granted	131,500	5.80
Forfeited	(7,333)	7.65
Awards outstanding at December 31, 2016	1,096,101	$ 10.68
Options exercisable at December 31, 2016	349,273	$ 11.09
Weighted average remaining contractual term	8.7 Years	
Options vested and expected to vest at December 31, 2016	1,059,523	$ 10.74
Weighted average remaining contractual term	8.8 Years	

Compensation expense related to the grants of stock options is included in research and development and general and administrative expense as follows (in thousands):

	2016	2015
Research and development	$ 975	$ 221
General and administrative	1,666	638
Total share-based compensation expense	$ 2,641	$ 859

Note 4: Property and Equipment

Property and equipment consists of the following (in thousands):

	December 31, 2016	2015
Laboratory equipment	$ 6,962	$ 7,085
Leasehold improvements	2,358	2,337
Computers and hardware	292	518
Software	855	1,307
Furniture and office equipment	431	465
Total property and equipment	10,898	11,712
Less: accumulated depreciation and amortization	(10,454)	(11,088)
Property and equipment, net	$ 444	$ 624

During the year ended December 31, 2014, the Company recognized an impairment loss on land of $0.5 million. The impairment loss is reflected in other (loss) income on the Consolidated Statements of Operations.

Depreciation expense, including amounts pertaining to assets held under capital leases, was $0.3 million, $0.5 million and $0.9 million for the years ended December 31, 2016, 2015 and 2014, respectively.

Note 5: Accounts Payable and Accrued Expenses

Accounts payable and accrued expenses consist of the following (in thousands):

	December 31, 2016	2015
Accounts payable	$ 3,060	$ 3,262
Accrued development costs	6,305	1,912
Accrued payroll related costs	1,468	1,040
Accrued other	580	413
Total	$ 11,413	$ 6,627

Note 6: Notes Payable

Notes payable consist of the following:

	2016	2015
Notes payable under the Loan Agreement	$ 12,500	$ —
Less: Debt discount	(1,442)	—
Total notes payable	$ 11,058	$ —

On October 28, 2016, the Company and vTv LLC entered into the Loan Agreement under which the Company and vTv LLC may borrow up to $25.0 million in three tranches of $12.5 million, $7.5 million and $5.0 million, respectively.

The Company borrowed the first tranche of $12.5 million upon closing of the transaction on October 28, 2016. Subject to certain customary funding conditions, the second tranche of $7.5 million and the third tranche of $5.0 million are available for borrowing by the Company no later than March 31, 2017 and June 30, 2017, respectively. Availability of the third tranche is also subject to receipt of an executed term sheet setting forth certain agreed upon upfront and clinical and regulatory milestone payments for the licensing or purchase of one of the Company's main drug candidates.

Each loan tranche bears interest at a floating rate equal to 10.5% plus the amount by which the one-month London Interbank Offer Rate ("LIBOR") exceeds 0.5%.

The Company has agreed to repay the first tranche of $12.5 million on an interest only basis monthly until May 1, 2018 followed by equal monthly payments of principal plus accrued interest through the scheduled maturity date for the first tranche loan on May 1, 2020. In addition, a final payment for the first tranche loan equal to $0.8 million will be due on May 1, 2020, or such earlier date specified in the Loan Agreement. The Company has agreed to repay any amounts advanced under the second and third tranches of $7.5 million and $5.0 million, respectively, in 18 monthly payments of interest only followed by 24 equal monthly

payments of principal plus accrued interest through the scheduled maturity date for such loans which is 42 months following the date the Company draws down the second or third tranche loans, as applicable. In addition, a final payment equal to $0.5 million will be due on the scheduled maturity date for the second tranche loan and a final payment of $0.3 million will be due on the scheduled maturity date for the third tranche loan, or on such earlier date specified in the Loan Agreement.

If the Company repays all or a portion of the loan prior to the applicable maturity date, it will pay the Lenders a prepayment penalty fee, based on a percentage of the then outstanding principal balance equal to 4.0% during the first 18 months following the funding of the second tranche and 2.0% thereafter.

The Company's obligations under the Loan Agreement are secured by a first priority security interest in substantially all of its assets other than its intellectual property. Subject to certain conditions related to the Company's Phase 3 clinical trial of *azeliragon*, the Company may be required to grant a security interest in its intellectual property. The Company has agreed not to pledge or otherwise encumber its intellectual property assets, subject to certain exceptions.

The Loan Agreement includes customary affirmative and restrictive covenants, including, but not limited to, restrictions on the payment of dividends or other equity distributions and the incurrence of debt or liens upon the assets of the Company or its subsidiaries. The Loan Agreement does not contain any financial maintenance covenants. The Loan Agreement includes customary events of default, including payment defaults, covenant defaults, and material adverse change default. Upon the occurrence of an event of default and following any applicable cure periods, a default interest rate of an additional 5% will be applied to the outstanding loan balances, and the Lenders may declare all outstanding obligations immediately due and payable and take such other actions as set forth in the Loan Agreement.

In connection with the Loan Agreement, the Company issued and is obligated to issue to the Lenders warrants to purchase shares of the Company's Class A Common Stock (the "Warrants"). On October 28, 2016, the Company issued Warrants to purchase 152,580 shares of its Class A Common Stock at a per share exercise price of $6.39 per share, which aggregate exercise price represents 6.0% of the principal amount borrowed under the first tranche of the Loan Agreement and 3.0% of the amount available under the second tranche of the Loan Agreement. Additionally, to the extent the second tranche is borrowed under the Loan Agreement, the Company is obligated to issue to the Lenders Warrants with respect to a number of shares such that the aggregate exercise price of such warrants is equal to 3.0% of the principal amount of the second tranche upon funding of the second tranche. To the extent that the third tranche is borrowed under the Loan Agreement, the Company is obligated to issue to the Lenders Warrants with respect to a number of shares such that the aggregate exercise price of such warrants is equal to 6.0% of third loan tranche upon funding of the third tranche. In each instance, the Warrants have or will have an exercise price equal to the lower of (a) the volume weighted average price per share of the Company's Class A Common Stock, as reported on the principal stock exchange on which the Company's Class A Common Stock is listed, for 10 trading days prior to the issuance of the applicable Warrants or (b) the closing price of a share of the Company's Class A Common Stock on the trading day prior to the issuance of the applicable Warrants. The Warrants will expire seven years from their date of issuance.

The Company incurred $0.7 million of costs in connection with the Loan Agreement. These costs, along with the allocated fair value of the Warrants issued of $0.9 million were treated as a debt discount, are offset against the carrying value of the notes payable in the Company's Consolidated Balance Sheet as of December 31, 2016 and will be recognized as interest expense over the term of the first tranche using the effective interest method. The final payment for the first loan tranche of $0.8 million will be accrued as additional interest expense, using the effective interest method, over the term of the first tranche.

The Company recorded interest expense related to the Loan Agreement of $0.4 million for the year ended December 31, 2016. The annual effective interest rate on the note payable, including the amortization of the debt discounts and accretion of the final payments, is 17.7%.

Principal payments due under the terms of the Loan Agreement are as follows (in thousands):

2017	$	—
2018		3,646
2019		6,250
2020		2,604
2021		—
Total	$	12,500

Note 7: Commitments and Contingencies

Legal Matters

From time to time, the Company is involved in various legal proceedings arising in the normal course of business. If a specific contingent liability is determined to be probable and can be reasonably estimated, the Company accrues and discloses the amount. The Company is not currently a party to any material legal proceedings.

Columbia University Agreement

In May 2015, the Company entered into a worldwide exclusive agreement with Columbia University ("Columbia") to license certain intellectual property from Columbia. Under the agreement, the Company is obligated to pay to Columbia (1) an annual fee of $0.1 million from 2015 through 2021, (2) a potential regulatory milestone payment of $0.8 million and (3) potential royalty payments at a single digit royalty rate based on net sales of licensed products as defined in the agreement.

Lease Agreements

The Company leases various equipment and facilities under operating leases expiring at various dates through 2019. Rent expense for non-cancelable operating leases was $0.6 million, $0.6 million and $1.0 million for the years ended December 31, 2016, 2015 and 2014, respectively.

Future minimum lease payments under non-cancelable operating leases as of December 31, 2016 were as follows (in thousands):

Year Ending December 31,		Operating Leases
2017	$	471
2018		244
2019		6
2020		—
2021		—
Total	$	721

The Company has recognized an asset retirement obligation for an obligation in its facility lease that requires the Company to return the property to the same or similar condition at the end of the lease as existed when the Company began using the facility. Although the lease termination date is currently in 2018, the Company may be able to renegotiate the lease to extend its terms. Asset retirement obligations recorded as a component of other noncurrent liabilities in the Consolidated Balance Sheets were $0.2 million at both December 31, 2016 and 2015. An immaterial amount of accretion and depreciation expense was recognized in the years ended December 31, 2016 and 2015.

Note 8: Stockholders' Equity

On July 29, 2015, the Company amended and restated its certificate of incorporation to authorize 100,000,000 shares of Class A Common Stock, 100,000,000 shares of Class B Common Stock and 50,000,000 shares of preferred stock, par value $0.01 per share.

Holders of Class A Common Stock and Class B Common Stock will be entitled to one vote for each share held on all matters submitted to stockholders for their vote or approval. The holders of Class A Common Stock and Class B Common Stock will vote together as a single class on all matters submitted to stockholders for their vote or approval, except with respect to the amendment of certain provisions of the Company's amended and restated certificate of incorporation that would alter or change the powers, preferences or special rights of the Class B Common Stock so as to affect them adversely, which amendments must be approved by a majority of the votes entitled to be cast by the holders of the shares affected by the amendment, voting as a separate class, or as otherwise required by applicable law. The voting power of the outstanding Class B Common Stock (expressed as a percentage of the total voting power of all common stock) will be equal to the percentage of vTv Units not held by the Company. Holders of Class B Common Stock are not entitled to receive dividends and will not be entitled to receive any distributions upon the liquidation, dissolution or winding up of the Company.

On October 28, 2016, the Company entered into the Loan Agreement as discussed in Note 6. In connection with the Loan Agreement, the Company issued to the Lenders Warrants to purchase a total of 152,580 shares of the Company's Class A Common Stock at an exercise price of $6.39 per share. Further, the Warrants issued related to the second tranche require the Company to issue

an additional variable number of shares under the Warrants dependent upon the fair value of the Company's Class A Common Stock as of the second tranche's funding date. In each case, the Warrants have a term of seven years.

The Warrants issued with a determinable number of shares and exercise price were recorded as a component of additional paid-in capital within the Company's Consolidated Balance Sheet as of December 31, 2016 based on their relative fair value. The Warrants issued for a variable number of shares were recorded as a component of other liabilities within the Consolidated Balance Sheet as of December 31, 2016. The related warrant liability will be adjusted to its fair value on a periodic basis until the associated warrants are cancelled or qualify for equity classification. For the year ended December 31, 2016, the Company recognized additional interest expense within the Consolidated Statement of Operations of a de minimus amount related to the adjustment of the warrant liability to its fair value.

Fair value of the Warrants was calculated as of October 28, 2016 using the methods described in Note 16 using the following assumptions:

Expected volatility	82.54%
Expected life of option, in years	7.0
Risk-free interest rate	1.63%
Expected dividend yield	0.00%

Note 9: Redeemable Noncontrolling Interest

The Company is subject to the Exchange Agreement with respect to the vTv Units representing the outstanding 70.5% noncontrolling interest in vTv LLC (see Note 1). The Exchange Agreement requires the surrender of an equal number of vTv Units and Class B Common Stock for (i) shares of Class A Common Stock on a one-for-one basis or (ii) cash (based on the fair market value of the Class A Common Stock as determined pursuant to the Exchange Agreement), at the Company's option (as the managing member of vTv LLC), subject to customary conversion rate adjustments for stock splits, stock dividends and reclassifications. The exchange value is determined based on a 20 day volume weighted average price of the Class A Common Stock as defined in the Exchange Agreement, subject to customary conversion rate adjustments for stock splits, stock dividends and reclassifications.

The redeemable noncontrolling interest is recognized at the higher of (1) its initial fair value plus accumulated earnings/losses associated with the noncontrolling interest or (2) the redemption value as of the balance sheet date. At December 31, 2016 and 2015, the redeemable noncontrolling interest was recorded based on the redemption value as of the balance sheet date of $122.5 million and $161.5 million, respectively.

Note 10: Related-Party Transactions

PharmaCore, Inc.

Prior to its acquisition by Cambrex Corporation in October 2016, certain controlling shareholders of the Company also controlled PharmaCore, Inc. ("PharmaCore") and PharmaCore was therefore considered to be a related party. The Company purchased chemistry and Good Manufacturing Practices manufacturing services from PharmaCore. Total purchases from PharmaCore, while it was considered to be a related party were $0.8 million, $2.3 million and $1.4 million for the years ended December 31, 2016, 2015 and 2014, respectively.

On April 17, 2007, the Company's Board of Directors approved $2.0 million of subordinated financing to be provided to PharmaCore. Advances were made and interest accrued before the Company entered into the Subordinated Promissory Note agreement (the "Note Agreement") with PharmaCore on June 9, 2008. The Note Agreement was amended on April 23, 2010 to provide an additional $2.9 million of subordinated financing, with the same terms as the original note. The Note Agreement had a nine-year term, a fixed interest rate of 8.25% per annum, with maturity of June 1, 2017. No payments were required through December 31, 2014 with accrued interest capitalized into the principal balance. Thereafter, interest is to be paid quarterly. As part of the agreement, the Company received a warrant, exercisable for up to ten years, to purchase 370,370 common units of PharmaCore at an exercise price of $0.54 per unit. During the years ended December 31, 2015 and 2014, the Company recorded interest income of $0.4 million and $0.6 million, respectively, related to this financing. This receivable balance was not contributed to the Company as part of the Reorganization Transactions and, as such, no interest income was recognized during the year ended December 31, 2016.

During the years ended December 31, 2015 and 2014, the Company recognized bad debt expense of $0.4 million and $0.6 million, respectively, for this Note Agreement due to the uncertainty of the receivable's collectability.

MacAndrews & Forbes Incorporated

Subsequent to the Reorganization Transactions (Note 1) subsidiaries of MacAndrews & Forbes Incorporated (collectively "MacAndrews") indirectly control 23,084,267 shares of Class B Common Stock. Further, as of December 31, 2016, MacAndrews holds 2,400,666 shares of the Company's Class A Common Stock. As a result, MacAndrews' holdings represent approximately 77.7% of the combined voting power of the Company's outstanding common stock.

The Company has entered into several agreements with MacAndrews or its affiliates as part of the Reorganization Transactions as further detailed below and in Note 1.

Exchange Agreement

Pursuant to the terms of the Exchange Agreement, but subject to the Amended and Restated LLC Agreement of vTv Therapeutics LLC, the vTv Units (along with a corresponding number of shares of the Class B Common Stock) are exchangeable for (i) shares of the Class A Common Stock on a one-for-one basis or (ii) cash (based on the fair market value of the Company's Class A Common Stock as determined pursuant to the Exchange Agreement), at the Company's option (as the managing member of vTv Therapeutics LLC), subject to customary conversion rate adjustments for stock splits, stock dividends and reclassifications. Any decision to require an exchange for cash rather than shares of Class A Common Stock will ultimately be determined by the entire Board of Directors. As of December 31, 2016, MacAndrews has not exchanged any shares under the provisions of this agreement.

Tax Receivable Agreement

The Tax Receivable Agreement among the Company, M&F and M&F TTP Holdings LLC provides for the payment by the Company to M&F (or certain of its transferees or other assignees) of 85% of the amount of cash savings, if any, in U.S. federal, state and local income tax or franchise tax that the Company actually realizes (or, in some circumstances, the Company is deemed to realize) as a result of (a) the exchange of Class B Common Stock, together with the corresponding number of vTv Units, for shares of the Company's Class A Common Stock (or for cash), (b) tax benefits related to imputed interest deemed to be paid by the Company as a result of the Tax Receivable Agreement and (c) certain tax benefits attributable to payments under the Tax Receivable Agreement. As no shares have been exchanged by MacAndrews pursuant to the Exchange Agreement (discussed above), the Company has not recognized any liability nor has it made any payments pursuant to the Tax Receivable Agreement as of December 31, 2016.

Investor Rights Agreement

The Company is party to the Investor Rights Agreement with M&F, as a successor in interest to vTv Therapeutics Holdings. The Investor Rights Agreement provides M&F with certain demand, shelf and piggyback registration rights with respect to its shares of Class A Common Stock and also provides M&F with certain governance rights, depending on the size of its holdings of Class A Common Stock. Under the Investor Rights Agreement, M&F was initially entitled to nominate a majority of the members of the Board of Directors and designate the members of the committees of the Board of Directors..

Letter Agreement for Reimbursement of Fees and Expenses

The Company entered into an agreement with MacAndrews & Forbes Group LLC ("M&F Group") in which it agreed to reimburse M&F Group or its affiliates for certain out of pocket fees and expenses advanced by M&F Group in connection with the IPO. During the year ended December 31, 2015, the Company remitted payments to M&F Group or its affiliates of $1.3 million for such costs.

Note 11: Employee Benefit Plan

The Company has a 401(k) retirement plan in which all of its full-time employees are eligible to participate. The plan provides for the Company to make discretionary 50% matching contributions up to a maximum of 6% of employees' eligible compensation. The Company contributed $0.2 million, $0.1 million and $0.2 million to the plan for the years ended December 31, 2016, 2015 and 2014, respectively.

Note 12: Income Taxes

From August 1, 2015, vTv Therapeutics Inc. has been subject to U.S. federal income taxes as well as state taxes. Prior to July 30, 2015, TTP and HPP were taxed as partnerships and all their income and deductions flowed through and were subject to tax at the partner level. The Company did not record an income tax provision for the years ended December 31, 2016, 2015 and 2014.

As discussed in Note 1, the Company is party to a tax receivable agreement with a related party which provides for the payment by the Company to M&F (or certain of its transferees or other assignees) of 85% of the amount of cash savings, if any, in U.S. federal, state and local income tax or franchise tax that the Company actually realizes (or, in some circumstances, the Company is deemed to realize) as a result of certain transactions. As no transactions have occurred which would trigger a liability under this agreement, the Company has not recognized any liability related to this agreement as of December 31, 2016.

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

	December 31,		
	2016	2015	2014
U.S. statutory tax benefit	$ (19,374)	$ (14,387)	$ (12,635)
Partnership income (federal) not subject to tax to the Company	13,651	12,502	12,635
State taxes (net of federal benefit)	—	—	—
Losses with no benefit	5,723	1,885	—
Provision for income taxes	$ —	$ —	$ —
Effective income tax rate	0.0%	0.0%	0.0%

Significant components of our net deferred tax assets/(liabilities) are as follows (in thousands):

	December 31,	
	2016	2015
Deferred tax assets:		
Net operating loss carryforwards	$ 8,189	$ 2,543
Share-based compensation	3	44
Investment in partnerships	1,844	1,476
Total deferred tax assets	10,036	4,063
Valuation allowance	(10,036)	(4,063)
Net deferred tax assets	$ —	$ —

The Company assesses the available positive evidence and negative evidence to estimate whether sufficient future taxable income will be generated to permit use of existing deferred tax assets. A significant piece of objective negative evidence evaluated was the Company's recent operating losses. Such objective evidence limits the ability to consider other subjective evidence, such as forecasts of profitability. On the basis of this evaluation, the Company concluded that its deferred tax assets were not realizable on a more-likely-than-not basis and recorded a full valuation allowance. As a result, the Company's valuation allowance increased by $6.0 million.

The Company has federal net operating loss carryforwards of $22.1 million that will be available to offset future taxable income. Such carryforwards expire in 2035 and 2036 if not utilized.

The Company applies applicable authoritative guidance which prescribes a comprehensive model for the manner in which a company should recognize, measure, present and disclose in its financial statements all material uncertain tax positions that the Company has taken or expects to take on a tax return. As of December 31, 2016, the Company had no uncertain tax positions. There are no uncertain tax positions for which it is reasonably possible that the total amount of unrecognized tax benefits will significantly increase or decrease within twelve months of December 31, 2016.

The Company files U.S. federal, Connecticut, New York, North Carolina and Virginia tax returns. The only open tax years for U.S. federal and the aforementioned states are December 31, 2016 and 2015.

Note 13: Net Loss per Share

Basic loss per share is computed by dividing net loss attributable to vTv Therapeutics Inc. by the weighted-average number of shares of Class A Common Stock outstanding during the period. Diluted loss per share is computed giving effect to all potentially dilutive shares. Diluted loss per share for the years ended December 31, 2016 and 2015 is the same as basic loss per share as the inclusion of potentially issuable shares would be antidilutive. Loss per share is not presented for the year ended December 31, 2014 as the Company did not have any economic interests prior to the date of the IPO and Reorganization Transactions through which it was given ownership in vTv LLC. Losses prior to the IPO and Reorganization Transactions would have been allocated to the original members of TTP and HPP. Loss per share for the year ended December 31, 2015 includes the losses recognized both prior and subsequent to the IPO and Reorganization Transactions.

A reconciliation of the numerator and denominator used in the calculation of basic and diluted net loss per share of Class A Common Stock is as follows (amounts in thousands, except per share amounts):

	Year Ended December 31,		
	2016	2015	2014
Numerator:			
Net loss	$ (55,353)	$ (41,107)	$ (36,101)
Less: Net loss attributable to noncontrolling interests	(39,001)	(13,609)	—
Net loss attributable to vTv Therapeutics Inc., basic and diluted	$ (16,352)	$ (27,498)	$ (36,101)
Denominator:			
Weighted-average vTv Therapeutics Inc. Class A Common Stock, basic and diluted	9,545,527	8,276,520	
Net loss per share of vTv Therapeutics Inc. Class A Common Stock, basic and diluted	$ (1.71)	$ (3.32)	

Potentially dilutive securities not included in the calculation of dilutive net loss per share are as follows:

	Year Ended December 31,		
	2016	2015	2014
Class B Common Stock (1)	23,119,246	23,655,814	—
Common stock options	1,096,101	971,934	—
Common stock warrants	152,580	—	—
Total	24,367,927	24,627,748	—

(1) Shares of Class B Common Stock do not share in the Company's earnings and are not participating securities. Accordingly, separate presentation of loss per share of Class B Common Stock under the two-class method has not been provided. Each share of Class B Common Stock (together with a corresponding vTv Unit) is exchangeable for one share of Class A Common Stock.

Note 14: Quarterly Financial Data (Unaudited)

The following interim financial information presents our 2016 and 2015 results of operations on a quarterly basis (in thousands, except per share amounts):

	2016			
	March 31	June 30	September 30	December 31
Revenues	$ 376	$ 182	$ 38	$ 38
Operating loss	(13,540)	(14,639)	(13,528)	(13,313)
Net loss before noncontrolling interest	(13,520)	(14,617)	(13,505)	(13,711)
Net loss attributable to vTv Therapeutics Inc.	(3,852)	(4,457)	(3,993)	(4,050)
Net loss per share of vTv Therapeutics Inc. Class A Common Stock, basic and diluted (1)	$ (0.42)	$ (0.47)	$ (0.41)	$ (0.42)

	2015			
	March 31	June 30	September 30	December 31
Revenues	$ 50	$ 110	$ 133	$ 226
Operating loss	(9,721)	(7,889)	(9,441)	(11,090)
Net loss before noncontrolling interest	(9,813)	(10,412)	(9,822)	(11,059)
Net loss attributable to vTv Therapeutics Inc.	(9,813)	(10,412)	(4,103)	(3,169)
Net loss per share of vTv Therapeutics Inc. Class A Common Stock, basic and diluted (1)	$ (1.26)	$ (1.33)	$ (0.49)	$ (0.35)

(1) Loss per share for the fiscal quarters ended in the 2015 fiscal year includes the losses recognized both prior and subsequent to the IPO and Reorganization Transactions. For the quarters ended March 31, 2015 and June 30, 2015, the weighed-average shares used to compute basic and diluted loss per share were based on the Class A Common Stock issued through the IPO (7,812,500 shares).

Note 15: Predecessor Financial Arrangements

The Reorganization Transactions discussed in Note 1 resulted in certain assets and liabilities of the Predecessors not being contributed to or assumed by the Company. As such, subsequent to the Reorganization Transactions, certain financial instruments and their related interest or fair value adjustments were no longer reflected within the Company's Consolidated Financial Statements. Such financial instruments included the following:

Note receivable from Former Officer - On March 30, 2007, TransTech Pharma, Inc. ("TTP Inc.") entered into a promissory note (the "2007 Note") with a former officer and director ("the Former Officer"), pursuant to which TTP Inc. loaned $4.8 million to the Former Officer.

Promissory note on land - In June 2008, TTP Inc. entered into a promissory note with a financial institution secured by a deed of trust on land purchased in 2008.

Distribution payable - On December 30, 2014, the boards of directors of TTP and HPP authorized a repurchase of units from the Former Officer and certain entities related to the officer (collectively with the Former Officer, the "Former Officer and Related Entities") of TTP. The terms of the unit repurchase are stipulated in a Letter Agreement (the "Former Officer Agreement") with the Former Officer and Related Entities. The Former Officer Agreement stipulated that these entities would repurchase all of the TTP and HPP issued and outstanding units owned by the Former Officer and Related Entities, including any warrants and options to purchase common units (collectively, the "Repurchased Units"). In exchange for the Repurchased Units, under the Former Officer Agreement, TTP and HPP agreed to make periodic cash payments to the Former Officer and Related Entities totaling $7.5 million between December 30, 2014 and September 30, 2017. Payments consisted of $2.5 million paid at closing of the agreement on December 30, 2014 and $5.0 million to be paid in eight equal quarterly installments beginning December 31, 2015.

Uncommitted advance agreement - On March 28, 2014, TTP, HPP and M&F agreed to exchange all $116.2 million of outstanding principal and interest due to M&F under a Note and Equity Issuance Agreement (including amounts advanced under the initial agreement plus the promissory notes issued in 2013 and amounts advanced following the December 24, 2013 amendment) for 292,722,844 Series F redeemable convertible preferred units of TTP and 155,219,376 Series B redeemable convertible preferred units of HPP. Concurrently on March 28, 2014, TTP and HPP entered into an Uncommitted Advance Agreement with M&F and the Former Officer. As of December 30, 2014, the Former Officer was no longer party to this agreement.

Contingent distribution - On December 31, 2014, TTP transferred 100% of its ownership interests in HPCTC to the Former Officer and agreed to make future distributions to the Former Officer (the "Contingent Distributions").

Perpetual securities - On March 28, 2014, TTP entered into a reaffirmation and pledge agreement ("Pledge Agreement") with the Former Officer and Related Entities. Pursuant to the Pledge Agreement, the Former Officer granted a security interest to TTP in the Pledged Units to secure the Former Officer's obligations to TTP under the 2007 Note and under the Pledge Agreement. On December 30, 2014, the Pledged Units were exchanged for TTP Perpetual Securities in the principal amount of approximately $6.0 million and HPP Perpetual Securities in the principal amount of approximately $0.5 million (the "Perpetual Securities"). The Perpetual Securities were initially recorded at their initial fair value of $6.6 million. The increase in the fair value of the perpetual securities during the year ended December 31, 2015, prior to the Reorganization Transactions was $0.1 million and is reflected in other income, net in the Consolidated Statements of Operations.

Release agreement - On August 28, 2015, vTv Therapeutics Holdings, vTvx Holdings I, vTvx Holdings II, MacAndrews & Forbes Incorporated and M&F entered into a release agreement (the "Release Agreement") with the Former Officer and Related Entities to settle certain obligations, including the obligation to pay the Contingent Distributions, under the Former Officer Agreement. Under the Release Agreement, vTv Therapeutics Holdings agreed to transfer 1,344,186 shares of Class B Common Stock and the same number of corresponding vTv Units to the Former Officer. Under the Release Agreement and the Former Officer Agreement, the 2007 Note owed by the Former Officer to TTP was also deemed discharged and canceled and the perpetual securities of vTvx Holdings I and vTvx Holdings II having principal amounts of $6.0 million and $0.5 million, respectively, held by the Former Officer, were repurchased by vTvx Holdings I and vTvx Holdings II in exchange therefor. On the same date, under the Exchange Agreement, the Former Officer exchanged those shares of Class B Common Stock and vTv Units for 1,344,186 shares of Class A Common Stock.

Note 16: Fair Value of Financial Instruments

The carrying amount of certain of the Company's financial instruments, including cash and cash equivalents, net accounts receivable, accounts payable and other accrued liabilities approximate fair value due to their short-term nature.

The fair value of the Company's notes payable is considered to approximate its carrying value because it bears interest at a variable interest rate.

Assets and Liabilities Measured at Fair Value on a Recurring Basis

The Company evaluates its financial assets and liabilities subject to fair value measurements on a recurring basis to determine the appropriate level in which to classify them for each reporting period. This determination requires significant judgments. The following table summarizes the conclusions reached regarding fair value measurements as of December 31, 2016 (in thousands):

	Balance at December 31, 2016	Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Warrant liability (1)	$ 167	$ —	$ —	$ 167
Total	$ 167	$ —	$ —	$ 167

(1) Fair value determined using the Black-Scholes option pricing model. Expected volatility is based on a portfolio of selected stocks of companies believed to have market and economic characteristics similar to its own. The risk-free rate is based on the U.S. Treasury yield curve in effect at the time of valuation.

	Changes in Level 3 Instruments for the years ended December 31, 2016, 2015 and 2014						
	Balance at January 1	Net Change in fair value included in earnings	Net change in fair value (1)	Purchases / Issuance	Sales / Repurchases	Effect of Reorganization Transaction	Balance at December 31
2016							
Warrant liability	$ —	$ —	$ —	$ 167	$ —	$ —	$ 167
Total	$ —	$ —	$ —	$ 167	$ —	$ —	$ 167
2015							
TTP Redeemable preferred units	$ 412,085	$ —	$ 66,379	$ —	$ —	$ (478,464)	$ —
HPP Redeemable preferred units	—	—	—	—	—	—	—
Consideration payable	4,897	—	—	—	—	(4,897)	—
Note payable	6,594	115	—	—	—	(6,709)	—
Contingent distribution	26,359	—	695	—	—	(27,054)	—
Total	$ 449,935	$ 115	$ 67,074	$ —	$ —	$ (517,124)	$ —
2014							
TTP Redeemable preferred units	$ 14,676	$ —	$ 399,106	$ 52,697	$ (54,394)	$ —	$ 412,085
HPP Redeemable preferred units	—	—	—	—	—	—	—
Consideration payable	—	—	—	4,897	—	—	4,897
Note payable	—	—	—	6,594	—	—	6,594
Contingent distribution	—	—	—	26,359	—	—	26,359
Total	$ 14,676	$ —	$ 399,106	$ 90,547	$ (54,394)	$ —	$ 449,935

(1) The above represents the change in the fair value of the Company's redeemable preferred units. See the Consolidated Statements of Changes in Redeemable Convertible Units, Redeemable Non-Controlling Interest, Stockholders' and Members' Deficit for additional changes in the carrying value of the Company's redeemable preferred units.

There were no transfers into or out of level 3 instruments and/or between level 1 and level 2 instruments during the year ended December 31, 2016, 2015 or 2014.

The fair value of the warrant liability is determined using the Black-Scholes option pricing model. Expected volatility is based on a portfolio of selected stocks of companies believed to have market and economic characteristics similar to its own. The risk-free rate is based on the U.S. Treasury yield curve in effect at the time of valuation. Significant inputs utilized in the valuation of the warrant liability as of December 31, 2016 were:

Annual volatility	83.28 %
Annual risk-free rate	2.30 %

Changes in the unobservable inputs noted above would impact the amount of the warranty liability. For the Company's warrants, increases (decreases) in the estimates of the Company's annual volatility would increase (decrease) the liability and an increase (decrease) in the annual risk-free rate would increase (decrease) the liability.

Exhibit 4.1

THIS WARRANT AND THE SHARES ISSUABLE HEREUNDER HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "**ACT**"), OR THE SECURITIES LAWS OF ANY STATE AND, EXCEPT AS SET FORTH IN SECTIONS 5.3 AND 5.4 BELOW, MAY NOT BE OFFERED, SOLD, PLEDGED OR OTHERWISE TRANSFERRED UNLESS AND UNTIL REGISTERED UNDER SAID ACT AND LAWS OR IN FORM AND SUBSTANCE SATISFACTORY TO THE COMPANY, SUCH OFFER, SALE, PLEDGE OR OTHER TRANSFER IS EXEMPT FROM SUCH REGISTRATION.

FORM OF

WARRANT TO PURCHASE CLASS A COMMON STOCK

(Loan [A/B/C/D/E/F])

Company: vTv Therapeutics Inc.
Number of Shares of Common Stock: See Section 1.7
Warrant Price: See Section 1.7
Issue Date: October __, 2016
Expiration Date: October __, 2023 See also Section 5.1(b).
Credit Facility: This Warrant to Purchase Class A Common Stock ("**Warrant**") is issued in connection with that certain Venture Loan and Security Agreement of even date herewith among Silicon Valley Bank, Horizon Technology Finance Corporation and the Company (the "**Loan Agreement**").

THIS WARRANT CERTIFIES THAT, for good and valuable consideration, [SILICON VALLEY BANK/HORIZON TECHNOLOGY FINANCE CORPORATION] (together with any successor or permitted assignee or transferee of this Warrant or of any shares issued upon exercise hereof, "**Holder**") is entitled to purchase the number of fully paid and non-assessable shares (the "**Shares**") of the above-stated Class A common stock (the "**Common Stock**") of the above-named company (the "**Company**") at the above-stated Warrant Price, all as set forth above and as adjusted pursuant to Section 2 of this Warrant, subject to the provisions and upon the terms and conditions set forth in this Warrant. [Reference is made to Section 5.4 of this Warrant whereby Silicon Valley Bank shall transfer this Warrant to its parent company, SVB Financial Group.]

SECTION 1. EXERCISE.

1.1 Method of Exercise. Holder may at any time and from time to time exercise this Warrant, in whole or in part, by delivering to the Company the original of this Warrant together with a duly executed Notice of Exercise in substantially the form attached hereto as Appendix 1 and, unless Holder is exercising this Warrant pursuant to a cashless exercise set forth in Section 1.2, a certified check, wire transfer of same-day funds (to an account designated by the Company) or other form of payment acceptable to the Company for the aggregate Warrant Price for the Shares being purchased.

1.2 Cashless Exercise. On any exercise of this Warrant, in lieu of payment of the aggregate Warrant Price in the manner as specified in Section 1.1 above, but otherwise in

accordance with the requirements of Section 1.1, Holder may elect to receive Shares equal to the value of this Warrant, or portion hereof as to which this Warrant is being exercised. Thereupon, the Company shall issue to the Holder such number of fully paid and non-assessable Shares as are computed using the following formula:

$$X = Y(A-B)/A$$

where:

X = the number of Shares to be issued to the Holder;

Y = the number of Shares with respect to which this Warrant is being exercised (inclusive of the Shares surrendered to the Company in payment of the aggregate Warrant Price);

A = the Fair Market Value (as determined pursuant to Section 1.3 below) of one Share; and

B = the Warrant Price.

1.3 Fair Market Value. If the Company's Common Stock is then traded or quoted on a Trading Market, the fair market value of a Share shall be the volume weighted average price of the Company's Common Stock, as reported by the Trading Market, during the ten (10) Trading Day period immediately before the date on which Holder delivers this Warrant together with its Notice of Exercise to the Company. If the Company's Common Stock is not traded in a Trading Market, the Board of Directors of the Company shall determine the fair market value of a Share in its reasonable good faith judgment.

"**Trading Day**" means a day on which (i) there is no Market Disruption Event and (ii) trading in the Common Stock generally occurs on the Trading Market.

"**Trading Market**" means NASDAQ or, if the Common Stock is not then listed on NASDAQ, on the principal other U.S. national or regional securities exchange on which the Common Stock is then listed or, if the Common Stock is not then listed on a U.S. national or regional securities exchange, on the principal other market on which the Common Stock is then listed or admitted for trading.

"**Market Disruption Event**" means (i) a failure by the primary U.S. national or regional securities exchange or market on which the Common Stock is listed or admitted for trading to open for trading during its regular trading session or (ii) the occurrence or existence prior to 1:00 p.m., New York City time, on any scheduled trading day for the Common Stock for more than one half-hour period in the aggregate during regular trading hours of any suspension or limitation imposed on trading (by reason of movements in price exceeding limits permitted by the relevant stock exchange or otherwise) in the Common Stock or in any options contracts or futures contracts relating to the Common Stock.

1.4 Delivery of Certificate and New Warrant. Within a reasonable time after Holder exercises this Warrant in the manner set forth in Section 1.1 or 1.2 above, the Company

shall deliver to Holder the Shares issued to Holder upon such exercise and, if this Warrant has not been fully exercised and has not expired, a new warrant of like tenor representing the Shares not so acquired.

1.5 Replacement of Warrant. On receipt of evidence reasonably satisfactory to the Company of the loss, theft, destruction or mutilation of this Warrant and, in the case of loss, theft or destruction, on delivery of an indemnity agreement reasonably satisfactory in form, substance and amount to the Company or, in the case of mutilation, on surrender of this Warrant to the Company for cancellation, the Company shall, within a reasonable time, execute and deliver to Holder, in lieu of this Warrant, a new warrant of like tenor and amount.

1.6 Treatment of Warrant Upon Acquisition of Company.

(a) Acquisition. For the purpose of this Warrant, "**Acquisition**" means any transaction or series of related transactions involving: (i) the sale, lease, exclusive license, or other disposition of all or substantially all of the assets of the Company; (ii) any merger or consolidation of the Company into or with another person or entity (other than a merger or consolidation effected exclusively to change the Company's domicile or to form or collapse a holding company structure), or any other corporate reorganization, in which the stockholders of the Company in their capacity as such immediately prior to such merger, consolidation or reorganization, own less than a majority of the Company's (or the surviving or successor entity's) outstanding voting power immediately after such merger, consolidation or reorganization; or (iii) any "person" or "group" (as such terms are used in Sections 13(d) and 14(d) of the Securities Exchange Act of 1934, as amended (the "**Exchange Act**")), other than MacAndrews & Forbes Incorporated or its affiliates, becomes the "beneficial owner" (as defined in the Exchange Act) of shares representing at least a majority of the Company's then-total outstanding combined voting power.

(b) Treatment of Warrant at Acquisition. In the event of an Acquisition in which the consideration to be received by the Company's stockholders consists solely of cash, solely of Marketable Securities or a combination of cash and Marketable Securities (a "**Cash/Public Acquisition**"), and the fair market value of one Share as determined in accordance with Section 1.3 above would be greater than the Warrant Price in effect on such date immediately prior to such Cash/Public Acquisition, and Holder has not exercised this Warrant pursuant to Section 1.1 above as to all Shares, then this Warrant shall automatically be deemed to be Cashless Exercised pursuant to Section 1.2 above as to all Shares effective immediately prior to and contingent upon the consummation of a Cash/Public Acquisition. In connection with such Cashless Exercise, Holder shall be deemed to have restated each of the representations and warranties in Section 4 of the Warrant as the date thereof and the Company shall promptly notify the Holder of the number of Shares (or such other securities) issued upon exercise. In the event of a Cash/Public Acquisition where the fair market value of one Share as determined in accordance with Section 1.3 above would be less than the Warrant Price in effect immediately prior to such Cash/Public Acquisition, then this Warrant will expire immediately prior to the consummation of such Cash/Public Acquisition.

(c) Upon the closing of any Acquisition other than a Cash/Public Acquisition defined above, the acquiring, surviving or successor entity shall assume the obligations of this

Warrant, and this Warrant shall thereafter be exercisable for the same securities and/or other property as would have been paid for the Shares issuable upon exercise of the unexercised portion of this Warrant as if such Shares were outstanding on and as of the closing of such Acquisition, subject to further adjustment from time to time in accordance with the provisions of this Warrant.

(d) As used in this Warrant, "**Marketable Securities**" means securities meeting all of the following requirements: (i) the issuer thereof is then subject to the reporting requirements of the Exchange Act, and is then current in its filing of all required reports and other information under the Act and the Exchange Act; (ii) the class and series of shares or other security of the issuer that would be received by Holder in connection with the Acquisition were Holder to exercise this Warrant on or prior to the closing thereof is then traded on a Trading Market, and (iii) following the closing of such Acquisition, Holder would not be restricted from publicly re-selling all of the issuer's shares and/or other securities that would be received by Holder in such Acquisition were Holder to exercise or convert this Warrant in full on or prior to the closing of such Acquisition, except to the extent that any such restriction (x) arises solely under federal or state securities laws, rules or regulations, and (y) does not extend beyond six (6) months from the closing of such Acquisition.

(e) Acquisition Transactions. The Company shall provide the holder of this Warrant with at least twenty (20) days' written notice prior to closing thereof of any Acquisition.

1.7 Warrant Price; Number of Shares. [NTD: FOR LOANS A/B ONLY: The number of shares for which this Warrant is exercisable shall be the nearest whole number determined by dividing [$375,000/$375,000] by the Warrant Price determined pursuant to this paragraph. The Warrant Price shall be the lower of (i) the volume weighted average price of the Company's common stock, as reported by the Trading Market, during the ten (10) Trading Day period immediately preceding the Funding Date (as defined in the Loan Agreement) of Loan [A/B] (as defined in the Loan Agreement) or (ii) the closing price of a share of the Company's Class A common stock, as reported by the Trading Market, on the day immediately preceding the Funding Date of Loan [A/B].]

[NTD: LOANS C/D/E/F ONLY: (a) The number of shares for which this Warrant is initially exercisable shall be the nearest whole number determined by dividing [$112,500/$112,500/$75,000/$75,000] by the Initial Warrant Price determined pursuant to this paragraph. The "**Initial Warrant Price**" shall be the lower of (i) the volume weighted average price of the Company's common stock, as reported by the Trading Market, during the ten (10) Trading Day period immediately preceding the Funding Date (as defined in the Loan Agreement) of Loan [A/B] (as defined in the Loan Agreement) or (ii) the closing price of a share of the Company's Class A common stock, as reported by the Trading Market, on the day immediately preceding the Funding Date of Loan [A/B].

(b) If Loan [C/D/E/F] is made to or on behalf of the Company and/or vTv Therapeutics LLC, then in addition to the number of Shares for which this Warrant is exercisable in Section 1.7(a) above, this Warrant shall also be exercisable for the number of Shares determined by dividing [$112,500/$112,500/$75,000/$75,000] by the Additional Warrant Price determined pursuant to this paragraph. The "**Additional Warrant Price**" shall be the lower of (i) the volume weighted

average price of the Company's common stock, as reported by the Trading Market, during the ten (10) Trading Day period immediately preceding the Funding Date (as defined in the Loan Agreement) of Loan [A/B] (as defined in the Loan Agreement) or (ii) the closing price of a share of the Company's Class A common stock, as reported by the Trading Market, on the day immediately preceding the Funding Date of Loan [C/D/E/F].]

1.8 Exercise Prior to Expiration. To the extent this Warrant is not previously exercised as to all of the Shares subject hereto, and if the fair market value of one share of the Common Stock is greater than the Warrant Price then in effect, this Warrant shall be deemed automatically exercised pursuant to Section 1.2 above (even if not surrendered) immediately before its expiration. For purposes of such automatic exercise, the fair market value of one share of the Common Stock upon such expiration shall be determined pursuant to Section 1.3. To the extent this Warrant or any portion thereof is deemed automatically exercised pursuant to this Section 1.8, the Company agrees to promptly notify the holder hereof of the number of Shares, if any, the holder hereof is to receive by reason of such automatic exercise.

SECTION 2. ADJUSTMENTS TO THE SHARES AND WARRANT PRICE.

2.1 Stock Dividends, Splits, Etc. If the Company declares or pays a dividend or distribution on the outstanding shares of the Common Stock payable in securities or property (other than cash), then upon exercise of this Warrant, for each Share acquired, Holder shall receive, without additional cost to Holder, the total number and kind of securities and property which Holder would have received had Holder owned the Shares of record as of the date the dividend or distribution occurred. If the Company subdivides the outstanding shares of the Common Stock by reclassification or otherwise into a greater number of shares, the number of Shares purchasable hereunder shall be proportionately increased and the Warrant Price shall be proportionately decreased. If the outstanding shares of the Common Stock are combined or consolidated, by reclassification or otherwise, into a lesser number of shares, the Warrant Price shall be proportionately increased and the number of Shares shall be proportionately decreased.

2.2 Reclassification, Exchange, Combinations or Substitution. Upon any event whereby all of the outstanding shares of the Common Stock are reclassified, exchanged, combined, substituted, or replaced for, into, with or by Company securities of a different class and/or series, then from and after the consummation of such event, this Warrant will be exercisable for the number, class and series of Company securities that Holder would have received had the Shares been outstanding on and as of the consummation of such event, and subject to further adjustment thereafter from time to time in accordance with the provisions of this Warrant. The provisions of this Section 2.2 shall similarly apply to successive reclassifications, exchanges, combinations substitutions, replacements or other similar events.

2.3 Adjustment of Number of Shares. Upon each adjustment in the Warrant Price, the number of Shares purchasable hereunder shall be adjusted, to the nearest whole share, to the product obtained by multiplying the number of Shares purchasable immediately prior to such adjustment in the Warrant Price by a fraction, the numerator of which shall be the Warrant Price immediately prior to such adjustment and the denominator of which shall be the Warrant Price immediately thereafter.

2.4 Intentionally Omitted.

2.5 No Fractional Share. No fractional Share shall be issuable upon exercise of this Warrant and the number of Shares to be issued shall be rounded down to the nearest whole Share. If a fractional Share interest arises upon any exercise of the Warrant, the Company shall eliminate such fractional Share interest by paying Holder in cash the amount computed by multiplying the fractional interest by (i) the fair market value (as determined in accordance with Section 1.3 above) of a full Share, less (ii) the then-effective Warrant Price.

2.6 Notice/Certificate as to Adjustments. Upon each adjustment of the Warrant Price, Common Stock and/or number of Shares, the Company, at the Company's expense, shall notify Holder in writing within a reasonable time setting forth the adjustments to the Warrant Price, class and/or number of Shares and facts upon which such adjustment is based. The Company shall, upon written request from Holder, furnish Holder with a certificate of its Chief Financial Officer, including computations of such adjustment and the Warrant Price, class and number of Shares in effect upon the date of such adjustment.

SECTION 3. REPRESENTATIONS AND COVENANTS OF THE COMPANY.

3.1 Representations and Warranties. The Company represents and warrants to, and agrees with, the Holder as follows:

(a) The initial Warrant Price referenced on the first page of this Warrant is not greater than the price per share at which shares of Company Common Stock or options to purchase shares of Company Common Stock were issued immediately prior to the Issue Date hereof.

(b) All Shares which may be issued upon the exercise of this Warrant, shall, upon issuance, be duly authorized, validly issued, fully paid and non-assessable, and free of any liens and encumbrances except for restrictions on transfer provided for herein or under applicable federal and state securities laws. The Company covenants that it shall at all times cause to be reserved and kept available out of its authorized and unissued capital stock such number of securities as will be sufficient to permit the exercise in full of this Warrant.

(c) The Company's capitalization table attached hereto as Schedule 1 is true and complete, in all material respects, as of the Issue Date.

3.2 Notice of Certain Events. If the Company proposes at any time to:

(a) declare any dividend or distribution upon the outstanding shares of the Company's stock, whether in cash, property, stock, or other securities and whether or not a regular cash dividend;

(b) offer for subscription or sale pro rata to the holders of the outstanding shares any additional shares of any class or series of the Company's stock (other than pursuant to contractual pre-emptive rights);

(c) effect any reclassification, exchange (other than, for the avoidance of doubt, any exchange of Class B common stock of the Company for Common Stock), combination, substitution, reorganization or recapitalization of the outstanding shares of the Common Stock;

(d) effect an Acquisition or to liquidate, dissolve or wind up; or

then, in connection with each such event, the Company shall give Holder:

(1) in the case of the matters referred to in (a) and (b) above, at least seven (7) Business Days prior written notice of the earlier to occur of the effective date thereof or the date on which a record will be taken for such dividend, distribution, or subscription rights (and specifying the date on which the holders of outstanding shares of the Common Stock will be entitled thereto) or for determining rights to vote, if any; and

(2) in the case of the matters referred to in (c) and (d) above at least seven (7) Business Days prior written notice of the date when the same will take place (and specifying the date on which the holders of outstanding shares of the Class will be entitled to exchange their shares for the securities or other property deliverable upon the occurrence of such event and such reasonable information as Holder may reasonably require regarding the treatment of this Warrant in connection with such event giving rise to the notice).

Company will also provide information requested by Holder that is reasonably necessary to enable Holder to comply with Holder's accounting or reporting requirements.

SECTION 4. REPRESENTATIONS, WARRANTIES OF THE HOLDER.

The Holder represents and warrants to the Company as follows:

4.1 Purchase for Own Account. This Warrant and the Shares to be acquired upon exercise of this Warrant by Holder are being acquired for investment for Holder's account, not as a nominee or agent, and not with a view to the public resale or distribution within the meaning of the Act. Holder also represents that it has not been formed for the specific purpose of acquiring this Warrant or the Shares.

4.2 Disclosure of Information. Holder is aware of the Company's business affairs and financial condition and has received or has had full access to all the information it considers necessary or appropriate to make an informed investment decision with respect to the acquisition of this Warrant and its underlying securities. Holder further has had an opportunity to ask questions and receive answers from the Company regarding the terms and conditions of the offering of this Warrant and its underlying securities and to obtain additional information (to the extent the Company possessed such information or could acquire it without unreasonable effort or expense) necessary to verify any information furnished to Holder or to which Holder has access.

4.3 Investment Experience. Holder understands that the purchase of this Warrant and its underlying securities involves substantial risk. Holder has experience as an investor in securities of companies in the development stage and acknowledges that Holder can bear the economic risk of such Holder's investment in this Warrant and its underlying securities and has such knowledge and experience in financial or business matters that Holder is capable of evaluating the merits and risks of its investment in this Warrant and its underlying securities and/or has a preexisting personal or business relationship with the Company and certain of its officers, directors or controlling persons of a nature and duration that enables Holder to be aware of the character, business acumen and financial circumstances of such persons.

4.4 Accredited Investor Status. Holder is an "accredited investor" within the meaning of Regulation D promulgated under the Act.

4.5 The Act. Holder understands that this Warrant and the Shares issuable upon exercise hereof have not been registered under the Act in reliance upon a specific exemption therefrom, which exemption depends upon, among other things, the bona fide nature of the Holder's investment intent as expressed herein. Holder understands that this Warrant and the Shares issued upon any exercise hereof must be held indefinitely unless subsequently registered under the Act and qualified under applicable state securities laws, or unless exemption from such registration and qualification are otherwise available. Holder is aware of the provisions of Rule 144 promulgated under the Act.

4.6 Market Standoff. Holder has not knowingly sold or otherwise transferred, made any short sale of, granted any option for the purchase of, or entered into any hedging or similar transaction with the same economic effect as a sale, of shares of any Common Stock (or other securities) of the Company during the ten (10) Trading Day period immediately preceding the Funding Date (as defined in the Loan Agreement) of Loan [A/B/C/D/E/F] with the intent of influencing the [Warrant Price] [the Initial Warrant Price or the Additional Warrant Price].

4.7 No Voting Rights. Holder, as a Holder of this Warrant, will not have any voting rights until the exercise of this Warrant.

SECTION 5. MISCELLANEOUS.

5.1 Term and Automatic Conversion Upon Expiration.

(a) Term. Subject to the provisions of Section 1.6 above, this Warrant is exercisable in whole or in part at any time and from time to time on or before 6:00 PM, Eastern time, on the Expiration Date and shall be void thereafter.

(b) Automatic Cashless Exercise upon Expiration. In the event that, upon the Expiration Date, the fair market value of one Share (or other security issuable upon the exercise hereof) as determined in accordance with Section 1.3 above is greater than the Warrant Price in effect on such date, then this Warrant shall automatically be deemed on and as of such date to be exercised pursuant to Section 1.2 above as to all Shares (or such other securities) for which it shall not previously have been exercised, and the Company shall, within a reasonable time, deliver a certificate representing the Shares (or such other securities) issued upon such exercise to Holder.

5.2 Legends. The Shares (and the securities issuable, directly or indirectly, upon conversion of the Shares, if any) shall be imprinted with a legend in substantially the following form:

> THE SHARES EVIDENCED BY THIS CERTIFICATE HAVE NOT BEEN REGISTERED UNDER THE SECURITIES ACT OF 1933, AS AMENDED (THE "**ACT**"), OR THE SECURITIES LAWS OF ANY STATE AND, EXCEPT AS SET FORTH IN THAT CERTAIN WARRANT TO PURCHASE COMMON STOCK ISSUED BY THE ISSUER TO [SILICON VALLEY BANK] [HORIZON TECHNOLOGY FINANCE CORPORATION] DATED _____, MAY NOT BE OFFERED, SOLD, PLEDGED OR OTHERWISE TRANSFERRED UNLESS AND UNTIL REGISTERED UNDER SAID ACT AND LAWS OR AN OPINION OF COUNSEL IS DELIVERED TO THE ISSUER IN FORM AND SUBSTANCE SATISFACTORY TO THE ISSUER STATING THAT SUCH OFFER, SALE, PLEDGE OR OTHER TRANSFER IS EXEMPT FROM SUCH REGISTRATION.

5.3 Compliance with Securities Laws on Transfer. This Warrant and the Shares issuable upon exercise of this Warrant (and the securities issuable, directly or indirectly, upon conversion of the Shares, if any) may not be transferred or assigned in whole or in part except in compliance with applicable federal and state securities laws by the transferor and the transferee (including, without limitation, the delivery of investment representation letters and legal opinions reasonably satisfactory to the Company, as reasonably requested by the Company). The Company shall not require Holder to provide an opinion of counsel if the transfer is to (a) to a partner of the holder if the holder is a partnership or to a member of the holder if the holder is a limited liability company, (b) to a partnership of which the holder is a partner or to a limited liability company of which the holder is a member, (c) to any affiliate of the holder if the holder is a corporation, [including SVB Financial Group (Silicon Valley Bank's parent company),] (d) notwithstanding the foregoing, to any corporation, company, limited liability company, limited partnership, partnership, or other person that a majority of the voting equity interests are owned, directly or indirectly, by [Horizon Technology Finance Corporation ("HRZN")/Silicon Valley Bank ("SVB")], (e) or to a lender to Holder or any of the foregoing if the Warrant has been pledged as collateral to such lender and such lender has an enforceable right to foreclose on such collateral; provided, however, in any such transfer, if applicable, the transferee shall on the Company's request agree in writing to be bound by the terms of this Warrant as if an original holder hereof.

5.4 Transfer Procedure. [After receipt by Silicon Valley Bank of the executed Warrant, Silicon Valley Bank will transfer all of this Warrant to its parent company, SVB Financial Group. By its acceptance of this Warrant, SVB Financial Group hereby makes to the Company each of the representations and warranties set forth in Section 4 hereof and agrees to be bound by all of the terms and conditions of this Warrant as if the original Holder hereof.] Subject to the provisions of Section 5.3 and upon providing the Company with written notice, [SVB Financial Group]/[Horizon Technology Finance Corporation] and any subsequent Holder may transfer all or part of this Warrant or the Shares issuable upon exercise of this Warrant (or the securities issuable directly or indirectly, upon conversion of the Shares, if any) to any

transferee, provided, however, in connection with any such transfer, [SVB Financial Group] /[Horizon Technology Finance Corporation] or any subsequent Holder will give the Company notice of the portion of the Warrant being transferred with the name, address and taxpayer identification number of the transferee and Holder will surrender this Warrant to the Company for reissuance to the transferee(s) (and Holder if applicable); and provided further, that any subsequent transferee other than [SVB Financial Group]/[Horizon Technology Finance Corporation] shall agree in writing with the Company to be bound by all of the terms and conditions of this Warrant. Notwithstanding any contrary provision herein, Holder may not, without the Company's prior written consent, transfer this Warrant or any portion hereof, or any Shares issued upon any exercise hereof, or any shares or other securities issued upon any conversion of any Shares issued upon any exercise hereof, to any person or entity who directly competes with the Company, except in connection with an Acquisition of the Company by such a direct competitor.

5.5 Notices. All notices and other communications hereunder from the Company to the Holder, or vice versa, shall be deemed delivered and effective (i) when given personally, (ii) on the third (3rd) Business Day after being mailed by first-class registered or certified mail, postage prepaid, (iii) upon actual receipt if given by facsimile or electronic mail and such receipt is confirmed in writing by the recipient, or (iv) on the first Business Day following delivery to a reliable overnight courier service, courier fee prepaid, in any case at such address as may have been furnished to the Company or Holder, as the case may be, in writing by the Company or such Holder from time to time in accordance with the provisions of this Section 5.5. All notices to Holder shall be addressed as follows until the Company receives notice of a change of address in connection with a transfer or otherwise:

[SVB Financial Group
Attn: Treasury Department
3003 Tasman Drive, HC 215
Santa Clara, CA 95054
Telephone: (408) 654-7400
Facsimile: (408) 988-8317
Email address: derivatives@svb.com]

[Horizon Technology Finance Corporation
Attn: Legal Department
312 Farmington Ave.
Farmington, CT 06032
Telephone: (860) 676-8654
Facsimile: (860) 676-8655
Email address: jay@horizontechfinance.com]

Notice to the Company shall be addressed as follows until Holder receives notice of a change in address:

vTv Therapeutics Inc.
4170 Mendenhall Oaks Pkwy.
High Point, NC 27265

Attention: Rudy Howard
Fax: 336-841-0310
Ph: 336-888-0421
Email:rhoward@vtvtherapeutics.com

5.6 Waiver. This Warrant and any term hereof may be changed, waived, discharged or terminated (either generally or in a particular instance and either retroactively or prospectively) only by an instrument in writing signed by the party against which enforcement of such change, waiver, discharge or termination is sought.

5.7 Attorney's Fees. In the event of any dispute between the parties concerning the terms and provisions of this Warrant, the party prevailing in such dispute shall be entitled to collect from the other party all costs incurred in such dispute, including reasonable attorneys' fees.

5.8 Counterparts; Facsimile/Electronic Signatures. This Warrant may be executed in counterparts, all of which together shall constitute one and the same agreement. Any signature page delivered electronically or by facsimile shall be binding to the same extent as an original signature page with regards to any agreement subject to the terms hereof or any amendment thereto.

5.9 Governing Law. This Warrant shall be governed by and construed in accordance with the laws of the State of New York, without giving effect to its principles regarding conflicts of law.

5.10 Headings. The headings in this Warrant are for purposes of reference only and shall not limit or otherwise affect the meaning of any provision of this Warrant.

5.11 Business Days. "**Business Day**" is any day that is not a Saturday, Sunday or a day on which [Silicon Valley Bank] [HRZN] is closed.

[Remainder of page left blank intentionally]
[Signature page follows]

IN WITNESS WHEREOF, the parties have caused this Warrant to Purchase Class A Common Stock to be executed by their duly authorized representatives effective as of the Issue Date written above.

“COMPANY”

VTV THERAPEUTICS INC.

By:

Name:
(Print)
Title:

“HOLDER”

[SILICON VALLEY BANK/HORIZON
TECHNOLOGY FINANCE
CORPORATION]

By:

Name:
(Print)
Title:

APPENDIX 1

NOTICE OF EXERCISE

1. The undersigned Holder hereby exercises its right purchase _____ shares of the Common Stock of VTV THERAPEUTICS INC. (the "**Company**") in accordance with the attached Warrant To Purchase Class A Common Stock, and tenders payment of the aggregate Warrant Price for such shares as follows:

[ ] certified check in the amount of $_____ payable to order of the Company enclosed herewith

[ ] Wire transfer of immediately available funds to the Company's account

[ ] Cashless Exercise pursuant to Section 1.2 of the Warrant

[ ] Other [Describe] _____

2. Please issue a certificate or certificates representing the Shares in the name specified below:

_____
Holder's Name

_____

_____
(Address)

3. By its execution below and for the benefit of the Company, Holder hereby restates each of the representations and warranties in Section 4 of the Warrant to Purchase Class A Common Stock as of the date hereof.

HOLDER:

By:

Name:

Title:

(Date):

SCHEDULE 1

Company Capitalization Table

See attached

Exhibit 10.17

VENTURE LOAN AND SECURITY AGREEMENT

Dated as of October 28, 2016

(the "Effective Date")

by and among

HORIZON TECHNOLOGY FINANCE CORPORATION,
a Delaware corporation
312 Farmington Avenue
Farmington, CT 06032

as a Lender and Collateral Agent

SILICON VALLEY BANK,
a California corporation
3475 Piedmont Road, NE, Suite 560
Atlanta, GA 30305

as a Lender

And

vTv THERAPEUTICS INC.,
a Delaware corporation
4170 Mendenhall Oaks Pkwy.
High Point, NC 27265
as Borrower Representative and a Co-Borrower

vTv THERAPEUTICS LLC,
a Delaware limited liability company
4170 Mendenhall Oaks Pkwy.
High Point, NC 27265
as a Co-Borrower

Loan A Commitment Amount: $6,250,000

Loan B Commitment Amount: $6,250,000

Loan C Commitment Amount: $3,750,000

Loan D Commitment Amount: $3,750,000

Loan E Commitment Amount: $2,500,000

Loan F Commitment Amount: $2,500,000

Loan A Commitment Termination Date:	October [___], 2016
Loan B Commitment Termination Date:	October [___], 2016
Loan C Commitment Termination Date:	March 31, 2017
Loan D Commitment Termination Date:	March 31, 2017
Loan E Commitment Termination Date:	June 30, 2017
Loan F Commitment Termination Date:	June 30, 2017

* Confidential treatment has been requested with respect to portions of this agreement as indicated by "[***]" and such confidential portions have been deleted and filed separately with the Securities and Exchange Commission pursuant to Rule 24b-2 of the Securities Exchange Act of 1934, as amended.

The Lenders, Collateral Agent and Co-Borrowers hereby agree as follows:

AGREEMENT

1. Definitions and Construction.

Definitions

. As used in this Agreement, the following capitalized terms shall have the following meanings (such meanings to be equally applicable to both the singular and plural forms of the terms defined):

"Account Control Agreement" means an agreement reasonably acceptable to Lenders which perfects via control Lender's and Collateral Agent's security interest in any Co-Borrower's deposit accounts and/or securities accounts.

"Additional Warrants" means warrants issued to each Lender for the purchase of Borrower Representative's Equity Securities, in an amount equal to six percent (6%) of the Loan E Commitment Amount or the Loan F Commitment Amount, as applicable, at a purchase price equal to the lower of (i) the volume weighted average price of Borrower Representative's Equity Securities, as reported by the exchange on which such Equity Securities are traded, during the ten (10) trading day period immediately preceding the Funding Date of Loan E and Loan F or (ii) the closing price of a share of Borrower Representative's Equity Securities, as reported by the exchange on which such Equity Securities are traded, on the day immediately preceding the Funding Date of Loan E and Loan F.

"Affiliate" means, with respect to any Person, any other Person that owns or controls directly or indirectly ten percent (10%) or more of the stock of such Person, any other Person that controls or is controlled by or is under common control with such Person and each of such Person's officers, directors, managers, joint venturers or partners. For purposes of this definition, the term "control" of a Person means the possession, direct or indirect, of the power to direct or cause the direction of the management and policies of such Person, whether through the ownership of voting Equity Securities, by contract or otherwise and the terms "controlled by" and "under common control with" shall have correlative meanings.

"Agreement" means this certain Venture Loan and Security Agreement by and among Co-Borrowers, Collateral Agent and Lenders dated as of the date on the cover page hereto (as it may from time to time be amended, modified or supplemented in a writing signed by Co-Borrowers, Collateral Agent and Lenders).

"Anti-Terrorism Laws" means any laws relating to terrorism or money laundering, including Executive Order No. 13224 (effective September 24, 2001), the USA PATRIOT Act, the laws comprising or implementing the Bank Secrecy Act, and the laws administered by OFAC.

"Bank Services" are any products, credit services, and/or financial accommodations previously, now, or hereafter provided to a Co-Borrower or any of its Subsidiaries by SVB or any of SVB's Affiliates, including, without limitation, any letters of credit, cash management services (including, without limitation, merchant services, direct deposit of payroll, business

credit cards, and check cashing services), interest rate swap arrangements, and foreign exchange services as any such products or services may be identified in SVB's various agreements related thereto (each, a "Bank Services Agreement").

"Borrower Representative" means the Borrower Representative as set forth on the cover page of this Agreement.

"Business Day" means any day that is not a Saturday, Sunday, or other day on which banking institutions are authorized or required to close in New York, Connecticut or North Carolina.

"Capital Lease Obligations" means the obligations of a Person to pay rent or other amounts under any lease of (or other arrangement conveying the right to use) real or personal property, or a combination thereof, which obligations are required to be classified and accounted for as capital leases on a balance sheet of such Person under GAAP and, for the purposes of this Agreement, the amount of such obligations will be the capitalized amount thereof determined in accordance with GAAP.

"Change of Control" means the occurrence of one or more of the following events:

(1) any sale, lease, exchange or other transfer, in one transaction or a series of related transactions, of all or substantially all of the assets of any Co-Borrower to any Person or group of related Persons for purposes of Section 13(d) of the Exchange Act (a "Group") other than one or more Permitted Investors;

(2) the approval by the holders of capital stock of any Co-Borrower of any plan for the liquidation or dissolution of such Co-Borrower (whether or not otherwise in compliance with the provisions of this Agreement); or

(3) any Person or Group (other than one or more Permitted Investors) shall "beneficially own" (as such term is defined in Rule 13d-3 and Rule 13d-5 under the Exchange Act), directly or indirectly through one or more intermediaries, shares representing more than 49% of the aggregate voting power represented by the issued and outstanding capital stock of any Co-Borrower entitled under ordinary circumstances to elect a majority of the directors of such Co-Borrower; it being understood that if any such Person or Group includes one or more Permitted Investors, shares of capital stock of such Co-Borrower directly or indirectly owned by the Permitted Investors that are part of such Person or Group shall not be treated as being owned by such Person or Group for purposes of determining whether this clause (3) is triggered.

Notwithstanding the foregoing: (A) a transaction that is otherwise permitted by the terms of this Agreement in which any Co-Borrower becomes a Subsidiary of another Person (other than a Person that is an individual, such Person that is not an individual, the "New Parent") shall not constitute a Change of Control under clause (3) of this definition if (a) the equityholders of such Co-Borrower immediately prior to such transaction ''beneficially own'' (as such term is defined in Rule 13d-3 and Rule 13d-5 under the Exchange Act), directly or indirectly through one or more intermediaries, at least a majority of the voting power of the outstanding voting stock of such New Parent immediately following the consummation of such transaction, substantially in proportion to their holdings of the equity of such Co-Borrower prior to such

transaction or (b) immediately following the consummation of such transaction, no ‘‘person’’ (as such term is defined above), other than a Permitted Investor or the New Parent, ‘‘beneficially owns’’ (as such term is defined above), directly or indirectly through one or more intermediaries, more than 49% of the voting power of the outstanding voting stock of such Co-Borrower or the New Parent; (B) any holding company whose only significant asset is equity interests of such Co-Borrower or a Parent Company shall not itself be considered a ‘‘person’’ or ‘‘group’’ for purposes of this definition; (C) the transfer of assets between or among the Co-Borrowers shall not itself constitute a Change of Control; (D) the term ‘‘Change of Control’’ shall not include a merger or consolidation of any Co-Borrower with, or the sale, assignment, conveyance, transfer, lease or other disposition of all or substantially all of the assets of such Co-Borrower to, an Affiliate incorporated or organized solely for the purpose of reincorporating or reorganizing such Co-Borrower in another jurisdiction and/or for the sole purpose of forming or collapsing a holding company structure; and (E) a ‘‘person’’ or ‘‘group’’ shall not be deemed to have beneficial ownership of securities subject to a stock purchase agreement, merger agreement or similar agreement (or voting or option agreement related thereto) until the consummation of the transactions contemplated by such agreement.

“Claim” has the meaning given such term in Section 10.3 of this Agreement.

“Co-Borrower” means a Co-Borrower as set forth on the cover page of this Agreement, and “Co-Borrowers” means all such Co-Borrowers collectively.

“Code” means the Uniform Commercial Code as adopted and in effect in the State of New York, as amended from time to time; *provided* that if by reason of mandatory provisions of law, the creation and/or perfection or the effect of perfection or non-perfection of the security interest in any Collateral is governed by the Uniform Commercial Code as in effect in a jurisdiction other than the State of New York, the term “Code” shall also mean the Uniform Commercial Code as in effect from time to time in such jurisdiction for purposes of the provisions hereof relating to such creation, perfection or effect of perfection or non-perfection.

“Collateral” has the meaning given such term in Section 4.1 of this Agreement.

“Collateral Agent” means Horizon, or any successor collateral agent appointed by Lenders.

“Commitment Amount” means the Loan A Commitment Amount, the Loan B Commitment Amount, the Loan C Commitment Amount, the Loan D Commitment Amount, the Loan E Commitment Amount, or the Loan F Commitment Amount, as applicable.

“Commitment Fee” has the meaning given such term in Section 2.6(c) of this Agreement.

“Consolidated” means the consolidation of accounts in accordance with GAAP.

“Default” means any event which with the passing of time or the giving of notice or both would become an Event of Default hereunder.

"Default Rate" means the per annum rate of interest equal to five percent (5%) over the Loan Rate, but such rate shall in no event be more than the highest rate permitted by applicable law to be charged on commercial loans in a default situation.

"Dollar Equivalent" is, at any time, (a) with respect to any amount denominated in Dollars, such amount, and (b) with respect to any amount denominated in a Foreign Currency, the equivalent amount therefor in Dollars as determined by Bank at such time on the basis of the then-prevailing rate of exchange in San Francisco, California, for sales of the Foreign Currency for transfer to the country issuing such Foreign Currency.

"Dollars," "dollars" and "$" each mean lawful money of the United States.

"Disclosure Schedule" means Exhibit A attached hereto.

"Eligible Assignee" has the meaning given such term in Section 12.1 of this Agreement.

"Environmental Laws" means all foreign, federal, state or local laws, statutes, common law duties, rules, regulations, ordinances and codes, together with all administrative orders, directed duties, requests, licenses, authorizations and permits of, and agreements with, any Governmental Authorities, in each case relating to environmental, health, safety and land use matters, including the Comprehensive Environmental Response, Compensation and Liability Act of 1980, the Clean Air Act, the Federal Water Pollution Control Act of 1972, the Solid Waste Disposal Act, the Federal Resource Conservation and Recovery Act, the Toxic Substances Control Act and the Emergency Planning and Community Right-to-Know Act.

"Equity Securities" of any Person means (a) all common stock, preferred stock, participations, shares, partnership interests, membership interests or other equity interests in and of such Person (regardless of how designated and whether or not voting or non-voting) and (b) all warrants, options and other rights to acquire any of the foregoing.

"ERISA" has the meaning given to such term in Section 7.12 of this Agreement.

"Event of Default" has the meaning given to such term in Section 8 of this Agreement.

"Exchange Act" means the Securities Exchange Act of 1934, as amended from time to time.

"Excluded Taxes" means any of the following Taxes imposed on or with respect to a Lender or required to be withheld or deducted from a payment to a Lender,(a) Taxes imposed on or measured by net income (however denominated), franchise Taxes, and branch profits Taxes, in each case, (i) imposed as a result of such Lender being organized under the laws of, or having its principal office or its applicable lending office located in, the jurisdiction imposing such Tax (or any political subdivision thereof) or (ii) imposed as a result of a present or former connection between the Lender and the jurisdiction imposing such Tax (other than connections arising solely from such Lender having executed, delivered, become a party to, performed its obligations under, received payments under, received or perfected a security interest under, or enforced any Loan Document), (b) U.S. federal withholding Taxes imposed on amounts payable to for the account of such Lender with respect to an applicable interest in a Loan or commitment pursuant

to a law in effect on the date on which (i) such Lender acquires such interest in the Loan or commitment or (ii) such Lender changes its lending office, except in each case to the extent that, pursuant to Section 2.4(c), amounts with respect to such Taxes were payable either to such Lender's assignor immediately before such Lender acquired the applicable interest or to such Lender immediately before it changed its lending office, (c) Taxes attributable to such Lender's failure to comply with Section 2.4(c), and (d) any U.S. federal withholding Taxes imposed under FATCA.

"Existing Lender" means the Lenders party to this Agreement as of the date hereof.

"FATCA" means Sections 1471 through 1474 of the Internal Revenue Code, as of the date of this Agreement (or any amended or successor version that is substantively comparable and not materially more onerous to comply with), any current or future regulations or official interpretations thereof and any agreements entered into pursuant to Section 1471(b)(1) of the Internal Revenue Code.

"Foreign Currency" means lawful money of a country other than the United States.

"Funding Certificate" means a certificate executed by a duly authorized Responsible Officer of Borrower Representative substantially in the form of Exhibit B-1 or such other form as Lenders may reasonably agree to accept.

"Funding Date" means any date on which a Loan is made to or on account of a Co-Borrower under this Agreement.

"FX Contract" is any foreign exchange contract by and between a Co-Borrower and SVB under which a Co-Borrower commits to purchase from or sell to SVB a specific amount of Foreign Currency on a specified date.

"GAAP" means generally accepted accounting principles as in effect in the United States of America from time to time, consistently applied; provided, however, that, with respect to the Co-Borrowers, items accounted for as operating leases under GAAP as in effect on the date such lease is entered into may be treated as operating leases for purposes of this definition irrespective of any change in GAAP that would otherwise re-characterize such operating leases as capital leases subsequent to such date (such change, as "GAAP Change"), provided, however, that in the event of a GAAP Change, Co-Borrowers shall provide Lenders with a schedule of all operating leases in effect as of the effective date of such GAAP Change.

"Good Faith Deposit" has the meaning given such term in Section 2.6(a) of this Agreement.

"Governmental Authority" means (a) any federal, state, county, municipal or foreign government, or political subdivision thereof, (b) any governmental or quasi-governmental agency, authority, board, bureau, commission, department, instrumentality or public body, (c) any court or administrative tribunal, or (d) with respect to any Person, any arbitration tribunal or other non-governmental authority to whose jurisdiction that Person has consented.

"Hazardous Materials" means all those substances which are regulated by, or which may form the basis of liability under, any Environmental Law, including all substances identified under any Environmental Law as a pollutant, contaminant, hazardous waste, hazardous constituent, special waste, hazardous substance, hazardous material, or toxic substance, or petroleum or petroleum derived substance or waste.

"Horizon" means Horizon Technology Finance Corporation.

"Indebtedness" means, with respect to any Person, the aggregate amount of, without duplication, (a) all obligations of such Person for borrowed money, (b) all obligations of such Person evidenced by bonds, debentures, notes or other similar instruments, (c) all obligations of such Person to pay the deferred purchase price of property or services (excluding trade payables aged less than one hundred eighty (180) days), (d) all Capital Lease Obligations of such Person, (e) all obligations or liabilities of others secured by a Lien on any asset of such Person, whether or not such obligation or liability is assumed, (f) all obligations or liabilities of others guaranteed by such Person, and (g) any other obligations or liabilities which are required by GAAP to be shown as debt on the balance sheet of such Person.

"Indemnified Person" has the meaning given such term in Section 10.3 of this Agreement.

"Indemnified Taxes" means (a) Taxes, other than Excluded Taxes, imposed on or with respect to any payment made by or on account of any obligation of Borrower under any Loan Document and (b) to the extent not otherwise described in (a), all present or future stamp, court or documentary, recording, filing, registration or similar Taxes that arise from any payment made under, from the execution, delivery, performance, enforcement or registration of, from the receipt or perfection of a security interest under, or the Liens created or secured under any Loan Document other than Taxes imposed as a result of a present or former connection between the Borrower and the jurisdiction imposing such Tax (other than connections arising from Borrower having executed, delivered, become a party to, performed its obligations under, received payments under, received or perfected a security interest under, engaged in any other transaction pursuant to or enforced any Loan Document, or sold or assigned an interest in any Loan or Loan Document).

"Intellectual Property" means, with respect to any Person, all of such Person's right, title and interest in and to patents, patent rights (and applications and registrations therefor and divisions, continuations, renewals, reissues, extensions and continuations-in-part of the same), trademarks and service marks (and applications and registrations therefor and the goodwill associated therewith), whether registered or not, inventions, copyrights (including applications and registrations therefor and like protections in each work or authorship and derivative work thereof), whether published or unpublished, mask works (and applications and registrations therefor), trade names, trade styles, software and computer programs, source code, object code, trade secrets, licenses, methods, processes, know how, drawings, specifications, descriptions, and all memoranda, notes, and records with respect to any research and development, all whether now owned or subsequently acquired or developed by such Person and whether in tangible or intangible form or contained on magnetic media readable by machine together with all such

magnetic media (but not including embedded computer programs and supporting information included within the definition of "goods" under the Code).

"Internal Revenue Code" has the meaning given such term in Section 5.19 of this Agreement.

"Investment" means the purchase or acquisition of any capital stock, equity interest, or any obligations or other securities of, or any interest in, any Person, or the extension of any advance, loan, extension of credit or capital contribution to, or any other investment in any Person. For the avoidance of doubt, advance payments under contracts for goods and services in the ordinary course of business shall not constitute Investments.

"Landlord Agreement" means an agreement substantially in the form provided by Lenders to Co-Borrowers or such other form as Lenders may reasonably agree to accept.

"Lender" means each Lender as set forth on the cover page of this Agreement and "Lenders" means all such Lenders.

"Lenders' Expenses" means all reasonable costs or expenses (including reasonable attorneys' fees and expenses) incurred in connection with the preparation, negotiation, documentation, drafting, amendment, modification, administration, perfection and funding of the Loan Documents; and all of each Lender's reasonable attorneys' fees, costs and expenses incurred in enforcing or defending the Loan Documents (including fees and expenses of appeal or review), including the exercise of any rights or remedies afforded hereunder or under applicable law, whether or not suit is brought, whether before or after bankruptcy or insolvency, including all fees and costs incurred by any Lender in connection with such Lender's enforcement of its rights in a bankruptcy or insolvency proceeding filed by or against any Co-Borrower, any Subsidiary or their respective Property.

"Letter of Credit" is a standby or commercial letter of credit issued by SVB upon request of a Co-Borrower based upon an application, guarantee, indemnity, or similar agreement.

"LIBOR Rate" means the one-month London Interbank Offered Rate or a comparable or successor rate as reported in the Wall Street Journal.

"Lien" means any voluntary or involuntary security interest, pledge, mortgage, hypothecation, conditional sales and title retention agreement, encumbrance or other lien with respect to any Property in favor of any Person.

"Loan" means each advance of credit by a Lender to Co-Borrowers under this Agreement.

"Loan A" means the advance of credit by a Lender to Co-Borrowers under this Agreement in the Loan A Commitment Amount.

"Loan A Commitment Amount" has the meaning set forth on the cover page of this Agreement.

"Loan A Commitment Termination Date" has the meaning set forth on the cover page of this Agreement.

"Loan A Final Payment" has the meaning given such term in Section 2.2(g) of this Agreement.

"Loan Amortization Date" means the Payment Date on which any Co-Borrower is required, pursuant to Section 2.2 (a) below, to commence making equal payments of principal plus accrued interest on the outstanding principal amount of the Loans.

"Loan B" means the advance of credit by a Lender to Co-Borrowers under this Agreement in the Loan B Commitment Amount.

"Loan B Commitment Amount" has the meaning set forth on the cover page of this Agreement.

"Loan B Commitment Termination Date" has the meaning set forth on the cover page of this Agreement.

"Loan B Final Payment" has the meaning given such term in Section 2.2(g) of this Agreement.

"Loan C" means the advance of credit by a Lender to Co-Borrowers under this Agreement in the Loan C Commitment Amount.

"Loan C Commitment Amount" has the meaning set forth on the cover page of this Agreement.

"Loan C Commitment Termination Date" has the meaning set forth on the cover page of this Agreement.

"Loan C Final Payment" has the meaning given such term in Section 2.2(g) of this Agreement.

"Loan D" means the advance of credit by a Lender to Co-Borrowers under this Agreement in the Loan D Commitment Amount.

"Loan D Commitment Amount" has the meaning set forth on the cover page of this Agreement.

"Loan D Commitment Termination Date" has the meaning set forth on the cover page of this Agreement.

"Loan D Final Payment" has the meaning given such term in Section 2.2(g) of this Agreement.

"Loan Documents" means, collectively, this Agreement, the Notes, the Warrants, any Landlord Agreement, each Loan Payment/Advance Request Form, any Bank Services

Agreement, any Account Control Agreement and all other documents, instruments and agreements entered into in connection with this Agreement; all as amended, restated, or otherwise modified.

"Loan E" means the advance of credit by a Lender to Co-Borrowers under this Agreement in the Loan E Commitment Amount.

"Loan E Commitment Amount" has the meaning set forth on the cover page of this Agreement.

"Loan E Commitment Termination Date" has the meaning set forth on the cover page of this Agreement.

"Loan E Final Payment" has the meaning given such term in Section 2.2(g) of this Agreement.

"Loan F" means the advance of credit by a Lender to Co-Borrowers under this Agreement in the Loan F Commitment Amount.

"Loan F Commitment Amount" has the meaning set forth on the cover page of this Agreement.

"Loan F Commitment Termination Date" has the meaning set forth on the cover page of this Agreement.

"Loan F Final Payment" has the meaning given such term in Section 2.2(g) of this Agreement.

"Loan Payment/Advance Request Form" is that certain form attached hereto as Exhibit B-2.

"Loan Rate" means, with respect to each Loan, the per annum rate of interest equal to 10.50% plus the amount by which the LIBOR Rate (rounded to the nearest one hundredth percent) exceeds 0.50%. Notwithstanding the foregoing, in no event shall the Loan Rate be less than 10.50%.

"Mafco" means MacAndrews & Forbes Incorporated and its successors.

"Management Group" means the group consisting of the directors, executive officers and other management personnel of any Co-Borrower or any direct or indirect parent of such Co-Borrower, as the case may be, on the Effective Date together with (1) any new directors whose election by such boards of directors or whose nomination for election by the shareholders of such Co-Borrower or any direct or indirect parent of such Co-Borrower, as applicable, was approved by a vote of a majority of the directors of such Co-Borrower or any direct or indirect parent of such Co-Borrower, as applicable, then still in office who were either directors on the Effective Date or whose election or nomination was previously so approved and (2) executive officers and other management personnel of such Co-Borrower or any direct or indirect parent of such Co-Borrower, as applicable, hired at a time when the directors on the Effective Date together with

the directors so approved constituted a majority of the directors of such Co-Borrower or any direct or indirect parent of such Co-Borrower, as applicable.

"Material Adverse Effect" means a material adverse effect on (a) the condition (financial or otherwise), business, operations, or Properties of the Co-Borrowers and their Subsidiaries, taken as a whole, (b) the ability of the Co-Borrowers and their Subsidiaries, taken as a whole, to perform their Obligations under the Loan Documents, or (c) the prospect of repayment of any portion of the Obligations or (d) the perfection or priority of Collateral Agent's or any Lender's Lien in the Collateral or in the value of such Collateral.

"Maturity Date" means, with respect to each Loan, forty-two (42) months from the first day of the month next following the month in which the Funding Date for such Loan occurs, or if earlier, the date of acceleration of such Loan following an Event of Default or the date of prepayment, whichever is applicable.

"Note" means each promissory note executed in connection with a Loan in substantially the form of Exhibit C attached hereto.

"Obligations" means all debt, principal, interest, fees, charges, expenses and reasonable attorneys' fees and costs and other amounts, obligations, covenants, and duties owing by any Co-Borrower to Collateral Agent or any Lender of any kind and description (whether pursuant to or evidenced by the Loan Documents (other than the Warrants), or by any other agreement between Lenders and any Co-Borrower (other than the Warrants), and whether or not for the payment of money), whether direct or indirect, absolute or contingent, due or to become due, now existing or hereafter arising, including all Lenders' Expenses.

"OFAC" means the Office of Foreign Assets Control of the United States Department of the Treasury.

"Officer's Certificate" means a certificate executed by a Responsible Officer substantially in the form of Exhibit E or such other form as Lenders may reasonably agree to accept.

"Payment Date" has the meaning given such term in Section 2.2(a) of this Agreement.

"Payroll Account" has the meaning given such term in Section 7.14 of this Agreement.

"Permitted Indebtedness" means and includes:

(a) Indebtedness of Co-Borrowers to Lenders under the Loan Documents;

(b) Indebtedness arising from the endorsement of instruments in the ordinary course of business;

(c) Indebtedness of any Co-Borrower existing on the date hereof and set forth on the Disclosure Schedule;

(d) Indebtedness of a Co-Borrower secured by Liens permitted under clause (e) of the definition of Permitted Liens, up to an aggregate principal amount of Five Hundred Thousand Dollars ($500,000) at any one time;

(e) Indebtedness of a Co-Borrower for Capital Lease Obligations incurred in the ordinary course of business up to an aggregate principal amount of One Million Dollars ($1,000,000) at any one time;

(f) Security deposits in favor of landlords and reimbursement obligations in connection with letters of credit in favor of landlords in the ordinary course of business in an amount not to exceed Five Hundred Thousand Dollars $500,000;

(g) Subordinated Debt incurred by any Co-Borrower provided that MacAndrews & Forbes Incorporated or any Affiliate thereof is the lender providing such Subordinated Debt;

(h) extensions, refinancings, modifications, amendments and restatements of any items of Permitted Indebtedness under subsection (c) above; *provided* that the principal amount thereof is not increased or the terms thereof are not modified to impose materially more burdensome terms upon any Co-Borrower; and

(i) other unsecured Indebtedness aggregating not in excess of Five Hundred Thousand Dollars ($500,000) at any time.

"Permitted Investments" means and includes any of the following Investments as to which the Collateral Agent and each Lender have a perfected security interest:

(a) Deposits and deposit accounts with commercial banks organized under the laws of the United States or a state thereof to the extent: (i) the deposit accounts of each such institution are insured by the Federal Deposit Insurance Corporation up to the legal limit; and (ii) each such institution has an aggregate capital and surplus of not less than One Hundred Million Dollars ($100,000,000);

(b) Investments in marketable obligations issued or fully guaranteed by the United States, any state thereof or any agency thereof, and maturing not more than one (1) year from the date of issuance;

(c) Investments in open market commercial paper rated at least "A1" or "P1" or higher by a national credit rating agency and maturing not more than one (1) year from the creation thereof;

(d) Investments pursuant to or arising under currency agreements or interest rate agreements entered into in the ordinary course of business;

(e) Investments by any Co-Borrower and Subsidiaries in their Subsidiaries outstanding on the date hereof;

(f) Investments consisting of loans made to employees for travel, relocation or other expenses in the ordinary course of business up to a maximum amount outstanding at any time of Fifty Thousand Dollars ($50,000);

(g) Investments by any Subsidiary in a Co-Borrower, or by a Co-Borrower in any Subsidiary that is a secured guarantor or Co-Borrower under the Agreement;

(h) Investments funded in their entirety by the issuance of Equity Securities provided that such issuance of Equity Securities is not otherwise prohibited under this Agreement; and

(i) other Investments aggregating not in excess of Five Hundred Thousand Dollars ($500,000) at any time.

"Permitted Investors" means (i) any Person included in the definition of Sponsor, and (ii) any Person included in the definition of Management Group.

"Permitted Liens" means and includes:

(a) the Liens created by this Agreement;

(b) Liens for fees, taxes, levies, imposts, duties or other governmental charges of any kind which are not yet delinquent or which are being contested in good faith by appropriate proceedings (*provided* that such appropriate proceedings do not involve any substantial danger of the sale, forfeiture or loss of any material item of Collateral which in the aggregate is material to any Co-Borrower or the Co-Borrowers and their Subsidiaries, taken as a whole, and that such Co-Borrower has adequately bonded such Lien or reserves sufficient to discharge such Lien have been provided on the books of such Co-Borrower);

(c) Liens identified on the Disclosure Schedule;

(d) carriers', warehousemen's, mechanics', materialmen's, repairmen's or other similar Liens arising in the ordinary course of business and which are not delinquent or remain payable without penalty or which are being contested in good faith and by appropriate proceedings (*provided* that such appropriate proceedings do not involve any substantial danger of the sale, forfeiture or loss of any material item of Collateral or Collateral which in the aggregate is material to any Co-Borrower or the Co-Borrowers and their Subsidiaries, taken as a whole, and that such Co-Borrower has adequately bonded such Lien or reserves sufficient to discharge such Lien have been provided on the books of such Co-Borrower);

(e) Liens upon any equipment or other personal property acquired by Borrower after the date hereof to secure (i) the purchase price of such equipment or other personal property, or (ii) Capital Lease Obligations or indebtedness incurred solely for the purpose of financing the acquisition of such equipment or other personal property; *provided* that (A) such Liens are confined solely to the equipment or other personal property so acquired and the amount secured does not exceed the acquisition price thereof, and (B) no such Lien shall be created, incurred, assumed or suffered to exist in favor of Borrower's officers, directors or shareholders holding five percent (5%) or more of Borrower's Equity Securities;

(f) Permitted Transfers;

(g) Liens in favor of customs and revenue authorities which secure payment of customs duties in connection with the importation of goods in the ordinary course of business;

(h) Pledges or deposits in connection with workers' compensation, unemployment insurance and other social security legislation and deposits securing liability to insurance carriers under insurance or self-insurance arrangements;

(i) Deposits to secure the performance of bids, trade contracts (other than for borrowed money), leases, statutory obligations, surety and appeal bonds, performance bonds and other obligations of a like nature incurred in the ordinary course of business; easements, rights-of-way, restrictions and other similar encumbrances incurred in the ordinary course of business which, in the aggregate, are not substantial in amount and which do not in any case materially detract from the value of the property subject thereto or materially interfere with the ordinary conduct of the business of the Co-Borrowers; and leases or subleases of real property entered into in the ordinary course of business;

(j) Liens arising from judgments, decrees or attachments in circumstances not constituting an Event of Default under Section 8.6 or 8.9;

(k) Subject to Section 7.13, Liens in favor of financial institutions arising in connection with a Co-Borrower's deposit or other accounts held at such institutions to secure standard fees for deposit or other services charged by, but not financing made available by, such institutions;

(l) Liens securing security deposits and reimbursement obligations in connection with letters of credit in favor of landlords in the ordinary course of business securing amounts not to exceed Five Hundred Thousand Dollars $(500,000);

(m) Liens incurred in the extension, renewal or refinancing of the indebtedness secured by Liens described above, but any extension, renewal or replacement Lien must be limited to the property encumbered by the existing Lien and the principal amount of the indebtedness may not increase; and

(n) Liens not securing Indebtedness that attach to any Collateral in an aggregate outstanding amount to exceed Five Hundred Thousand Dollars ($500,000) in the aggregate during the term of this Agreement.

"Permitted Transferees" means, with respect to any Person that is a natural person (and any Permitted Transferee of such Person), (a) such Person's immediate family, including his or her spouse or any ex-spouse, or any lineal or step-lineal descendant (including adopted descendants) or the spouses of any such descendants, (b) in the event of such Person's incompetence or death, his estate and beneficiaries, and executors, administrators, committee or other personal representatives of such Person (collectively, such Person's "heirs"), (c) any trust or other legal entity the primary beneficiary of which is such Person and/or such Person's immediate family (including his or her spouse or any ex-spouse, or any lineal or step-lineal

descendant (including adopted descendants) or the spouses of any such descendants) or such Person's heirs and (d) any Person controlled (as defined in the definition of "Affiliate"), directly or indirectly, by any of the foregoing.

"Permitted Transfers" means and includes:

(a) non-exclusive licenses of Intellectual Property entered into in the ordinary course of business;

(b) exclusive licenses, sales, options agreements that once exercised create a binding obligation, evidenced by a Qualifying Term Sheet, to enter into an exclusive license or sale, co-development, co-commercialization, or other transfers of Intellectual Property of either Co-Borrower's (i) glucokinase activator program, including the TTP399 drug compound, (ii) GLP1-R program, including the TTP273 drug compound, or (iii) receptor for advanced glycation endproducts program, including the TTP488 drug compound; and

(c) exclusive licenses, sales, options agreements that once exercised create a binding obligation, to enter an exclusive license or sale, co-development, co-commercialization, or other transfer of Intellectual Property for any of Co-Borrowers' pre-clinical or Phase 1 programs, including, but not limited to, (i) PPAR-d program, including the HPP593 drug compound, (ii) PDE4 program, including the HPP737 drug compound, (iii) BACH1 program, including the HPP971 compound, or (iv) HexoKinase II Inhibitor program.

"Person" means and includes any individual, any partnership, any corporation, any business trust, any joint stock company, any limited liability company, any unincorporated association or any other entity and any domestic or foreign national, state or local government, any political subdivision thereof, and any department, agency, authority or bureau of any of the foregoing.

"Property" means any interest in any kind of property or asset, whether real, personal or mixed, whether tangible or intangible.

"Qualifying Term Sheet" has the meaning given such term on Exhibit G to this Agreement.

"Responsible Officer" has the meaning given such term in Section 6.3 of this Agreement.

"Restricted License" means any license or other agreement with respect to which any Co-Borrower is the licensee and such license or agreement is material to the Co-Borrowers' and their Subsidiaries' business, taken as a whole, and (a) that prohibits or otherwise restricts any Co-Borrower from granting a security interest in such Co-Borrower's interest in such license or agreement or any other property or (b) for which a default under or termination of could reasonably be expected to interfere with Collateral Agent's or Lenders' right to sell any Collateral.

"Rights to Payment" has the meaning given such term in Section 4.1 of this Agreement.

"Sanctions" means any economic or financial sanction administered or enforced by the United States Government (including, without limitation, OFAC and the United States Department of State), the United Nations Security Council, the European Union, Her Majesty's Treasury or other relevant sanctions authority.

"Securities Act" means the Securities Act of 1933, as amended from time to time.

"Scheduled Payments" has the meaning given such term in Section 2.2(a) of this Agreement.

"Solvent" has the meaning given such term in Section 5.12 of this Agreement.

"Sponsor" means (a) Mafco, (b) each of Mafco's direct and indirect Subsidiaries and Affiliates, (c) Ronald O. Perelman, (d) any of the directors or executive officers of Mafco or (e) any of their respective Permitted Transferees.

"Subordinated Debt" means Indebtedness (i) approved by Lenders, or (ii) where the holder's right to payment of such Indebtedness, the priority of any Lien securing the same, and the rights of the holder thereof to enforce remedies against Borrower following default have been made subordinate to the Liens of Collateral Agent and Lenders and to the prior payment to Lenders of the Obligations, either (A) pursuant to a written subordination agreement approved by Lenders in their sole but reasonable discretion or (B) on terms otherwise approved by Lenders in their sole but reasonable discretion.

"Subsidiary" means any corporation or other entity of which a majority of the outstanding Equity Securities entitled to vote for the election of directors or other governing body (otherwise than as the result of a default) is owned by any Co-Borrower directly or indirectly through Subsidiaries.

"SVB" means Silicon Valley Bank.

"Tax Distributions" has the meaning given such term in Section 7.6 of this Agreement.

"Taxes" means all present or future taxes, levies, imposts, duties, deductions, withholdings (including backup withholding), assessments, fees or other charges in the nature of a tax imposed by any Governmental Authority, including any interest, additions to tax or penalties applicable thereto.

"Transfer" has the meaning given such term in Section 7.5 of this Agreement.

"Warrant" means the separate warrant or warrants dated on or about the date hereof in favor of each Lender or its designees to purchase securities of Borrower Representative.

Construction

. References in this Agreement to "Articles," "Sections," "Exhibits," "Schedules" and "Annexes" are to recitals, articles, sections, exhibits, schedules and annexes herein and hereto unless otherwise indicated. References in this Agreement and each of the other Loan Documents to any document, instrument or agreement shall include (a) all exhibits, schedules, annexes and other attachments thereto, (b) all documents, instruments or

agreements issued or executed in replacement thereof, and (c) such document, instrument or agreement, or replacement or predecessor thereto, as amended, modified and supplemented from time to time and in effect at any given time (subject, in the case of clauses (b) and (c), to any restrictions on such replacement, amendment, modification or supplement set forth in the Loan Documents). The words "hereof," "herein" and "hereunder" and words of similar import when used in this Agreement or any other Loan Document shall refer to this Agreement or such other Loan Document, as the case may be, as a whole and not to any particular provision of this Agreement or such other Loan Document, as the case may be. The words "include" and "including" and words of similar import when used in this Agreement or any other Loan Document shall not be construed to be limiting or exclusive. Whenever the word "or" is used in this Agreement, it shall not be construed to be limiting or exclusive. Unless the context requires otherwise, any reference in this Agreement or any other Loan Document to any Person shall be construed to include such Person's successors and assigns. Unless otherwise indicated in this Agreement or any other Loan Document, all accounting terms used in this Agreement or any other Loan Document shall be construed, and all accounting and financial computations hereunder or thereunder shall be computed, in accordance with GAAP, and all terms describing Collateral shall be construed in accordance with the Code. The terms and information set forth on the cover page of this Agreement are incorporated into this Agreement. The parties hereto have participated jointly in the negotiation and drafting of this Agreement and the other Loan Documents with the assistance of counsel and, in the event an ambiguity or question of intent or interpretation arises, this Agreement and the other Loan Documents shall be construed as jointly drafted by the parties hereto and thereto, and no presumption or burden of proof shall arise favoring or disfavoring any party by virtue of the authorship of any provision of this Agreement or any other Loan Document.

2. Loans; Repayment.

Commitments

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(a) The Commitment Amounts. Subject to the terms and conditions of this Agreement and relying upon the representations and warranties herein set forth as and when made or deemed to be made, Horizon agrees to lend to Co-Borrowers, prior to the Loan A Commitment Termination Date, Loan A, prior to the Loan C Commitment Termination Date, Loan C, and prior to the Loan E Commitment Termination Date, Loan E, and SVB agrees to lend to Co-Borrowers, prior to the Loan B Commitment Termination Date, Loan B, prior to the Loan D Commitment Termination Date, Loan D, and prior to the Loan F Commitment Termination Date, Loan F.

(b) The Loans and the Notes. The obligation of each Co-Borrower to repay the unpaid principal amount of and interest on each Loan shall be evidenced by a Note issued to the relevant Lender.

(c) Use of Proceeds. The proceeds of each Loan shall be used solely for working capital or general corporate purposes of Co-Borrowers.

(d) Termination of Commitment to Lend. Notwithstanding anything in the Loan Documents, each respective Lender's obligation to lend the undisbursed portion of its

Commitment Amount to Co-Borrowers hereunder shall terminate on the earlier of (i) at such Lender's sole election, the occurrence of any Default or Event of Default hereunder, and (ii) with respect to Loan A, the Loan A Commitment Termination Date, with respect to Loan B, the Loan B Commitment Termination Date, with respect to Loan C, the Loan C Commitment Termination Date, with respect to Loan D, the Loan D Commitment Termination Date, with respect to Loan E, the Loan E Commitment Termination Date, and with respect to Loan F, the Loan F Commitment Termination Date. Notwithstanding the foregoing, each Lender's obligation to lend the undisbursed portion of its Commitment Amount to Co-Borrowers shall terminate if, in such Lender's sole, but reasonable, discretion, a Material Adverse Effect has occurred.

Payments

.

(a) Scheduled Payments. Each Co-Borrower shall make (i) a payment of accrued interest only to each applicable Lender on the outstanding principal amount of each Loan on the first eighteen (18) Payment Dates specified in the Note applicable to such Loan and (ii) an equal payment of principal plus accrued interest to each applicable Lender on the outstanding principal amount of the Loan on the next twenty-four (24) Payment Dates as set forth in the Note applicable to such Loan (collectively, the "Scheduled Payments"). Each Co-Borrower shall make such Scheduled Payments commencing on the date set forth in the Note applicable to such Loan and continuing thereafter on the first Business Day of each calendar month (each a "Payment Date") through the Maturity Date. In any event, all unpaid principal and accrued interest shall be due and payable in full on the Maturity Date applicable to each Loan.

(b) Interim Payment. Unless the Funding Date for a Loan is the first day of a calendar month, each Co-Borrower shall pay the per diem interest (accruing at the Loan Rate from the Funding Date through the last day of that month) payable with respect to such Loan on the first Business Day of the next calendar month.

(c) Payment of Interest. Each Co-Borrower shall pay interest on each Loan at a per annum rate of interest equal to the Loan Rate. The Loan Rate shall initially be calculated using the LIBOR Rate on the date which is five (5) Business Days prior to the proposed date of disbursement of the Loan, but shall thereafter be calculated for each calendar month using the LIBOR Rate on the first calendar day of such month, provided, however, that if the first calendar day of any month is not a Business Day, the Loan Rate shall be calculated using the LIBOR Rate on the Business Day immediately preceding the first calendar day of such month. Interest (including interest at the Default Rate, if applicable) shall be computed on the basis of a 360-day year for the actual number of days elapsed. Notwithstanding any other provision hereof, the amount of interest payable hereunder shall not in any event exceed the maximum amount permitted by the law applicable to interest charged on commercial loans.

(d) Application of Payments. All payments received by Lenders prior to an Event of Default shall be applied as follows: (i) first, to each Lender's pro rata portion of the Lenders' Expenses then due and owing; and (ii) second, ratably, to all Scheduled Payments then due and owing (*provided*, however, if such payments are not sufficient to pay the whole amount then due, such payments shall be applied first to unpaid interest at the Loan Rate, then to the

remaining amounts then due). After an Event of Default, all payments and application of proceeds shall be made as set forth in Section 9.7.

(e) Late Payment Fee. Co-Borrowers shall pay to each Lender a late payment fee equal to five percent (5%) of any Scheduled Payment not paid when due to such Lender.

(f) Default Rate. Co-Borrowers shall pay interest at a per annum rate equal to the Default Rate on any amounts required to be paid by any Co-Borrower to Collateral Agent or any Lender under this Agreement or the other Loan Documents (including Scheduled Payments), payable with respect to any Loan, accrued and unpaid interest, and any fees or other amounts which remain unpaid after such amounts are due. If an Event of Default has occurred and the Obligations have been accelerated (whether automatically or by any Lender's election), Co-Borrowers shall pay interest on the aggregate, outstanding accelerated balance hereunder from the date of the Event of Default until all Events of Default are cured, at a per annum rate equal to the Default Rate.

(g) Final Payment.

(i) Loan A Final Payment. Co-Borrowers shall pay to Horizon a payment in the amount of Three Hundred Seventy-Five Thousand Dollars ($375,000) (the "Loan A Final Payment") upon the earlier of (A) payment in full of the principal balance of Loan A, (B) an Event of Default and demand by any Lender of payment in full of Loan A or (C) the Maturity Date applicable to Loan A, as applicable.

(ii) Loan B Final Payment. Co-Borrowers shall pay to SVB a payment in the amount of Three Hundred Seventy-Five Thousand Dollars ($375,000) (the "Loan B Final Payment") upon the earlier of (A) payment in full of the principal balance of Loan B, (B) an Event of Default and demand by any Lender of payment in full of Loan B or (C) the Maturity Date applicable to Loan B, as applicable.

(iii) Loan C Final Payment. Provided Loan C is funded, Co-Borrowers shall pay to Horizon a payment in the amount of Two Hundred Twenty-Five Thousand Dollars ($225,000) (the "Loan C Final Payment") upon the earlier of (A) payment in full of the principal balance of Loan C, (B) an Event of Default and demand by any Lender of payment in full of Loan C or (C) the Maturity Date applicable to Loan C, as applicable.

(iv) Loan D Final Payment. Provided Loan D is funded, Co-Borrowers shall pay to SVB a payment in the amount of Two Hundred Twenty-Five Thousand Dollars ($225,000) (the "Loan D Final Payment") upon the earlier of (A) payment in full of the principal balance of Loan D, (B) an Event of Default and demand by any Lender of payment in full of Loan D or (C) the Maturity Date applicable to Loan D, as applicable.

(v) Loan E Final Payment. Provided Loan E is funded, Co-Borrowers shall pay to Horizon a payment in the amount of One Hundred Fifty Thousand Dollars ($150,000) (the "Loan E Final Payment") upon the earlier of (A) payment in full of the principal balance of Loan E, (B) an Event of Default and demand by any Lender of payment in full of Loan E or (C) the Maturity Date applicable to Loan E, as applicable.

(vi) Loan F Final Payment. Provided Loan F is funded, Co-Borrowers shall pay to SVB a payment in the amount of One Hundred Fifty Thousand Dollars ($150,000) (the "Loan F Final Payment") upon the earlier of (A) payment in full of the principal balance of Loan F, (B) an Event of Default and demand by any Lender of payment in full of Loan F or (C) the Maturity Date applicable to Loan F, as applicable.

Prepayments

.

(a) Mandatory Prepayment Upon an Acceleration. If the Loans are accelerated following the occurrence of an Event of Default pursuant to Section 9.1(a) hereof, then Co-Borrowers, in addition to any other amounts which may be due and owing hereunder, shall immediately pay to Lenders the amount set forth in Section 2.3(b) below, as if Co-Borrowers had opted to prepay on the date of such acceleration.

(b) Optional Prepayment. Upon ten (10) Business Days' prior written notice to Lenders, Co-Borrowers may, at their option, at any time, prepay all (and not less than all) of the outstanding Loans by simultaneously paying to each Lender an amount equal to (i) any accrued and unpaid interest on the outstanding principal balance of its Loan being prepaid; *plus* (ii) an amount equal to (A) if such Loan is prepaid on or before the date that is eighteen (18) months from the Funding Date of Loan C and D hereunder, four percent (4%) of the then outstanding principal balance of such Loan, or (B) if such Loan is prepaid more than eighteen (18) months from the Funding Date of Loan C and D hereunder, two percent (2%) of the then outstanding principal balance of such Loan; *plus* (iii) the outstanding principal balance of such Loan; *plus* (iv) all other sums, if any, that shall have become due and payable hereunder.

Other Payment Terms

.

(a) Place and Manner. Co-Borrowers shall make all payments due to Lenders in lawful money of the United States. All payments of principal, interest, fees and other amounts payable by any Co-Borrower hereunder shall be made, in immediately available funds, not later than 2:00 p.m. New York time, on the date on which such payment is due. Co-Borrowers shall make such payments to each Lender via wire transfer or ACH as instructed by such Lender from time to time.

(b) Date. Whenever any payment is due hereunder on a day other than a Business Day, such payment shall be made on the next succeeding Business Day, and such extension of time shall be included in the computation of interest or fees, as the case may be.

(c) Taxes.

(i) Unless otherwise required under applicable law, any and all payments made hereunder or under the Notes shall be made free and clear of and without deduction for any Taxes; *provided* that if any Co-Borrower shall be required to deduct any Taxes from such payments, then (A) if such Tax is an indemnified Tax, the sum payable shall be increased as necessary so that after making all required deductions (including deductions applicable to additional sums payable under this Section 2.4(c)) the relevant Lender receives an amount equal to the sum it would have received had no such deductions for Indemnified Taxes been made, (B) such Co-Borrower shall make such deductions and (C) such Co-Borrower shall

pay the full amount deducted to the relevant Governmental Authority in accordance with applicable law.

(ii) Each Co-Borrower shall indemnify each Lender, within 10 days after written demand therefor, for the full amount of any Indemnified Taxes (including Indemnified Taxes imposed or asserted on or attributable to amounts payable under this Section 2.4(c)) payable or paid by such Lender or required to be withheld or deducted from a payment to such Lender and any reasonable expenses arising therefrom or with respect thereto, whether or not such Indemnified Taxes were correctly or legally imposed or asserted by the relevant Governmental Authority. A certificate as to the amount of such payment or liability delivered to Borrower Representative by a Lender shall be conclusive absent manifest error.

(iii) As soon as practicable after any payment of Taxes by any Co-Borrower hereunder to a Governmental Authority, such Co-Borrower shall deliver to Lenders the original or a certified copy of a receipt issued by such Governmental Authority evidencing such payment, a copy of the return reporting such payment or other evidence of such payment reasonably satisfactory to Lenders.

(iv) If any Lender is entitled to an exemption from or reduction of withholding Tax under the law of the jurisdiction in which any Co-Borrower is located, or any treaty to which such jurisdiction is a party, with respect to payments under this Agreement, such Lender shall deliver to Borrower Representative, as reasonably requested by Borrower Representative, such properly completed and executed documentation prescribed by applicable law as will permit such payments to be made without withholding or at a reduced rate. Without limiting the generality of the foregoing, (a) any Lender that is a U.S. Person shall deliver to Borrower on or prior to the date on which such Lender becomes a Lender under this Agreement (and from time to time thereafter upon the reasonable request of Borrower), an executed IRS Form W-9 certifying that such Lender is exempt from U.S. federal backup withholding tax and (b) any Lender that is not a U.S. Person shall, to the extent it is legally entitled to do so, deliver to Borrower on or prior to the date on which such Lender becomes a Lender under this Agreement (and from time to time thereafter upon the reasonable request of Borrower) an executed IRS Form W-8BEN, W-8BEN-E, W-8ECI or W-8YMI, as applicable, claiming exemption from or a reduction in U.S. federal withholding Tax, duly completed, together with such supplementary documentation as may be prescribed by applicable law to permit Borrower to determine the withholding or deduction required to be made, including in the case of a Lender claiming the benefits of the exemption for portfolio interest under Section 881(c) of the Internal Revenue Code, a certificate to the effect that such Lender is not a "bank" within the meaning of Section 881(c)(3)(A) of the Internal Revenue Code, a "10 percent shareholder" of Borrower within the meaning of Section 881(c)(3)(B) of the Internal Revenue Code, or a "controlled foreign corporation" described in Section 881(c)(3)(C) of the Internal Revenue Code. If a payment made to a Lender under any Loan Document would be subject to U.S. federal withholding Tax imposed by FATCA if such Lender were to fail to comply with the applicable reporting requirements of FATCA (including those contained in Section 1471(b) or 1472(b) of the Internal Revenue Code, as applicable), such Lender shall deliver to the Borrower at the time or times prescribed by law and at such time or times reasonably requested by Borrower such documentation prescribed by applicable law (including as prescribed by Section 1471(b)(3)(C)(i) of the Internal Revenue Code) and such additional documentation reasonably requested by

Borrower as may be necessary for Borrower to comply with their obligations under FATCA and to determine that such Lender has complied with such Lender's obligations under FATCA or to determine the amount to deduct and withhold from such payment. Solely for purposes of this clause (d), "FATCA" shall include any amendments made to FATCA after the date of this Agreement. Each Lender agrees that if any form or certification it previously delivered expires or becomes obsolete or inaccurate in any respect, it shall update such form or certification or promptly notify Borrower in writing of its legal inability to do so.

(v) If a Lender determines, in its sole, but reasonable, discretion exercised in good faith, that it has received a refund of any Taxes as to which it has been indemnified pursuant to this Section 2.4(c) (including by the payment of additional amounts pursuant to this Section 2.4(c)), it shall pay to the indemnifying Co-Borrower an amount equal to such refund (but only to the extent of indemnity payments made under this Section with respect to the Taxes giving rise to such refund), net of all out-of-pocket expenses (including Taxes) of such indemnified party and without interest (other than any interest paid by the relevant Governmental Authority with respect to such refund). Such indemnifying Co-Borrower, upon the request of such Lender, shall repay to such Lender the amount paid over pursuant to this paragraph (v) (plus any penalties, interest or other charges imposed by the relevant Governmental Authority) in the event that such Lender is required to repay such refund to such Governmental Authority. Notwithstanding anything to the contrary in this paragraph (v), in no event will the Lender be required to pay any amount to an indemnifying Co-Borrower pursuant to this paragraph (v) the payment of which would place the Lender in a less favorable net after-Tax position than the Lender would have been in if the Tax subject to indemnification and giving rise to such refund had not been deducted, withheld or otherwise imposed and the indemnification payments or additional amounts with respect to such Tax had never been paid. This paragraph shall not be construed to require any Lender to make available its tax returns (or any other information relating to its Taxes that it deems confidential) to any Co-Borrower or any other Person.

Procedure for Making the Loans

.

(a) Notice. Borrower Representative shall notify each Lender of the date on which Borrower Representative desires a Lender to make any Loan at least five (5) Business Days in advance of the desired Funding Date (except with respect to Loan A and Loan B, which shall be made by Lenders to the Co-Borrowers on the Effective Date), unless the relevant Lender elects at its sole discretion to allow the Funding Date for a Loan to be made by such Lender to be within five (5) Business Days of Borrower Representative's notice. Each Co-Borrower's execution and delivery to Lenders of one or more Notes in respect of a Loan shall be such Co-Borrower's agreement to the terms and calculations thereunder with respect to such Loan. Each Lender's obligation to make any Loan shall be expressly subject to the satisfaction of the conditions set forth in Section 3.

(b) Loan Rate Calculation. Prior to each Funding Date for any Loan, the applicable Lender shall establish the Loan Rate with respect to such Loan, which shall be set forth in the Note to be executed by each Co-Borrower with respect to such Loan and shall be conclusive in the absence of a manifest error.

(c) Disbursement. Lenders shall disburse the proceeds of each Loan by wire transfer to Co-Borrowers at the account specified in the Funding Certificate and Loan Payment/Advance Request Form for such Loan.

Good Faith Deposit; Legal and Closing Expenses; and Commitment Fee

.

(a) Good Faith Deposit. Co-Borrowers have delivered to Horizon a good faith deposit in the amount of Fifty Thousand Dollars ($50,000) (the "Good Faith Deposit"). The Good Faith Deposit paid to Horizon will be credited to the Commitment Fee payable to the Lenders. If, in connection with Lenders' due diligence or underwriting, Lenders elect not to proceed with the funding of the Loans, each Lender shall deduct its share of Lenders' Expenses and promptly return its pro rata share of the balance of the Good Faith Deposit to the Co-Borrowers. If the Co-Borrowers elect not to proceed with the financing, Lenders shall retain the Good Faith Deposit as compensation for their time, expenses and opportunity cost.

(b) Legal, Due Diligence and Documentation Expenses. Concurrently with its execution and delivery of this Agreement, Co-Borrowers shall pay to Lenders their reasonable legal, due diligence and documentation expenses in connection with the negotiation and documentation of this Agreement and the Loan Documents; provided that Co-Borrowers shall not be required to pay Lenders' Expenses in connection with closing of the Loan Documents in excess of Seventy-Five Thousand Dollars ($75,000) without each Co-Borrower's consent.

(c) Commitment Fee. Co-Borrowers shall pay concurrently with their execution and delivery of this Agreement a commitment fee to Horizon in the amount of One Hundred Twenty-Five Thousand Dollars ($125,000) and a commitment fee to SVB in the amount of One Hundred Twenty-Five Thousand Dollars ($125,000) (collectively, the "Commitment Fee"). The Commitment Fee shall be retained by the applicable Lender and be deemed fully earned upon receipt.

3. Conditions of Loan.

Conditions Precedent to Closing

. At the time of the execution and delivery of this Agreement, each Lender shall have received, in form and substance reasonably satisfactory to such Lender, all of the following (unless all Lenders have agreed to waive such condition or document, in which case such condition or document shall be a condition precedent to the making of any Loan and shall be deemed added to Section 3.2):

(a) Loan Agreement. This Agreement duly executed by each Co-Borrower, Collateral Agent and Lenders.

(b) Warrants. The Warrants duly executed by Borrower Representative.

(c) Secretary's Certificate. A certificate of the secretary or assistant secretary of each Co-Borrower, dated as of the date hereof, with copies of the following documents attached: (i) the certificate of incorporation and bylaws (or equivalent documents) of such Co-Borrower certified by such Co-Borrower as being complete and in full force and effect

on the date thereof, (ii) incumbency and representative signatures, and (iii) resolutions authorizing the execution and delivery of this Agreement and each of the other Loan Documents.

(d) Good Standing Certificates. A good standing certificate from each Co-Borrower's state of organization and the state in which each Co-Borrower's principal place of business is located, each dated as of a date no earlier than thirty (30) days prior to the date hereof.

(e) Certificate of Insurance. Evidence of the insurance coverage required by Section 6.8 of this Agreement.

(f) Consents. All necessary consents of shareholders and other third parties with respect to the execution, delivery and performance of this Agreement, the Warrants and the other Loan Documents. Lenders acknowledge that Co-Borrowers have, as of the date of this Agreement, satisfied the requirement set forth in this subsection (f).

(g) Legal Opinion. A legal opinion of the Co-Borrowers' counsel, dated as of the date hereof, covering the matters set forth in Exhibit D hereto.

(h) Account Control Agreements. Account Control Agreements for all of each Co-Borrower's deposit accounts and securities accounts at Citibank and Silicon Valley Bank, as well as each Co-Borrower's deposit accounts at Deutsche Bank and Wells Fargo, in each case, duly executed by all of the parties thereto.

(i) Fees and Expenses. Payment of all fees and expenses then due hereunder or under any other Loan Document.

(j) Material Adverse Effect. In each Lender's sole but reasonable discretion, there has not been any Material Adverse Effect.

(k) Other Documents. Such other documents and completion of such other matters, as any Lender may reasonably deem necessary or appropriate.

Conditions Precedent to Making Loan A and Loan B

. The obligation of the applicable Lender to make Loan A or Loan B is further subject to satisfaction of the following conditions as of the applicable Funding Date:

(a) No Default. No Default or Event of Default shall have occurred and be continuing.

(b) Landlord Agreements. Each Co-Borrower shall have provided Lenders with a Landlord Agreement for each location where any Co-Borrower's books and records and the Collateral (other than (i) clinical trial materials, patient materials and generic kits, (ii) laptops and similar equipment maintained by Borrower's employees, and (iii) other Collateral with an aggregate value not to exceed Fifty Thousand Dollars ($100,000)) is located (unless a Co-Borrower is the fee owner thereof).

(c) Note. Each Co-Borrower shall have duly executed and delivered a Note in the amount of the Loan A to Horizon, and a Note in the amount of Loan B to SVB.

(d) UCC Financing Statements. Lenders shall have received such documents, instruments and agreements, including UCC financing statements or amendments to UCC financing statements and UCC financing statement searches, as any Lender shall reasonably request to evidence the perfection and priority of the security interests granted to Collateral Agent and each Lender pursuant to Section 4. Each Co-Borrower authorizes Collateral Agent and each Lender to file any UCC financing statements, continuations of or amendments to UCC financing statements they deem necessary to perfect its security interest in the Collateral.

(e) Funding Certificate/Loan Payment Advance Request Form. Borrower Representative shall have duly executed and delivered to (i) Lenders, a Funding Certificate for such Loans and (ii) SVB, a Loan Payment/Advance Request Form for such Loan B.

(f) Warrants. The Warrants duly executed by Borrower Representative.

(g) Representations and Warranties. The representations and warranties made by each Co-Borrower in Section 5 and in the other Loan Documents shall be true and correct in all material respects (except to the extent that such representations and warranties are qualified by the term "material," or a similar term, in which case such representations and warranties (as so written, including the term "material" or such similar term) shall have been true, correct and complete in all respects) as of such Funding Date, except for any representations and warranties that specifically relate to a prior date, which shall be true and correct as of such earlier date.

(h) Material Adverse Effect. In each Lender's sole, but reasonable, discretion, there has not been any Material Adverse Effect.

(i) Other Documents. Each Co-Borrower shall have provided Lenders with such other documents and completion of such other matters, as any Lender may reasonably deem necessary or appropriate.

Conditions Precedent to Making Loan C and Loan D

3.4 . The obligation of the applicable Lender to make Loan C or Loan D is further subject to satisfaction of the following conditions as of the applicable Funding Date:

(a) No Default. No Default or Event of Default shall have occurred and be continuing.

(b) Note. Each Co-Borrower shall have duly executed and delivered a Note in the amount of the Loan C to Horizon, and a Note in the amount of Loan D to SVB.

(c) Patient Enrollment. Borrower Representative shall have provided Lenders with evidence reasonably satisfactory to Lenders that, on or before the Loan C Commitment Termination Date, not less than four hundred (400) patients have been enrolled in Part A of Co-Borrowers' Phase III clinical trial for Borrower's TTP488 drug. Lenders

acknowledge that Co-Borrowers have, as of the date of this Agreement, satisfied the requirement set forth in this subsection (c).

(d) Clinical Milestones. Borrower Representative shall have provided Lenders with evidence reasonably satisfactory to Lenders that, on or before the Loan C Commitment Termination Date, Co-Borrowers have achieved positive top line results for either (i) Co-Borrowers' TTP399 drug or (ii) Co-Borrowers' TTP273 drug. Lenders acknowledge that Co-Borrowers have, as of the date of this Agreement, satisfied the requirement set forth in this subsection (d).

(e) Filing of 10Q. Borrower Representative shall have provided Lenders with evidence reasonably satisfactory to Lenders that Borrower Representative has filed Report 10-Q with respect to the Co-Borrowers operations for the period commencing as of July 1, 2016 and continuing through September 30, 2016 with the United States Securities and Exchange Commission.

(f) Funding Certificate/Loan Payment Advance Request Form. Borrower Representative shall have duly executed and delivered to (i) Lenders, a Funding Certificate for such Loans and (ii) SVB, a Loan Payment/Advance Request Form for such Loan D.

(g) Representations and Warranties. The representations and warranties made by each Co-Borrower in Section 5 and in the other Loan Documents shall be true and correct in all material respects (except to the extent that such representations and warranties are qualified by the term "material," or a similar term, in which case such representations and warranties (as so written, including the term "material" or such similar term) shall have been true, correct and complete in all respects) as of such Funding Date, except for any representations and warranties that specifically relate to a prior date, which shall be true and correct as of such earlier date.

(h) Material Adverse Effect. In each Lender's sole, but reasonable, discretion, there has not been any Material Adverse Effect.

(i) Other Documents. Each Co-Borrower shall have provided Lenders with such other documents and completion of such other matters, as any Lender may reasonably deem necessary or appropriate.

Conditions Precedent to Making Loan E and Loan F

. The obligation of the applicable Lender to make Loan E or Loan F is further subject to satisfaction of the following conditions as of the applicable Funding Date:

(a) No Default. No Default or Event of Default shall have occurred and be continuing.

(b) Note. Each Co-Borrower shall have duly executed and delivered a Note in the amount of the Loan E to Horizon, and a Note in the amount of Loan F to SVB.

(c) Conditions to Making Loans C and D Satisfied. Co-Borrowers shall have satisfied the conditions to the making of Loan C and Loan D set forth in Sections 3.3(c), 3.3(d) and 3.3(e) of this Agreement.

(d) Definitive Term Sheet. Borrower Representative shall have, on or prior to the Loan E Commitment Termination Date, delivered to Lenders a Qualifying Term Sheet.

(e) Funding Certificate/Loan Payment Advance Request Form. Borrower Representative shall have duly executed and delivered to (i) Lenders, a Funding Certificate for such Loans and (ii) SVB, a Loan Payment/Advance Request Form for such Loan F.

(f) Additional Warrants. The Additional Warrants duly executed by Borrower Representative.

(g) Representations and Warranties. The representations and warranties made by each Co-Borrower in Section 5 and in the other Loan Documents shall be true and correct in all material respects (except to the extent that such representations and warranties are qualified by the term "material," or a similar term, in which case such representations and warranties (as so written, including the term "material" or such similar term) shall have been true, correct and complete in all respects) as of such Funding Date, except for any representations and warranties that specifically relate to a prior date, which shall be true and correct as of such earlier date.

(h) Material Adverse Effect. In each Lender's sole, but reasonable, discretion, there has not been any Material Adverse Effect.

(i) Other Documents. Each Co-Borrower shall have provided Lenders with such other documents and completion of such other matters, as any Lender may reasonably deem necessary or appropriate.

Covenant to Deliver

. Each Co-Borrower agrees (not as a condition but as a covenant) to deliver to Lenders each item required to be delivered to Lenders as a condition to each Loan, if such Loan is advanced. Each Co-Borrower expressly agrees that the extension of any Loan prior to the receipt by a Lender of any such item shall not constitute a waiver by such Lender of any Co-Borrower's obligation to deliver such item, and any such extension in the absence of a required item shall be in each Lender's sole discretion.

3.7 Post-Effective Date Obligations. Within 45 days of the Effective Date, or such longer period as Lenders may agree in their sole discretion, Co-Borrowers shall provide:

(a) Account Control Agreements. Account Control Agreements for all of each Co-Borrower's securities accounts located at Wells Fargo, duly executed by all of the parties thereto.

4. Creation of Security Interest.

Grant of Security Interests

. Each Co-Borrower grants to Collateral Agent and each Lender a valid, continuing security interest in all presently existing and hereafter acquired or arising Collateral in order to secure prompt, full and complete payment of any and all Obligations and in order to secure prompt, full and complete performance by each Co-Borrower of each of its covenants and duties under each of the Loan Documents (other than the Warrants). The "Collateral" shall mean and include all right, title, interest, claims and demands of each Co-Borrower in the following:

(a) All goods (and embedded computer programs and supporting information included within the definition of "goods" under the Code) and equipment now owned or hereafter acquired, including all laboratory equipment, computer equipment, office equipment, machinery, fixtures, vehicles (including motor vehicles and trailers), and any interest in any of the foregoing, and all attachments, accessories, accessions, replacements, substitutions, additions, and improvements to any of the foregoing, wherever located;

(b) All inventory now owned or hereafter acquired, including all merchandise, raw materials, parts, supplies, packing and shipping materials, work in process and finished products including such inventory as is temporarily out of any Co-Borrower's custody or possession or in transit and including any returns upon any accounts or other proceeds, including insurance proceeds, resulting from the sale or disposition of any of the foregoing and any documents of title representing any of the above, and each Co-Borrower's books relating to any of the foregoing;

(c) All contract rights and general intangibles (except to the extent included within the definition of Intellectual Property), now owned or hereafter acquired, including goodwill, license agreements, franchise agreements, blueprints, drawings, purchase orders, customer lists, route lists, infringements, claims, software, computer programs, computer disks, computer tapes, literature, reports, catalogs, design rights, income tax refunds, payment intangibles, commercial tort claims, payments of insurance and rights to payment of any kind;

(d) All now existing and hereafter arising accounts, contract rights, royalties, license rights, license fees and all other forms of obligations owing to any Co-Borrower arising out of the sale or lease of goods, the licensing of technology or the rendering of services by any Co-Borrower (subject, in each case, to the contractual rights of third parties to require funds received by any Co-Borrower to be expended in a particular manner), whether or not earned by performance, and any and all credit insurance, guaranties, and other security therefor, as well as all merchandise returned to or reclaimed by any Co-Borrower and each Co-Borrower's books relating to any of the foregoing;

(e) All documents, cash, deposit accounts, letters of credit and letters of credit rights (whether or not the letter of credit is evidenced by a writing) and other supporting obligations, certificates of deposit, instruments, promissory notes, chattel paper (whether tangible or electronic) and investment property, including all securities, whether certificated or uncertificated, security entitlements, securities accounts, commodity contracts and commodity

accounts, and all financial assets held in any securities account or otherwise, wherever located, now owned or hereafter acquired and each Co-Borrower's books relating to the foregoing; and

(f) To the extent not covered by clauses (a) through (e), all other personal property of each Co-Borrower, whether tangible or intangible, and any and all rights and interests in any of the above and the foregoing and, any and all claims, rights and interests in any of the above and all substitutions for, additions and accessions to and proceeds thereof, including insurance, condemnation, requisition or similar payments and proceeds of the sale or licensing of Intellectual Property to the extent such proceeds no longer constitute Intellectual Property; but

Notwithstanding the foregoing, the Collateral shall not include any Intellectual Property; *provided*, *however*, that the Collateral shall include all accounts receivables, accounts, and general intangibles that consist of rights to payment and proceeds from the sale, licensing or disposition of all or any part, or rights in, the foregoing (the "Rights to Payment"). Notwithstanding the foregoing, if a judicial authority (including a U.S. Bankruptcy Court) holds that a security interest in the underlying Intellectual Property is necessary to have a security interest in the Rights to Payment, then the Collateral shall automatically, and effective as of the date hereof, include the Intellectual Property to the extent necessary to permit perfection of Lender's security interest in the Rights to Payment.

Notwithstanding the foregoing, upon the earlier of (a) the failure of Co-Borrowers' Phase III clinical trial for Co-Borrowers' TTP488 drug to meet the FDA Special Protocol Assessment clinical end points for such Phase III clinical trial, as approved by the FDA and as set forth on Exhibit F annexed hereto or (b) Co-Borrowers ending such Phase III clinical trial for Co-Borrowers' TTP488 drug, then as of such date, (A) each Co-Borrower grants and pledges to Collateral Agent and Lenders a continuing security interest in all of such Co-Borrower's then owned and thereafter arising Intellectual Property in order to secure prompt payment of any and all Obligations and in order to secure prompt performance by each Co-Borrower of each of its covenants and duties under the Loan Documents, (B) the definition of "Collateral" shall be amended, automatically and immediately, without any further action or writing required by the parties such that all of each Co-Borrower's Intellectual Property then owned and thereafter arising or acquired becomes part of the Collateral for all purposes of the Loan Agreement, (C) Collateral Agent and Lenders shall be authorized to file an amendment to their UCC-1 financing statements to reflect the inclusion of the Intellectual Property within the description of the Collateral as well as appropriate documentation with the United Stated Patent and Trademark Office to evidence such security interest and (D) each Co-Borrower shall execute and deliver, at Co-Borrowers' sole cost and expense, all documents and instruments reasonably necessary to perfect such security interest, including, but not limited to, intellectual property security agreements. Notwithstanding the foregoing, to the extent that any Intellectual Property is subject to a Permitted Transfer, such Intellectual Property shall not be considered Collateral to the extent that such Permitted Transfer expressly prohibits Co-Borrowers from granting a Lien on such Intellectual Property.

4.1.2 Bank Services. Each Co-Borrower acknowledges that it previously has entered, and/or may in the future enter, into Bank Services Agreements with SVB. Regardless of the terms of any Bank Services Agreement, each Co-Borrower agrees that any amounts such Co-Borrower owes SVB thereunder shall be deemed to be Obligations hereunder and that it is the

intent of each Co-Borrower and SVB to have all such Obligations secured by the first priority perfected security interest in the Collateral granted herein (subject only to Permitted Liens that may have superior priority to SVB's Lien in this Agreement).

After-Acquired Property

. If any Co-Borrower shall at any time acquire a commercial tort claim, as defined in the Code, with a value in excess of Two Hundred Fifty Thousand Dollars ($250,000), Borrower Representative shall promptly notify Collateral Agent and Lenders in writing signed by Borrower Representative of the brief details thereof and each Co-Borrower shall grant to Collateral Agent and each Lender a security interest therein and in the proceeds thereof, all upon the terms of this Agreement, with such writing to be in form and substance satisfactory to Collateral Agent and each Lender.

Duration of Security Interest

. Collateral Agent's and each Lender's security interest in the Collateral shall continue until the indefeasible payment in full and the satisfaction of all Obligations, and termination of each Lender's commitment to fund the Loans, whereupon such security interest shall terminate. Collateral Agent and each Lender shall, at Co-Borrowers' sole cost and expense, execute such further documents and take such further actions as may be reasonably necessary to make effective the release contemplated by this Section 4.3, including duly authorizing and delivering termination statements for filing in all relevant jurisdictions under the Code. In the event (x) all Obligations (other than inchoate indemnity obligations), except for Bank Services, are satisfied in full, and (y) this Agreement is terminated, SVB shall terminate the security interest granted herein upon Borrower providing cash collateral acceptable to SVB in its good faith business judgment for Bank Services, if any. In the event such Bank Services consist of outstanding Letters of Credit, Borrower shall provide to SVB cash collateral in an amount equal to (x) if such Letters of Credit are denominated in Dollars, then one hundred five percent (105%); and (y) if such Letters of Credit are denominated in a Foreign Currency, then one hundred ten percent (110%), of the Dollar Equivalent of the face amount of all such Letters of Credit plus all interest, fees, and costs due or to become due in connection therewith (as estimated by SVB in its good faith business judgment), to secure all of the Obligations relating to such Letters of Credit.

Location and Possession of Collateral

. The Collateral (other than (i) clinical trial materials, patient materials and generic kits, (ii) laptops and similar equipment maintained by Borrower's employees, and (iii) other Collateral with an aggregate value not to exceed $100,000) is and shall remain in the possession of a Co-Borrower at its location listed on the cover page hereof or as set forth in the Disclosure Schedule, or at such other locations as to which a Co-Borrower has provided written notice to Collateral Agent. Co-Borrowers shall remain in full possession, enjoyment and control of the Collateral (other than (i) clinical trial materials, patient materials and generic kits, (ii) laptops and similar equipment maintained by Borrower's employees, and (iii) other Collateral with an aggregate value not to exceed $100,000) (except only as may be otherwise required by Collateral Agent for perfection of the security interests therein created hereunder and as otherwise permitted under this Agreement) and so long as no Event of Default has occurred, shall be entitled to manage, operate and use the same and each part thereof with the rights and franchises appertaining thereto; *provided* that the possession, enjoyment, control and use of the Collateral shall at all times be subject to the observance and performance of the terms of this Agreement.

Delivery of Additional Documentation Required

. Each Co-Borrower shall from time to time execute and deliver to Collateral Agent and Lenders, at the request of Collateral Agent or any Lender, all financing statements and other documents Collateral Agent or any Lender may reasonably request, in form satisfactory to Collateral Agent and Lenders, to perfect and continue Collateral Agent's and Lenders' perfected security interests in the Collateral and in order to consummate fully all of the transactions contemplated under the Loan Documents.

Right to Inspect

. Collateral Agent and each Lender (through any of their officers, employees, or agents) shall have the right, upon reasonable prior notice, from time to time during each Co-Borrower's usual business hours, to inspect the books and records of each Co-Borrower and their Subsidiaries and to make copies thereof and to inspect, test, and appraise the Collateral in order to verify each Co-Borrower's financial condition or the amount, condition of, or any other matter relating to, the Collateral; provided, that, prior to an Event of Default, Collateral Agent shall be permitted to conduct no more than one inspection in any calendar year period. The Co-Borrowers shall pay all reasonable costs and expenses in connection with such inspection.

Protection of Intellectual Property

. Each Co-Borrower shall:

(a) To the extent required in the exercise of such Co-Borrower's reasonable business judgment, protect, defend and maintain the validity and enforceability of its Intellectual Property material to such Co-Borrower's business and promptly advise Collateral Agent in writing of material infringements; and

(b) not allow any Intellectual Property material to any Co-Borrower's business to be abandoned, forfeited or dedicated to the public without each Lender's written consent, such consent not to be unreasonably withheld.

5. Representations and Warranties. Except as set forth in the Disclosure Schedule, each Co-Borrower represents and warrants as follows:

Organization and Qualification

. Each Co-Borrower and its Subsidiaries is a corporation or limited liability company duly organized and validly existing under the laws of its state of formation and qualified and licensed to do business in, and is in good standing in, any jurisdiction in which the conduct of its business or its ownership of Property requires that it be so qualified and licensed or in which the Collateral is located, except for such states as to which any failure to so qualify would not have a Material Adverse Effect.

Authority

. Each Co-Borrower has all necessary power and authority to execute, deliver, and perform in accordance with the terms thereof, the Loan Documents to which it is a party. Each Co-Borrower and its Subsidiaries have all requisite power and authority to own and operate their Property and to carry on their businesses as now conducted. To each Co-Borrower's knowledge, each Co-Borrower and its Subsidiaries have obtained all licenses, permits, approvals and other authorizations necessary for the operation of their business.

Conflict with Other Instruments, etc.

Neither the execution and delivery of any Loan Document to which any Co-Borrower is a party nor the consummation of the transactions therein contemplated nor compliance with the terms, conditions and provisions thereof will conflict with or result in a breach of any of the terms, conditions or provisions of the articles or certificate of incorporation, the by-laws, or any other organizational documents of any Co-Borrower or violate in any material respect any law or any regulation, order, writ, injunction or decree of any court or Governmental Authority by which any Co-Borrower or any Subsidiary or any of their respective property or assets may be bound or affected or any material agreement or instrument to which any Co-Borrower is a party or by which it or any of its Property is bound or to which it or any of its Property is subject, or constitute a default thereunder or result in the creation or imposition of any Lien, other than Permitted Liens.

Authorization; Enforceability

. The execution and delivery of this Agreement, the granting of the security interest in the Collateral, the incurrence of the Loans, the execution and delivery of the other Loan Documents to which any Co-Borrower is a party and the consummation of the transactions herein and therein contemplated have each been duly authorized by all necessary action on the part of each Co-Borrower. No authorization, consent, approval, license or exemption of, and no registration, qualification, designation, declaration or filing with, or notice to, any Person is, except for those which have been made or obtained and are in full force and effect, was or will be necessary to (a) the valid execution and delivery of any Loan Document to which any Co-Borrower is a party, (b) the performance of each Co-Borrower's obligations under any Loan Document or (c) the granting of the security interest in the Collateral, except for filings in connection with the perfection of the security interest in any of the Collateral or the issuance of the Warrants. The Loan Documents have been duly executed and delivered and constitute legal, valid and binding obligations of each Co-Borrower, enforceable in accordance with their respective terms, except as the enforceability thereof may be limited by bankruptcy, insolvency or other similar laws of general application relating to or affecting the enforcement of creditors' rights or by general principles of equity.

No Prior Encumbrances

. Each Co-Borrower has good and marketable title to the Collateral, free and clear of Liens except for Permitted Liens. Each Co-Borrower has good title and ownership of, or is licensed under, all of such Co-Borrower's current Intellectual Property, free and clear of Liens other than Permitted Liens. Each Co-Borrower is the sole owner of the Intellectual Property which it owns or purports to own except for (a) Permitted Transfers, (b) over-the-counter software that is commercially available to the public and (c) material Intellectual Property licensed to, or jointly owned by, such Co-Borrower and noted on the Disclosure Schedule. To the knowledge of each Co-Borrower, each patent which it owns or purports to own and which is material to any Co-Borrower's business is valid and enforceable, and no part of the Intellectual Property which any Co-Borrower owns or purports to own and which is material to any Co-Borrower's business has been judged invalid or unenforceable, in whole or in part. Except as noted on the Disclosure Schedule, no Co-Borrower is a party to, nor is it bound by, any Restricted License. No Co-Borrower has received any communications alleging that any Co-Borrower has violated, or by conducting its business as proposed, would violate any proprietary rights of any other Person. No Co-Borrower has knowledge of any material infringement or violation by it of the intellectual property rights of any third party and has no knowledge of any violation or infringement by a third party of any of its Intellectual

Property. The Collateral and the Intellectual Property constitute substantially all of the assets and property of each Co-Borrower.

Security Interest

. The provisions of this Agreement create legal and valid security interests in the Collateral in favor of the Collateral Agent and each Lender, and, assuming the proper filing of one or more financing statement(s) identifying the Collateral with the proper state and/or local authorities, the security interests in the Collateral granted to Collateral Agent and each Lender pursuant to this Agreement (a) constitute and will continue to constitute first priority security interests (except to the extent any Permitted Liens may have a superior priority to Collateral Agent's and Lenders' Lien under this Agreement) and (b) are and will continue to be superior and prior to the rights of all other creditors of any Co-Borrower (except to the extent of such Permitted Liens).

Name; Location of Chief Executive Office, Principal Place of Business and Collateral

. No Co-Borrower has done business under any name other than that specified on the signature page hereof. Each Co-Borrower's jurisdiction of incorporation, chief executive office, principal place of business, and the place where such Co-Borrower maintains its records concerning the Collateral are presently located in the state and at the address set forth on the cover page of this Agreement. The Collateral is presently located at the address set forth on the cover page hereof or as set forth in the Disclosure Schedule.

Litigation

. There are no actions or proceedings pending by or against any Co-Borrower or any Subsidiary before any court, arbitral tribunal, regulatory organization, administrative agency or similar body in which an adverse decision could result in liabilities owing from any Co-Borrower, individually or in the aggregate, of more than Two Hundred Thousand Dollars ($200,000.00). No Co-Borrower has knowledge of any such pending or threatened actions or proceedings.

Financial Statements

. All financial statements relating to any Co-Borrower or any Subsidiary that have been delivered by any Co-Borrower to Collateral Agent or a Lender present fairly in all material respects each Co-Borrower's Consolidated financial condition as of the date thereof and each Co-Borrower's Consolidated results of operations for the period then ended.

No Material Adverse Effect

. No event has occurred and no condition exists which could reasonably be expected to have a Material Adverse Effect since December 31, 2015.

Full Disclosure

. No written representation, warranty or other statement made by any Co-Borrower in any Loan Document (including the Disclosure Schedule), certificate or written statement (other than projections, forward-looking statements and other information of a general economic or industry nature, which projections, forward-looking statements and other information of a general economic or industry nature have been prepared by Borrower in good faith based upon assumptions believed by Borrower to be reasonable at the time) furnished to Collateral Agent or any Lender taken together with all other representations, warranties or other statements contains any untrue statement of a material fact or omits to state a material fact necessary in order to make the statements contained in such certificates or

statements, in light of the circumstances under which they were made, not misleading. There is no fact known to any Co-Borrower which materially adversely affects, or which could in the future be reasonably expected to materially adversely affect, its ability to perform its obligations under this Agreement.

Solvency, Etc

. Each Co-Borrower is Solvent (as defined below) and, after the execution and delivery of the Loan Documents and the consummation of the transactions contemplated thereby, each Co-Borrower will be Solvent. "Solvent" means, with respect to any Person on any date, that on such date (a) the fair value of the property of such Person is greater than the fair value of the liabilities (including contingent liabilities) of such Person, (b) the present fair saleable value of the assets of such Person is not less than the amount that will be required to pay the probable liability of such Person on its debts as they become absolute and matured, (c) such Person does not intend to, and does not believe that it will, incur debts or liabilities beyond such Person's ability to pay as such debts and liabilities mature and (d) such Person is not engaged in business or a transaction, and is not about to engage in business or a transaction, for which such Person's property would constitute an unreasonably small capital.

Subsidiaries

. As of the Effective Date, no Co-Borrower has any Subsidiaries.

5.14 Reserved.

5.15 Catastrophic Events; Labor Disputes. No Co-Borrower or Subsidiary, or any of their respective Property is or has been affected by any fire, explosion, accident, strike, lockout or other labor dispute, drought, storm, hail, earthquake, embargo, act of God or other casualty that could reasonably be expected to have a Material Adverse Effect. There are no disputes presently subject to grievance procedure, arbitration or litigation under any of the collective bargaining agreements, employment contracts or employee welfare or incentive plans to which any Co-Borrower or any Subsidiary is a party, and there are no strikes, lockouts, work stoppages or slowdowns, or, to the knowledge of any Co-Borrower, jurisdictional disputes or organizing activity occurring or threatened which could reasonably be expected to have a Material Adverse Effect.

Certain Agreements of Officers, Employees and Consultants

.

(a) No Violation. To the knowledge of each Co-Borrower, no officer, employee or consultant of any Co-Borrower is, or is now expected to be, in violation of any term of any employment contract, proprietary information agreement, nondisclosure agreement, noncompetition agreement or any other material contract or agreement or any restrictive covenant relating to the right of any such officer, employee or consultant to be employed by any Co-Borrower because of the nature of the business conducted or to be conducted by such Co-Borrower or relating to the use of trade secrets or proprietary information of others, and to each Co-Borrower's knowledge, the continued employment of each Co-Borrower's officers, employees and consultants does not subject any Co-Borrower to any material liability for any claim or claims arising out of or in connection with any such contract, agreement, or covenant in each case that, either individually or in the aggregate, would reasonably be expected to have a Material Adverse Effect.

(b) No Present Intention to Terminate. To the knowledge of each Co-Borrower, no officer of any Co-Borrower, and no employee or consultant of any Co-Borrower whose termination, either individually or in the aggregate, would reasonably be expected to have a Material Adverse Effect, has any present intention of terminating his or her employment or consulting relationship with any Co-Borrower.

No Plan Assets

. No Co-Borrower nor any Subsidiary is an "employee benefit plan," as defined in Section 3(3) of ERISA, subject to Title I of ERISA, and none of the assets of any Co-Borrower or any Subsidiary constitutes or will constitute "plan assets" of one or more such plans within the meaning of 29 C.F.R. Section 2510.3-101. In addition, (a) no Co-Borrower nor any Subsidiary is a "governmental plan" within the meaning of Section 3(32) of ERISA and (b) transactions by or with any Co-Borrower or any Subsidiary are not subject to state statutes regulating investment of, and fiduciary obligations with respect to, governmental plans similar to the provisions of Section 406 of ERISA or Section 4975 of the Internal Revenue Code currently in effect, which prohibit or otherwise restrict the transactions contemplated by this Loan Agreement.

5.18 Sanctions, Etc. No Co-Borrower, nor any of its Subsidiaries or to the knowledge of a Co-Borrower, any director, officer, employee or agent of any Co-Borrower or any of its Subsidiaries, is a Person that is, or is owned or controlled by Persons that are, (b) the subject or target of any Sanctions or (b) located, organized or resident in a country or territory that is, or whose government is, the subject of Sanctions. To the best of each Co-Borrower's knowledge, as of the date hereof and at all times throughout the term of this Agreement, including after giving effect to any transfers of interests permitted pursuant to the Loan Documents, none of the funds of any Co-Borrower or any Subsidiary have been (or will be) derived from any unlawful activity with the result that the investment in the respective party (whether directly or indirectly), is prohibited by applicable law or the Loans are in violation of applicable law.

Regulatory Compliance

. No Co-Borrower is a "bank holding company" or a direct or indirect subsidiary of a "bank holding company" as defined in the Bank Holding Company Act of 1956, as amended, and Regulation Y thereunder of the Board of Governors of the Federal Reserve System. No Co-Borrower nor any Subsidiary is required to be registered as an "investment company" or a company controlled by an "investment company" under the Investment Company Act of 1940. No Co-Borrower is engaged in the business of extending credit for the purpose of purchasing or carrying margin stock (as defined in Regulation U of the Board of Governors of the Federal Reserve System) and no proceeds of any Loan will be used to purchase or carry margin stock or to extend credit to others for the purpose of purchasing or carrying any margin stock.

Payment of Taxes

, Tax Audits.

(a) Each of the Co-Borrowers and their Subsidiaries has (i) timely filed or caused to be timely filed all U.S. federal income tax returns and all other material tax returns reports and statements (including any attachments thereto or amendments thereof) required to be filed by such Persons, (ii) paid or made adequate provision for the payment of all material amounts of taxes, fees, assessments and other governmental charges except for taxes, fees, assessments and other

governmental charges that are being contested in good faith through appropriate proceedings and with respect to which adequate reserves are being maintained in accordance with GAAP, and (iii) no tax lien has been filed and no tax lien claim is being asserted against any of its properties with respect to tax liabilities in excess of Fifty Thousand Dollars ($50,000), individually, or in the aggregate.

(b) No Co-Borrower is an "S corporation" within the meaning of Section 1361(a)(1) of the Internal Revenue Code of 1986, as amended (the "Internal Revenue Code").

(c) To the knowledge of each Co-Borrower, no tax return of any Co-Borrower or any Subsidiary is currently under an audit or examination, and no Co-Borrower has received written notice of any proposed audit or examination, in each case where a material amount of tax is at issue.

6. Affirmative Covenants. Each Co-Borrower, until the full and complete payment of the Obligations, covenants and agrees that:

Good Standing

. Each Co-Borrower shall maintain, and cause each of its Subsidiaries to maintain, its corporate existence and its good standing in its jurisdiction of incorporation and maintain qualification in each jurisdiction in which the failure to so qualify could reasonably be expected to have a Material Adverse Effect. Each Co-Borrower shall maintain, and cause each of its Subsidiaries to maintain, in force all licenses, approvals and agreements, the loss of which could reasonably be expected to have a Material Adverse Effect.

Government Compliance

. Each Co-Borrower shall comply, and cause each of its Subsidiaries to comply, with all statutes, laws, ordinances and government rules and regulations to which it is subject, noncompliance with which could reasonably be expected to have a Material Adverse Effect.

Financial Statements, Reports, Certificates

. Each Co-Borrower shall deliver to each Lender: (a) as soon as available, but in any event within thirty (30) days after the end of each month, Co-Borrower prepared monthly reports of cash balances, and (b) as soon as available, but in any event within sixty (60) days after the earlier of (i) the end of each Co-Borrower's fiscal year or (ii) the date of such Co-Borrower's board of directors' adoption, such Co-Borrower's operating budget and plan for the next fiscal year; and (c) such other financial information that is prepared or maintained by a Co-Borrower in the ordinary course of its business as any Lender may reasonably request from time to time. From and after such time as any Co-Borrower becomes a publicly reporting company, Borrower Representative shall deliver to each Lender: promptly as they are available and in any event: (i) at the time of filing of such Co-Borrower's Form 10-K with the Securities and Exchange Commission after the end of each fiscal year of such Co-Borrower (and in any event within ninety (90) days following the end of each fiscal year), the financial statements of such Co-Borrower filed with such Form 10-K; and (ii) at the time of filing of such Co-Borrower's Form 10-Q with the Securities and Exchange Commission after the end of each of the first three fiscal quarters of such Co-Borrower (and in any event within forty-five (45) days following the end of each of the first three fiscal quarters of the fiscal year), the Consolidated financial statements of such Co-Borrower filed with such Form 10-Q. In addition, each Co-Borrower shall deliver to each Lender (A) promptly upon

becoming available, copies of all statements, reports and notices sent or made available generally by such Co-Borrower to its security holders and (B) promptly upon receipt of written notice thereof, a report of any material legal actions pending or threatened against such Co-Borrower or any Subsidiary or the commencement of any action, proceeding or governmental investigation involving such Co-Borrower or any Subsidiary is commenced that is reasonably expected to result in damages or costs to any Co-Borrower of Two Hundred and Fifty Thousand Dollars ($250,000) or more. The items specified in this Section 6.3 shall be deemed delivered upon posting with EDGAR or posting the items or a link thereto on the Borrower Representative's website.

Certificates of Compliance

. Each time financial statements are furnished pursuant to Section 6.3 above, Borrower Representative shall deliver to each Lender an Officer's Certificate signed by a Responsible Officer, in the form of, and certifying to the matters set forth in, Exhibit E hereto.

Notice of Defaults

. As soon as possible, and in any event within five (5) days after the discovery of a Default or an Event of Default, Borrower Representative shall provide each Lender with an Officer's Certificate setting forth the facts relating to or giving rise to such Default or Event of Default and the action which each Co-Borrower proposes to take with respect thereto.

Taxes

. Each Co-Borrower shall, and cause each Subsidiary to, (i) timely file or cause to be filed all U.S. federal income tax returns and all other material tax returns required to be filed by it and (ii) pay, or cause to be paid, all material amounts of taxes, assessments and other governmental charges, if any, other than taxes, assessments and other governmental charges being contested in good faith by appropriate proceedings as to which adequate reserves have been provided in accordance with GAAP. In addition, no Co-Borrower shall change, and nor shall any Subsidiary be permitted to change, its respective jurisdiction of incorporation or formation (other than to another jurisdiction within the United States).

Use; Maintenance

. Each Co-Borrower shall keep and maintain all items of equipment and other similar types of personal property that form any significant portion or portions of the Collateral in good operating condition and repair, ordinary wear and tear excepted, and shall make all necessary replacements thereof and renewals thereto so that the value and operating efficiency thereof shall at all times be maintained and preserved. No Co-Borrower shall permit any such material item of Collateral to become a fixture to real estate or an accession to other personal property of another Person, without the prior written consent of Collateral Agent. No Co-Borrower shall permit any such material item of Collateral to be operated or maintained in violation of any applicable law, statute, rule or regulation. With respect to items of leased equipment (to the extent Collateral Agent and Lenders have any security interest in any residual Co-Borrower's interest in such equipment under the lease), such Co-Borrower shall keep, maintain, repair, replace and operate such leased equipment in accordance in all material respects with the terms of the applicable lease.

Insurance

. Each Co-Borrower shall keep its business and the Collateral insured for risks and in amounts usual and customary for companies in such Co-Borrower's industry and location, and as Collateral Agent or any Lender may reasonably request. Insurance

policies shall be in a form, with companies, and in amounts that are satisfactory to Collateral Agent. All property policies shall have a lender's loss payable endorsement showing Collateral Agent and each Lender as an additional loss payee and all general liability policies shall show Collateral Agent and each Lender as an additional insured and all policies shall provide that the insurer must give Collateral Agent at least thirty (30) days notice before canceling its policy At Collateral Agent's or any Lender's request, Borrower Representative shall deliver certified copies of policies and evidence of all premium payments. Proceeds payable under any property policy shall, at Collateral Agent's or any Lender's option, be payable to Collateral Agent, for the benefit of Lenders, or to Lenders on account of the Obligations. Notwithstanding the foregoing, so long as no Event of Default has occurred and is continuing, each Co-Borrower shall have the option of applying the proceeds of any property policy up to Two Hundred Fifty Thousand Dollars ($250,000.00) with respect to any loss, but not exceeding Five Hundred Thousand Dollars ($500,000.00) in the aggregate for all losses under all property policies in any one year, toward the replacement or repair of destroyed or damaged property; *provided* that (a) any such replaced or repaired property (i) shall be of equal or like value as the replaced or repaired Collateral and (ii) shall be deemed Collateral in which Collateral Agent and Lenders have been granted a first priority security interest (except to the extent that any Permitted Lien is permitted by the terms of this Agreement to have priority over the lien granted to Collateral Agent and Lenders) and (b) after the occurrence and during the continuation of an Event of Default all proceeds payable under such property policy shall, at the option of Collateral Agent or any Lender, be payable to Collateral Agent, for the benefit of Lenders, or to Lenders on account of the Obligations. If any Co-Borrower fails to obtain insurance as required under Section 6.8 or to pay any amount or furnish any required proof of payment to third persons and Collateral Agent, Collateral Agent or any Lender may make all or part of such payment or obtain such insurance policies required in Section 6.8, and take any action under the policies Collateral Agent or such Lender deems prudent. On or prior to the first Funding Date and prior to each policy renewal, Borrower Representative shall furnish to Collateral Agent certificates of insurance or other evidence reasonably satisfactory to Collateral Agent and each Lender that insurance complying with all of the above requirements is in effect.

Further Assurances

. At any time and from time to time each Co-Borrower shall execute and deliver such further instruments and take such further action as may reasonably be requested by Collateral Agent or any Lender to make effective the purposes of this Agreement, including the continued perfection and priority of Collateral Agent's and Lenders' security interest in the Collateral.

Equity Investment.

Borrower Representative shall permit Lenders or their respective assignees, at each Lender's sole discretion, to collectively purchase up to each Lender's pro rata share of up to an aggregate amount of One Million Dollars ($1,000,000) of Borrower Representative's Class A Common Shares being sold in a follow-on public offering of Borrower Representative's Class A Common Shares which results in Borrower Representative receiving cash proceeds of not less than Ten Million Dollars ($10,000,000), at a price per share equal to the product of (a) 0.85 multiplied by (b) the closing price of Borrower Representative's common stock on the date that was ten (10) calendar days prior to the date on which such follow-on offering of Borrower Representative's Equity Securities was completed. In the event that any Lender declines to purchase its full pro rata portion of Borrower Representative's securities pursuant to this Section 6.10, the other Lender may purchase more

than its pro rata portion of the securities to be offered hereunder; *provided* that the aggregate amount of securities purchased by Lenders pursuant to this Section 6.10 does not exceed One Million Dollars ($1,000,000). Borrower Representative agrees that it shall notify each Lender promptly upon the execution by Borrower Representative of a term sheet or letter of intent setting forth the terms and conditions of such financing and in any event within five (5) days of such execution.

6.11 Subsidiaries. Each Co-Borrower, upon any Lender's, or Collateral Agent's, request, shall cause any Subsidiary to provide Lenders and Collateral Agent with a guaranty of the Obligations and a security interest (of substantially similar scope as the Collateral) in such Subsidiary's assets to secure such guaranty, in each case on terms reasonably acceptable to the Collateral Agent.

6.12 Keeping of Books. Each Co-Borrower shall keep proper books of record and account, in which full and correct entries shall be made of all financial transactions and the assets and business of such Co-Borrower and its Subsidiaries in accordance with GAAP.

6.13 Accounts; Credit Cards. Within five (5) Business Days after the Effective Date, Co-Borrowers shall maintain an amount equal to not less than fifty percent (50%) of their aggregate cash on the Effective Date (inclusive of the aggregate proceeds of Loan A and Loan B) at SVB or SVB's Affiliates. Collateral Agent and Lenders acknowledge and agree that Co-Borrowers may draw down the deposits required pursuant to the foregoing sentence prior to any other deposits held at other depositary institutions, which may lead to the cash deposits at SVB equaling less than fifty percent (50%) of the Co-Borrowers' aggregate cash balances at such future date and time. Within ninety (90) days after the Effective Date, each Co-Borrower shall have implemented a business credit card program with SVB.

6.14 Litigation Cooperation. Commencing on the Effective Date and continuing through the termination of this Agreement, make available to Collateral Agent and the Lenders, without expense to Collateral Agent or the Lenders, each Co-Borrower and each Co-Borrower's officers, employees and agents and each Co-Borrower's books of record, to the extent that Collateral Agent or any Lender may reasonably deem them necessary to prosecute or defend any third-party suit or proceeding instituted by or against Collateral Agent or any Lender with respect to any Collateral or relating to any Co-Borrower.

7. Negative Covenants. Each Co-Borrower, until the full and complete payment of the Obligations, covenants and agrees that such Co-Borrower shall not:

Chief Executive Office

. Change its name, jurisdiction of incorporation, chief executive office, principal place of business or any of the items set forth in Section 1 of the Disclosure Schedule without thirty (30) days prior written notice to Collateral Agent.

7.2 Change in Executive Management; Change in Board of Directors. Replace or suffer the departure of its chief executive officer or chief financial officer without delivering written notice to Collateral Agent and each Lender within 10 days, or fail to appoint an interim replacement or fill a vacancy in the position of chief executive officer or chief financial officer for more than one hundred twenty (120) days.

Collateral Control

. Subject to its rights under Sections 4.4 and 7.5, remove any items of Collateral (other than (i) clinical trial materials, patient materials and generic kits, (ii) laptops and similar equipment maintained by Borrower's employees and (iii) other Collateral with an aggregate value not to exceed $100,000) from any Co-Borrower's facility located at the address set forth on the cover page hereof or as set forth on the Disclosure Schedule without providing Collateral Agent with thirty (30) days prior written notice.

Liens

. Create, incur, allow or suffer, or permit any Subsidiary to create, incur, allow or suffer, any Lien on any of its property, or assign or convey any right to receive income, including the sale of any accounts except for Permitted Liens, or permit any Collateral not to be subject to the first priority security interest granted herein (except for Permitted Liens that are permitted by the terms of this Agreement or as permitted by law to have priority to Collateral Agent's and Lenders' Liens), or enter into any agreement, document, instrument or other arrangement (except with or in favor of Collateral Agent, for the benefit of Lenders, or Lenders) with any Person which prohibits any Co-Borrower or any Subsidiary from assigning, mortgaging, pledging, granting a security interest in or upon, or encumbering any Co-Borrower's or any Subsidiary's Intellectual Property, except (a) as otherwise permitted in Section 7.5 hereof and (b) as permitted in the definition of "Permitted Liens" herein.

Other Dispositions of Collateral

. Convey, sell, lease or otherwise dispose of, or permit any Subsidiary to convey, sell, lease or otherwise dispose, of all or any part of the Collateral to any Person (collectively, a "Transfer"), except for: (a) Transfers of inventory in the ordinary course of business; (b) Transfers of worn-out or obsolete equipment made in the ordinary course of business; (c) Transfers of Permitted Transfers; (d) sales of assets consented to by Collateral Agent; (e) Transfers by a Subsidiary of any or all of its business, property or assets to a Co-Borrower; (f) Transfers in connection with transactions permitted by Sections 7.6, 7.7 and 7.9; (g) Transfers of cash or cash equivalents in the ordinary course of business for uses not prohibited by the terms of this Agreement; (h) Liens permitted by Section 7.4; (i) disposition of Investments permitted by Section 7.12; and (j) Transfers not otherwise permitted pursuant to this Section; provided that (i) at the time of such Transfer, no Default or Event of Default shall exist or would result from such Transfer, (ii) such Transfer is made for fair market value and the consideration received shall be no less than 75% in cash, and (iii) the aggregate book value of all property disposed of in reliance on this clause (j) shall not exceed One Hundred Thousand Dollars ($100,000) in any fiscal year of Borrower.

Distributions

. (a) Pay any dividends or make any distributions (other than that vTv Therapeutics LLC may make tax distributions to its members solely to satisfy tax liabilities in accordance with the terms of its limited liability company agreement ("Tax Distributions")), or permit any Subsidiary to pay any dividends or make any distributions (other than Tax Distributions), on their respective Equity Securities; (b) purchase, redeem, retire, defease or otherwise acquire, or permit any Subsidiary to purchase, redeem, retire, defease or otherwise acquire, for value any of their respective Equity Securities (other than repurchases pursuant to the terms of employee stock purchase plans, employee restricted stock agreements, options under Borrower Representative's equity incentive plans or similar arrangements in an aggregate amount not to exceed Five Hundred Thousand Dollars ($500,000) in the aggregate during the term of this Agreement); (c) return, or permit any Subsidiary to return, any capital to any holder of its Equity Securities as such; (d) make, or permit any Subsidiary to make, any

distribution of assets, Equity Securities, obligations or securities to any holder of its Equity Securities as such; or (e) set apart any sum for any such purpose; *provided*, however, (A) any Subsidiary may pay dividends, make distributions or return capital solely to a Co-Borrower or another wholly-owned Subsidiary, (B) a Co-Borrower may pay dividends, make distributions, or return capital solely to another Co-Borrower, (C) a Co-Borrower may pay dividends payable solely in such Co-Borrower's common stock, and (D) Borrower Representative may pay dividends, make distributions or return capital as may be required in connection with the Warrants. Notwithstanding anything to the contrary contained in this Section 7.6, any Co-Borrower may, or permit any Subsidiary to, make any distributions, or take any of the actions otherwise prohibited by clauses (a) through (e) of the first sentence of this Section 7.6, in an amount not to exceed Two Hundred Thousand Dollars ($200,000) in the aggregate during the term of this Agreement.

Mergers or Acquisitions

. Merge or consolidate, or permit any Subsidiary to merge or consolidate, with or into any other Person or acquire, or permit any Subsidiary to acquire, all or substantially all of the capital stock or assets of another Person; *provided* that (a) any Subsidiary may merge into another Subsidiary and (b) any Subsidiary may merge into any Co-Borrower so long as such Co-Borrower is the surviving entity.

Change in Business or Ownership

. Engage, or permit any Subsidiary to engage, in any business other than the businesses currently engaged in by a Co-Borrower or such Subsidiary, as applicable, or reasonably related thereto or have a Change of Control.

Transactions With Affiliates; Creation of Subsidiaries

. (a) Enter, or permit any Subsidiary to enter, into any contractual obligation with any Affiliate or engage in any other transaction with any Affiliate except (i) upon terms at least as favorable to such Co-Borrower or such Subsidiary, as applicable, as an arms-length transaction with Persons who are not Affiliates of any Co-Borrower, (ii) any transaction permitted by Section 7.6, (iii) employment, services or consulting arrangements (including arrangements made with respect to indemnification, bonuses, directors fees and expense reimbursement, severance and employee benefit arrangements) entered into in the ordinary course of any Co-Borrower's business upon terms at least as favorable to such Co-Borrower as an arms-length transaction with Persons who are not Affiliates of such Co-Borrower, including, without limitation, issuances of Equity Securities, long term incentive compensation plans, restricted stock agreements, restricted stock unit agreements, stock option agreements, warrants and other similar arrangements, and/or (b) create a Subsidiary without providing at least 10 Business Days advance notice thereof to Lenders and, if requested by Lenders, such Subsidiary guarantees the Obligations and grants a security interest in its assets (of substantially similar scope as the Collateral) to secure such guaranty, in each case on terms reasonably satisfactory to Collateral Agent and each Lender.

Indebtedness Payments

. (a) Prepay, redeem, purchase, defease or otherwise satisfy in any manner prior to the scheduled repayment thereof any Indebtedness for borrowed money (other than as permitted to be prepaid hereunder) or Capital Lease Obligations, (b) amend, modify or otherwise change the terms of any Indebtedness for borrowed money or Capital Lease Obligations so as to accelerate the scheduled repayment thereof or (c) repay any notes to officers, directors or shareholders.

Indebtedness

. Create, incur, assume or permit, or permit any Subsidiary to create, incur or permit, to exist any Indebtedness except Permitted Indebtedness.

Investments

. Make, or permit any Subsidiary to make, any Investment except for Permitted Investments.

Compliance

.

(a) (i) Become, or permit any Subsidiary to become, an "investment company" or a company controlled by an "investment company" under the Investment Company Act of 1940 or undertake as one of its important activities extending credit to purchase or carry margin stock (as defined in Regulation U of the Board of Governors of the Federal Reserve System), or use the proceeds of any Loan for that purpose; (ii) become, or permit any Subsidiary to become, subject to any other federal or state law or regulation which purports to restrict or regulate its ability to borrow money; or (iii) (A) fail, or permit any Subsidiary to fail, to meet the minimum funding requirements of the Employment Retirement Income Security Act of 1974, and its regulations, as amended from time to time ("ERISA"), or (B) permit, or permit any Subsidiary to permit, a Reportable Event or Prohibited Transaction, as defined in ERISA, to occur; (iv) fail, or permit any Subsidiary to fail, to comply with the Federal Fair Labor Standards Act or violate any other applicable law or regulation, if the violation could reasonably be expected to have Material Adverse Effect.

(b) Lenders hereby notify each Co-Borrower that pursuant to the requirements of Anti-Terrorism Laws, and each Lender's policies and practices, each Lender is required to obtain, verify and record certain information and documentation that identifies such Co-Borrower and its principals, which information includes the name and address of such Co-Borrower and its principals and such other information that will allow such Lender to identify such party in accordance with Anti-Terrorism Laws. No Co-Borrower shall, directly or indirectly, use the proceeds of the Loans, or lend, contribute or otherwise make available such proceeds to any Subsidiary, joint venture partner or other Person, (i) to fund any activities or business of or with any Person, or in any country or territory, that, at the time of such funding, is, or whose government is, the subject of Sanctions, or (ii) in any other manner that would result in a violation of Sanctions by any Person (including any Person participating in the Loans, whether as lender, underwriter, advisor, investor or otherwise).

Maintenance of Accounts

. (a) Maintain any deposit account or securities account except accounts with respect to which Collateral Agent or any Lender is able to take such actions as Lenders reasonably deem necessary to obtain a perfected security interest in such accounts through one or more Account Control Agreements, provided, however, Co-Borrowers may maintain a deposit account solely for the purpose of payroll purposes (such account, the "Payroll Account"), provided, however, that the amount on deposit in such Payroll Account shall not exceed the amount required to pay all amounts due and owing to such Co-Borrower's employees in one payroll cycle or (b) grant or allow any other Person (other than Collateral Agent or Lenders) to perfect a security interest in, or enter into any agreements with any Persons (other than Collateral Agent or Lenders or the depositary bank pursuant to its customary terms) accomplishing perfection via control as to, any of its deposit accounts or securities accounts.

Negative Pledge Regarding Intellectual Property

. Create, incur, assume or suffer to exist, or permit any Subsidiary to create, incur, assume or suffer to exist, any Lien of any kind upon any Intellectual Property or Transfer any Intellectual Property, other than Permitted Transfers, or enter into any agreement, document, instrument or other arrangement (except for Permitted Transfers or agreements with or in favor of Lenders) with any Person which directly or indirectly prohibits or has the effect of prohibiting such Co-Borrower, or any of its Subsidiaries, from assigning, mortgaging, pledging, granting a security interest in or upon, or encumbering any of such Co-Borrower's or such Subsidiary's Intellectual Property, whether now owned or hereafter acquired, other than non-exclusive licenses of Intellectual Property entered into in the ordinary course of business.

8. Events of Default. Any one or more of the following events shall constitute an "Event of Default" by Co-Borrowers under this Agreement:

8.1 Failure to Pay. If any Co-Borrower fails to pay when due and payable or when declared due and payable in accordance with the Loan Documents: (a) any Scheduled Payment on the relevant Payment Date or on the relevant Maturity Date; or (b) any other portion of the Obligations within five (5) days after receipt of written notice from a Lender that such payment is due.

8.2 Certain Covenant Defaults. If any Co-Borrower fails to perform any obligation arising under Sections 6.3, 6.4, 6.5, 6.6, 6.8, 6.10 or 6.11 or violates any of the covenants contained in Section 7 of this Agreement.

8.3 Other Covenant Defaults. If any Co-Borrower fails or neglects to perform, keep, or observe any other term, provision, condition, covenant, or agreement contained in this Agreement (other than as set forth in Sections 8.1, 8.2 or 8.4 through 8.15), in any of the other Loan Documents and such Co-Borrower has failed to cure such default within thirty (30) days of the occurrence of such default. During this thirty (30) day period, the failure to cure the default is not an Event of Default (but no Loan will be made during the cure period).

8.4 Material Adverse Change. If a Material Adverse Effect occurs.

8.5 Seizure of Assets, Etc. (a) If any material portion of any Co-Borrower's or any Subsidiary's assets (i) is attached, seized, subjected to a writ or distress warrant, or is levied upon or (ii) comes into the possession of any trustee, receiver or Person acting in a similar capacity and such attachment, seizure, writ or distress warrant or levy has not been removed, discharged or rescinded within ten (10) days, (b) if any Co-Borrower or any Subsidiary is enjoined, restrained or in any way prevented by court order from continuing to conduct all or any material part of its business affairs, (c) if a judgment or other claim becomes a lien or encumbrance upon any material portion of any Co-Borrower's or any Subsidiary's assets or (d) if a notice of lien, levy, or assessment is filed of record with respect to any Co-Borrower's or any Subsidiary's assets by the United States Government, or any department agency or instrumentality thereof, or by any state, county, municipal, or governmental agency, and the same is not paid within ten (10) days after such Co-Borrower receives notice thereof; *provided* that none of the foregoing shall constitute an Event of Default where such action or event is stayed or an adequate bond has been posted pending a good faith contest by such Co-Borrower.

8.6 Service of Process. (a) The service of process upon Collateral Agent or any Lender seeking to attach by a trustee or other process any funds of any Co-Borrower in excess of One Hundred Thousand Dollars ($100,000) on deposit or otherwise held by Collateral Agent or such Lender, (b) the delivery upon Collateral Agent or any Lender of a notice of foreclosure by any Person seeking to attach or foreclose on any funds in excess of One Hundred Thousand Dollars ($100,000) of any Co-Borrower on deposit or otherwise held by Collateral Agent or such Lender or (c) the delivery of a notice of foreclosure or exclusive control to any entity holding or maintaining any Co-Borrower's deposit accounts or accounts holding securities by any Person (other than Collateral Agent or a Lender) seeking to foreclose or attach any such accounts or securities.

8.7 Default on Indebtedness. (a) One or more defaults shall exist under any agreement by and between a Co-Borrower or any Subsidiary and any third party which results in a right by such third party or parties, whether or not exercised, to accelerate the maturity of Indebtedness in an aggregate amount in excess of Two Hundred Fifty Thousand Dollars ($250,000) or (iii) the result of which could have a material adverse effect on a Co-Borrower's business; or (b) a default shall exist under any financing agreement with a Lender or any Lender's Affiliates.

8.8 Judgments. If a judgment or judgments for the payment of money in an amount, individually or in the aggregate, of at least Two Hundred Fifty Thousand Dollars ($250,000) shall be rendered against Co-Borrowers or any Subsidiary and shall remain unsatisfied and unstayed for a period of thirty (30) days or more.

8.9 Misrepresentations. If any material misrepresentation or material misstatement exists now or hereafter in any warranty, representation, statement, certification, or report made to Collateral Agent or any Lender by any Co-Borrower or any officer, employee, agent, or director of any Co-Borrower when made or deemed made.

8.10 Breach of Warrant. If Borrower Representative shall breach any material term of any Warrant.

8.11 Unenforceable Loan Document. If any Loan Document shall in any material respect cease to be, or any Co-Borrower shall assert that any Loan Document is not, a legal, valid and binding obligation of any Co-Borrower enforceable in accordance with its terms.

8.12 Involuntary Insolvency Proceeding. (a) If a proceeding shall have been instituted in a court having jurisdiction in the premises (i) seeking a decree or order for relief in respect of any Co-Borrower or any Subsidiary in an involuntary case under any applicable bankruptcy, insolvency or other similar law now or hereafter in effect, (ii) for the appointment of a receiver, liquidator, administrator, assignee, custodian, trustee (or similar official) of any Co-Borrower or any Subsidiary or for any substantial part of its Property or (iii) for the winding-up or liquidation of its affairs, and such proceeding shall remain undismissed or unstayed and in effect for a period of forty-five (45) consecutive days or (b) such court shall enter a decree or order granting the relief sought in any such proceeding.

8.13 Voluntary Insolvency Proceeding. If any Co-Borrower or any Subsidiary shall (a) commence a voluntary case under any applicable bankruptcy, insolvency or other similar law now or hereafter in effect, (b) consent to the entry of an order for relief in an involuntary case under any such law, (c) consent to the appointment of or taking possession by a receiver, liquidator, assignee, trustee, custodian (or other similar official) of any Co-Borrower or any Subsidiary or for any substantial part of its Property, (d) shall make a general assignment for the benefit of creditors, (e) shall fail generally to pay its debts as they become due or (f) take any corporate action in furtherance of any of the foregoing.

9. Lenders' Rights and Remedies.

Rights and Remedies

. Upon the occurrence and continuance of any Default or Event of Default, no Lender shall have any further obligation to advance money or extend credit to or for the benefit of any Co-Borrower. In addition, upon the occurrence and continuation of an Event of Default, Collateral Agent and each Lender shall have the rights, options, duties and remedies of a secured party as permitted by law and, in addition to and without limitation of the foregoing, Collateral Agent, on behalf of Lenders, or any Lender (acting alone) may, at its election, without notice of election and without demand, do any one or more of the following, all of which are authorized by each Co-Borrower:

(a) Acceleration of Obligations. Declare all Obligations, whether evidenced by this Agreement, by any of the other Loan Documents, or otherwise, including (i) any accrued and unpaid interest, (ii) the amounts which would have otherwise come due under Section 2.3(b)(ii) if the Loans had been voluntarily prepaid, (iii) the unpaid principal balance of the Loans and (iv) all other sums, if any, that shall have become due and payable hereunder, immediately due and payable (*provided* that upon the occurrence and continuation of an Event of Default described in Section 8.13 or 8.14 all Obligations shall become immediately due and payable without any action by Collateral Agent or any Lender);

(b) Protection of Collateral. Make such payments and do such acts as Collateral Agent or such Lender considers necessary or reasonable to protect Collateral Agent's and Lenders' security interest in the Collateral. Each Co-Borrower agrees to assemble the Collateral if Collateral Agent or any Lender so requires and to make the Collateral available to Collateral Agent or any Lender as Collateral Agent may designate. Each Co-Borrower authorizes Collateral Agent, each Lender and their designees and agents to enter the premises where the Collateral is located, to take and maintain possession of the Collateral, or any part of it, and to pay, purchase, contest, or compromise any Lien which in Collateral Agent's or such Lender's determination appears or is claimed to be prior or superior to its security interest and to pay all expenses incurred in connection therewith. With respect to any Co-Borrower's owned premises, such Co-Borrower hereby grants Collateral Agent and each Lender a license to enter into possession of such premises and to occupy the same, without charge, for up to one hundred twenty (120) days in order to exercise any of Collateral Agent's and each Lender's rights or remedies provided herein, at law, in equity, or otherwise;

(c) Preparation of Collateral for Sale. Ship, reclaim, recover, store, finish, maintain, repair, prepare for sale, advertise for sale, and sell (in the manner provided for herein) the Collateral. Collateral Agent, each Lender and their agents and any purchasers at or after

foreclosure are hereby granted a non-exclusive, irrevocable, perpetual, fully paid, royalty-free license or other right, solely pursuant to the provisions of this Section 9.1, to use, without charge, any Co-Borrower's owned Intellectual Property, including labels, patents, copyrights, rights of use of any name, trade secrets, trade names, trademarks, service marks, and advertising matter, or any Property of a similar nature, now or at any time hereafter owned or acquired by any Co-Borrower or in which any Co-Borrower now or at any time hereafter has any rights; *provided* that such license shall only be exercisable in connection with the disposition of Collateral upon Collateral Agent's or a Lender's exercise of its remedies hereunder;

(d) Sale of Collateral. Sell the Collateral at either a public or private sale, or both, by way of one or more contracts or transactions, for cash or on terms, in such manner and at such places (including any Co-Borrower's premises) as Collateral Agent or any Lender determines are commercially reasonable; and

(e) Purchase of Collateral. Credit bid and purchase all or any portion of the Collateral at any public sale.

(f) Cash Collateralization of Letters of Credit. With respect to any Letters of Credit, demand that any Co-Borrower (i) deposit cash with SVB in an amount equal to (x) if such Letters of Credit are denominated in Dollars, then one hundred five percent (105%); and (y) if such Letters of Credit are denominated in a Foreign Currency, then one hundred ten percent (110%), of the Dollar Equivalent of the aggregate face amount of all Letters of Credit remaining undrawn (plus all interest, fees, and costs due or to become due in connection therewith (as estimated by SVB in its good faith business judgment)), to secure all of the Obligations relating to such Letters of Credit, as collateral security for the repayment of any future drawings under such Letters of Credit, and such Co-Borrower shall forthwith deposit and pay such amounts, and (ii) pay in advance all letter of credit fees scheduled to be paid or payable over the remaining term of any Letters of Credit; and

(g) Termination of FX Contracts. Terminate any FX Contracts.

Any deficiency that exists after disposition of the Collateral as provided above will be paid immediately by Co-Borrowers.

Set Off Right

. Collateral Agent and each Lender may set off and apply to the Obligations any and all Indebtedness at any time owing to or for the credit or the account of any Co-Borrower or any other assets of any Co-Borrower in Collateral Agent's or such Lender's possession or control.

Effect of Sale

. Upon the occurrence and continuation of an Event of Default, to the extent permitted by law, each Co-Borrower covenants that it will not at any time insist upon or plead, or in any manner whatsoever claim or take any benefit or advantage of, any stay or extension law now or at any time hereafter in force, nor claim, take nor insist upon any benefit or advantage of or from any law now or hereafter in force providing for the valuation or appraisement of the Collateral or any part thereof prior to any sale or sales thereof to be made pursuant to any provision herein contained, or to the decree, judgment or order of any court of competent jurisdiction; nor, after such sale or sales, claim or exercise any right under any statute

now or hereafter made or enacted by any state or otherwise to redeem the property so sold or any part thereof, and, to the full extent legally permitted, except as to rights expressly provided herein, hereby expressly waives for itself and on behalf of each and every Person, except decree or judgment creditors of any Co-Borrower, acquiring any interest in or title to the Collateral or any part thereof subsequent to the date of this Agreement, all benefit and advantage of any such law or laws, and covenants that it will not invoke or utilize any such law or laws or otherwise hinder, delay or impede the execution of any power herein granted and delegated to Collateral Agent or a Lender, but will suffer and permit the execution of every such power as though no such power, law or laws had been made or enacted. Any sale, whether under any power of sale hereby given or by virtue of judicial proceedings, shall operate to divest all right, title, interest, claim and demand whatsoever, either at law or in equity, of each Co-Borrower in and to the Property sold, and shall be a perpetual bar, both at law and in equity, against each Co-Borrower, its successors and assigns, and against any and all Persons claiming the Property sold or any part thereof under, by or through any Co-Borrower, its successors or assigns.

Power of Attorney in Respect of the Collateral

. Each Co-Borrower does hereby irrevocably appoint Collateral Agent, on behalf of Lenders (which appointment is coupled with an interest) the true and lawful attorney in fact of such Co-Borrower, with full power of substitution and in its name to file any notices of security interests, financing statements and continuations and amendments thereof pursuant to the Code or federal law, as may be necessary to perfect or to continue the perfection of Collateral Agent's and Lenders' security interests in the Collateral. Each Co-Borrower does hereby irrevocably appoint Collateral Agent, on behalf of Lenders (which appointment is coupled with an interest) on the occurrence and continuation of an Event of Default, the true and lawful attorney in fact of such Co-Borrower, with full power of substitution and in its name: (a) to ask, demand, collect, receive, receipt for, sue for, compound and give acquittance for any and all rents, issues, profits, avails, distributions, income, payment draws and other sums in which a security interest is granted under Section 4 with full power to settle, adjust or compromise any claim thereunder as fully as if Collateral Agent were such Co-Borrower itself; (b) to receive payment of and to endorse the name of such Co-Borrower to any items of Collateral (including checks, drafts and other orders for the payment of money) that come into Collateral Agent's or a Lender's possession or under Collateral Agent's or a Lender's control; (c) to make all demands, consents and waivers, or take any other action with respect to, the Collateral; (d) in Collateral Agent's discretion to file any claim or take any other action or proceedings, either in its own name or in the name of such Co-Borrower or otherwise, which Collateral Agent may reasonably deem necessary or appropriate to protect and preserve the right, title and interest of Collateral Agent and Lenders in and to the Collateral; (e) endorse such Co-Borrower's name on any checks or other forms of payment or security; (f) sign such Co-Borrower's name on any invoice or bill of lading for any account or drafts against account debtors; (g) make, settle, and adjust all claims under such Co-Borrower's insurance policies; (h) settle and adjust disputes and claims about the accounts directly with account debtors, for amounts and on terms Collateral Agent or any Lender determines reasonable; (i) transfer the Collateral into the name of Collateral Agent, a Lender or a third party as the Code permits; and (j) to otherwise act with respect thereto as though Collateral Agent were the outright owner of the Collateral.

Lenders' Expenses

. If any Co-Borrower fails to pay any amounts or furnish any required proof of payment due to third persons or entities, as required under the terms of

this Agreement, then Collateral Agent or any Lender may do any or all of the following: (a) make payment of the same or any part thereof; or (b) obtain and maintain insurance policies of the type discussed in Section 6.8 of this Agreement, and take any action with respect to such policies as Collateral Agent or any Lender deems prudent. Any amounts paid or deposited by Collateral Agent or a Lender shall constitute Lenders' Expenses, shall be immediately due and payable, shall bear interest at the Default Rate and shall be secured by the Collateral. Any payments made by Collateral Agent or any Lender shall not constitute an agreement by Collateral Agent or any Lender to make similar payments in the future or a waiver by Collateral Agent or any Lender of any Event of Default under this Agreement. Co-Borrowers shall pay all reasonable fees and expenses, including Lenders' Expenses, incurred by Collateral Agent or any Lender in the enforcement or attempt to enforce any of the Obligations hereunder not performed when due.

Remedies Cumulative; Independent Nature of Lenders' Rights

. Collateral Agent's and each Lender's rights and remedies under this Agreement, the Loan Documents, and all other agreements shall be cumulative. Collateral Agent and each Lender shall have all other rights and remedies not inconsistent herewith as provided under the Code, by applicable law, or in equity. No failure on the part of Collateral Agent or any Lender to exercise, and no delay in exercising, any right or remedy hereunder shall operate as a waiver thereof; nor shall any single or partial exercise of any such right or remedy preclude any other or further exercise thereof or the exercise of any other right. The Obligations of each Co-Borrower to any Lender may be enforced by such Lender against such Co-Borrower in accordance with the terms of this Agreement and the other Loan Documents and, to the fullest extent permitted by applicable law, it shall not be necessary for Collateral Agent, any other Lender or any other Co-Borrower to be joined as an additional party in any proceeding to enforce such Obligations.

Application of Collateral Proceeds

. The proceeds and/or avails of the Collateral, or any part thereof, and the proceeds and the avails of any remedy hereunder (as well as any other amounts of any kind held by Collateral Agent or any Lender, at the time of or received by Collateral Agent or any Lender after the occurrence and continuation of an Event of Default hereunder) shall be paid to and applied as follows:

(a) First, to the payment of out-of-pocket costs and expenses, including all amounts expended to preserve the value of the Collateral, of foreclosure or suit, if any, and of such sale and the exercise of any other rights or remedies, and of all proper fees, expenses, liability and advances, including reasonable legal expenses and attorneys' fees, incurred or made hereunder by Collateral Agent or any Lender, including Lenders' Expenses;

(b) Second, to the payment to Lenders of the amount then owing or unpaid on the Loans for any accrued and unpaid interest, the amounts which would have otherwise come due under Section 2.3(b)(ii), if the Loans had been voluntarily prepaid, the principal balance of the Loans, and all other Obligations with respect to the Loans (*provided*, however, if such proceeds shall be insufficient to pay in full the whole amount so due, owing or unpaid upon the Loans, then *first*, to the unpaid interest thereon ratably, *second*, to the amounts which would have otherwise come due under Section 2.3(b)(ii) ratably, if the Loans had been voluntarily prepaid, *third*, to the principal balance of the Loans ratably, and *fourth*, to the ratable payment of other amounts then payable to Lenders under any of the Loan Documents); and

(c) Third, to the payment of the surplus, if any, to Co-Borrowers, their successors and assigns or to the Person lawfully entitled to receive the same.

Reinstatement of Rights

. If Collateral Agent or any Lender shall have proceeded to enforce any right under this Agreement or any other Loan Document by foreclosure, sale, entry or otherwise, and such proceedings shall have been discontinued or abandoned for any reason or shall have been determined adversely, then and in every such case (unless otherwise ordered by a court of competent jurisdiction), Collateral Agent and Lenders shall be restored to their former position and rights hereunder with respect to the Property subject to the security interest created under this Agreement.

10. Waivers; Indemnification.

Demand; Protest

. Each Co-Borrower waives demand, protest, notice of protest, notice of default or dishonor, notice of payment and nonpayment, notice of any default, nonpayment at maturity, release, compromise, settlement, extension, or renewal of accounts, documents, instruments, chattel paper, and guarantees at any time held by Collateral Agent or any Lender on which such Co-Borrower may in any way be liable.

Lender's Liability for Collateral

. So long as Collateral Agent and each Lender complies with its obligations, if any, under the Code, neither Collateral Agent nor any Lender shall in any way or manner be liable or responsible for: (a) the safekeeping of the Collateral; (b) any loss or damage thereto occurring or arising in any manner or fashion from any cause other than Collateral Agent's or any Lender's gross negligence or willful misconduct; (c) any diminution in the value thereof; or (d) any act or default of any carrier, warehouseman, bailee, forwarding agency, or other Person whomsoever. All risk of loss, damage or destruction of the Collateral shall be borne by Co-Borrowers.

Indemnification and Waiver

. Whether or not the transactions contemplated hereby shall be consummated:

(a) General Indemnity. Each Co-Borrower agrees upon demand to pay or reimburse Collateral Agent and each Lender for all liabilities, obligations and out-of-pocket expenses, including Lenders' Expenses and reasonable fees and expenses of counsel for Collateral Agent and each Lender from time to time arising in connection with the enforcement or collection of sums due under the Loan Documents, and in connection with any amendment or modification of the Loan Documents or any "work-out" in connection with the Loan Documents. Each Co-Borrower shall indemnify, reimburse and hold Collateral Agent, each Lender, and each of their respective successors, assigns, agents, attorneys, officers, directors, equity holders, servants, agents and employees (each an "Indemnified Person") harmless from and against all liabilities, losses, damages, actions, suits, demands, claims of any kind and nature (including claims relating to environmental discharge, cleanup or compliance), all costs and expenses whatsoever to the extent they may be incurred or suffered by such Indemnified Person in connection therewith (including reasonable attorneys' fees and expenses), fines, penalties (and other charges of any applicable Governmental Authority), licensing fees relating to any item of Collateral, damage to or loss of use of property (including consequential or special damages to third parties or damages to any Co-Borrower's property), or bodily injury to or death of any

person (including any agent or employee of any Co-Borrower) (each, a "Claim"), directly or indirectly relating to or arising out of the use of the proceeds of the Loans or otherwise, the falsity of any representation or warranty of any Co-Borrower or any Co-Borrower's failure to comply with the terms of this Agreement or any other Loan Document. The foregoing indemnity shall cover, without limitation, (i) any Claim in connection with a design or other defect (latent or patent) in any item of equipment or product included in the Collateral, (ii) any Claim for infringement of any patent, copyright, trademark or other intellectual property right, (iii) any Claim resulting from the presence on or under or the escape, seepage, leakage, spillage, discharge, emission or release of any Hazardous Materials on the premises owned, occupied or leased by any Co-Borrower, including any Claims asserted or arising under any Environmental Law, (iv) any Claim for negligence or strict or absolute liability in tort or (v) any Claim asserted as to or arising under any Account Control Agreement or any Landlord Agreement; *provided*, however, no Co-Borrower shall be required to indemnify any Indemnified Person for any liability incurred by such Indemnified Person as a result of such Indemnified Person's gross negligence or willful misconduct. Such indemnities shall continue in full force and effect, notwithstanding the expiration or termination of this Agreement. Upon Collateral Agent's or a Lender's written demand, each Co-Borrower shall assume and diligently conduct, at its sole cost and expense, the entire defense of Collateral Agent and Lenders, each of their members, partners, and each of their respective, agents, employees, directors, officers, equity holders, successors and assigns against any indemnified Claim described in this Section 10.3(a). No Co-Borrower shall settle or compromise any Claim against or involving Collateral Agent or any Lender without first obtaining Collateral Agent's or such Lender's written consent thereto, which consent shall not be unreasonably withheld.

(b) Waiver. NOTWITHSTANDING ANYTHING TO THE CONTRARY CONTAINED IN THIS AGREEMENT OR ANYWHERE ELSE, EACH CO-BORROWER AGREES THAT IT SHALL NOT SEEK FROM COLLATERAL AGENT OR ANY LENDER UNDER ANY THEORY OF LIABILITY (INCLUDING ANY THEORY IN TORTS), ANY SPECIAL, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES.

(c) Survival; Defense. The obligations in this Section 10.3 shall survive payment of all other Obligations pursuant to Section 12.8. At the election of any Indemnified Person, Co-Borrowers shall defend such Indemnified Person using legal counsel satisfactory to such Indemnified Person in such Person's reasonable discretion, at the sole cost and expense of Co-Borrowers. All amounts owing under this Section 10.3 shall be paid within thirty (30) days after written demand.

11. Notices. Unless otherwise provided in this Agreement, all notices or demands by any party relating to this Agreement or any other agreement entered into in connection herewith shall be in writing and (except for financial statements and other informational documents which may be sent by first-class mail, postage prepaid) shall be personally delivered or sent by certified mail, postage prepaid, return receipt requested, by prepaid nationally recognized overnight courier, or by prepaid facsimile or other electronic means to Borrower Representative, Collateral Agent or to Lenders, as the case may be, at their respective addresses set forth below:

If to Borrower Representative:	vTv Therapeutics Inc. 4170 Mendenhall Oaks Pkwy. High Point, NC 27265 Attention: Legal Department Fax: 336-841-0310 Ph: 336-841-0300 ext. 100 Email:
If to Horizon:	Horizon Technology Finance Corporation 312 Farmington Avenue Farmington, CT 06032 Attention: Legal Department Fax: (860) 676-8655 Ph: (860) 676-8654 Email: jay@horizontechfinance.com
If to SVB:	Silicon Valley Bank 3475 Piedmont Road, NE, Suite 560 Atlanta, GA 30305 Attention: Scott McCarty Fax: (404) 783-5822 Email:

The parties hereto may change the address at which they are to receive notices hereunder, by notice in writing in the foregoing manner given to the other.

12. General Provisions.

Successors and Assigns

. This Agreement and the Loan Documents shall bind and inure to the benefit of the respective successors and permitted assigns of each of the parties; *provided*, however, neither this Agreement nor any rights hereunder may be assigned by any Co-Borrower without each Lender's prior written consent, which consent may be granted or withheld in each Lender's sole discretion. Unless an Event of Default has occurred and is continuing, each Lender shall only assign its interest in the Loan Documents to an Eligible Assignee. For purposes hereof, an "Eligible Assignee" is (a) any bank organized under the Federal Reserve System, (b) an Affiliate of an Existing Lender, or (c) any commercial bank, insurance company, investment or mutual fund or other entity that is an accredited investor (as defined in Regulation D under the Securities Act) and which extends credit or buys loans as one

of its businesses and (i) is not a vulture fund or distressed debt fund as reasonably determined by such Lender, and (ii) is not a competitor of the Co-Borrowers as reasonably determined by the Co-Borrowers. The Collateral Agent and each Lender may disclose the Loan Documents and any other financial or other information relating to any Co-Borrower to any potential assignee of any of the Loans; *provided* that such assignee agrees to protect the confidentiality of such documents and information using the same measures that it uses to protect its own confidential information.

Time of Essence

. Time is of the essence for the performance of all obligations set forth in this Agreement.

Severability of Provisions

. Each provision of this Agreement shall be severable from every other provision of this Agreement for the purpose of determining the legal enforceability of any specific provision.

Entire Agreement; Construction; Amendments and Waivers

.

(a) Entire Agreement. This Agreement and each of the other Loan Documents, taken together, constitute and contain the entire agreement among Co-Borrowers, Collateral Agent and Lenders and supersede any and all prior agreements, negotiations, correspondence, understandings and communications between the parties, whether written or oral, respecting the subject matter hereof. Each Co-Borrower acknowledges that it is not relying on any representation or agreement made by Collateral Agent, any Lender or any employee, attorney or agent thereof, other than the specific agreements set forth in this Agreement and the Loan Documents.

(b) Construction. This Agreement is the result of negotiations between and has been reviewed by each Co-Borrower, Collateral Agent and each Lender as of the date hereof and their respective counsel; accordingly, this Agreement shall be deemed to be the product of the parties hereto, and no ambiguity shall be construed in favor of or against any Co-Borrower, Collateral Agent or any Lender. Co-Borrowers, Collateral Agent and Lenders agree that they intend the literal words of this Agreement and the other Loan Documents and that no parol evidence shall be necessary or appropriate to establish any Co-Borrower's, Collateral Agent's or any Lender's actual intentions.

(c) Amendments and Waivers. Any and all discharges or waivers of, or consents to any departures from any provision of this Agreement or of any of the other Loan Documents shall not be effective without the written consent of each Lender; *provided* that no such discharge, waiver or consent affecting the rights or duties of the Collateral Agent under this Agreement or any other Loan Document shall be effective without the written consent of the Collateral Agent. Any and all amendments and modifications of this Agreement or of any of the other Loan Documents shall not be effective without the written consent of each Lender and each Co-Borrower; *provided* that no such amendment or modification affecting the rights or duties of the Collateral Agent under this Agreement or any other Loan Document shall be effective without the written consent of the Collateral Agent. Any waiver or consent with respect to any provision of the Loan Documents shall be effective only in the specific instance and for the specific purpose for which it was given. No notice to or demand on any Co-Borrower in any

case shall entitle any Co-Borrower to any other or further notice or demand in similar or other circumstances. Any amendment, modification, waiver or consent affected in accordance with this Section 12.4 shall be binding upon Collateral Agent, Lenders and on Co-Borrowers.

Reliance by Lender

. All covenants, agreements, representations and warranties made herein by any Co-Borrower shall be deemed to be material to and to have been relied upon by Collateral Agent and Lenders, notwithstanding any investigation by Collateral Agent or any Lender.

No Set-Offs by any Co-Borrower

. All sums payable by any Co-Borrower pursuant to this Agreement or any of the other Loan Documents shall be payable without notice or demand and shall be payable in United States Dollars without set-off or reduction of any manner whatsoever.

Counterparts

. This Agreement may be executed in any number of counterparts and by different parties on separate counterparts (including signatures delivered by facsimile or other electronic means), each of which, when executed and delivered, shall be deemed to be an original, and all of which, when taken together, shall constitute but one and the same Agreement.

Survival

. All covenants, representations and warranties made in this Agreement shall continue in full force and effect so long as any Obligations or commitment to fund remain outstanding. The obligations of Co-Borrowers to indemnify Collateral Agent and Lenders with respect to the expenses, damages, losses, costs and liabilities described in Section 10.3 shall survive until all applicable statute of limitations periods with respect to actions that may be brought against Collateral Agent or any Lender have run.

13. Relationship of Parties. Co-Borrowers and Lenders acknowledge, understand and agree that the relationship between each Co-Borrower, on the one hand, and Lenders, on the other, is, and at all times shall remain solely that of a borrower and lender. No Lender shall, under any circumstances, be construed to be a partner or a joint venturer of any Co-Borrower or any of its Affiliates; nor shall any Lender, under any circumstances, be deemed to be in a relationship of confidence or trust or a fiduciary relationship with any Co-Borrower or any of its Affiliates, or to owe any fiduciary duty or any other duty to any Co-Borrower or any of its Affiliates. Neither Collateral Agent nor any Lender undertakes or assumes any responsibility or duty to any Co-Borrower or any of its Affiliates to select, review, inspect, supervise, pass judgment upon or otherwise inform any Co-Borrower or any of its Affiliates of any matter in connection with its or their Property, any Collateral held by Collateral Agent or any Lender or the operations of any Co-Borrower or any of its Affiliates. Each Co-Borrower and each of its Affiliates shall rely entirely on their own judgment with respect to such matters, and any review, inspection, supervision, exercise of judgment or supply of information undertaken or assumed by Collateral Agent or any Lender in connection with such matters is solely for the protection of Collateral Agent and Lenders and no Co-Borrower nor any Affiliate is entitled to rely thereon.

14. Confidentiality. All information (other than periodic reports filed by any Co-Borrower with the Securities and Exchange Commission) disclosed by any Co-Borrower to Collateral Agent or any Lender in writing or through inspection pursuant to this Agreement that

is marked confidential (or, if not marked, if the Collateral Agent or such Lender knows that such information is material non-public information) shall be considered confidential. Collateral Agent and each Lender agrees to use the same degree of care to safeguard and prevent disclosure of such confidential information as Collateral Agent and such Lender uses with its own confidential information, but in any event no less than a reasonable degree of care. Neither Collateral Agent nor any Lender shall disclose such information to any third party (other than (a) to another party hereto, (b) to Collateral Agent's or any Lender's members, partners, attorneys, governmental regulators (including any self-regulatory authority) or auditors, (c) to Collateral Agent's or a Lender's subsidiaries and affiliates, (d) on a confidential basis, to any rating agency, (e) to prospective transferees and purchasers of the Loans or any actual or prospective party (or its Affiliates) to any swap, derivative or other transaction under which payments are to be made by reference to the Obligations, any Co-Borrower, any Loan Document or any payment thereunder, all subject to the same confidentiality obligation set forth herein or (f) as required by law, regulation, subpoena or other order to be disclosed) and shall use such information only for purposes of evaluation of its investment in any Co-Borrower and the exercise of Collateral Agent's or any Lender's rights and the enforcement of its remedies under this Agreement and the other Loan Documents. The obligations of confidentiality shall not apply to any information that (i) was known to the public prior to disclosure by any Co-Borrower under this Agreement, (ii) becomes known to the public through no fault of Collateral Agent or any Lender, (iii) is disclosed to Collateral Agent or any Lender on a non-confidential basis by a third party or (iv) is independently developed by Collateral Agent or any Lender. Notwithstanding the foregoing, Collateral Agent's and Lenders' agreement of confidentiality shall not apply if Collateral Agent or any Lender has acquired indefeasible title to any Collateral or in connection with any enforcement or exercise of Collateral Agent's or a Lender's rights and remedies under this Agreement following an Event of Default, including the enforcement of Collateral Agent's and Lenders' security interest in the Collateral.

15. CHOICE OF LAW AND VENUE; JURY TRIAL WAIVER; CONSENT TO SERVICE OF PROCESS.

(a) THIS AGREEMENT, THE OTHER LOAN DOCUMENTS, AND ANY DISPUTE, CONTROVERSY OR PROCEEDING ARISING OUT OF OR RELATING TO THIS AGREEMENT, THE OTHER LOAN DOCUMENTS, OR THE TRANSACTIONS OR THE SUBJECT MATTER HEREOF OR THEREOF OR THE RELATIONSHIP AMONG THE PARTIES HERETO OR THERETO IN CONNECTION HEREWITH OR THEREWITH (IN EACH CASE WHETHER IN CONTRACT, TORT, COMMON OR STATUTORY LAW, EQUITY OR OTHERWISE) SHALL BE GOVERNED BY, AND CONSTRUED AND ENFORCED IN ACCORDANCE WITH, THE SUBSTANTIVE LAWS OF THE STATE OF NEW YORK, WITHOUT REGARD TO CONFLICT OF LAW PRINCIPLES THEREOF OR OF ANY OTHER JURISDICTION THAT WOULD CAUSE THE APPLICATION OF LAWS OF ANY JURISDICTION OTHER THAN THOSE OF THE STATE OF NEW YORK.

(b) EACH CO-BORROWER, COLLATERAL AGENT AND LENDERS HEREBY SUBMITS TO THE NON-EXCLUSIVE JURISDICTION OF THE STATE AND FEDERAL COURTS LOCATED IN THE BOROUGH OF MANHATTAN IN THE CITY OF NEW YORK IN THE STATE OF NEW YORK.

(c) EACH CO-BORROWER, COLLATERAL AGENT AND LENDERS HEREBY WAIVE THEIR RESPECTIVE RIGHTS TO A JURY TRIAL OF ANY CLAIM OR CAUSE OF ACTION BASED UPON OR ARISING OUT OF ANY OF THE LOAN DOCUMENTS OR ANY OF THE TRANSACTIONS CONTEMPLATED THEREIN, INCLUDING CONTRACT CLAIMS, TORT CLAIMS, BREACH OF DUTY CLAIMS, AND ALL OTHER COMMON LAW OR STATUTORY CLAIMS.

(d) EACH OF THE PARTIES HERETO HEREBY IRREVOCABLY AND UNCONDITIONALLY CONSENTS TO SERVICE OF PROCESS IN THE MANNER PROVIDED FOR NOTICES IN SECTION 11 AND AGREES THAT NOTHING IN THIS AGREEMENT OR ANY OTHER LOAN DOCUMENT WILL AFFECT THE RIGHT OF ANY PARTY HERETO TO SERVE PROCESS IN ANY OTHER MANNER PERMITTED BY APPLICABLE LAW.

16. Cross-Guaranty of Co-Borrowers.

16.1 Cross-Guaranty. Each Co-Borrower hereby agrees that such Co-Borrower is jointly and severally liable for, and hereby absolutely and unconditionally guarantees to Lender and its successors and assigns, the full and prompt payment (whether at stated maturity, by acceleration or otherwise) and performance of, all Obligations owed or hereafter owing to Lender by each other Co-Borrower. Each Co-Borrower agrees that its guaranty obligation hereunder is a continuing guaranty of payment and performance and not of collection, that its obligations under this Section 16 shall not be discharged until payment and performance, in full, of the Obligations has occurred, and that its obligations under this Section 16 shall be absolute and unconditional, irrespective of, and unaffected by:

(a) the genuineness, validity, regularity, enforceability or any future amendment of, or change in, this Agreement, any other Loan Document or any other agreement, document or instrument to which any Co-Borrower is or may become a party;

(b) the absence of any action to enforce this Agreement (including this Section 16) or any other Loan Document, or the waiver or consent by Lender with respect to any of the provisions hereof or thereof;

(c) the existence, value or condition of, or failure to perfect its Lien against, any security for the Obligations or any action, or the absence of any action, by Lender in respect thereof (including the release of any such security);

(d) the insolvency of any Co-Borrower or any other Person; or

(e) any other action or circumstances that might otherwise constitute a legal or equitable discharge or defense of a surety or guarantor.

Each Co-Borrower shall be regarded, and shall be in the same position, as principal debtor with respect to the Obligations guaranteed hereunder.

16.2 Waivers by Co-Borrowers. Each Co-Borrower expressly waives all rights it may have now or in the future under any statute, at common law, at law, in equity or otherwise,

to compel Lender to marshal assets or to proceed in respect of the Obligations guaranteed hereunder against any other Co-Borrower, any other party or against any security for the payment and performance of the Obligations before proceeding against, or as a condition to proceeding against, such Co-Borrower. Each Co-Borrower and the Lender agrees that the foregoing waivers are of the essence of the transaction contemplated by this Agreement and the other Loan Documents and that, but for the provisions of this Section 16 and such waivers, Lender would decline to enter into this Agreement.

16.3 Benefit of Guaranty. Each Co-Borrower agrees that the provisions of this Section 16 are for the benefit of Lender and its successors, transferees, endorsees and assigns, and nothing herein contained shall impair, as between any other Co-Borrower and the Lender, the obligations of such other Co-Borrower under the Loan Documents.

16.4 Waiver of Subrogation, Etc. Notwithstanding anything to the contrary in this Agreement or in any other Loan Document, and except as set forth in Section 16.7, each Co-Borrower hereby expressly and irrevocably waives any and all rights at law or in equity to subrogation, reimbursement, exoneration, contribution, indemnification or set off and any and all defenses available to a surety, guarantor or accommodation co-obligor until the Obligations are indefeasibly paid in full in cash. Each Co-Borrower acknowledges and agrees that this waiver is intended to benefit Lender and shall not limit or otherwise affect such Co-Borrower's liability hereunder or the enforceability of this Section 16, and that Lender and its successors and assigns are intended third party beneficiaries of the waivers and agreements set forth in this Section 16.

16.5 Election of Remedies. If Lender may, under applicable law, proceed to realize its benefits under any of the Loan Documents giving Lender a Lien upon any Collateral, whether owned by any Co-Borrower or by any other Person, either by judicial foreclosure or by non-judicial sale or enforcement, Lender may, at its sole option, determine which of its remedies or rights it may pursue without affecting any of its rights and remedies under this Section 16. If, in the exercise of any of its rights and remedies, Lender shall forfeit any of its rights or remedies (including, without limitation, its right to enter a deficiency judgment against any Co-Borrower or any other Person), whether because of any applicable laws pertaining to "election of remedies" or the like, each Co-Borrower hereby consents to such action by Lender and waives any claim based upon such action, even if such action by Lender shall result in a full or partial loss of any rights of subrogation that each Co-Borrower might otherwise have had but for such action by Lender. Any election of remedies that results in the denial or impairment of the right of Lender to seek a deficiency judgment against any Co-Borrower shall not impair any other Co-Borrower's obligation to pay the full amount of the Obligations. In the event Lender shall bid at any foreclosure or trustee's sale or at any private sale permitted by law or the Loan Documents, Lender may bid all or less than the amount of the Obligations and the amount of such bid need not be paid by Lender but shall be credited against the Obligations. The amount of the successful bid at any such sale, whether a Lender or any other party is the successful bidder, shall be conclusively deemed to be the fair market value of the Collateral and the difference between such bid amount and the remaining balance of the Obligations shall be conclusively deemed to be the amount of the Obligations guaranteed under this Section 16, notwithstanding that any present or future law or court decision or ruling may have the effect of reducing the amount of any deficiency claim to which Lender might otherwise be entitled but for such bidding at any such sale.

16.6 Limitation. Notwithstanding any provision herein contained to the contrary, each Co-Borrower's liability under this Section 16 (which liability is in any event in addition to amounts for which such Co-Borrower is primarily liable under this Agreement) shall be limited to an amount not to exceed as of any date of determination the lesser of:

(a) the net amount of all Loans advanced to any other Co-Borrower under this Agreement and then re-loaned or otherwise transferred to, or for the benefit of, such Co-Borrower; and

(b) the amount that could be claimed by Lender from such Co-Borrower under this Section 16 without rendering such claim voidable or avoidable under Section 548 of the Bankruptcy Code or under any applicable state Uniform Fraudulent Transfer Act, Uniform Fraudulent Conveyance Act or similar statute or common law after taking into account, among other things, such Co-Borrower's right of contribution and indemnification from each other Co-Borrower under Section 16.7.

16.7 Contribution with Respect to Guaranty Obligations.

(a) To the extent that any Co-Borrower shall make a payment under this Section 16 of all or any of the Obligations (other than Loans made to such Co-Borrower for which it is primarily liable) (a "Guarantor Payment") that, taking into account all other Guarantor Payments then previously or concurrently made by any other Co-Borrower, exceeds the amount that such Co-Borrower would otherwise have paid if each Co-Borrower had paid the aggregate Obligations satisfied by such Guarantor Payment in the same proportion that such Co-Borrower's "Allocable Amount" (as defined below) (as determined immediately prior to such Guarantor Payment) bore to the aggregate Allocable Amounts of each of the Co-Borrowers as determined immediately prior to the making of such Guarantor Payment, then, following indefeasible payment in full in cash of the Obligations and termination of the commitments to lend hereunder, such Co-Borrower shall be entitled to receive contribution and indemnification payments from, and be reimbursed by, each other Co-Borrower for the amount of such excess, pro rata based upon their respective Allocable Amounts in effect immediately prior to such Guarantor Payment.

(b) As of any date of determination, the "Allocable Amount" of any Co-Borrower shall be equal to the maximum amount of the claim that could then be recovered from such Co-Borrower under this Section 16 without rendering such claim voidable or avoidable under Section 548 of the Bankruptcy Code or under any applicable state Uniform Fraudulent Transfer Act, Uniform Fraudulent Conveyance Act or similar statute or common law.

(c) This Section 16.7 is intended only to define the relative rights of Co-Borrowers and nothing set forth in this Section 16.7 is intended to or shall impair the obligations of Co-Borrowers, jointly and severally, to pay any amounts as and when the same shall become due and payable in accordance with the terms of this Agreement. Nothing contained in this Section 16.7 shall limit the liability of any Co-Borrower to pay the Loans made directly or indirectly to such Co-Borrower and accrued interest, fees and expenses with respect thereto for which such Co-Borrower shall be primarily liable.

(d) The parties hereto acknowledge that the rights of contribution and indemnification hereunder shall constitute assets of the Co-Borrowers to which such contribution and indemnification is owing.

(e) The rights of the indemnifying Co-Borrowers against other Co-Borrowers under this Section 16 shall be exercisable upon the full and indefeasible payment of the Obligations and the termination of the commitments to lend hereunder.

16.8 Liability Cumulative. The liability of Co-Borrowers under this Section 16 is in addition to and shall be cumulative with all liabilities of each Co-Borrower to the Lender under this Agreement and the other Loan Documents to which such Co-Borrower is a party or in respect of any Obligations or obligation of the other Co-Borrower, without any limitation as to amount, unless the instrument or agreement evidencing or creating such other liability specifically provides to the contrary.

[Remainder of page intentionally left blank.]

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the date first above written.

BORROWER REPRESENTATIVE and CO-BORROWER:
vTv THERAPEUTICS INC.

By: /s/ Rudy C. Howard

Name: Rudy C. Howard

Title: Executive Vice President and Secretary

CO-BORROWER:
vTv THERAPEUTICS LLC

By: /s/ Rudy C. Howard

Name: Rudy C. Howard

Title: Executive Vice President and Secretary

LENDER and COLLATERAL AGENT:
HORIZON TECHNOLOGY FINANCE CORPORATION

By: /s/ Robert D. Pomeroy, Jr.
Name: Robert D. Pomeroy, Jr.
Title: Chief Executive Officer

LENDER:
SILICON VALLEY BANK

By: /s/ James Caccavaro
Name: James Caccavaro
Title: Vice President

LIST OF EXHIBITS AND SCHEDULES

Exhibit A	Disclosure Schedule
Exhibit B-1	Funding Certificate
Exhibit B-2	Loan Payment/Advance Request Form
Exhibit C	Form of Note
Exhibit D	Form of Legal Opinion
Exhibit E	Form of Officer’s Certificate
Exhibit F	Clinical end points for Phase III clinical trial of TTP488
Exhibit G	Qualifying Term Sheet

EXHIBIT A

DISCLOSURE SCHEDULE

Each Co-Borrower hereby certifies the following information to Lenders:

Section 1. Information For UCC Financing Statements and Searches and Deposit Accounts and Accounts Holding Securities.

(a) The exact corporate name of each Co-Borrower as it appears in its Articles of Incorporation or Certificate of Formation, as amended to date is:

See Schedule A below.

(b) Each Co-Borrower's state of incorporation is:

See Schedule A below.

(c) The organizational ID number of each Co-Borrower from its jurisdiction of incorporation is:

See Schedule A below.

(d) Each Co-Borrower's taxpayer identification number is:

See Schedule A below.

SCHEDULE A

(a)Name	(b)State of Incorporation / Formation	(c)Org. ID	(d)FEIN
vTv Therapeutics Inc.	Delaware	5718082	47-3916571
vTv Therapeutics LLC	Delaware	5729446	35-2536301

(e) All corporate names, dba or trade names used in the past five years:

Current Name	Previous Names	Type
vTv Therapeutics Inc.	N/A	N/A
vTv Therapeutics LLC	vTv Therapeutics Operating LLC	Prior corporate name

Current Name	Previous Names	Type
	vTv Therapeutics OpCo NC LLC	North Carolina DBA

(f) Address of the headquarters and chief executive office is:

Current Name	Previous Names
vTv Therapeutics Inc.	4170 Mendenhall Oaks Pkwy High Point, NC 27265
vTv Therapeutics LLC	4170 Mendenhall Oaks Pkwy High Point, NC 27265

(g) All States where the headquarters and chief executive office has been located in the past five years:

North Carolina

(h) All States where the property and assets have been located in the past five years (other than (i) clinical trial materials, patient materials and generic kits, (ii) laptops and similar equipment maintained by Borrower's employees, and (iii) other Collateral with an aggregate value not to exceed $100,000):

North Carolina

(i) All accounts (bank name, address and account names and numbers):

Co-Borrower Name	Depository Bank	Bank Address	Type of Account	Acct. No. (Last 4 Digits)
vTv Therapeutics LLC	Wells Fargo Bank	301 South Tryon Street Charlotte, NC 28282	Operating	3079
vTv Therapeutics Inc.	Wells Fargo Bank	301 South Tryon Street Charlotte, NC 28282	Operating	7793
vTv Therapeutics LLC	Deutsche Bank	345 Park Avenue New York City, NY 10154	Operating	2312
vTv Therapeutics LLC	Deutsche Bank	345 Park Avenue New York City, NY 10154	Deposit	4983

vTv Therapeutics LLC	Citibank	153 East 53rd Street, 24th Floor New York, NY 10022	Checking	4786

(j) All accounts holding securities (broker/bank name, address and account names and numbers):

Permitted Indebtedness

SHI Capital Lease IBM Storage System, dated as of February 1, 2014, with an initial balance of $16,528.70.

Permitted Liens

None.

Collateral Locations (other than principal place of business) (Section 4.4)

None.

Material Intellectual Property Licensed to Co-Borrower (Section 5.5)

- That Intellectual Property licensed pursuant to the New Exclusive License Agreement, dated May 14, 2015, between the Trustees of Columbia University in the City of New York and vTv Therapeutics LLC (as successor-in-interest to TransTech Pharma, LLC) (the "Columbia License").

- That Intellectual Property licensed pursuant to the Agreement Concerning Glucokinase Activator Project, dated as of February 20, 2007, by and between Novo Nordisk A/S and vTv Therapeutics LLC (as successor-in-interest to TransTech Pharma, Inc.) (the "Novo License").

Restricted Licenses (Section 5.5)

- That Intellectual Property licensed pursuant to the License and Research Agreement, dated as of March 5, 2015, by and between Calithera Biosciences Inc. and vTv Therapeutics LLC (as successor-in-interest to High Point Pharmaceuticals, LLC and TransTech Pharma LLC) (the "Calithera License").

- That Intellectual Property option granted pursuant to the Letter Agreement, dated October 1, 2015, by and between Sparrow Pharmaceuticals Inc. and vTv Therapeutics LLC (the "Sparrow Option Agreement").

Jointly Owned Intellectual Property

- That Intellectual Property jointly owned by vTv Therapeutics LLC and the Trustees of Columbia University in the City of New York, filed August 3, 2005 with Application Number 11/197,644, entitled RAGE fusion proteins and methods of use (the "Columbia IP").

Names; Location of Chief Executive Office; Etc. (Section 5.7)

Co-Borrower Name	Legal Name	Date of Change	Reason for Change
vTv Therapeutics LLC	vTvx Holdings I LLC (previously vTv Therapeutics LLC, previously TransTech Pharma, LLC)	7/29/2015	Contribution of substantially all assets
	vTvx Holdings II LLC (previously High Point Pharmacueticals, LLC)	7/29/2015	Contribution of substantially all assets
	vTv Therapeutics Holdings LLC	7/29/2015	Contribution of all assets
	TransTech Pharma, Inc.	11/14/2013	Contribution of all assets to TransTech Pharma, LLC

Litigation (Section 5.8)

vTv Therapeutics Inc. is named as a nominal defendant in a Section 16 short-swing trading suit brought against Ronald O. Perelman by Aaron Rubenstein.

EXHIBIT B-1

FUNDING CERTIFICATE

The undersigned, being the duly elected and acting _____of vTv THERAPEUTICS, INC. a Delaware corporation ("Borrower Representative"), does hereby certify to HORIZON TECHNOLOGY FINANCE CORPORATION ("Horizon") and SILICON VALLEY BANKS("SVB", and collectively with Horizon, the "Lenders") in connection with that certain Venture Loan and Security Agreement dated as of August __, 2016 by and among Borrower Representative, vTv Therapeutics LLC, Lenders and Horizon as Collateral Agent (the "Loan Agreement"; with other capitalized terms used below having the meanings ascribed thereto in the Loan Agreement) that:

1. The representations and warranties made by each Co-Borrower in Section 5 of the Loan Agreement and in the other Loan Documents are true and correct as of the date hereof.

2. No event or condition has occurred that would constitute a Default or an Event of Default under the Loan Agreement or any other Loan Document.

3. Each Co-Borrower is in compliance with the covenants and requirements contained in Sections 4, 6 and 7 of the Loan Agreement.

4. All conditions referred to in Section 3 of the Loan Agreement to the making of the Loan to be made on or about the date hereof have been satisfied.

5. No material adverse change in the general affairs, management, results of operations, condition (financial or otherwise) or prospects of any Co-Borrower, whether or not arising from transactions in the ordinary course of business, has occurred.

6. The proceeds for Loan [ ] shall be disbursed as follows:

Disbursement from Horizon:

Loan Amount	$
Less:	
Legal Fees	$
Balance of Commitment Fee	$

Net Proceeds due from Horizon: $

7. The proceeds for Loan [ ] shall be disbursed as follows:

Disbursement from SVB:

Loan Amount	$
Less:	
Legal Fees	$
Balance of Commitment Fee	$

Net Proceeds due from SVB: $

8. The aggregate net proceeds of Loan [ ] in the amount of $_____ shall be transferred by Horizon to Borrower Representative's account as follows:

Account Name:
Bank Name:
Bank Address:
Attention:
Telephone:
Account Number:
ABA Number:

9. The aggregate net proceeds of Loan [ ] in the amount of $_____ shall be transferred by SVB to Borrower Representative's account as follows:

Account Name:
Bank Name:
Bank Address:
Attention:
Telephone:
Account Number:
ABA Number:

Dated: __, 201[ ]

BORROWER REPRESENTATIVE:

vTv THERAPEUTICS INC.

By: _____

Name: _____

Title: _____

EXHIBIT B-2

Loan Payment/Advance Request Form

Deadline for same day processing is Noon Pacific Time*

Fax To: Date: _____

Loan Payment:

vTv Therapeutics Inc., on behalf of Co-Borrowers.

From Account #_____ To Account #_____
(Deposit Account #) (Loan Account #)
Principal $_____ and/or Interest $_____

Authorized Signature: Phone Number:
Print Name/Title:

Loan Advance:

Complete *Outgoing Wire Request* section below if all or a portion of the funds from this loan advance are for an outgoing wire.

From Account #_____ To Account #_____
(Loan Account #) (Deposit Account #)

Amount of Advance $_____

All Borrower's representations and warranties in the Venture Loan and Security Agreement are true, correct and complete in all material respects on the date of the request for an advance; provided, however, that such materiality qualifier shall not be applicable to any representations and warranties that already are qualified or modified by materiality in the text thereof; and provided, further that those representations and warranties expressly referring to a specific date shall be true, accurate and complete in all material respects as of such date:

Authorized Signature: Phone Number:
Print Name/Title:

Outgoing Wire Request:

Complete only if all or a portion of funds from the loan advance above is to be wired.
Deadline for same day processing is noon, Pacific Time

Beneficiary Name: _____ Amount of Wire: $
Beneficiary Bank: _____ Account Number:
City and State:

Beneficiary Bank Transit (ABA) #: Beneficiary Bank Code (Swift, Sort, Chip, etc.):

(For International Wire Only)

Intermediary Bank: Transit (ABA) #:
For Further Credit to:

Special Instruction:
By signing below, I (we) acknowledge and agree that my (our) funds transfer request shall be processed in accordance with and subject to the terms and conditions set forth in the agreements(s) covering funds transfer service(s), which agreements(s) were previously received and executed by me (us).

Authorized Signature: _____ 2nd Signature (if required): _____
Print Name/Title: _____ Print Name/Title: _____
Telephone #: Telephone #:

EXHIBIT C

SECURED PROMISSORY NOTE

(Loan [ ])

$_____ Dated: August __, 2016

FOR VALUE RECEIVED, the undersigned, vTv THERAPEUTICS INC., a Delaware corporation ("Borrower Representative") and vTv THERAPEUTICS LLC, a Delaware limited liability company ("vTv LLC" and collectively with Borrower Representative, "Co-Borrowers"), HEREBY JOINTLY AND SEVERALLY PROMISE TO PAY to [HORIZON TECHNOLOGY FINANCE CORPORATION, a Delaware corporation[/[SILICON VALLEY BANK, a California corporation] ("Lender") the principal amount of _____ Dollars ($_____) or such lesser amount as shall equal the outstanding principal balance of Loan [ ] (the "Loan") made to Co-Borrowers by Lender pursuant to the Loan Agreement (as defined below), and to pay all other amounts due with respect to the Loan on the dates and in the amounts set forth in the Loan Agreement. Capitalized terms used but not defined herein shall have the meaning ascribed thereto in the Loan Agreement.

Interest on the principal amount of this Note from the date of this Note shall accrue at the Loan Rate or, if applicable, the Default Rate, each as established in accordance with the Loan Agreement (as defined below). Interest shall be computed on the basis of a 360-day year for the actual number of days elapsed. If the Funding Date is not the first day of the month, interim interest accruing from the Funding Date through the last day of that month shall be paid on the first calendar day of the next calendar month. Commencing [_], 201[_], through and including [_], 201[_], on the first day of each month (each an "Interest Payment Date") Co-Borrowers shall make payments of accrued interest only on the outstanding principal amount of the Loan. Commencing on [_], 201[_], and continuing on the first day of each month thereafter (each a "Principal and Interest Payment Date" and, collectively with each Interest Payment Date, each a "Payment Date"), Co-Borrowers shall make to Lender twenty-four (24) equal payments of principal in the amount of [_____] plus accrued interest on the then outstanding principal amount due hereunder. On the earliest to occur of (i) [_], 201[_], (ii) payment in full of the principal balance of the Loan or (iii) an Event of Default and demand by Lender of payment in full of the Loan, Co-Borrowers shall make a payment of [_] and 00/100 Dollars ($[_]) to Lender (the "Final Payment"). If not sooner paid, all outstanding amounts hereunder and under the Loan Agreement shall become due and payable on [_], 201[_].

Principal, interest and all other amounts due with respect to the Loan, are payable in lawful money of the United States of America to Lender as set forth in the Loan Agreement. The principal amount of this Note and the interest rate applicable thereto, and all payments made with respect thereto, shall be recorded by Lender and, prior to any transfer hereof, endorsed on the grid attached hereto which is part of this Note.

This Note is referred to in, and is entitled to the benefits of, the Venture Loan and Security Agreement dated as of August __, 2016 (the "Loan Agreement"), among Co-Borrowers, Lender and [Horizon Technology Finance Corporation][Silicon Valley Bank]. The Loan Agreement, among other things, (a) provides for the making of a secured Loan to Co-Borrowers, and (b) contains provisions for acceleration of the maturity hereof upon the happening of certain stated events.

This Note may not be prepaid, except as set forth in Section 2.3 of the Loan Agreement.

This Note and the obligation of Co-Borrowers to repay the unpaid principal amount of the Loan, interest on the Loan and all other amounts due Lender under the Loan Agreement is secured under the Loan Agreement.

Presentment for payment, demand, notice of protest and all other demands and notices of any kind in connection with the execution, delivery, performance and enforcement of this Note are hereby waived.

Co-Borrowers shall pay all fees and expenses, including reasonable attorneys' fees and costs, incurred by Lender in the enforcement or attempt to enforce any Co-Borrower's obligations hereunder not performed when due.

Any reference herein to Lender shall be deemed to include and apply to every subsequent holder of this Note. Reference is made to the Loan Agreement for provisions concerning optional and mandatory prepayments, Collateral, acceleration and other material terms affecting this Note.

This Note shall be governed by and construed under the laws of the State of New York. Each Co-Borrower agrees that any action or proceeding brought to enforce or arising out of this Note may be commenced in the Supreme Court of the State of New York, Borough of Manhattan, or in the District Court of the United Stated for the Southern District of New York.

IN WITNESS WHEREOF, each Co-Borrower has caused this Note to be duly executed by one of its officers thereunto duly authorized on the date hereof.

BORROWER REPRESENTATIVE AND CO-BORROWER:

vTv THERAPEUTICS INC.

By: _____

Name: _____

Title: _____

CO-BORROWER:

vTv THERAPEUTICS LLC

By: _____

Name: _____

Title: _____

EXHIBIT D

ITEMS TO BE COVERED BY OPINIONS OF CO-BORROWERS' COUNSEL(S)

1. Co-Borrower is a [corporation/limited liability company], duly organized, validly existing and in good standing under the laws of the State of Delaware, and is duly qualified and authorized to do business in the State of North Carolina.

2. Co-Borrower has the full corporate power, authority and legal right, and has obtained all necessary approvals, consents and given all notices to execute and deliver the Loan Documents and perform the terms thereof.

3. The Loan Documents have been duly authorized, executed and delivered by Co-Borrower and constitute valid, legal and binding agreements, and are enforceable in accordance with their terms.

4. To our knowledge, there is no action, suit, audit, investigation, proceeding or patent claim pending or threatened against Co-Borrower in any court or before any governmental commission, agency, board or authority which might have a Material Adverse Effect.

5. The Shares (as defined in the Warrant) issuable pursuant to exercise or conversion of the Warrant have been duly authorized and reserved for issuance by Borrower Representative and, when issued in accordance with the terms thereof, will be validly issued, fully paid and nonassessable.

6. The execution and delivery of the Loan Documents are not, and the issuance of the Shares upon exercise of the Warrant in accordance with the terms thereof will not be, inconsistent with Co-Borrower's [Articles/Certificate] of Incorporation, as amended, or Bylaws, do not and will not contravene any law, governmental rule or regulation, judgment or order applicable to Co-Borrower, and do not and will not conflict with or contravene any provision of, or constitute a default under, any indenture, mortgage, contract or other agreement or instrument of which Co-Borrower is a party or by which it is bound or require the consent or approval of, the giving of notice to, the registration or filing with or the taking of any action in respect of or by, any federal, state or local government authority or agency or other person, except for the filing of notices pursuant to federal and state securities laws, which filings will be effected by the time required thereby.

EXHIBIT E

FORM OF OFFICER'S CERTIFICATE

TO: HORIZON TECHNOLOGY FINANCE CORPORATION
SILICON VALLEY BANK

Reference is made to the Venture Loan and Security Agreement dated as of August __, 2016 (as it may be amended from time to time, the "Loan Agreement") by and among vTv THERAPEUTICS INC. ("Borrower Representative"), vTv THERAPEUTICS LLC ("vTv LLC" and collectively with Borrower Representative, "Co-Borrowers"), HORIZON TECHNOLOGY FINANCE CORPORATION, as a Lender and Collateral Agent ("Horizon") and SILICON VALLEY BANK, as a Lender ("SVB" and collectively with Horizon, "Lenders"). Unless otherwise defined herein, capitalized terms have the meanings given such terms in the Loan Agreement. The undersigned Responsible Officer of Borrower Representative hereby certifies to Lenders that:

1. No Event of Default or Default has occurred under the Loan Agreement, including, without limitation, any Event of Default or Default caused by a cross-default under any agreement evidencing Permitted Indebtedness of any Co-Borrower to lenders other than Lenders. (If a Default or Event of Default has occurred, specify the nature and extent thereof and the action each Co-Borrower proposes to take with respect thereto.)

2. The information provided in the Disclosure Schedules is currently true and accurate, except as noted below.

3. Each Co-Borrower is in compliance with the provisions of Section 4, 6 and 7 of the Loan Agreement, except as noted below.

4. Attached herewith are the monthly reports of cash balances pursuant to Section 6.3(a) of the Loan Agreement.

NOTES TO ABOVE CERTIFICATIONS:

BORROWER REPRESENTATIVE:
vTv THERAPEUTICS INC.

By: _____
Name: _____
Title: _____

Date: _____

EXHIBIT F

CLINICAL END POINTS FOR PHASE III CLINICAL TRIAL OF TTP488

The STEADFAST Study is a multi-center, randomized, double-blind, placebo-controlled, parallel-group study evaluating the efficacy and safety of 18 months of treatment with *azeliragon* relative to placebo conducted in approximately 800 mild AD patients (Parts A and B) who are on background standard of care.

Primary Endpoints:

Co-primary Endpoints:

- Change from Baseline in the ADAS-cog at Month 18.
- Change from Baseline in the CDR-sb at Month 18.

EXHIBIT G

QUALIFYING TERM SHEET

"Qualifying Term Sheet" means a fully-executed term sheet for the licensing sale, co-development, co-commercialization, or other transfer of a drug compound or program, which term sheet:

(a) for the glukokinase activator program, including the TTP399 drug compound, or the GLP1-R program, including the TTP273 drug compound, requires either (i) a cash payment to Co-Borrowers upon the closing of such transaction of not less than [***], or (ii) both (x) a cash payment to Co-Borrowers upon the closing of such transaction of not less than [***] and (y) clinical milestone payments to Co-Borrowers of not less than [***];

(b) for the receptor for advanced glycation endproducts program, including the TTP488 drug compound, requires either (i) a cash payment to Co-Borrowers upon the closing of such transaction of not less than [***], or (ii) requires both (x) a cash payment to Co-Borrowers upon the closing of such transaction of not less than [***] and (y) clinical milestone payments to Co-Borrowers of not less than [***]; or

(c) is otherwise acceptable to Lenders in their sole discretion.

Exhibit 21.1

vTv Therapeutics Inc.
Corporate Subsidiaries as of February 24, 2017

Subsidiary	Jurisdiction of Incorporation
vTv Therapeutics LLC	Delaware

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in Registration Statement No. 333-206335 on Form S-8 of our report dated February 24, 2017, with respect to the consolidated financial statements of vTv Therapeutics Inc. included in this Annual Report on Form 10-K of vTv Therapeutics Inc. for the year ended December 31, 2016.

/s/ Ernst & Young LLP

Raleigh, North Carolina
February 24, 2017

EXHIBIT 31.1

SECTION 302 CERTIFICATION

I, Stephen L. Holcombe, certify that:

1. I have reviewed this annual report on Form 10-K of vTv Therapeutics Inc. (the "registrant");

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(s) 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)) 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) 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

   (c) 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(s) 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: February 24, 2017

By: /s/ Stephen L. Holcombe
Stephen L. Holcombe
President and Chief Executive Officer

EXHIBIT 31.2

SECTION 302 CERTIFICATION

I, Rudy C. Howard, certify that:

1. I have reviewed this annual report on Form 10-K of vTv Therapeutics Inc. (the "registrant");

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(s) 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)) 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) 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

   (c) 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 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(s) 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: February 24, 2017

By: /s/ Rudy C. Howard
Rudy C. Howard
Chief Financial 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 of vTv Therapeutics Inc. (the "Company") on Form 10-K for the period ended December 31, 2016 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Stephen L. Holcombe, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, in my capacity as an officer of the Company that, to my knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d), as applicable, of the Securities Exchange Act of 1934; and

2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: February 24, 2017

By: /s/ Stephen L. Holcombe
Stephen L. Holcombe
President and Chief 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 of vTv Therapeutics Inc. (the "Company") on Form 10-K for the period ended December 31, 2016 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), I, Rudy C. Howard, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, in my capacity as an officer of the Company that, to my 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: February 24, 2017

By: /s/ Rudy C. Howard
Rudy C. Howard
Chief Financial Officer