

**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION**

Washington, D.C. 20549

Form 10-K

Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934

For the fiscal year ended: March 31, 2020

or

Transition Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934

Commission file number: 001-37761

VistaGen Therapeutics, Inc.

(Exact name of registrant as specified in its charter)

Nevada

(State or other jurisdiction of
incorporation or organization)

20-5093315

(I.R.S. Employer
Identification No.)

**343 Allerton Avenue
South San Francisco, California 94080
(650) 577-3600**

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

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

Title of each class

Name of each exchange on which registered

Common Stock, par value \$0.001 per share

The Nasdaq Capital Market

Securities registered pursuant to Section 12(g) of the Act

None

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

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

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

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

Indicate by check mark 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.

Large accelerated filer Accelerated filer Non-accelerated filer Smaller reporting company Emerging Growth Company

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

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. Yes No

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

The aggregate market value of the common stock of the registrant held by non-affiliates of the registrant on September 30, 2019, the last business day of the registrant's second fiscal quarter, was: \$45,352,358.

As of June 26, 2020, there were 55,773,682 shares of the registrant's common stock, \$0.001 par value per share, outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Items 10, 11, 12, 13 and 14 of Part III incorporate by reference certain information from VistaGen Therapeutics, Inc.'s definitive proxy statement, to be filed with the Securities and Exchange Commission on or before July 29, 2020.

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Forward-Looking Statements

This Annual Report on Form 10-K (*Annual Report*) contains forward-looking statements that involve substantial risks and uncertainties. All statements contained in this Annual Report other than statements of historical facts, including statements regarding our strategy, future operations, future financial position, future revenue, projected costs, prospects, plans, objectives of management and expected market growth, are forward-looking statements. These statements involve known and unknown risks, uncertainties and other important factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements.

The words “anticipate,” “believe,” “estimate,” “expect,” “intend,” “may,” “plan,” “predict,” “project,” “target,” “potential,” “will,” “would,” “could,” “should,” “continue,” and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. These forward-looking statements include, among other things, statements about:

- the impact of the novel coronavirus (*COVID-19*) pandemic, efforts to contain the pandemic and resulting economic downturn on our operations and financial condition;
- the availability of capital to satisfy our working capital requirements and clinical and nonclinical development objectives;
- the accuracy of our estimates regarding expenses, future revenues and capital requirements;
- our plans to develop and commercialize our product candidates, including, among other things, PH94B as a treatment for Social Anxiety Disorder (*SAD*), AV-101 as a treatment for diseases and disorders involving the Central Nervous System (*CNS*), and PH10 as a treatment for major depressive disorder (*MDD*);
- our ability to initiate and complete necessary preclinical and clinical trials to advance the development of our product candidates, including pivotal clinical trials, to successfully complete any such preclinical and clinical trials, and for those trials to generate positive results;
- economic, regulatory and political developments in the U.S. and foreign countries;
- the performance of the Department of Veterans Affairs (*VA*), Baylor University, our third-party contract manufacturer(s) (*CMOs*), contract research organizations (*CROs*) and other third-party preclinical and clinical drug development collaborators and regulatory service providers;
- our ability to obtain and maintain intellectual property (*IP*) protection for our core assets, including our product candidates;
- the size of the potential markets for our product candidates and our ability to enter and serve those markets;
- the rate and degree of market acceptance of our product candidates for any indication once approved;
- the success of competing products and product candidates in development by others that are or become available for the indications that we are pursuing in the markets we seek to enter on our own or with collaborators;
- the loss of key scientific, clinical or nonclinical development, regulatory, and/or management personnel, internally or from one or more of our third-party collaborators; and
- other risks and uncertainties, including those listed under Part I, Item 1A of this Annual Report titled “*Risk Factors*.”

These forward-looking statements are only predictions and we may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, so you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. We have based these forward-looking statements largely on our current expectations and projections about future events and trends that we believe may affect our business, financial condition and operating results. We have included important factors in the cautionary statements included in this Annual Report, particularly in Part I, Item 1A, titled “*Risk Factors*,” that could cause actual future results or events to differ materially from the forward-looking statements that we make. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments we may make.

You should read this Annual Report and the documents that we have filed as exhibits to the Annual Report with the understanding that our actual future results may be materially different from what we expect. We do not assume any obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by applicable law.

PART I

All brand names or trademarks appearing in this Annual Report are the property of their respective holders. Unless the context requires otherwise, references in this report to “VistaGen,” the “Company,” “we,” “us,” and “our” refer to VistaGen Therapeutics, Inc., a Nevada corporation. All references to future quarters and years in this Annual Report refer to calendar quarters and calendar years, unless reference is made otherwise.

Item 1. Business

Overview

We are a clinical-stage biopharmaceutical company committed to developing new generation therapies for anxiety, depression and certain additional central nervous system (CNS) disorders for which current treatment options are inadequate, resulting in high unmet need in large and growing markets worldwide. Our pipeline includes three clinical-stage CNS product candidates, PH94B, PH10 and AV-101, each with a differentiated mechanism of action, an exceptional safety profile in all clinical studies to date, and therapeutic potential in multiple CNS indications. We are currently preparing PH94B for Phase 3 clinical development for the acute treatment of adult patients with social anxiety disorder (SAD). We are also preparing PH94B for an exploratory Phase 2A open-label study in adult patients experiencing adjustment disorder with anxiety (AjDA) related to the COVID-19 pandemic. PH10 has completed successful exploratory Phase 2A development as a novel treatment for major depressive disorder (MDD). We are currently preparing PH10 for Phase 2B development as a potential stand-alone treatment for MDD. In several clinical studies, we have established that AV-101 is orally available and has an excellent safety profile. Based on successful preclinical studies involving AV-101 alone and in combination with probenecid, we are currently assessing potential Phase 1B and subsequent Phase 2A development of AV-101, in combination with probenecid, for treatment of depression and several other CNS indications involving the NMDAR (*N-methyl-D-aspartate receptor*). Additionally, our subsidiary, VistaStem Therapeutics (*VistaStem*), has pluripotent stem cell technology focused on assessing and developing small molecule new chemical entities (NCEs) for our CNS pipeline, or for out-licensing, by utilizing CardioSafe 3D, VistaStem’s customized human heart cell-based cardiac bioassay system. Our goal is to become a fully integrated biopharmaceutical company that develops and commercializes innovative medicine for large and growing neuropsychiatry and neurology markets worldwide where current treatments are inadequate to meet the needs of millions of patients.

Our Product Candidates

PH94B is a novel, first-in-class neuroactive nasal spray with therapeutic potential in a wide range of indications involving anxiety or phobia. Self-administered in microgram doses, PH94B does not require systemic uptake and distribution to produce its rapid-onset anti-anxiety effects. We are initially developing PH94B as a potential fast-acting, non-sedating, non-addictive new generation acute treatment of SAD, as well as AjDA related to the COVID-19 pandemic. With its rapid-onset pharmacology, lack of systemic exposure and excellent safety profile, PH94B also has potential as a novel treatment for postpartum anxiety (PPA), post-traumatic stress disorder (PTSD), preoperative anxiety (POA), panic disorder and other anxiety-related disorders.

PH10 is an odorless, fast-acting synthetic neurosteroid delivered intranasally that has therapeutic potential in a wide range of neuropsychiatric indications involving depression. Self-administered in microgram doses, PH10 does not require systemic uptake and distribution to produce its rapid-onset antidepressant effects. We are initially developing PH10 as a potential fast-acting, non-sedating, non-addictive new generation treatment of MDD. With its rapid-onset pharmacology, lack of systemic exposure and excellent safety profile, PH10 also has potential as a novel treatment for postpartum depression (PPD), treatment-resistant depression (TRD) and suicidal ideation (SI).

AV-101 (4-Cl-KYN) is a novel, oral prodrug that targets the NMDAR, an ionotropic glutamate receptor in the brain. Abnormal NMDAR function is associated with numerous CNS diseases and disorders. AV-101’s active metabolite, 7-chloro-kynurenic acid (7-Cl-KYNA), is a potent and selective full antagonist of the glycine coagonist site of the NMDAR that inhibits the function of the NMDAR, but does not block the NMDAR receptor like ketamine and other NMDAR antagonists. We have demonstrated in clinical trials that AV-101 is orally-available, well-tolerated and does not cause dissociative or hallucinogenic psychological side effects or safety concerns similar to those that may be caused by other NMDAR antagonists. With its exceptionally few side effects and excellent safety profile, AV-101 has potential to be an oral, new generation treatment for multiple large market CNS indications involving abnormal NDAR function and where current treatments are inadequate to meet high unmet patient needs. The FDA has granted Fast Track designation for development of AV-101 as both a potential adjunctive treatment for MDD and as a non-opioid treatment for neuropathic pain (NP). We are currently assessing AV-101’s potential in combination with probenecid, to treat both MDD and NP, as well as dyskinesia associated with levodopa therapy for Parkinson’s disease, epilepsy and suicidal ideation.

VistaStem is applying pluripotent stem cell (hPSC) technology and CardioSafe 3D, our customized cardiac bioassay system, to discover and develop, novel small molecule NCEs for our CNS pipeline or for out-licensing.

Our product candidates are protected through a combination of patents, trade secrets, and proprietary know-how. If approved, they may also be eligible for periods of regulatory exclusivity. Our intellectual property portfolio includes issued U.S. and foreign patents, as well as U.S. and foreign patent applications.

VistaStem, a California corporation, is our wholly-owned subsidiary. Our Condensed Consolidated Financial Statements in this Annual Report also include the accounts of VistaStem and VistaStem's two wholly-owned inactive subsidiaries, Artemis Neuroscience, Inc., a Maryland corporation, and VistaStem Canada, Inc., a corporation organized under the laws of Ontario, Canada.

Our Strategy

Our goal is to be a leading biopharmaceutical company committed to development and commercialization of novel proprietary therapies for the treatment of anxiety, depression and other CNS diseases and disorders with high unmet need. Key elements of our strategy to achieve our goal are as follows:

- Focus on global development and commercialization, on our own in the U.S. and with collaborators outside the U.S., of novel CNS drug candidates with fundamentally differentiated mechanisms of pharmacological action than currently approved therapies;
- Emphasize the development and commercialization of differentiated CNS product candidates with potential for (i) rapid-onset therapeutic effects, (ii) exceptional safety profiles, especially product candidates without high potential risk of addiction, sedation, cognitive impairment, psychological side effects (such as hallucinations or dissociation), or cardiac and/or drug-drug interaction liabilities, and (iii) significant therapeutic and commercial impact in multiple CNS markets where currently-approved treatment alternatives are inadequate, resulting in high unmet but addressable need;
- Advance and complete Phase 3 clinical development of PH94B for acute treatment of SAD, on our own in the U.S. and, in markets outside the U.S., through strategic license, development and commercialization agreements with biopharmaceutical companies with high-quality capabilities and expertise in such markets, such as the EverInsight License Agreement (as further described below) (*Collaborators*);
- File for and obtain regulatory approval of PH94B for acute treatment of SAD on our own in the U.S. and with Collaborators outside the U.S., if our Phase 3 clinical development efforts are successful;
- Commercialize PH94B, initially for acute treatment of SAD, on our own in the U.S. and with Collaborators outside the U.S., if and when approved for acute treatment of SAD in the U.S. and other markets;
- Pursue exploratory Phase 2 clinical development of PH94B, on our own or with Collaborators, academic institutions, private foundations and/or U.S. government institutions, such as the U.S. National Institutes of Health (*NIH*), U.S. Department of Veterans Affairs (*VA*), and U.S. Department of Defense (*DOD*), for multiple additional anxiety-related indications, including adjustment disorder with anxiety related to the COVID-19 pandemic, postpartum anxiety, post-traumatic stress disorder, preoperative anxiety, panic disorder and potentially other anxiety-related disorders;
- Advance PH10 into and through Phase 2B clinical development for treatment of MDD in the U.S. on our own, and, if our U.S. Phase 2B development efforts are successful, advance and complete Phase 3 clinical development of PH10 for treatment of MDD, on our own in the U.S. and with Collaborators outside the U.S.;
- File for and obtain regulatory approval of PH10 for treatment of MDD on our own in the U.S. and with Collaborators outside the U.S., if our Phase 3 clinical development efforts are successful;
- Commercialize PH10, initially for treatment of MDD, on our own in the U.S. and with Collaborators outside the U.S., if and when approved for treatment of MDD in the U.S. and other markets;
- Pursue exploratory Phase 2 clinical development of PH10, on our own or with Collaborators, academic institutions, private foundations and/or U.S. government institutions for multiple additional depression-related indications, including postpartum depression, treatment resistant depression and suicidal ideation;
- File for and obtain regulatory approval of PH10 for treatment of MDD in the U.S., if it has advanced into and successfully completed Phase 3 development;
- Commercialize PH10 on our own in the U.S. and with Collaborators outside the U.S., if and when approved;
- Pursue exploratory Phase 1 and Phase 2 clinical development of AV-101 in combination with probenecid, on our own or with academic institutions, private foundations and/or U.S. government institutions in the U.S., and with Collaborators outside the U.S., for treatment of multiple CNS indications involving abnormal NDAR function, including depression, dyskinesia associated with levodopa therapy for Parkinson's disease, epilepsy, neuropathic pain and suicidal ideation;

- Advance AV-101, in combination with probenecid, on our own into and through Phase 2B clinical development for treatment of one or more CNS indications involving abnormal NMDAR function, and, if our U.S. Phase 2B development program is successful, advance and complete Phase 3 clinical development of AV-101, in combination with probenecid, for treatment of such indication(s), on our in the U.S. and with Collaborators outside the U.S.;
- File for and obtain regulatory approval in the U.S. of AV-101, in combination with probenecid, for treatment of one or more CNS indications involving abnormal NMDAR function, if it has advanced into and successfully completed Phase 3 development;
- Commercialize AV-101 on our own in the U.S. and with Collaborators outside the U.S., if and when approved;
- Evaluate the market potential and regulatory pathways for our product candidates in countries outside the U.S., and move forward where and when it may make business and strategic sense for us to proceed;
- Explore potential for development and commercialization collaborations to advance clinical development, file for and obtain regulatory approval of, and commercialize our product candidates in global markets outside the U.S.;
- Continue our research and development efforts to evaluate the potential for our existing product candidates in the treatment of additional CNS indications, and the identification of new drug candidates and new areas of interest;
- Utilize the strengths of VistaStem and its proprietary hPSC-based cardiotoxicity assay system, *CardioSafe* 3D, and our scientific know-how to both expand our CNS product candidate portfolio through our internal drug rescue programs and lessen our long-term reliance on the success of any one particular program to facilitate our long-term growth; and
- Leverage the strengths of VistaStem and its hPSC-based intellectual property portfolio to explore potential for one or more additional strategic out-licensing transactions in the predictive toxicology, regenerative medicine and/or cell therapy fields focused on applications of our *CardioSafe* 3D assay system and/or blood, cartilage and liver cells.

Our Product Pipeline

The following table summarizes the status of our development programs as of the filing date of this Annual Report.

Product Candidate	Indication	Preclinical	Phase 1	Phase 2	Phase 3
PH94B Neuroactive Nasal Spray*	Social Anxiety Disorder ^{†12}	[Progress bar: Preclinical to Phase 3]			
	Generalized Anxiety Disorder ⁵	[Progress bar: Preclinical to Phase 2]			
	Adjustment Disorder with Anxiety ⁴	[Progress bar: Preclinical to Phase 2]			
	Postpartum Anxiety ⁵	[Progress bar: Preclinical to Phase 2]			
	Perioperative Anxiety ⁵	[Progress bar: Preclinical to Phase 2]			
	Panic Disorder ⁵	[Progress bar: Preclinical to Phase 2]			
	PTSD ⁵	[Progress bar: Preclinical to Phase 2]			
PH10 Neuroactive Nasal Spray*	Major Depressive Disorder ³	[Progress bar: Preclinical to Phase 2]			
	Postpartum Depression ⁵	[Progress bar: Preclinical to Phase 2]			
	Treatment-resistant Depression ⁵	[Progress bar: Preclinical to Phase 2]			
	Suicidal Ideation ⁵	[Progress bar: Preclinical to Phase 2]			
AV-101 (oral)*	Major Depressive Disorder ^{†6}	[Progress bar: Preclinical to Phase 2]			
	Neuropathic Pain ^{†5}	[Progress bar: Preclinical to Phase 2]			
	LID associated with Parkinson's Therapy ⁶	[Progress bar: Preclinical to Phase 2]			
	Epilepsy ⁶	[Progress bar: Preclinical to Phase 2]			
	Suicidal Ideation ⁶	[Progress bar: Preclinical to Phase 2]			

* The commencement of all potential studies noted above with dashed arrow bars is subject to U.S. FDA regulatory approval and the availability of sufficient funding.

† FDA Fast Track designation granted

1. Successful Phase 2 program completed; preparing for Phase 3 program

2. EverInsight Therapeutics has exclusive rights to develop and commercialize in certain Asian markets

3. Successful Phase 2A program completed; preparing for Phase 2B program

4. Preparing for U.S. Phase 2A program

5. Assessing for potential Phase 2A program

6. Planning for Phase 1B study with probenecid

Our Lead Programs

PH94B Neuroactive Nasal Spray for Acute Treatment of Social Anxiety Disorder

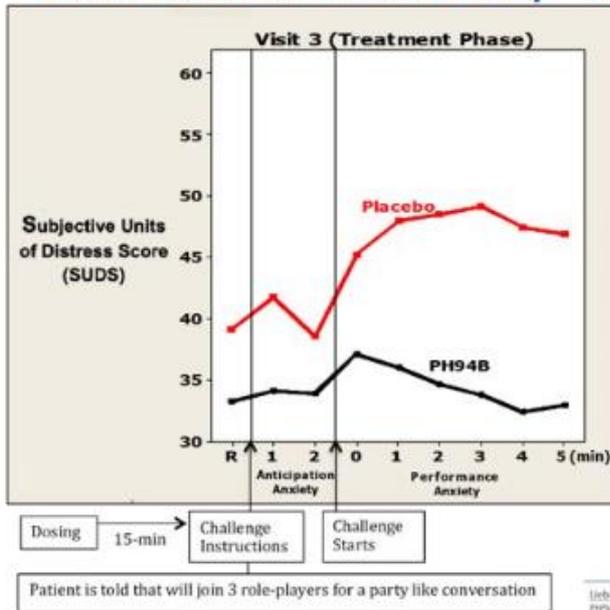
Social Anxiety Disorder affects over 20 million Americans and, according to the NIH, is the third most common psychiatric condition after depression and substance abuse. A person with SAD feels intense, persistent symptoms of anxiety or fear in certain social situations, such as meeting new people, dating, being on a job interview, answering a question in class, or having to talk to a cashier in a store. Doing everyday things in front of people - such as eating or drinking in front of others or using a public restroom - also causes anxiety or fear. A person with SAD is afraid that he or she will be humiliated, judged, and rejected. The fear that people with SAD have in social situations is so strong that they feel it is beyond their ability to control. As a result, SAD gets in the way of going to work, attending school, or doing everyday things in situations with potential for interpersonal interaction. People with SAD may worry about these and other things for weeks before they happen. Sometimes, they end up staying away from places or events where they think they might have to do something that will embarrass them. Some people with SAD do not have anxiety in social situations, but instead have performance anxiety. They feel physical symptoms of anxiety in performance situations, such as giving a lecture, a speech or a presentation at school or work, as well as playing a sports game, or dancing or playing a musical instrument on stage. Without treatment, SAD can last for many years or a lifetime and prevent a person from reaching his or her full potential.

Only three drugs, all oral antidepressant drugs (ADs), are approved by the U.S Food and Drug Administration (FDA) specifically for treatment of SAD, and no drug is FDA-approved for acute, on-demand treatment of SAD. These FDA-approved chronic oral ADs have slow onset of effect (often many weeks or months) and significant side effects that may make them inadequate or inappropriate treatment alternatives for many individuals affected by acute, episodic symptoms of SAD. Benzodiazepines, often referred to as “benzos,” and beta blockers, both of which are not FDA-approved to treat SAD, also are prescribed by psychiatrists and physicians for treatment of SAD on an off-label basis. Unlike ADs, which can take several weeks to take full effect, benzodiazepines have rapid-onset effect by slowing the nervous system to induce a calming effect that can last up to twelve hours. However, the safety concerns and side effects of benzodiazepines, many of which are similar to side effects of alcohol, also can appear rapidly. Extended use of benzodiazepines may lead to physical dependence, and weaning off benzodiazepines can take up to many months, often resulting in severe withdrawal symptoms, including muscle pain, sweating, blurred vision, depression, seizures and delirium tremens similar to those experienced with alcohol withdrawal. Benzodiazepines users also can build up a tolerance that requires increasingly larger doses over time. When taken with opioid drugs, benzodiazepine use may be quite dangerous, so much so that in 2016 the FDA ordered that benzodiazepines must display a “black box” label on bottles to warn against their potential for dangerous interactions with opioids. We believe PH94B, with its rapid-onset activity without systemic exposure and its lack of benzodiazepine-like side effects and safety concerns, has potential to displace benzodiazepines in many established anxiety disorder treatment paradigms.

PH94B neuroactive nasal spray is a synthetic investigational neurosteroid with a novel, rapid-onset mechanism of action developed from proprietary compounds called pherines and administered at microgram doses as an odorless nasal spray. The pharmacological activity of VistaGen’s PH94B is fundamentally differentiated from that of all FDA-approved anti-anxiety drugs, or anxiolytics, including all ADs approved by the FDA for treatment of SAD. PH94B engages nasal chemosensory receptors that trigger a subset of neurons in the main olfactory bulbs (OB) in nasal passages. The OB neurons then stimulate inhibitory GABAergic neurons in the limbic amygdala, decreasing release of norepinephrine, and facilitating fear extinction activity of the limbic-hypothalamic system, the main fear and anxiety center in the brain, as well as other parts of the brain. Importantly, PH94B does not require systemic uptake and distribution to produce its rapid-onset anti-anxiety effects.

In a peer-reviewed, published, randomized, double-blind, placebo-controlled Phase 2 clinical trial (n=91), with Dr. Michael Liebowitz, the creator of the Liebowitz Social Anxiety Scale (LSAS), as principal investigator, PH94B was significantly more effective than placebo in reducing both public-speaking (performance) anxiety (p=0.002) and social interaction anxiety (p=0.009) in laboratory-induced challenges of individuals with SAD, as assessed using subjective anxiety ratings on the Subjective Units of Distress Scale (SUDS) within 15 minutes of self-administration of a non-systemic 1.6 microgram dose of PH94B.

Published PH94B Phase 2 Study – Social Interaction (n = 91)



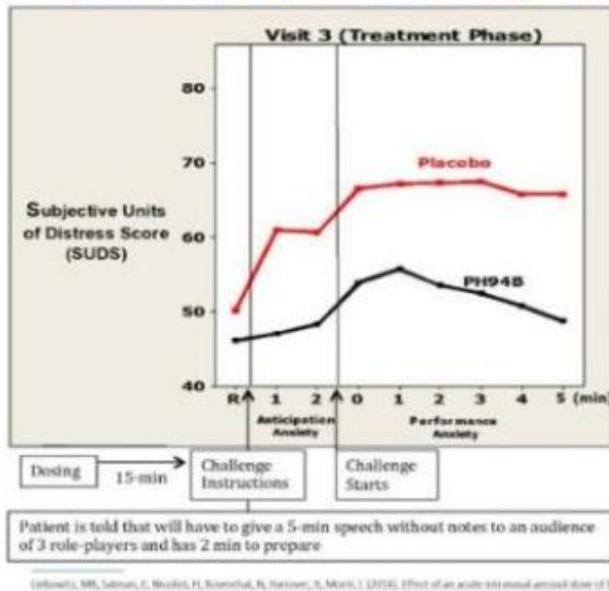
PH94B Rapidly Reduced Anxiety in Response to Social Interaction Challenge

Active Group: Mean Difference = 18.3 Standard Deviation = 17.4 Number of Subjects = 45	Placebo Group: Mean Difference = 6.6 Standard Deviation = 23.6 Number of Subjects = 46
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t = 2.67	p = 0.009	Cohen's d (Effect size) .56
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Liebowitz, MK, Salzman, S, Nicolini, H, Rosenthal, N, Hanover, R, Morri, J. (2014). Effect of an acute intranasal aerosol dose of PH94B on social and performance anxiety in women with social anxiety disorder. *Am. J. Psychiatry* 171:675-682.

Published PH94B Phase 2 Study – Public Speaking (n = 91)



PH94B Rapidly Reduced Anxiety in Response to Public Speaking Challenge

Active Group: Mean Difference = 26.7 Standard Deviation = 21.6 Number of Subjects = 45	Placebo Group: Mean Difference = 14.0 Standard Deviation = 16.3 Number of subjects = 46
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t = 3.16	p = 0.002	Cohen's d (Effect Size) .72
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Liebowitz, MK, Salzman, S, Nicolini, H, Rosenthal, N, Hanover, R, Morri, J. (2014). Effect of an acute intranasal aerosol dose of PH94B on social and performance anxiety in women with social anxiety disorder. *Am. J. Psychiatry* 171:675-682.

In all Phase 1 and Phase 2 studies to date, PH94B's safety profile has been exceptional, without indication of abuse potential, psychological side effects (such as dissociation or hallucinations), sedation or other side effects and safety concerns that may be associated with ADs approved by the FDA for treatment of SAD, as well as with benzodiazepines and beta blockers. Based on its novel mechanism of pharmacological action, rapid-onset of therapeutic effects and exceptional safety and tolerability profile in Phase 2 development, we are preparing for Phase 3 development of PH94B in the U.S. and abroad. Our goal is to develop and commercialize PH94B as the first FDA-approved, fast-acting, on-demand, acute treatment for SAD without debilitating side effects and safety concerns.

PH10 Neuroactive Nasal Spray for Major Depressive Disorder

Depression is a serious medical illness and a global public health concern that can occur at any time over a person's life. According to the World Health Organization (*WHO*), depression is the leading cause of disability worldwide, affecting over 300 million people. Statistics from the U.S. National Institute of Mental Health (*NIMH*) indicate that an estimated 17.3 million adults in the U.S., or approximately 7.1% of all adults in the U.S., had at least one major depressive episode in 2017. While most people will experience depressed mood at some point during their lifetime, MDD is different. MDD is the chronic, pervasive feeling of utter unhappiness and suffering, which impairs daily functioning. In typical depressive episodes, an individual experiences depressed mood, loss of interest and enjoyment, and reduced energy leading to diminished activity and impaired daily functioning for at least two weeks and often much longer. Symptoms of MDD also may include diminished pleasure in activities, changes in appetite that result in weight changes, insomnia or oversleeping, psychomotor agitation, loss of energy or increased fatigue, feelings of worthlessness or inappropriate guilt, difficulty thinking, concentrating or making decisions, and thoughts of death or suicide and attempts at suicide. MDD is the psychiatric diagnosis most commonly associated with suicide.

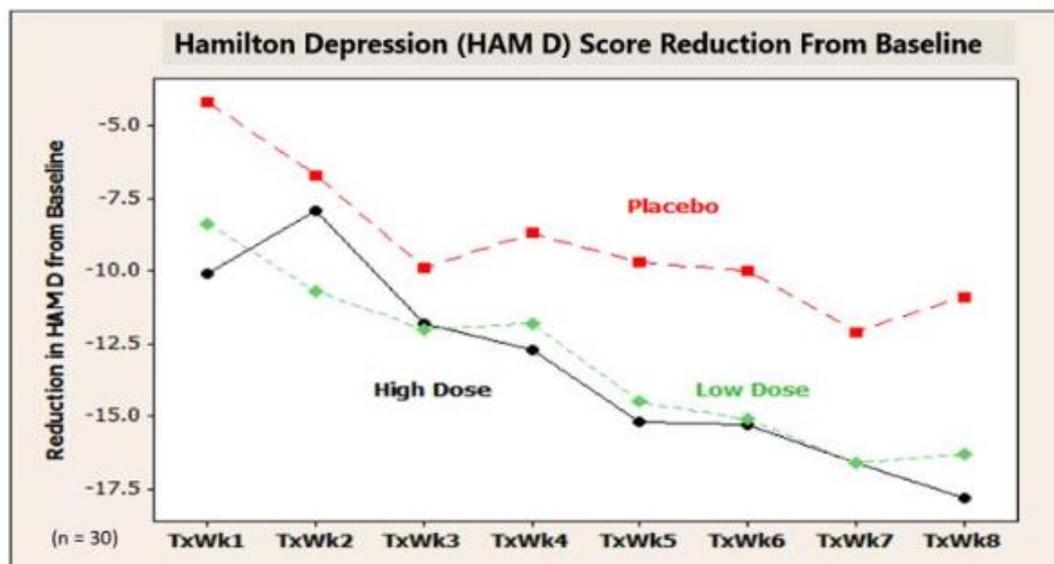
For many people, depression cannot be controlled for any length of time without treatment. Current oral ADs available in the multi-billion-dollar global depression market have modest efficacy, substantial lag of onset of action, and considerable side effects. Approximately two out of every three depression sufferers do not receive adequate therapeutic benefits from their initial treatment with a standard AD, and the likelihood of achieving remission of depressive symptoms declines with each successive AD treatment attempt. Even after multiple treatment attempts, approximately one-third of depression sufferers still fail to find an adequately effective AD. In addition, this trial and error process and the systemic effects of the various ADs involved may increase the risk of patient tolerability issues and serious side effects, including suicidal thoughts and behaviors in certain groups. New generation ADs with different mechanisms of action, faster onset activity and fewer side effects are needed.

While current FDA-approved ADs are widely used, about two-thirds of patients with MDD do not respond to their initial AD treatment. Inadequate response to current ADs is among the key reasons MDD is one of the leading public health concerns in the United States, creating a significant unmet medical need for new agents with fundamentally different mechanisms of action and safety profiles.

PH10 neuroactive nasal spray is a synthetic investigational neurosteroid with a novel, rapid-onset mechanism of action (*MOA*) that is fundamentally different from the *MOA* of all current treatments for MDD. Developed from proprietary compounds called pherines, PH10 is self-administered at microgram doses as an odorless nasal spray. PH10 activates nasal chemosensory receptors that trigger neural circuits in the brain that produce antidepressant effects. Specifically, PH10 engages nasal chemosensory receptors that trigger a subset of neurons in the main OB. OB neurons then stimulate neurons in the limbic amygdala that release norepinephrine and increase activity of the limbic-hypothalamic sympathetic nervous system. Importantly, unlike all currently approved ADs, PH10 does not require systemic uptake and distribution to produce its rapid-onset antidepressant effects. In addition, in clinical studies to date, PH10 has not caused psychological side effects (such as dissociation and hallucinations) or safety concerns that may be associated with ketamine-based therapy (*KBT*), including intravenous ketamine or intranasal ketamine (esketamine), a nasal spray.

In a peer-reviewed, published exploratory Phase 2A clinical study (n=30), PH10, self-administered at a dose of 6.4 micrograms, was well-tolerated and demonstrated significant (p=0.022) rapid-onset antidepressant effects, which were sustained over an 8-week period, as measured by the Hamilton Depression Rating Scale-17 (*HAM-D-17*), without side effects or safety concerns that may be caused by certain oral ADs or *KBT*.

PH10 Published Phase 2A MDD Monotherapy Study (n = 30)



Microgram doses of PH10 neuroactive nasal spray improved MDD symptoms with rapid-onset efficacy

PH10 Dose	HAM D Score	P (PH10 vs Placebo)	Cohen's D (Effect Size)
3.2 µg (Low Dose)	16.3	.101	0.74
6.4 µg (High Dose)	17.8	.022	0.95
Placebo	10.9		

With its potential for rapid-onset activity at a microgram dose that does not require systemic uptake to achieve sustained antidepressant effects, and, as demonstrated in the PH10 Phase 2A program for MDD, an exceptional safety profile that is not expected to require administration in a clinical setting, we believe PH10 has transformative potential in the treatment paradigm for multiple applications in global depression markets. Based on positive results from the PH10 Phase 2A program, we are preparing to conduct two nonclinical studies necessary to support submission of our Investigational New Drug (IND) application to the FDA for Phase 2B clinical development of PH10 for rapid-onset treatment of MDD. Our goal is to submit our IND for a Phase 2B study of PH10 in MDD in the first half of 2021, and, if authorized by the FDA, begin the study in the second half of 2021. Although our initial plan is to develop PH94B as a new stand-alone therapy for MDD, we also believe PH10 has potential as a stand-alone therapy for treatment-resistant depression (TRD) and postpartum depression (PPD), and as an adjunctive therapy to augment current FDA-approved ADs for individuals with MDD, TRD and PPD who have an inadequate response to their current ADs and to prevent relapse following successful treatment with KBT.

AV-101 with Probenecid for MDD

AV-101 (4-Cl-KYN) is a novel, oral prodrug that targets the NMDAR (N-methyl-D-aspartate receptor), an ionotropic glutamate receptor in the brain. Abnormal NMDAR function is associated with numerous CNS diseases and disorders. The active metabolite of AV-101, 7-chloro-kynurenic acid (7-Cl-KYNA), is a potent and selective full antagonist of the glycine coagonist site of the NMDAR that inhibits the function of the NMDAR. Unlike ketamine and many other NMDAR antagonists, 7-Cl-KYNA is not an ion channel blocker. In clinical and nonclinical testing, AV-101 has good oral bioavailability, an excellent pharmacokinetic (PK) profile, and is not an inhibitor or inducer of the human cytochrome P450 (CYP) isoforms. No binding of AV-101 or 7-Cl-KYNA to off-site targets was identified by an extensive receptor screening. Moreover, in all clinical trials to date, AV-101 has been safe and very well-tolerated with no psychological side effects or safety concerns, and no treatment-related serious adverse events that are often observed with classic channel-blocking NMDAR antagonists such as ketamine and amantadine.

In late-2019, we completed a double-blind, placebo-controlled, Phase 2 clinical trial of AV-101 as a potential adjunctive treatment, together with a standard oral AD, in MDD patients who had an inadequate response to a stable dose of a standard oral AD (the *Elevate Study*). Topline results of the *Elevate Study* (n=199) indicated that the AV-101 treatment arm (1440 mg) did not differentiate from placebo on the primary endpoint (change in the Montgomery-Åsberg Depression Rating Scale (*MADRS-10*) total score compared to baseline). After further analysis, we believe that this was likely due to sub-therapeutic concentrations in the brain of 7-Cl-KYNA, the active metabolite of AV-101, resulting from the activity of certain organic ion efflux transporters which reduce 7-Cl-KYNA concentrations in the brain. As in all prior clinical studies, in the *Elevate Study*, AV-101 was well tolerated, with no psychotomimetic side effects or drug-related serious adverse events.

Recent discoveries from successful AV-101 preclinical studies suggest that there is a substantial increase in brain concentrations of AV-101 and 7-Cl-KYNA when AV-101 is given together with probenecid, which is known to block activity of certain organic ion efflux transporters in the kidney. These surprising results in the brain were first revealed in our recent preclinical studies, and are consistent with well-documented clinical studies of probenecid increasing the therapeutic levels in the blood of several unrelated classes of approved drugs, including certain antibacterial, anticancer and antivirals. Many clinical studies demonstrate that probenecid is safe and well tolerated. Probenecid administered adjunctively with AV-101 in an animal model resulted in substantial increased brain concentrations of AV-101 (7-fold) and 7-Cl-KYNA (35-fold). We also recently identified that these increases in brain levels could result from blocking of some of the same transporters in the blood brain barrier that are expressed in the kidney, which are used to regulate drug levels in the blood. This 7-Cl-KYNA efflux-blocking effect of probenecid, with the resulting increased brain levels and duration of 7-Cl-KYNA, suggests the potential impact of AV-101 with probenecid could result in far more profound therapeutic benefits for patients with MDD and other NMDAR-focused CNS diseases and disorders than was demonstrated in the *Elevate Study*. Some of the new discoveries from our recent AV-101 preclinical studies with adjunctive probenecid were presented by a collaborator of VistaGen at the British Pharmacological Society's Pharmacology 2019 annual conference in Edinburgh, UK in December 2019. Recent nonclinical results also indicate that chronic administration of 4-Cl-KYN induces hippocampal neurogenesis, a hallmark of drugs that have antidepressant effects, and increases endogenous levels of KYNA, which also is a functional NMDAR glycine site antagonist.

In addition, a Phase 1B target engagement clinical study completed after the *Elevate Study* by the Baylor College of Medicine (*Baylor*), with financial support from the U.S. Department of Veterans Affairs (VA), involved 10 healthy volunteer U.S. military Veterans who received single doses of AV-101 (720 mg or 1440 mg) or placebo, in a double-blind, randomized, cross-over controlled trial. The primary goal of the study was to identify and define a dose-response relationship between AV-101 and multiple electrophysiological (*EEG*) biomarkers related to NMDAR function, as well as blood biomarkers associated with suicidality (the *Baylor Study*). The findings from the *Baylor Study* suggest that, in healthy Veterans, the higher dose of AV-101 (1440 mg) was associated with dose-related increase in the 40 Hz Auditory Steady State Response (*ASSR*), a robust measure of the integrity of inhibitory interneuron synchronization that is associated with NMDAR inhibition. Findings from the successful *Baylor Study* were presented at the 58th Annual Meeting of the American College of Neuropsychopharmacology (*ACNP*) in Orlando, Florida in December 2019.

The successful *Baylor Study* and the recent discoveries in our preclinical studies involving AV-101 and adjunctive probenecid suggest that it may be possible to increase therapeutic concentrations and duration of 7-Cl-KYNA in the brain, and thus increase NMDAR antagonism in MDD patients with an inadequate response to standard ADs when AV-101 and probenecid are combined. We are conducting additional preclinical studies of AV-101 with adjunctive probenecid to evaluate its potential applicability to NMDAR-focused CNS indications for which we have existing AV-101 data without probenecid (depression, epilepsy, levodopa-induced dyskinesia, and neuropathic pain) to determine the most appropriate next-step clinical studies of AV-101 plus adjunctive probenecid, which may include MDD, and optimal commercialization of AV-101.

The FDA has granted Fast Track designation for development of AV-101 as an adjunctive treatment for MDD in adult patients with an inadequate response to standard ADs.

Additional Potential Clinical Development Programs

PH94B for Additional Anxiety Disorders

Adjustment Disorder with Anxiety

Almost everyone experiences significant life events, changes, or stressors and while some individuals adjust to such changes within a few months, others cannot and may struggle with adjustment disorder. Adjustment disorder is an emotional or behavioral reaction considered excessive or disproportionate to a sudden change, stressful event or major life change, such as loss of work, divorce or health setback, occurring within three months of the stressor, and/or significantly impairing a person's social, occupational and/or other important areas of functioning. The stress-related disturbance does not represent normal bereavement or meet the criteria for another mental disorder and is not merely an exacerbation of a preexisting mental disorder.

The recent onset of mental health stressors associated with the COVID-19 pandemic has directly or indirectly affected hundreds of millions of individuals around the world. With the future still uncertain in the COVID-19 era, including uncertainty about safety and protocols for reopening and operating workplaces, schools, universities and sporting venues, as well as parks, beaches and other many other public and private locations, on top of fear and anxiety about catching and spreading the virus and about new waves of cases and a new round of stay-at-home orders, has increased prevalence of AjDA considerably during the COVID-19 pandemic. We believe the mental health impact of the COVID-19 pandemic will be long-term and varied across a wide range of anxiety disorders. PH94B has potential as a novel, acute treatment for AjDA, including stress and impaired functioning as a result of recent-onset of stressors brought on by the health, safety, economic and social circumstances and consequences of the COVID-19 pandemic. With successful Phase 2 development of PH94B for SAD completed and preparations for Phase 3 development underway, we are also planning exploratory Phase 2 development of PH94B for AjDA.

We recently submitted our proposed protocol for an exploratory Phase 2A study of PH94B for acute treatment of AjDA related to the COVID-19 pandemic to the FDA through the FDA's Coronavirus Treatment Acceleration Program (CTAP). We plan to conduct the proposed Phase 2A study in New York City, the epicenter of the COVID-19 pandemic in the U.S., on an open-label basis and involve approximately 30 adult individuals suffering from AjDA from stressors related to the pandemic. Dr. Michael Liebowitz, Professor of Clinical Psychiatry at Columbia University and director of the Medical Research Network in New York City, will serve as Principal Investigator of the exploratory Phase 2A study. Our goal in this Phase 2A study is to gain initial experience with PH94B in this patient population, and, based on those results, apply that experience to advance development into a Phase 2B randomized, double-blind, placebo-controlled study of approximately 150 subjects with AjDA.

Postpartum Anxiety

Even before the COVID-19 pandemic, there was compelling research indicating that about 17% of new mothers battle anxiety. Recent research reflects that the prevalence of postpartum anxiety (PPA) among new mothers is increasing significantly during the COVID-19 pandemic. Combined with commonly experienced hormone changes and sleep deprivation, key factors contributing to increasing mental health challenges among new mothers during the COVID-19 pandemic include job loss, lack of secure housing and access to healthcare, physical isolation from friends and family, increased childcare, educational and household duties, and fear and uncertainty about the state of the world for themselves and their newborn children.

With its potential to produce rapid-onset therapeutic effects at microgram doses, without requiring systemic uptake and without causing sedation, we believe PH94B may be ideally suited for new mothers suffering with PPA, especially new mothers who are interested in breastfeeding and who would prefer a non-systemic, non-sedating therapeutic alternative.

In collaboration with a leading academic university in the U.S., we are planning to explore opportunities to assess PH94B's potential as a novel monotherapy for treating PPA in a small (n=25-30) open-label, Phase 2A study.

Post-Traumatic Stress Disorder

Post-traumatic stress disorder (*PTSD*) is a clinically diagnosed psychiatric disorder that develops in some people who have experienced or witnessed a shocking, scary, dangerous or life-threatening event, such as military combat, natural disasters, terrorist incidents, serious accidents, or physical or sexual assault in adulthood or childhood. Symptoms of PTSD include flashbacks, nightmares, severe anxiety, uncontrollable intrusive thoughts, and emotional numbing after the event. More than 8 million people in the U.S. suffer from PTSD. Anyone can develop PTSD at any age. According to the National Center for PTSD, about seven or eight out of every 100 people will experience PTSD at some point in their lives. PTSD is often accompanied by depression, substance abuse or one or more of the other anxiety disorders.

It is natural to feel afraid during and after a traumatic situation. Fear triggers many split-second changes in the body to help defend against danger or to avoid it. This “fight-or-flight” response is a typical reaction meant to protect a person from harm. Because PTSD is associated with a heightened “fight or flight” response mediated by increased sympathetic nervous response to conditioned stimuli, an agent which decreases sympathetic tone may be able to treat some symptoms of PTSD. In Phase 2 studies, at microgram doses, PH94B has been shown to have anti-anxiety effects in patients with both generalized anxiety disorder and SAD. PH94B may therefore have utility either as monotherapy or as add-on therapy in PTSD. Available therapeutic options for PTSD are limited, including only two FDA-approved SSRI antidepressants, which have limited efficacy, undesirable side effects, and target only the symptoms of PTSD, not the underlying disorder itself. We are currently assessing PH94B’s potential for exploratory Phase 2 clinical development as a new generation, rapid-acting, anxiolytic for treatment of PTSD.

General Anxiety Disorder

Generalized Anxiety Disorder (*GAD*) is a common chronic neuropsychiatric disorder characterized by persistent, debilitating and excessive concern and worry about family, friends, health, money, work, or other everyday issues and situations. Individuals with GAD find it difficult to control their worry and may worry more about actual circumstances than seems appropriate. They may also expect the worst even when there is no apparent reason to do so. GAD is diagnosed when an individual is unable or finds it difficult to control worry on more days than not for at least six months and has three or more of the many symptoms of GAD, such as excessive and ongoing worrying and tension, an unrealistic view of problems, restlessness, irritability, difficulty concentrating, or being easily startled. This differentiates GAD from worry that may be specific to a set stressor or for a more limited period of time. According to the Anxiety and Depression Association, GAD affects approximately 6.8 million adults in the U.S. in any given year. GAD comes on gradually and can begin across the life cycle, though the risk is highest between childhood and middle age.

People with GAD do not know how to stop the worry cycle and feel it is beyond their control, even though they usually realize that their anxiety is more intense than the situation warrants. Many individuals with GAD may avoid situations because they have the disorder or they may not take advantage of important professional or social opportunities in their lives due to their anxiety and worry. When their anxiety is severe, it is difficult for individuals with GAD to carry out even the simplest of daily activities. Currently, the standard of care for GAD includes psychotherapy and certain medications with limited therapeutic benefits and various side effects and safety concerns, including antidepressants (SSRIs and SNRIs) and benzodiazepines.

PH94B demonstrated efficacy in a small, exploratory, placebo-controlled Phase 2 study in patients with GAD. Twenty-one patients were randomized to receive 200 picograms of PH94B or placebo in a one-second aerosol pulse to the chemosensory epithelium of the anterior nasal septum. Thirty minutes after treatment there was mean reduction of 32.0% for the PH94B group and 19.6% for the placebo group in the total Hamilton Anxiety Rating Scale (*HAM-A*) score. Electrophysiological changes (respiratory, cardiac, and electrodermal frequency), concordant with the reduction in anxiety, were significantly greater for the PH94B group. We believe these transient anti-anxiety effects of PH94B may warrant further investigation in a larger Phase 2 GAD trial.

We are also assessing PH94B’s potential for exploratory Phase 2A studies to treat preoperative/pretesting anxiety and panic disorder. We are considering including open-label investigation in these populations in the context of our long-term safety study in parallel with Phase 3 development of PH94B for acute treatment of SAD

PH10 for Treatment-resistant Depression and Postpartum Depression

Treatment-resistant Depression

TRD is a form of depression that does not get better even after an individual has tried adequate and well-controlled doses of two different oral, FDA-approved antidepressant therapies taken for a sufficient period of time, usually at least six weeks. Approximately one-third of adults with MDD battle depression symptoms that do not respond to current oral AD treatments, including persistent feelings of sadness, disturbances in their sleep patterns, low energy and thoughts of suicide. Certain populations, especially women and elderly individuals, experience TRD at higher rates than others. Individuals who endure severe or frequently recurring bouts of depression also appear to be more susceptible to TRD. Individuals with MDD who also have certain underlying medical conditions, such as thyroid disease, chronic pain, substance abuse and eating or sleep disorders, also may be at greater risk for TRD.

While certain individuals with TRD may benefit from giving their current oral antidepressant more time to work or by taking a larger dose, for others, switching to a different class of antidepressant, or augmenting their current AD with an FDA-approved atypical antipsychotic may lead to remission. In recent years, ketamine-based therapy (KBT) which includes intravenous ketamine and intranasal esketamine given adjunctively with a new oral AD, have been effective in treating TRD. However, KBT has significant drawbacks. Certain patients receiving KBT may experience uncomfortable dissociative symptoms, hypertension, or other side effects for a few hours after administration. Additionally, because of these potential side effects and safety concerns, as well as the potential for abuse, KBT must be administered in a clinical setting.

With its potential for rapid-onset at a microgram dose that does not require systemic uptake to achieve sustained antidepressant effects, and, as demonstrated in the PH10 Phase 2A program for MDD, an exceptional safety profile that is not expected to require administration in a clinical setting, we believe PH10 has transformative potential in the treatment paradigm for multiple applications in global depression markets, including as a new stand-alone therapy for TRD and to prevent relapse following successful treatment for TRD with KBT. After we submit our IND for Phase 2B development of PH10 as a stand-alone treatment for MDD, we plan to assess its potential for exploratory Phase 2A development as a treatment for TRD.

Postpartum Depression

New mothers face many challenges, both practical and emotional, when adjusting to life following the birth of a newborn child. PPD develops around the time a woman gives birth, occurring in approximately 15% of births, according to the NIMH. Women with PPD often struggle with anxiety, sadness, difficulty eating and sleeping, or disturbing thoughts of worthlessness, shame, guilt or suicide, all significant depressive symptoms that may commence during pregnancy or typically within the first few months following childbirth. Other symptoms of PPD may include agitation, loss of interest in daily activities, feeling overwhelmed and fatigued, and inability to concentrate. The current standard of care for PPD involves psychotherapy and, in certain mothers, off-label use of oral ADs or a recently-approved intravenous neurosteroid, all of which require systemic uptake to achieve a therapeutic effect, a potential complication for new mothers who wish to breastfeed their newborn child. The recently-approved intravenous neurosteroid requires a lengthy continuous intravenous infusion (approximately 60 hours) that must be administered in a clinical setting and may also cause sedation.

As demonstrated in an exploratory Phase 2A study of PH10 in adults, including adult women, PH10, self-administered intranasally in microgram doses, does not require systemic uptake to achieve antidepressant effects and, based on its safety profile in all studies to date, is not expected to require inconvenient administration in a clinical setting. PH10 is fundamentally differentiated from the FDA-approved neurosteroid for PPD, as well as all ADs used off-label for treatment of PPD. Based on prior clinical studies of PH10, including the exploratory Phase 2A clinical study of PH10 in MDD, we believe it has potential to be the first FDA-approved, rapid-onset, non-systemic stand-alone treatment for PPD. After we submit our IND for Phase 2B development of PH10 as a stand-alone treatment for MDD, we plan to assess its potential for exploratory Phase 2A development as a treatment for PPD.

PH10 and AV-101 for Suicidal Ideation

According to the WHO, every year approximately 800,000 people worldwide take their own life and many more attempt suicide. The U.S. Centers for Disease Control (CDC) views suicide as a major public health concern in the U.S. as rates of suicide have been increasing for both men and women and across all age groups. Suicide is the 10th leading cause of death in the U.S. and is one of just three leading causes that are on the rise. According to experts in the field of suicidal ideation (SI), characterized as suicidal thoughts and behavior, the number of Americans who die by suicide is, since 2010, higher than those who die in motor vehicle accidents. People of all genders, ages, and ethnicities can be at risk for suicide. Suicidal ideation is complex and there is no single cause. The NIMH attributes many different factors to someone making a suicide attempt, including, but not limited to, depression, other mental health disorders or substance abuse. Additionally, according to reports released by the VA, the U.S. Military Veteran population is at significantly higher risk for suicide than the general population.

As previously noted, we collaborated with Baylor and the VA on a small Phase 1b clinical trial of AV-101 in healthy volunteer U.S. Military Veterans from Operation Enduring Freedom, Operation Iraqi Freedom or Operation New Dawn. The Baylor Study was a randomized, double-blind, placebo-controlled cross-over study designed as a target engagement study as the first-step in our plans to test potential anti-suicidal effects of AV-101 in U.S. Military Veterans who respond to ketamine-based therapy.

Going forward, we believe both PH10 and AV-101 may play a key role in a new treatment paradigm for SI. Accordingly, based on results of various IND-enabling preclinical studies, and, after appropriate IND submissions, we will assess potential exploratory Phase 2A development of each drug candidate for treatment for stand-alone treatment of SI and/or adjunctive treatment of SI together with KBT or other AD therapies.

AV-101 for Certain CNS Diseases and Disorders related to Abnormal NMDAR Function

Neuropathic Pain

NP affects approximately 33 million people in the United States (excluding patients with back pain) according to an article published in the Journal of Pain Research in 2017. NP is a complex, chronic pain state characterized by a steady burning "pins and needles" or "electric shock" sensation that results in abnormal neuronal function after nerve damage. The American Chronic Pain Association has identified various causes of NP, including tissue injury, nerve damage or disease, diabetes, infection, toxins, certain types of drugs, such as antivirals and chemotherapeutic agents, certain cancers, and even chronic alcohol intake. Current treatments for NP include antidepressants, anticonvulsants (such as gabapentin and pregabalin), and opioids, among others. However, current medications may offer inadequate efficacy, have limiting side effects, and be associated with abuse.

The effects of AV-101 as a potential new treatment for NP were assessed in published peer-reviewed preclinical studies involving four well-established models of pain. In these studies, AV-101 was observed to have robust, dose-dependent anti-nociceptive effects, as measured by dose-dependent reversal of NP in the Chung (nerve ligation), formalin and carrageenan thermal models in rats, and was well-tolerated. The publication, titled: "*Characterization of the effects of L-4-chlorokynurenine on nociception in rodents*," by lead author, Tony L. Yaksh, Ph.D., Professor in Anesthesiology at the University of California, San Diego, was published in *The Journal of Pain* in April 2017 (J Pain. 18:1184-1196, 2017)). In recent studies in this preclinical model, AV-101 also had positive results using pregabalin as an active control. AV-101 demonstrated robust analgesic effects, similar to Lyrica, but fewer side effects as measured in the rotarod assay. Neurontin and Lyrica have been associated with sedation and mild cognitive impairment in third party literature and are often prescribed for treatment of NP. Other commonly prescribed medications for NP include drugs targeting opioid receptors in the brain. Unfortunately, misuse of such drugs can lead to a significantly increased risk of addiction, and, we believe, their therapeutic utility for neuropathic pain is unclear.

Based on successful preclinical studies involving AV-101, gabapentin and pregabalin, as well as AV-101's exceptional safety profile in all preclinical and clinical studies to date, we are exploring the optimal development path forward, subject to securing sufficient capital, for Phase 2A clinical development of AV-101, together with probenecid, as a new generation, non-opioid treatment to reduce debilitating NP, as well as its potential to avoid sedative side effects and cognitive impairment that have been observed in third party literature to be associated with other NP treatments, and to reduce the risk of addiction associated with pain medications targeting opioid receptors.

Levodopa-Induced Dyskinesia

Parkinson's disease (PD) is the second most common neurodegenerative disease worldwide, affecting approximately one million people in the U.S., according to the Parkinson's Foundation. Although there is no "one-size-fits-all" description of PD, PD is a complex neurodegenerative disorder that occurs when brain cells responsible for making dopamine, a chemical that coordinates movement, stop working or die. This results in progressive deterioration of voluntary motor control. Loss of dopamine neurons is thought to be due to neurotoxicity associated with misfolding of proteins and is associated with increased signaling of glutamate, the most abundant excitatory neurotransmitter in the brain. Increased glutamate activity is involved with aberrant neuronal signaling and excitotoxic death of neurons. Classic PD motor symptoms include muscular rigidity, resting tremor, and postural and gait impairment. Typically, PD patients present with a combination of motor and non-motor symptoms. Non-motor symptoms may include cognitive impairment, sleep disorders pain and fatigue. There is currently no medication to slow, delay, stop or cure PD, and currently available treatments are symptomatic. Treatment of motor symptoms with oral levodopa, introduced about 50 years ago, remains the gold standard treatment.

Levodopa-induced dyskinesia (LID) is a disorder that affects people with PD who are treated with levodopa for an extended period of time. Oral levodopa remains the most effective therapy for motor symptoms of PD. However, after continuous long-term use (longer than five years), many PD patients experience LID. Although clinical manifestations of LID are heterogenous, LID is commonly associated with abnormal involuntary movements, including chorea and dystonia. These motor complications tend to become more severe as PD progresses and as the duration of levodopa treatment is extended, until the impact of LID may compromise the advantage of treatment with levodopa. PD treatment with levodopa is routinely delayed due to concerns over LID. Once LID develops, levodopa-treated PD patients may be faced with a choice between immobility due to untreated and uncontrolled PD, or mobility with the associated LID. Studies published in the *New England Journal of Medicine* and *Movement Disorders* have shown LID develops in approximately 45% of levodopa-treated Parkinson's disease patients after five years and 80% after 10 years of levodopa treatment. In the U.S., there are an estimated 150,000 to 200,000 people with PD who are impacted by LID.

AV-101 is not a dopamine-based drug candidate. Rather, AV-101's active metabolite, 7-Cl-KYNA, is a potent and selective NMDA receptor glycine site antagonist with neuroprotective properties, which receptor plays a major role in glutamatergic signaling and has been shown to be a therapeutic target for LID.

In a recently reported preclinical study in the "gold standard" MPTP monkey model of PD and LID, AV-101's efficacy against LID was measured through behavioral scores on a dyskinesia scale, and a Parkinsonian disability scale was used to measure levodopa anti-parkinsonian efficacy. This study demonstrated that AV-101 significantly ($p = 0.01$) reduced LID. Importantly, AV-101 did not reduce the timing, extent, or duration of the therapeutic effects of levodopa, indicating that AV-101 did not impact the anti-parkinsonian efficacy of levodopa. Moreover, AV-101 did not cause adverse events often associated with amantadine therapy for LID, such as hallucinations, dizziness, and falls. These preclinical results confirmed our prior anti-dyskinesia study in this MPTP monkey model. We believe these preclinical data and AV-101's positive safety profile in all clinical studies to date support AV-101's potential to treat LID, while both maintaining the antiparkinsonian benefits of levodopa and without causing hallucinations or other serious side effects that may be associated with amantadine therapy for LID. As a result, we are exploring the optimal development path forward, subject to securing sufficient capital, for Phase 2A clinical development of AV-101, together with probenecid, as a new generation treatment for LID.

Epilepsy

Epilepsy is one of the most prevalent neurological disorders, affecting almost 1% of the worldwide population. According to the Epilepsy Foundation, as many as three million Americans have epilepsy, and one-third of those suffering from epilepsy are not effectively treated with currently available medications. In addition, standard anticonvulsants can cause significant side effects, which frequently interfere with compliance.

Glutamate is a neurotransmitter that is critically involved in the pathophysiology of epilepsy. Through its stimulation of the NMDAR subtype, glutamate has been implicated in the neuropathology and clinical symptoms of the disease. In support of this, NMDAR antagonists are potent anticonvulsants. However, as noted, classic ion channel-blocking NMDAR antagonists are limited by adverse effects, such as neurotoxicity, declining mental status, and the onset of psychotic symptoms following administration of the drug. The endogenous amino acid glycine modulates glutamatergic neurotransmission by stimulating the glycine coagonist site of the NMDAR. Glycine site antagonists such as AV-101's active metabolite, 7-Cl-KYNA, inhibit NMDAR function and are therefore anticonvulsant and neuroprotective. Importantly, glycine site antagonists have fewer and less severe side effects than classic ion channel-blocking NMDAR antagonists and other antiepileptic agents, making them a safer potential alternative to, and one expected to be associated with greater patient compliance than, currently available anticonvulsant medications.

In addition, another active metabolite of AV-101, 4-Cl-3-hydroxyanthranilic acid, inhibits the synthesis of quinolinic acid (*QUIN*), which is an endogenous NMDAR agonist that causes convulsions and excitotoxic neuronal damage.

AV-101 has been shown to protect against seizures and neuronal damage in preclinical animal models of epilepsy. We believe AV-101's dual action as a NMDAR GlyB antagonist and *QUIN* synthesis inhibitor, and exploratory preclinical data, together with human safety data in all clinical studies to date, may provide support for AV-101's potential as an exploratory Phase 2A clinical development candidate for treatment of epilepsy. As a result, we are planning to conduct additional preclinical studies to assess AV-101's optimal development path forward and potential for future Phase 2A clinical development, together with probenecid, as a new generation treatment for epilepsy.

VistaStem Therapeutics - Stem Cell Technology-Based Programs

Stem cells are the building blocks of all cells of the human body. They have the potential to develop into many different mature cell types. Stem cells are defined by a minimum of two key characteristics: (i) their capacity to self-renew, or divide in a way that results in more stem cells; and (ii) their capacity to differentiate, or turn into mature, specialized cells that make up tissues and organs. There are many different types of stem cells that come from different places in the body or are formed at different times throughout our lives, including pluripotent stem cells and adult or tissue-specific stem cells, which are limited to differentiating into the specific cell types of the tissues in which they reside. We focus exclusively on hPSCs, which can be differentiated into all of the more than 200 types of cells in the human body, can be expanded readily, and have diverse medical research, drug discovery, drug rescue (*DR*), drug development and therapeutic applications. We believe hPSCs can be used to develop numerous cell types, tissues and customized assays that can mimic complex human biology, including heart biology for *DR* applications.

VistaStem is our wholly owned subsidiary focused on applying our hPSC technology to discover, rescue, develop and commercialize proprietary new chemical entities (*NCEs*) for our CNS pipeline and cellular therapies and RM involving hPSC-derived blood, cartilage, heart and liver cells. We used our hPSC-derived human heart cells to develop *CardioSafe* 3D™, our customized *in vitro* bioassay system for predicting heart toxicity of potential *DR* *NCEs*. We believe *CardioSafe* 3D is more comprehensive and clinically predictive than the hERG assay and provides us with new generation human cell-based technology to identify and evaluate *DR* candidates and develop *DR* *NCEs* for our CNS pipeline and/or out-licensing.

Drug Rescue

Our *DR* activities are focused on producing, for our internal CNS pipeline or out-licensing, novel, proprietary and safer variants of still-promising *NCEs* previously discovered, optimized and tested for efficacy by pharmaceutical companies and others but terminated before FDA approval due to unexpected heart toxicity. Our *DR* strategy involves using *CardioSafe* 3D to assess the cardiac toxicity that caused certain *NCEs* available in the public domain to be terminated, and then produce and develop new, potentially safer, and proprietary *NCEs*. We believe the pre-existing public domain knowledge base supporting the therapeutic and commercial potential of *NCEs* that we target for our *DR* programs will provide us with a valuable head start as we launch each of our potential *DR* programs. The essential components of our *DR* strategy are to (i) leverage the substantial prior investments by global pharmaceutical companies and others in discovery, optimization and efficacy validation of the *NCEs* we identify in the public domain and (ii) use *CardioSafe* 3D to enhance our understanding of the cardiac liability profile of such *NCEs*, insight not previously available when the *NCEs* were originally discovered, optimized for efficacy and developed by others, and (iii) demonstrate preclinical proof-of-concept (*POC*) as to the efficacy and safety of new, safer *DR* *NCEs* in standard *in vitro* and *in vivo* models earlier in development and with substantially less investment in discovery and preclinical development than was required of others prior to their decision to terminate the original *NCE*. In this context, *POC* means that the lead *DR* *NCE*, as compared to the original previously-terminated original *NCE*, demonstrates both (i) equal or superior efficacy in the same, or a similar, *in vitro* and *in vivo* preclinical efficacy models used by the initial developer of the previously-terminated *NCE* before it was terminated for cardiac safety reasons, and (ii) significant reduction of concentration dependent cardiotoxicity in *CardioSafe* 3D.

Regenerative Medicine

Stem cell technology-based cell therapy (*CT*) and RM have the potential to transform healthcare by providing new approaches for treating the fundamental mechanisms of disease. We currently intend to establish strategic *CT*- and/or *RM*-focused collaborations to leverage our hPSC technology platform, our expertise in human biology, differentiation of hPSCs to develop functional adult human cells and tissues involved in human disease, including blood, bone, cartilage, heart and liver cells for *CT* and *RM* purposes. We have exclusively sublicensed to BlueRock Therapeutics, a next generation *RM* company established by Bayer AG and Versant Ventures and later acquired by Bayer, rights to certain proprietary technologies relating to the production of cardiac stem cells for the treatment of heart disease (the *Bayer Agreement*). In a manner similar to the *Bayer Agreement*, we may pursue additional *CT* and *RM* collaborations or licensing transactions involving blood, cartilage, and/or liver cells derived from hPSCs for *CT* and *RM* applications.

Intellectual Property

We strive to protect the proprietary know-how and technology that we believe is important to our business, including seeking and maintaining patents intended to cover our product candidates and related pharmaceutical compositions, their therapeutic methods of use, including therapeutic and prognostic methods, as well as processes for their manufacture, and any other aspects of our discoveries and inventions that are commercially important to the development of our business.

We may also rely on trade secrets to protect aspects of our business that are not amenable to, or that we do not consider appropriate for, patent protection. We also rely on know-how, continuing technological innovation and in-licensing opportunities to develop and maintain our proprietary position. We seek to obtain domestic and international patent protection, and endeavor to promptly file patent applications for new commercially valuable inventions.

To protect our rights to our proprietary technology, we require all employees, as well as our external collaborators, consultants and CROs when feasible, to enter into agreements that require disclosure and assignment to us of ideas, developments, discoveries and inventions made by these employees, consultants, and CROs in the course of their service to us.

We plan to continue to expand our intellectual property estate by filing patent applications directed to compositions, methods of use, including treatment and patient selection, formulations and manufacturing processes created or identified from our ongoing development of our product candidates.

Patents

We own and have licensed granted patents and pending patent applications in the U.S. and in certain foreign countries. These patent properties include, but are not limited to:

PH94B (licensed by us from Pherin Pharmaceuticals, Inc. (Pherin))

- Two granted U.S. patents and other foreign patents related to the reduction of anticipatory anxiety or social phobic response; and

The U.S. patents related to PH94B nominally expire either in 2025 or 2028, respectively, and foreign patents nominally expire in 2026, subject to extensions that may be available on a country-by-country basis.

PH94B patent application owned by VistaGen:

- Pending U.S. patent application related to the treatment of adjustment disorder with anxiety.

Patents that may be granted on this patent application nominally will expire in 2041.

PH10 (licensed by us from Pherin)

- One granted U.S. patent related to treatment of depressive disorders; and
- Granted foreign patents and pending foreign patent applications related to treatment of depressive disorders.

The U.S. and foreign patents related to PH10 nominally expire in 2033, subject to extensions that may be available on a country-by-country basis.

AV-101

- Four granted U.S. patents related to the treatment of depression with AV-101, certain unit dose formulations of AV-101 effective to treat depression, and treatment of dyskinesia induced by the administration of L-DOPA;
- Pending U.S. patent applications and foreign granted patents and pending foreign patent applications related to treatment of various disorders, including depression, LID, neuropathic pain (NP), tinnitus and obsessive-compulsive disorder;
- Pending U.S. patent application related to the prognostic identification of high and low responders to treatment of various CNS disorders with AV-101;
- Pending U.S. patent application related to the therapeutic use of the combined administration of AV-101 plus probenecid; and
- Two granted U.S. patents, and foreign granted patents and pending foreign patent applications related to the manufacture of AV-10.

The U.S. and foreign patents related to AV-101 nominally expire between 2034 and 2040, depending on the particular subject matter, subject to extensions that may be available on a country-by-country basis.

Stem Cell Technology (owned by us and/or licensed by us from the University Health Network (Toronto) or Icahn School of Medicine at Mount Sinai)

Cardiac Cells

- U.S. and foreign patents and patent applications relating to methods for enriching pluripotent stem cell-derived cardiomyocyte cells, methods for generating epicardium cells, methods for making and using sino-atrial node-like pacemaker and ventricular-like cardiomyocytes and methods for generation of atrial and ventricular cardiomyocyte lineages.

The U.S. and foreign patents and patent applications related to cardiac stem cells nominally expire between 2031 and 2037, subject to extensions that may be available on a country-by-country basis. Additionally, therapeutic and certain other fields of use have been licensed by us to Bayer under the Bayer Agreement.

Blood Cells

- U.S. and foreign patents and patent applications relating mesoderm and definitive endoderm cell populations, and to populations of hematopoietic progenitors.

The U.S. and foreign patents and patent applications related to blood stem cells nominally expire between 2023 and 2032, subject to extensions that may be available on a country-by-country basis.

Cartilage and Chondrocyte Cells

- U.S. and foreign patents and patent applications relating to methods and compositions for generating chondrocyte lineage cells and cartilage like tissue.

The U.S. and foreign patents and patent applications related to blood stem cells nominally expire in 2034, subject to extensions that may be available on a country-by-country basis.

Liver and Biliary Cells

- U.S. and foreign patents and patent applications relating to methods for generating hepatocytes and cholangiocytes from pluripotent stem cells and to toxicity typing using liver stem cells.

The U.S. and foreign patents and patent applications related to blood stem cells nominally expire between 2021 and 2034.

Patent Term

The base term of a U.S. patent is 20 years from the filing date of the earliest-filed non-provisional patent application from which the patent claims priority. The term of a U.S. patent can be lengthened by patent term adjustment, which compensates the owner of the patent for administrative delays at the U.S. Patent and Trademark Office (*PTO*). In some cases, the term of a U.S. patent is shortened by a terminal disclaimer that reduces its term to align with that of a related patent.

Depending upon the timing, duration and specifics of the FDA approval of our drug candidates, if any, some of our U.S. patents may be eligible for limited patent term extension under the Drug Price Competition and Patent Term Restoration Act of 1984, commonly referred to as the Hatch-Waxman Amendments. The Hatch-Waxman Amendments permit a patent restoration term of up to five years as compensation for patent term lost during product development and the FDA regulatory review process. However, patent term restoration cannot extend the remaining term of a patent beyond a total of 14 years from the product's approval date. The patent term restoration period is generally one-half the time between the effective date of an IND and the submission date of an NDA (*testing phase*), plus the time between the submission date of an NDA and the approval of that application (*approval phase*). This patent term restoration period may be reduced by the FDA if it finds that applicant did not act with due diligence during the testing phase or the approval phase. Only one patent related 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. The U.S. PTO, in consultation with the FDA, reviews and approves the application for any patent term extension or restoration. In the future, if circumstances permit, we intend to apply for restoration of patent term for one of our then-owned or licensed patents, if any, to extend patent life beyond its current expiration date, depending on the expected length of the clinical trials and other factors involved in the filing of the relevant NDA.

Some of our products may also be entitled to certain non-patent-related data exclusivity under the FDCA. The FDCA provides a five-year period of non-patent data exclusivity within the U.S. 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 moiety, which is the molecule or ion responsible for the action of the drug substance. During the exclusivity period, an abbreviated new drug application (ANDA), or a 505(b)(2) NDA may not be submitted by another company for another drug containing the same active moiety, regardless of whether the drug is intended for the same indication as the original innovator drug or for another indication, where the applicant does not own or have a legal right of reference to all the data required for approval. However, an application may be submitted after four years if it contains a certification of patent invalidity or non-infringement to one of the patents listed with the FDA Orange Book by the innovator NDA holder. The FDCA also provides three years of marketing exclusivity for a full 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, for example, for new indications, dosages or strengths of an existing drug. Three-year exclusivity prevents the FDA from approving ANDAs and 505(b)(2) applications that rely on the information that served as the basis of granting three-year exclusivity. This three-year exclusivity covers only the modification for which the drug received approval on the basis of the new clinical investigations, and does not prohibit the FDA from approving ANDAs for drugs containing the active agent for the original indication or condition of use. Five-year and three-year exclusivity will not delay the submission or approval of a full NDA. However, an applicant submitting a full NDA would be required to conduct or obtain a right of reference to all of the nonclinical studies and adequate and well-controlled clinical trials necessary to demonstrate safety and efficacy.

Some foreign jurisdictions, including Europe and Japan, also have patent term extension provisions, which allow for extension of the term of a patent that covers a drug approved by the applicable foreign regulatory agency. In the future, if and when our pharmaceutical products receive FDA approval, we expect to apply for patent term extension on patents covering those products, their methods of use, and/or methods of manufacture.

Trade Secrets

In addition to patents, we may rely on trade secrets and know-how to develop and maintain our competitive position. We protect trade secrets, if any, and know-how by establishing confidentiality agreements and invention assignment agreements with our employees, consultants, scientific advisors, contractors and partners. These agreements provide that all confidential information developed or made known during the course of an individual's or entity's relationship with us must be kept confidential during and after the relationship. These agreements also generally provide that all relevant inventions resulting from work performed for us or relating to our business and conceived or completed during the period of employment or assignment, as applicable, shall be our exclusive property. In addition, we take other appropriate precautions, such as physical and technological security measures, to guard against misappropriation of our proprietary information by third parties.

Trademarks

The Company also owns a registered trademark in the U.S. for "VISTAGEN," which was renewed in 2014. In addition, we use trademarks in our business for *CardioSafe 3D* and *LiverSafe 3D*.

Strategic Transactions and Relationships

Strategic collaborations are an important cornerstone of our corporate development strategy. We believe that our highly selective outsourcing of certain research, development, manufacturing and regulatory activities gives us flexible access to a broad range of capabilities and expertise at a lower overall cost than developing and maintaining such capabilities and expertise internally on a full-time basis. In particular, we contract with third parties for certain manufacturing, nonclinical development, clinical development and regulatory affairs support.

We may seek multiple strategic collaborations and relationships focused on development and commercialization of our product candidates in regions outside the U.S.

Commercial Agreements

We have customary clinical supply agreements and customary agreements with clinical research organizations to help us manage our nonclinical and clinical development programs. Each of our commercial agreements is non-exclusive, and we have no material contractual obligations under such agreements, except to the extent we order supplies or request services to be performed under work orders that we generate from time to time.

Material License Agreements

Exclusive License and Collaboration Agreements with Pherin

In September 2018, we acquired from Pherin an exclusive worldwide license to develop and commercialize PH94B. In October 2018, we acquired from Pherin an exclusive worldwide license to develop and commercialize PH10. Under the terms of the PH94B and PH10 license agreements, we are obligated to make additional cash payments, and pay royalties, to Pherin in connection with our sublicense, development and commercialization collaborations involving PH94B and/or PH10, as well as in the event that certain development milestones and commercial sales are achieved. Additionally, in connection with the license agreements, we are obligated to pay to Pherin monthly support payments of \$10,000 for a term of the earlier of 18 months or the termination of the license agreement, however no monthly support payment is required under the 18-month period identified in the PH10 license agreement if support payments are being made under the terms of the PH94B license agreement. In April 2020, we completed our obligation to pay such monthly support payments to Pherin, and that contractual requirement has been fully satisfied.

Exclusive License and Collaboration Agreement with EverInsight Therapeutics

In June 2020, we entered into a license and collaboration agreement (the *EverInsight License Agreement*) with EverInsight Therapeutics Inc., a company incorporated under the laws of the British Virgin Islands (*EverInsight*), pursuant to which we granted EverInsight an exclusive license to develop, manufacture and commercialize PH94B for multiple anxiety-related disorders in Greater China (Mainland China, Hong Kong, Macau and Taiwan), South Korea and Southeast Asia (Indonesia, Malaysia, Philippines, Thailand and Vietnam) (collectively, the *Territory*). We retained development, manufacturing and commercialization rights for PH94B in the rest of the world.

Under the terms of the EverInsight License Agreement, we are entitled to receive an upfront payment of \$5.0 million. We may also receive up to an additional \$172 million in milestone payments upon EverInsight's achievement of certain developmental, regulatory and sales milestone events related to PH94B, which achievement cannot be guaranteed. We are also entitled to receive certain royalties on net sales, if any, of PH94B in the Territory following receipt of any required regulatory approval. In addition, EverInsight has the right to sublicense to affiliates and third parties in the Territory. EverInsight is responsible for all costs related to developing, obtaining regulatory approval of and commercializing PH94B in the Territory. A joint development committee will be established between the Company and EverInsight to coordinate and review the development, manufacturing and commercialization plans with respect to PH94B in the Territory. Unless earlier terminated due to certain material breaches of the contract, or otherwise, the EverInsight License Agreement will expire on a jurisdiction-by-jurisdiction basis until the latest to occur of expiration of the last valid claim under a licensed patent of PH94B in such jurisdiction, the expiration of regulatory exclusivity in such jurisdiction or ten years after the first commercial sale of PH94B in such jurisdiction.

Manufacturing and Supply

Manufacturing of the drug substance and drug product for our product candidates is done by third-parties and must comply with FDA current good manufacturing practice (*cGMP*) regulations. Our product candidates are comprised of synthetic small molecules made through a series of organic chemistry steps starting with commercially available organic chemical raw materials. We do not currently own or operate, nor do we plan to own or operate, any manufacturing facilities for the clinical or commercial production of our drug candidates. We conduct manufacturing activities under individual project or work orders with independent CMOs, to supply all of our nonclinical and clinical trial needs. We conduct periodic quality audits of their facilities. We believe that our existing suppliers of our product candidate's active pharmaceutical ingredients and drug products will be capable of providing sufficient quantities of each to meet our clinical trial supply needs. Other CMOs may be used in the future for clinical supplies and, subject to approval, commercial manufacturing.

By design, we do not currently have any fixed contractual arrangements in place for either long-term supply or redundant supply of bulk drug substance or drug product for our product candidates. If our product candidates are approved, we intend to contract with CMOs to produce all of our future commercial supplies on our behalf. We plan to mitigate potential commercial supply risks for any products that are approved in the future through inventory management and through exploring additional back-up manufacturers, both in the U.S. and outside the U.S., to provide API and/or drug product.

Sales and Marketing

We believe that we can successfully launch and commercialize PH94B for acute treatment of SAD on our own in the U.S., if approved in the U.S. by the FDA. Upon successful completion of our PH94B Phase 3 clinical development program for acute treatment of SAD, should that occur, we believe that we can cost effectively build a commercial infrastructure in the U.S. in advance of U.S. approval of PH94B for acute treatment of SAD and ultimately implement a targeted sales force required to commercialize PH94B in the U.S. Support for this targeted team will include sales management, internal sales support, distribution support, and an internal marketing group. Additional requisite capabilities will include focused management of key accounts such as managed care organizations, group purchasing organizations, and government accounts. We also may seek co-promotion partners for our U.S. sales efforts to achieve broader reach or call frequency with other U.S. target physicians.

We believe that there are significant market opportunities for our products outside of the U.S. As a result, as we have done with EverInsight for development and commercialization of PH94B in Greater China, South Korea and Southeast Asia, we plan to seek strategic partnerships with third party collaborators, which third-parties may have greater reach and resources by virtue of their size and/or experience in the field, for the development and commercialization of our products outside the U.S. We may elect in the future to utilize strategic partners, distributors, or contract sales forces to assist in the commercialization of our products. In order to implement this infrastructure, we will have to allocate management resources and make significant financial investments prior to and following any product approval, through the hiring of a targeted sales and marketing force. We expect to focus our future sales and marketing efforts, if PH94B is approved for acute treatment of SAD, on psychiatrists and select primary care physicians and potentially on pediatricians who are likely to see adolescents, as well as nurse practitioners and psychologists who, in some states, are permitted to prescribe medications.

Should we advance PH10 and AV-101 through successful completion of Phase 2 and Phase 3 clinical development for treatment of MDD and/or other CNS indications, we plan to file for and obtain regulatory approval of PH10 and AV-101 in the U.S. and then commercialize them in the U.S. on our own and outside the U.S. with third-party collaborators.

Clinical, Regulatory and Scientific Advisors

We have formed a Clinical and Regulatory Advisory Board (*CRA Board*) and a Scientific Advisory Board (*SAB*) composed of leading experts in the areas of related to development of our product portfolio, including anxiety, depression, neuropathic pain, FDA regulations, clinical trial design, drug rescue and medicinal chemistry, and stem cell technology, cell therapy and regenerative medicine. These experts provide us with key scientific, clinical, regulatory and strategic guidance concerning our development programs in anxiety, depression and other CNS disorders, as well as potential applications of our stem cell technology platform. The following are members of our CRA Board: Maurizio Fava, M.D., Director of the Clinical Research Program and Executive Vice Chair of the Department of Psychiatry at Massachusetts General Hospital, and Slater Family Professor of Psychiatry at Harvard Medical School; Thomas Laughren, M.D., retired Division Director of the FDA's Division of Psychiatry Products; Michael Liebowitz, M.D., Professor of Clinical Psychiatry at Columbia University and director of the Medical Research Network in New York City; Gerard Sanacora, M.D., Ph.D., George D. and Esther S. Gross Professor of Psychiatry, Director of Yale Depression Research Program and Co-Director of Yale New Haven Hospital Interventional Psychiatry Service; Sanjay Mathew, M.D., vice chair for research and professor of psychiatry and behavioral sciences at Baylor College of Medicine and a Staff Psychiatrist at the Michael E. DeBakey VA Medical Center; and Mark Wallace, M.D., Distinguished Professor of Clinical Anesthesiology at the University of California, San Diego. Members of our SAB include Gordon Keller, Ph.D., Director of University Health Network McEwen Stem Cell Institute, and Professor, Department of Medical Biophysics, University of Toronto, Ontario, and Ron Wester, Ph.D., retired Vice President, Medicinal Chemistry and Drug Discovery at Pfizer Global R&D.

Competition

The biopharmaceutical industry is highly competitive and subject to rapid and significant technological change. The high unmet need in large and growing global markets for anxiety, depression and other CNS diseases and disorders, as well as stem cell technology, cell therapy and regenerative medicine, make them attractive therapeutic areas and market opportunities for biopharmaceutical businesses. We face potential competition from many different sources, including major pharmaceutical, specialty pharmaceutical, and biotechnology companies, academic institutions, governmental agencies, and public and private research institutions. Any product candidates that we successfully develop and commercialize will compete with existing therapies and new therapies that may become available in the future. Many of our competitors may have significantly greater financial resources and expertise in research and development, manufacturing, preclinical testing, conducting clinical studies, obtaining regulatory approvals, and marketing approved products than we do. Several of these entities have commercial products, robust drug pipelines, readily available capital, and established research and development organizations. Mergers and acquisitions in the pharmaceutical, biotechnology, and diagnostic industries may result in even more resources being concentrated among a smaller number of our competitors. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel and establishing clinical study sites and patient registration for clinical studies, as well as in acquiring technologies complementary to, or necessary for, our programs. Small or early-stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. It is probable that the number of companies seeking to develop products and therapies similar to our products will increase. The key competitive factors affecting the success of all of our product candidates, if approved, are likely to be their efficacy, safety, convenience, price, the level of branded and generic competition, and the availability of reimbursement from government and other third-party payors.

Although currently there are no FDA-approved therapies for SAD with the mechanism of action of PH94B, and we are aware of no company developing a potential acute treatment for SAD that is either a nasal spray or involves the same mechanism of pharmacological action as PH94B. However, although they are not FDA-approved for the acute treatment of SAD and are associated with side effects and safety concerns we do not anticipate to be associated with PH94B, we may face competition to PH94B for acute treatment of SAD from off-label use of generic benzodiazepines and generic beta blockers. In addition, although there are three antidepressants approved by the FDA for overall treatment of SAD, such drugs do not achieve rapid-onset therapeutic effects.

Although currently there are no FDA-approved oral therapies for MDD with the mechanism of pharmacological action of either PH10 or AV-101, we are aware of numerous pharmaceutical and biotechnology companies that are developing therapies targeting the MDD market, including with drug candidates focused on the NMDAR. Certain of the potential MDD therapies being developed are broad NMDAR antagonists and tend to have multiple target actions. We believe AV-101 is a specific NMDAR glycine site antagonist, without negative off-target activity in preclinical screening. We are aware of the numerous companies developing or commercializing therapies for MDD or NMDAR-targeted therapies for other CNS disorders. Such companies include but are not limited to, Acadia, Adamas, Alkermes, Allergan, Aptynix, Avanir, Axsome, Biohaven, Biogen, BlackThorn, Cadent, Cerecor, Eli Lilly, Janssen, Lundbeck, Minerva, Navitor, NeuroRx, Otsuka, Novartis, Perceptive Neuroscience, Praxis, Relmada, Sage, Seelos, Shionogi, Taisho and Takeda. Additionally, with respect to MDD, we expect that PH10 and AV-101 will have to compete with a variety of therapeutic procedures for treatment of MDD, such as psychotherapy and electroconvulsive therapy.

We believe that VistaStem's hPSC technology platform, the hPSC-derived human cells we study, and the customized human cell-based assay systems we have developed and used are capable of being competitive in the diverse and growing global stem cell, CT and RM markets, including potential markets involving the sale of hPSC-derived cells to third-parties for their *in vitro* drug discovery and safety testing, contract predictive toxicology drug screening services for third parties, internal drug discovery, drug development and DR of new NCEs, and RM, including *in vivo* CT research and development. A representative list of such biopharmaceutical companies pursuing one or more of these potential applications of adult and/or hPSC technology includes, but is not limited to, the following: Acea, Astellas, Athersys, BioCardia, BioTime, Caladrius, Cellectis, Cellerant, Cytori, Fujifilm, HemoGenix, International Stem Cell, Neuralstem, Organovo, PluriStem, and Stemina BioMarker Discovery. Pharmaceutical companies and other established corporations such as Bristol-Myers Squibb, Charles River, GE Healthcare, GlaxoSmithKline, Novartis, Pfizer, Roche Holdings, Thermo Fisher and others have been and are expected to continue pursuing internally various stem cell-related research and development programs. Many of the foregoing companies have greater resources and capital availability and as a result, may be more successful in their research and development programs than us. We anticipate that acceptance and use of hPSC technology for drug development, CT and RM will continue to occur and increase at pharmaceutical and biotechnology companies in the future.

While we believe that our employees' and consultants' scientific knowledge, technology, and development experience provide us with competitive advantages, many of our potential competitors, alone or with their strategic partners, have substantially greater financial, technical and human resources than we do and significantly greater experience in the discovery and development of product candidates, obtaining FDA and other regulatory approvals of treatments and the commercialization of those treatments.

Government Regulation and Product Approval

Government authorities in the U.S., at the federal, state, and local level, and in other countries and supranational regions, extensively regulate, among other things, the research, development, testing, manufacture, packaging, storage, recordkeeping, labeling, advertising, promotion, distribution, marketing, import, and export of pharmaceutical products such as those we are developing. In addition, healthcare regulatory bodies in the United States and around the world impose a range of requirements related to the payment for pharmaceutical products, including laws intended to prevent fraud, waste, and abuse of healthcare dollars. This includes, for example, requirements that manufacturers of pharmaceutical products participating in Medicaid and Medicare comply with mandatory price reporting, discount, rebate requirements, and other cost control measures, as well as anti-kickback laws and laws prohibiting false claims. Some states also have enacted fraud, waste, and abuse laws that parallel (and in some cases apply more broadly than) federal laws, and in some cases price transparency requirements. The processes for obtaining regulatory approvals in the United States and in foreign countries, along with subsequent compliance with applicable statutes and regulations, require the expenditure of substantial time and financial resources. Further, healthcare is an active area of governmental scrutiny, and it is reasonable to expect that the requirements may become more stringent within the foreseeable future.

FDA Regulation

In the U.S., the FDA regulates drugs under the Federal Food, Drug, and Cosmetic Act (*FDCA*) and its implementing regulations. The process required by the FDA before product candidates may be marketed in the U.S. generally involves the following:

- completion of preclinical laboratory tests, animal studies, and formulation studies in compliance with the FDA's Good Laboratory Practice (*GLP*) regulations;
- submission to the FDA of an IND which must become effective before human clinical trials may begin;
- approval by an independent Institutional Review Board (*IRB*) for each clinical site or centrally, before each trial may be initiated;
- adequate and well-controlled human clinical trials to establish the safety and efficacy of the proposed drug candidates for its intended use, performed in accordance with current Good Clinical Practices (*GCP*);
- development of manufacturing processes in compliance with current cGMPs to ensure the drug's identity, strength, quality, and purity;
- compilation of required information and submission to the FDA of an NDA;
- satisfactory completion of an FDA advisory committee review, if applicable;
- satisfactory completion of an FDA inspection of the manufacturing facility or facilities at which the product is produced to assess compliance with cGMPs, and to assure that the facilities, methods, and controls are adequate to preserve the drug's identity, strength, quality, and purity, as well as satisfactory completion of an FDA inspection of selected clinical sites and selected clinical investigators to determine GCP compliance; and
- FDA review and approval of the NDA to permit commercial marketing for particular indications for use.

Preclinical Studies and IND Submission

The testing and approval process of product candidates requires substantial time, effort, and financial resources. Preclinical studies include laboratory evaluation of drug substance chemistry, pharmacology, toxicity, and drug product formulation, as well as animal studies to assess potential safety and efficacy. Such studies must generally be conducted in accordance with the FDA's Good Laboratory Practice regulations. Prior to commencing the first clinical trial with a product candidate, an IND sponsor must submit the results of the preclinical tests and preclinical literature, together with manufacturing information, analytical data, any available clinical data or literature, and proposed clinical study protocols, among other things, to the FDA as part of an IND.

An IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA, within the 30-day time period, notifies the applicant of safety concerns or questions related to one or more proposed clinical trials and places the trial on a clinical hold. 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 noncompliance. As a result, submission of an IND may not result in FDA authorization to commence a clinical trial.

Clinical Trials

Clinical trials involve the administration of the investigational new drug to human subjects under the supervision of qualified investigators in accordance with GCP requirements, which include the requirements that all research subjects provide their informed consent in writing for their participation in any clinical trial, as well as review and approval of the study by an IRB. Investigators must also provide certain information to the clinical trial sponsors to allow the sponsors to make certain financial disclosures to the FDA. Clinical trials are conducted under protocols detailing, among other things, the objectives of the trial, the trial procedures, the parameters to be used in monitoring safety, the effectiveness criteria to be evaluated, and a statistical analysis plan. A protocol for each clinical trial, and any subsequent protocol amendments, must be submitted to the FDA as part of the IND. In addition, an IRB at each study site participating in the clinical trial or a central IRB must review and approve the plan for any clinical trial, informed consent forms, and communications to study subjects before a study commences at that site. 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 and whether the planned human subject protections are adequate. The IRB must continue to oversee the clinical trial while it is being conducted.

Once an IND is in effect, each new clinical protocol and any amendments to the protocol must be submitted to for FDA review, and to the IRB for approval. Progress reports detailing the results of the clinical trials must also be submitted at least annually to the FDA and the IRB and more frequently if serious adverse events or other significant safety information is found.

Information about certain clinical trials, including a description of the study and study results, must be submitted within specific timeframes to the NIH for public dissemination on their clinicaltrials.gov website.

Additionally, some clinical trials are overseen by an independent group of qualified experts organized by the clinical trial sponsor, known as a data safety monitoring board or committee. This group regularly reviews accumulated data and advises the study sponsor regarding the continuing safety of trial subjects, enrollment of potential trial subjects, and the continuing validity and scientific merit of the clinical trial. The data safety monitoring board receives special access to unblinded data during the clinical trial and may advise the sponsor to halt the clinical trial if it determines there is an unacceptable safety risk for subjects or on other grounds, such as no demonstration of efficacy.

The manufacture of investigational drugs for the conduct of human clinical trials (and their active pharmaceutical ingredients) is subject to cGMP requirements. Investigational drugs and active pharmaceutical ingredients imported into the United States are also subject to regulation by the FDA relating to their labeling and distribution. Further, the export of investigational drug products outside of the United States is subject to regulatory requirements of the receiving country as well as U.S. export requirements under the FDCA.

In general, for purposes of NDA approval, human clinical trials are typically conducted in three sequential phases, which may overlap or be combined.

- *Phase 1*—Studies are initially conducted in healthy human volunteers or subjects with the target disease or condition and test the product candidate for safety, dosage tolerance, structure-activity relationships, mechanism of action, absorption, metabolism, distribution, and excretion. If possible, Phase 1 trials may also be used to gain an initial indication of product effectiveness.
- *Phase 2*—Controlled studies are conducted in limited subject populations with a specified disease or condition to evaluate preliminary efficacy, identify optimal dosages, dosage tolerance and schedule, possible adverse effects and safety risks, and expanded evidence of safety.
- *Phase 3*—These adequate and well-controlled clinical trials are undertaken in expanded subject populations, generally at geographically dispersed clinical trial sites, to generate enough data to provide statistically significant evidence of clinical efficacy and safety of the product for approval, to establish the overall risk-benefit profile of the product, and to provide adequate information for the labeling of the product. Typically, two Phase 3 trials are required by the FDA for product approval.

The FDA may also require, or companies may conduct, additional clinical trials for the same indication after a product is approved. These so-called Phase 4 studies may be required by the FDA as a condition of approval of the NDA, to be satisfied after approval. The results of Phase 4 studies can confirm the effectiveness of a product candidate and can provide important safety information. In addition to the above traditional kinds of clinical trial data required for the approval of an NDA, the 21st Century Cures Act provides for potential FDA use of different types and sources of data in regulatory decision-making, such as patient experience data, real world evidence for already approved products, and, for appropriate indications sought through supplemental marketing applications, data summaries. Implementation of this law and related initiatives is still in progress and we do not know the extent to which we may in the future be able to utilize these types and sources of data. In the case of a 505(b)(2) NDA, which is a marketing application in which sponsors may rely on investigations that were not conducted by or for the applicant and for which the applicant has not obtained a right of reference or use from the person by or for whom the investigations were conducted, some of the above described studies and preclinical studies may not be required or may be abbreviated. Bridging studies may be needed, however, to demonstrate the applicability of the studies that were previously conducted by other sponsors to the drug that is the subject of the marketing application.

Clinical trials at any phase may not be completed successfully within any specified period, or at all. Regulatory authorities, an IRB, or the sponsor may suspend or discontinue a clinical trial at any time on various grounds, including a finding that the subjects are being exposed to an unacceptable health risk, the clinical trial is not being conducted in accordance with the FDA's or the IRB's requirements, if the drug has been associated with unexpected serious harm to the subjects, or based on evolving business objectives or competitive climate.

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 candidate as well as 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 product candidate and, among other things, the manufacturer must develop methods for testing the identity, strength, quality, potency, and purity of the final product. Additionally, appropriate packaging must be selected and tested, and stability studies must be conducted to demonstrate that the product candidate does not undergo unacceptable deterioration over its shelf life.

During the development of a new drug, a sponsor may be able to request a Special Protocol Assessment (*SPA*), the purpose of which is to reach agreement with the FDA on the Phase 3 clinical trial protocol design and analysis that will form the primary basis of an efficacy claim as well as preclinical carcinogenicity trials and stability studies. An SPA may only be modified with the agreement of the FDA and the trial sponsor or if the director of the FDA reviewing division determines that a substantial scientific issue essential to determining the safety or efficacy of the drug was identified after the testing began. An SPA is intended to provide assurance that, in the case of clinical trials, if the agreed-upon clinical trial protocol is followed, the clinical trial endpoints are achieved, and there is a favorable risk-benefit profile, the data may serve as the primary basis for an efficacy claim in support of an NDA. However, SPA agreements are not a guarantee of an approval of a product candidate or any permissible claims about the product candidate. In particular, SPAs are not binding on the FDA if, among other reasons, previously unrecognized public health concerns arise during the performance of the clinical trial, other new scientific concerns regarding the product candidate's safety or efficacy arise, or if the sponsoring company fails to comply with the agreed upon clinical trial protocol.

NDA Submission, Review by the FDA, and Marketing Approval

Assuming successful completion of the required clinical and preclinical testing, the results of product development, including chemistry, manufacturing, and control (CMC) information, non-clinical studies, and clinical trial results, including negative or ambiguous results as well as positive findings, are all submitted to the FDA, along with the proposed labeling, as part of an NDA requesting approval to market the product for one or more indications. In most cases, the submission of an NDA is subject to a substantial application user fee, authorized every five years by Congress under the Prescription Drug User Fee Act (PDUFA). User fees must be paid at the time of the first submission of the application, even if the application is being submitted on a rolling basis, and if approved, program fees must be paid on an annual basis. Product candidates that are designated as orphan drugs, which are further described below, are also not subject to application user fees unless the application includes an indication other than the orphan indication.

In addition, under the Pediatric Research Equity Act (PREA), an NDA or supplement to an NDA for a new active ingredient, indication, dosage form, dosage regimen, or route of administration must contain data that are adequate to assess the safety and effectiveness of the drug for the claimed indications in all relevant pediatric subpopulations, and to support dosing and administration for each pediatric subpopulation for which the product is safe and effective. A sponsor who is planning to submit a marketing application for a drug product that includes a new active ingredient, new indication, new dosage form, new dosing regimen or new route of administration must submit an initial Pediatric Study Plan (PSP) within 60 days of an End-of-Phase 2 meeting or as may be agreed between the sponsor and the FDA. The initial PSP must include an outline of the pediatric study or studies that the sponsor plans to conduct, including study objectives and design, age groups, relevant endpoints and statistical approach, or a justification for not including such detailed information, and any request for a deferral of pediatric assessments or a full or partial waiver of the requirement to provide data from pediatric studies along with supporting information. The FDA and the sponsor must reach agreement on the PSP. A sponsor can submit amendments to an agreed-upon initial PSP at any time if changes to the pediatric plan need to be considered based on data collected from preclinical studies, early phase clinical studies or other clinical development program. The FDA may, on its own initiative or at the request of the applicant, grant deferrals for submission of some or all pediatric data until after approval of the product for use in adults, or full or partial waivers from the pediatric data requirements. The FDA also may require submission of a risk evaluation and mitigation strategy (REMS) to ensure that the benefits of the drug outweigh the risks of the drug. The REMS plan could include medication guides, physician communication plans, and elements to assure safe use, such as restricted distribution methods, patient registries, or other risk minimization tools. An assessment of the REMS must also be conducted at set intervals. Following product approval, a REMS may also be required by the FDA if new safety information is discovered and the FDA determines that a REMS is necessary to ensure that the benefits of the drug continue to outweigh the risks of the drug.

Once the FDA receives an application, it will determine within 60 days whether the NDA as filed is sufficiently complete to permit a substantive review (with this decision often referred to as the NDA being “accepted for filing.”). The FDA may request additional information rather than accept an NDA for filing. In this event, the application must be resubmitted with the additional information. The resubmitted application is also subject to review before the FDA accepts it for filing. Once the submission is accepted for filing, the FDA begins an in-depth substantive review of the NDA.

The FDA has agreed to a set of performance goals and procedures under PDUFA to review 90% of all applications within ten months from the 60-day filing date for its initial review of a standard NDA for a New Molecular Entity (NME). For non-NME standard applications, the FDA has set the goal of completing its review of 90% of all applications within ten months from the submission receipt date. Such deadlines are referred to as the PDUFA date. The PDUFA date is only a goal, thus, the FDA does not always meet its PDUFA goal dates. The review process and the PDUFA goal date may also be extended if the FDA requests, or the NDA sponsor otherwise provides, substantial additional information or clarification regarding the submission.

The FDA may refer an application to an advisory committee for review, evaluation and recommendation as to whether the application should be approved, and applications for new molecular entities are generally discussed at advisory committee meetings unless the FDA determines that this type of consultation is not needed under the circumstances.

An advisory committee is typically a panel that includes clinicians and other experts, which review, evaluate, and make a recommendation as to whether the application should be approved and under what conditions. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions and typically follows such recommendations.

The FDA reviews applications to determine, among other things, whether a product is safe and effective for its intended use and whether the manufacturing methods and controls are adequate to assure and preserve the product's identity, strength, quality, safety, potency, and purity. Before approving an NDA, the FDA typically will inspect the facility or facilities where the product is manufactured, referred to as a Pre-Approval Inspection. The FDA will not approve an application unless it determines that the manufacturing processes and facilities, including contract manufacturers and subcontractors, are in compliance with cGMP requirements and adequate to assure consistent production of the product within required specifications. Additionally, before approving an NDA the FDA will inspect one or more clinical trial sites to assure compliance with GCPs.

The approval process is lengthy and difficult, and involves numerous FDA personnel assigned to review different aspects of the NDA, and the FDA may refuse to approve an NDA if the applicable regulatory criteria are not satisfied or may require additional preclinical, clinical, CMC, or other data and information. Uncertainties can be presented by reviewers' ability to exercise judgment and discretion during the review process. Even if such data and information are submitted, the FDA and 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 an applicant interprets the same data.

After evaluating the NDA and all related information, including the advisory committee recommendation, if any, and inspection reports regarding the manufacturing facilities and clinical trial sites, the FDA may issue an approval letter, or, in some cases, a Complete Response Letter (CRL). If a CRL 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. A CRL indicates that the review cycle of the application is complete and the application is not ready for approval in its current form and describes all of the specific deficiencies that the FDA identified in the NDA. A CRL generally contains a statement of specific conditions that must be met in order to secure final approval of the NDA, and may require additional clinical or preclinical testing in order for the FDA to reconsider the application. The deficiencies identified may be minor, for example, requiring labeling changes; or major, for example, requiring additional clinical trials. The FDA has the goal of reviewing 90% of application and efficacy supplement resubmissions in either two or six months (from receipt) for a Class 1 or Class 2 resubmission, respectively. For non-efficacy supplements (i.e., labeling and manufacturing supplements), CDER's goal is to review the supplement within the same length of time (from receipt) as the initial review cycle (excluding an extension caused by a major amendment of the initial supplement).

Even with the submission of additional information, the FDA ultimately may decide that the application does not satisfy the regulatory criteria for approval. If and when the issues identified in a CRL have been addressed and resolved to the FDA's satisfaction, the FDA may issue an approval letter. An approval letter authorizes commercial marketing of the drug for specific indications and with specific prescribing information which was reviewed in connection with the NDA.

Even if the FDA approves a product, it may limit the approved indications for use of the product, require that contraindications, warnings, or precautions be included in the product labeling, including a boxed warning, require that post-approval studies, including Phase 4 clinical trials, be conducted to further assess a drug's safety and efficacy after approval, require testing and surveillance programs to monitor the product after commercialization, or impose other conditions, including distribution restrictions or other risk management mechanisms under a REMS which can materially affect the potential market and profitability of the product. The FDA may also not approve label statements that are necessary for successful commercialization and marketing.

After approval, some types of changes to the approved product, such as adding new indications, manufacturing changes, and additional labeling claims, are subject to further testing requirements and FDA review and approval. The FDA may also withdraw the product approval if compliance with the pre- and post-marketing regulatory standards are not maintained or if problems occur after the product reaches the marketplace. Further, should new safety information arise, additional testing, product labeling, or FDA notification may be required.

505(b)(2) Approval Process

Section 505(b)(2) of the FDCA, provides an alternate regulatory pathway to FDA approval for new or improved formulations or new uses of previously approved drug products. Specifically, Section 505(b)(2) was enacted as part of the Drug Price Competition and Patent Term Restoration Act of 1984, commonly referred to as the Hatch-Waxman Act amendments, and permits the filing of an NDA where at least some of the information required for approval comes from studies not conducted by or for the applicant and for which the applicant has not obtained a right of reference or use from the person by or for whom the investigations were conducted. The applicant may rely, in part, upon the FDA's prior findings of safety and effectiveness for an approved product that acts as the reference listed drug or on published scientific literature, in support of its application. The FDA may also require 505(b)(2) applicants to perform additional studies or measurements to support the changes from the reference listed drug as well as bridging studies to the reference listed drug. The FDA may then approve the new product candidate for all or some of the labeled indications for which the referenced product has been approved, as well as for any new indication sought by the Section 505(b)(2) applicant.

Orange Book Listing

Section 505 of the FDCA describes three types of marketing applications that may be submitted to the FDA to request marketing authorization for a new drug. A section 505(b)(1) NDA is an application that contains full reports of investigations of safety and efficacy. A section 505(b)(2) NDA is an application in which the applicant, in part, relies on investigations that were not conducted by or for the applicant and for which the applicant has not obtained a right of reference or use from the person by or for whom the investigations were conducted. Section 505(j) establishes an abbreviated approval process for a generic version of approved drug products through the submission of an Abbreviated New Drug Application (ANDA). An ANDA is an application for marketing of a generic drug product that has the same active ingredients, dosage form, strength, route of administration, labeling, performance characteristics, and intended use, among other things, to a previously approved product. Limited changes must be pre-approved by the FDA via a suitability petition. ANDAs are termed “abbreviated” because they are generally not required to include preclinical and clinical data to establish safety and efficacy. Instead, generic applicants must scientifically demonstrate that their product is bioequivalent to, or performs in the same manner as, the innovator drug through in vitro, in vivo, or other testing. The generic version must deliver the same amount of active ingredients into a subject’s bloodstream in the same amount of time as the innovator drug and, under state substitution laws, may be substituted at the pharmacy for the reference listed drug.

In seeking approval for a drug through an NDA, including a 505(b)(2) NDA, applicants are required to identify to the FDA patents that contain claims that are directed to the applicant’s product and/or method(s) of use. Upon approval of an NDA, each of the identified patents is then listed in *Approved Drug Products with Therapeutic Equivalence Evaluations*, also known as the Orange Book.

An applicant who files an ANDA seeking approval of a generic version of a drug listed in the Orange Book or a 505(b)(2) NDA referencing a drug listed in the Orange Book must make patent certifications to the FDA that (1) no patent information on the drug or method of use that is the subject of the application has been submitted to the FDA; (2) the patent has expired; (3) the date on which the patent has expired and approval will not be sought until after the patent expiration; or (4) in the applicant’s opinion and to the best of its knowledge, the patent is invalid, unenforceable, or will not be infringed upon by the manufacture, use, or sale of the drug product for which the application is submitted. The last certification is known as a paragraph IV certification. Generally, the ANDA or 505(b)(2) NDA approval cannot be made effective until all listed patents have expired, except where the ANDA or 505(b)(2) NDA applicant challenges a listed patent through a paragraph IV certification or if the applicant is not seeking approval of a patented method of use. If the applicant does not challenge the listed patents or does not indicate that it is not seeking approval of a patented method of use, the ANDA or 505(b)(2) NDA application approval will not be made effective until all of the listed patents claiming the referenced product have expired.

If the competitor has provided a paragraph IV certification to the FDA, the competitor must also send notice of the paragraph IV certification to the holder of the NDA for the reference listed drug and the patent owner within 20 days after the application has been accepted for filing by the FDA. The NDA holder or patent owner may then initiate a patent infringement lawsuit in response to the notice of the paragraph IV certification. The filing of a patent infringement lawsuit within 45 days of the receipt of a paragraph IV certification notice prevents the FDA from making the approval of the ANDA or 505(b)(2) application effective until the earlier of 30 months from the date of the lawsuit, expiration of the patent, settlement of the lawsuit, a decision in the infringement case that is favorable to the applicant or such shorter or longer period as may be ordered by a court. This prohibition is generally referred to as the automatic 30-month stay.

In practice, where an ANDA or 505(b)(2) NDA applicant files a paragraph IV certification, the NDA holder or patent owners often take action to trigger the automatic 30-month stay, resulting in patent litigation that may take many months or years to resolve. Thus, approval of an ANDA or 505(b)(2) application could be delayed for a significant period of time depending on the patent certification the applicant makes and the reference drug sponsor’s decision to initiate patent litigation.

Regulatory Exclusivity

Regulatory exclusivity provisions under the FDCA can also delay the submission or the approval effective date of certain applications. A regulatory exclusivity can provide the holder of an approved NDA protection from new competition in the marketplace for the innovation represented by its approved drug. Five years of exclusivity are available for NCEs. An NCE is a drug that contains no active moiety that has been approved by the FDA in any other NDA. An active moiety is the molecule or ion excluding those appended portions of the molecule that cause the drug to be an ester, salt, including a salt with hydrogen or coordination bonds, or other noncovalent derivatives, such as a complex, chelate, or clathrate, of the molecule, responsible for the therapeutic activity of the drug substance. During the NCE exclusivity period, the FDA may not accept for review an ANDA or a 505(b)(2) NDA application by another company that contains the previously approved active moiety. An ANDA or 505(b)(2) application, however, may be submitted one year before NCE exclusivity expires if a paragraph IV certification is filed.

Three years of exclusivity are available to the holder of an NDA, including a 505(b)(2) NDA, for a particular condition of approval, or change to a marketed product, such as a new formulation or indication for a drug product that contains an active moiety that has been previously approved, when the application contains reports of new clinical investigations, other than bioavailability studies, conducted by the sponsor that were essential to approval of the application. Changes in an approved drug product that affect its active ingredient(s), strength, dosage form, route of administration or conditions of use may be granted this exclusivity if a new clinical investigation (NCI) was essential to approval of the application containing those changes. During the NCI exclusivity period, FDA may not approve an ANDA or 505(b)(2) NDA by another company for the condition of the new drug's approval. NCE and NCI exclusivities will not delay the submission or approval of a full NDA; however, an applicant submitting a full NDA would be required to conduct or obtain a right of reference to, all of the preclinical studies and adequate and well-controlled clinical trials necessary to demonstrate safety and efficacy.

Pediatric exclusivity is a regulatory exclusivity in the United States that provides for the attachment of an additional six months of marketing protection to the term of any existing regulatory and statutory exclusivity, including the non-patent exclusivity periods described above as well as applicable patent terms. This six-month exclusivity may be granted if an NDA sponsor submits pediatric data that fairly respond to a written request from the FDA for such data. The data do not need to show the product to be effective in the pediatric population studied; rather, if the clinical trial is deemed to fairly respond to the FDA's request, the additional protection is granted. If reports of requested pediatric studies are submitted to and accepted by the FDA within the required time frames, whatever statutory or regulatory periods of exclusivity or Orange Book listed patent protection cover the drug are extended by six months. This is not a patent term extension, but it effectively extends the regulatory period during which the FDA cannot make an ANDA or 505(b)(2) application approval effective as a result of regulatory exclusivity or listed patents. Moreover, pediatric exclusivity attaches to all formulations, dosage forms, and indications for products with existing marketing exclusivity or patent life that contain the same active moiety as that which was studied.

The Orphan Drug Act provides incentives for the development of drugs intended to treat rare diseases or conditions, which generally are diseases or conditions affecting less than 200,000 individuals annually in the United States, or affecting more than 200,000 in the United States and for which there is no reasonable expectation that the cost of developing and making the drug available in the United States will be recovered from United States sales. If a product receives FDA approval for the indication for which it has orphan designation, the product is generally entitled to orphan drug exclusivity, which means the FDA may not approve any other application to market the same drug for the same indication for a period of seven years, except in limited circumstances, such as a showing of clinical superiority over the product with orphan exclusivity. Orphan drug designation also entitles a party to financial incentives such as opportunities for grant funding towards clinical study costs, tax advantages, and application user-fee waivers.

Special FDA Expedited Review and Approval Programs

The FDA has various programs, including Fast Track designation, Priority Review and Breakthrough designation, that are intended to expedite or simplify the process for the development and FDA review of certain drug products that are intended for the treatment of serious or life threatening diseases or conditions, and demonstrate the potential to address unmet medical needs or present a significant improvement over existing therapy. 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 will determine that a product will fill an unmet medical need if the product will provide a therapy where none exists or provide a therapy that may be potentially superior to existing therapy based on efficacy, safety, or public health factors. If Fast Track designation is obtained, drug sponsors may be eligible for more frequent development meetings and correspondence with the FDA.

In addition, if an applicant obtains “rolling review” the FDA may accept and initiate review of sections of an NDA before the application submission is complete, although it is not guaranteed that FDA will commence review before the application submission is complete, and the timing of the review depends on a number of factors including availability of review personnel at the FDA, and competing agency priorities among other things. The applicant must provide, and the FDA must agree to, a schedule for the remaining information after the initial section of the NDA.

In some cases, a Fast Track product may be eligible for Accelerated Approval or Priority Review.

The FDA may give a Priority Review designation to drugs that are intended to treat serious conditions and, if approved, would provide significant improvements in the safety or effectiveness of the treatment, diagnosis, or prevention of serious conditions. A Priority Review designation means that the goal for the FDA is to review an application within six months of receipt, rather than the standard review of ten months under current PDUFA guidelines, of the 60-day filing date for NMEs and within six months of the submission receipt date for non-NMEs. Products that are eligible for Fast Track designation may also be considered appropriate to receive a Priority Review.

Moreover, under the provisions of the Food and Drug Administration Safety and Innovation Act (*FDASIA*), enacted in 2012, a sponsor can request designation of a product 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 eligible for the Fast Track designation features as described above, intensive guidance on an efficient drug development program beginning as early as Phase 1 trials, and a commitment from the FDA to involve senior managers and experienced review staff in a proactive collaborative, cross-disciplinary review.

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.

Post-approval Requirements

Any product manufactured or distributed pursuant to FDA approvals are subject to pervasive and continuing regulation by the FDA, as well as other federal and state agencies, including, among other things, requirements related to manufacturing, recordkeeping, and reporting, including adverse experience reporting, drug shortage reporting, and other periodic reporting; drug supply chain security surveillance and tracking requirements; product sampling and distribution; advertising; marketing; promotion; certain electronic records and signatures; licensure in certain states for the manufacturing and distribution of drug products; and post-approval obligations imposed as a condition of approval, such as Phase 4 clinical trials, REMS, and surveillance to assess safety and effectiveness after commercialization.

After approval, most changes to the approved product, such as adding new indications or other labeling claims are subject to prior FDA review and approval. There are also continuing annual prescription drug program user fee requirements for any approved products. In addition, drug manufacturers and other entities involved in the manufacture and distribution of approved drugs are required to register their establishments with the FDA and certain state agencies and list their drug products, and are subject to periodic announced and unannounced inspections by the FDA and these state agencies for compliance with cGMP and other requirements, which impose certain procedural and documentation requirements upon the company and third-party manufacturers.

Changes to the manufacturing process are strictly regulated and often require prior FDA approval or notification before being implemented. FDA regulations also require investigation and correction of any deviations from cGMP and product specifications and impose reporting and documentation requirements upon the sponsor and any third-party manufacturers that the sponsor may decide to use. Accordingly, manufacturers must continue to expend time, money, and effort in the area of production and quality control to maintain cGMP compliance.

The FDA also strictly regulates marketing, labeling, advertising, and promotion of products that are placed on the market. A company can make only those claims relating to safety and efficacy, purity, and potency that are approved by the FDA. Physicians, in their independent professional medical judgment, may prescribe legally available products for unapproved indications that are not described in the product's labeling and that differ from those tested and approved by the FDA. Pharmaceutical companies, however, are required to promote their drug products only for the approved indications and in accordance with the provisions of the approved label. The FDA and other agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses, and a company that is found to have improperly promoted off-label uses may be subject to significant liability, including, but not limited to, criminal and civil penalties under the FDCA and False Claims Act, exclusion from participation in federal healthcare programs, mandatory compliance programs under corporate integrity agreements, debarment, and refusal of government contracts. Recent court decisions have impacted the FDA's enforcement activity regarding off-label promotion in light of First Amendment considerations; however, there are still significant risks in this area in part due to the potential False Claims Act exposure. Further, the FDA has not materially changed its position on off-label promotion following legal setbacks on First Amendment grounds and the DOJ has consistently asserted in FCA briefings that "speech that serves as a conduit for violations of the law is not constitutionally protected."

The Drug Supply Chain Security Act (*DSCSA*) imposes obligations on manufacturers of prescription biopharmaceutical products for commercial distribution, regulating the distribution of the products at the federal level, and sets certain standards for federal or state registration and compliance of entities in the supply chain (manufacturers and repackagers, wholesale distributors, third-party logistics providers, and dispensers). The *DSCSA* preempts certain previously enacted state pedigree laws and the pedigree requirements of the Prescription Drug Marketing Act (*PDMA*). Trading partners within the drug supply chain must now ensure certain product tracing requirements are met that they are doing business with other authorized trading partners; and they are required to exchange transaction information, transaction history, and transaction statements. Further, the *DSCSA* limits the distribution of prescription pharmaceutical products and imposes requirements to ensure overall accountability and security in the drug supply chain. Product identifier information (an aspect of the product tracing scheme) is also now required. The *DSCSA* requirements, development of standards, and the system for product tracing have been and will continue to be phased in over a period of years through 2023, and subject companies will need to continue their implementation efforts. Many states still have in place licensure and other requirements for manufacturers and distributors of drug products. The distribution of product samples continues to be regulated under the *PDMA*, and some states also impose regulations on drug sample distribution.

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 significant regulatory actions. Such actions may include refusal to approve pending applications, license suspension or revocation, withdrawal of an approval, imposition of a clinical hold or termination of clinical trials, warning letters, untitled letters, modification of promotional materials or labeling, provision of corrective information, imposition of post-market requirements including the need for additional testing, imposition of distribution or other restrictions under a REMS, product recalls, product seizures or detentions, refusal to allow imports or exports, total or partial suspension of production or distribution, FDA debarment, injunctions, fines, consent decrees, corporate integrity agreements, debarment from receiving government contracts and new orders under existing contracts, exclusion from participation in federal and state healthcare programs, restitution, disgorgement, or civil or criminal penalties including fines and imprisonment, and may result in adverse publicity, among other adverse consequences.

Fraud and Abuse, and Transparency Laws and Regulations

Following product approval, our business activities, including but not limited to research, sales, promotion, marketing, distribution, medical education, sponsorships, relationships with prescribers and other referral sources, and other activities will be subject to regulation by numerous federal and state regulatory and law enforcement authorities in the United States in addition to the FDA, including potentially the Department of Justice, the Department of Health and Human Services and its various divisions, including the CMS the Office of Inspector General (*OIG*) and the Health Resources and Services Administration (*HRSA*), the Department of Veterans Affairs, the Department of Defense, and certain state and local governments. Our business activities must comply with numerous healthcare laws, including but not limited to, anti-kickback and false claims laws and regulations as well as data privacy and security laws and regulations, which are described below.

The federal Anti-Kickback Statute prohibits, among other things, any person or entity, from knowingly and willfully offering, paying, soliciting, or receiving any remuneration, directly or indirectly, overtly or covertly, in cash or in kind, to induce or in return for purchasing, leasing, ordering, or arranging for or recommending the purchase, lease, furnishing, or order of any item or service reimbursable under Medicare, Medicaid, or other federal healthcare programs, in whole or in part. The term “remuneration” has been interpreted broadly to include anything of value. The Anti-Kickback Statute has been interpreted to apply to arrangements between pharmaceutical manufacturers on one hand and prescribers, purchasers, formulary managers, and beneficiaries on the other. There are certain statutory exceptions and regulatory safe harbors protecting some common activities from prosecution. The exceptions and safe harbors are drawn narrowly, and practices that involve remuneration that may be alleged to be intended to induce prescribing, purchases, or recommendations may be subject to scrutiny if they do not qualify for an exception or safe harbor. Failure to meet all of the requirements of a particular applicable statutory exception or regulatory safe harbor, however, does not make the conduct per se illegal under the Anti-Kickback Statute. Instead, the legality of the arrangement will be evaluated on a case by case basis based on a cumulative review of all of its facts and circumstances to determine whether one purpose of an arrangement involving remuneration is to induce referrals of federal healthcare covered business. The Patient Protection and Affordable Care Act (ACA), of 2010, as amended, modified the intent requirement under the Anti-Kickback Statute to a stricter standard, such that a person or entity no longer needs to have actual knowledge of the statute or specific intent to violate it in order to have committed a violation. The ACA further amended the federal civil False Claims Act to provide that a claim that includes items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim under the False Claims Act. Therefore, either the federal government or private citizens under the False Claims Act’s qui tam provisions (discussed further below) can bring an action under the False Claims Act for violations of the Anti-Kickback Statute, potentially exposing an alleged violator to substantial monetary damages and penalties. Certain Anti-Kickback safe harbor provisions that protect the rebates paid by drug manufacturers to third parties may also be repealed or materially revised, as contemplated in a recent regulatory proposal.

The government has asserted False Claims Act liability against manufacturers by alleging that improper arrangements with ordering physicians caused them or another provider to file false claims in violation of the False Claims Act or that manufacturers’ support of patient assistance programs improperly induced beneficiaries to choose their products in violation of the Anti-Kickback Statute. Sales, marketing and business arrangements in the healthcare industry are also subject to extensive laws and regulations intended to prevent fraud, kickbacks, self-dealing and other abusive practices. These laws and regulations may restrict or prohibit a wide range of pricing, discounting, marketing and promotion, sales commission, customer incentive programs, patient assistance programs, and other business arrangements. Medicare Advantage and Medicaid managed care plan regulations prohibit certain forms of marketing to enrollees that are designed to discriminate against beneficiaries on the basis of their health conditions or history. These regulations may require regulatory review of marketing materials, and coordination with health plan or governmental regulators. Additionally, the federal government has pursued electronic health record (EHR) vendors and pharmaceutical manufacturers for remunerative relationships involving the EHR platform’s recommendation of particular drugs and “prompting” technology to increase prescribing of particular drugs.

The ACA further created new federal requirements for reporting under the Physician Payments Sunshine Act (the *Sunshine Act*) by applicable manufacturers of covered drugs, payments and other transfers of value to physicians and teaching hospitals, and ownership and investment interests held by physicians and their immediate family members. 2018 legislation extended the Sunshine Act to cover payments and transfers of value to physician assistants, nurse practitioners, and other mid-level practitioners (with reporting requirements going into effect in 2022 for payments and transfers of value made in 2021).

The federal civil False Claims Act (*FCA*) prohibits, among other things, any person or entity from knowingly presenting, or causing to be presented, a false or fraudulent claim for payment to, or approval by, the federal government, knowingly making, using, or causing to be made or used a false record or statement material to a false or fraudulent claim to the federal government, or avoiding, decreasing, or concealing an obligation to pay money to the federal government. A claim includes “any request or demand” for money or property presented to the U.S. government. The civil False Claims Act has been used to assert liability on the basis of kickbacks and other improper referrals, improperly reported government pricing metrics such as Best Price or Average Manufacturer Price, or submission of inaccurate information required by government contracts, improper use of Medicare provider or supplier numbers when detailing a provider of services, improper promotion of off-label uses not expressly approved by the FDA in a drug’s label, and allegations as to misrepresentations with respect to the products supplied or services rendered. Several pharmaceutical and other healthcare companies have further been sued under these laws for allegedly providing free product to customers with the expectation that the customers would bill federal programs for the product. Intent to deceive is not required to establish liability under the civil False Claims Act; however, a November 2017 Department of Justice memorandum now prohibits the use of subregulatory guidance documents to impose new or more stringent requirements on entities outside the Executive Branch of the federal government. Because the Department has experienced recent administration changes, it is unclear whether the new Attorney General will continue this policy. Civil False Claims Act actions may be brought by the government or may be brought by private individuals on behalf of the government, called “qui tam” actions. If the government decides to intervene in a qui tam action and prevails in the lawsuit, the individual will share in the proceeds from any fines or settlement funds. If the government declines to intervene, the individual may pursue the case alone, subject to governmental review and certain approvals. Qui tam complaints are filed under seal, and the cases may progress for a number of years before a complaint is unsealed and a manufacturer becomes aware of its existence. Since 2004, these False Claims Act lawsuits against pharmaceutical companies have increased significantly in volume and breadth, leading to several substantial civil and criminal settlements, as much as \$3.0 billion, regarding certain sales practices and promoting off-label drug uses. For example, civil False Claims Act liability may be imposed for Medicare or Medicaid overpayments arising out of claims that were filed by providers but alleged to have been caused by manufacturers’ incentives, impermissible discounts, or overpayments caused by understated rebate amounts. False Claims Act enforcement may also arise from claims filed as the result of manufacturing marketing materials that contained inaccurate statements or provided certain reimbursement guidance.

The government may further prosecute conduct constituting a false claim under the criminal False Claims Act. The criminal False Claims Act prohibits the making or presenting of a claim to the government knowing such claim to be false, fictitious, or fraudulent and, unlike the civil False Claims Act, requires proof of intent to submit a false claim.

Similarly, the criminal healthcare fraud statutes impose criminal liability for, among other things, knowingly and willfully attempting or executing a scheme to defraud any healthcare benefit program, including private third-party payors, obtaining money or property of a benefit program by false or fraudulent means, or falsifying, concealing, or covering up a material fact or submitting a materially false statement in connection with the delivery of, or payment for, healthcare benefits, items, or services. These statutes are not limited to items and services reimbursed by a governmental health care program and have been used to prosecute commercial insurance fraud as well.

The civil monetary penalties statute is another potential statute under which biopharmaceutical companies may be subject to enforcement. Among other things, the civil monetary penalties statute imposes fines against any person who is determined to have presented, or caused to be presented, claims to a federal healthcare 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.

The exclusion statute requires the exclusion of entities and individuals who have been convicted of federal- program related crimes or health care felony fraud or controlled substance charges. The statute also permits the exclusion of those that have been convicted of any form of fraud, the anti-kickback statute, for obstructing an investigation or audit, misdemeanor controlled substance charges, those whose health care license has been revoked or suspended, and those who have filed claims for excessive charges or unnecessary services. If a company were to be excluded, its products would be ineligible for reimbursement from any federal programs, including Medicare and Medicaid, and no other entity participating in those programs would be permitted to enter into contracts with the company. Further, employment or contracting with an individual or entity that has been excluded from participation in federal healthcare programs could serve as a basis to invalidate claims for items or services submitted by that entity and to exclude that entity from participation in such programs as well. In order to preserve access to beneficial drugs, the government may elect to exclude officers and key employees of manufacturers, rather than excluding the organization. Such enforcement actions would prohibit the Company from engaging those individuals, which could adversely affect operations, and could result in significant reputational harm.

Payment or reimbursement of prescription drugs by Medicaid or Medicare requires manufacturers of the drugs to submit pricing information to CMS. The Medicaid Drug Rebate statute requires manufacturers to calculate and report price points, which are used to determine Medicaid rebate payments shared between the states and the federal government and Medicaid payment rates for certain drugs. For drugs paid under Medicare Part B, manufacturers must also calculate and report their Average Sales Price, which is used to determine the Medicare Part B payment rate for the drug. Drugs that are approved under a Biologic License Application (*BLA*) or an NDA, including 505(b)(2) drugs, are subject to an additional inflation penalty which can substantially increase rebate payments. In addition, for *BLA* and *NDA* drugs, the Veterans Health Care Act (*VHCA*) requires manufacturers to calculate and report to the VA a different price called the Non-Federal Average Manufacturing Price, which is used to determine the maximum price that can be charged to certain federal agencies, referred to as the Federal Ceiling Price, or *FCP*. Like the Medicaid rebate amount, the *FCP* includes an inflation penalty. A Department of Defense regulation requires manufacturers to provide this discount through prescription rebates on drugs dispensed by retail pharmacies when paid by the TRICARE Program. All of these price reporting requirements create risk of submitting false information to the government and resulting potential FCA liability.

The *VHCA* also requires manufacturers of covered drugs participating in the Medicaid program to enter into Federal Supply Schedule contracts with the VA through which their covered drugs must be sold to certain federal agencies at *FCP* and to report pricing information. This necessitates compliance with applicable federal procurement laws and regulations and subjects us to contractual remedies as well as administrative, civil, and criminal sanctions. In addition, the *VHCA* requires manufacturers participating in Medicaid to agree to provide different mandatory discounts to certain Public Health Service grantees and other safety net hospitals and clinics under the 340B Drug Pricing Program, and report the ceiling price to HRSA within Department of Health and Human Services. Manufacturers can be audited by HRSA and be subjected to civil monetary penalties for knowingly and intentionally overcharging covered entities for drugs.

The federal Health Insurance Portability and Accountability Act of 1996 (*HIPAA*) also created federal criminal statutes that prohibit knowingly and willfully executing, or attempting to execute, a scheme to defraud or to 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, a healthcare benefit program, regardless of whether the payor is public or private, knowingly and willfully embezzling or stealing from a health care benefit program, willfully obstructing a criminal investigation of a health care 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. The *ACA*, as amended, modified the intent requirement under the certain portions of these federal criminal statutes such that a person or entity no longer needs to have actual knowledge of the statute or specific intent to violate it.

Further, we may 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 for Economic and Clinical Health Act (*HITECH*), and its respective implementing regulations, extended certain requirements relating to the privacy, security, and transmission of individually identifiable health information directly to business associates of *HIPAA*-covered entities. A business associate is defined as a person or organization, other than a member of a covered entity's workforce, that performs certain functions or activities that involve the use or disclosure of protected health information on behalf of, or provides services to, a covered entity. We are not a covered entity under *HIPAA* but in certain limited situations, we may be considered a business associate. *HITECH* also strengthened the civil and criminal penalties that may be imposed against covered entities, business associates, and individuals, 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 attorneys' fees and costs associated with pursuing federal civil actions. In addition, other federal and state laws may govern the privacy and security of health and other information in certain circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts.

Even for entities that are not deemed "covered entities" or "business associates" under *HIPAA*, according to the United States Federal Trade Commission (the *FTC*) failing to take appropriate steps to keep consumers' personal information secure constitutes unfair acts or practices in or affecting commerce in violation of Section 5(a) of the Federal Trade Commission Act (the *FTCA*) 15 USC § 45(a). The *FTC* expects a company's data security measures to be reasonable and appropriate in light of the sensitivity and volume of consumer information it holds, the size and complexity of its business, and the cost of available tools to improve security and reduce vulnerabilities. Medical data is considered sensitive data that merits stronger safeguards. The *FTC*'s guidance for appropriately securing consumers' personal information is similar to what is required by the *HIPAA* Security Rule. The *FTC*'s authority under Section 5 is concurrent with *HIPAA*'s jurisdiction and with any action taken under state law.

In addition, other federal and state laws may govern the privacy and security of health and other information in certain circumstances, many of which differ from each other in significant ways and may not have the same effect, thus complicating compliance efforts. For example, California recently enacted legislation – the California Consumer Privacy Act (CCPA) was made effective January 1, 2020. The CCPA, among other things, created new data privacy obligations for covered companies and provided new privacy rights to California residents, including the right to opt out of certain disclosures of their information. The CCPA also created a private right of action with statutory damages for certain data breaches, thereby potentially increasing risks associated with a data breach. The California Attorney General will issue clarifying regulations. Although the law includes limited exceptions, including for certain information collected as part of clinical trials as specified in the law, it may regulate or impact our processing of personal information depending on the context, and it remains unclear what language the final Attorney General regulations will contain or how the statute and the regulations will be interpreted.

Many states have also adopted laws similar to each of the above federal laws, which may be broader in scope and apply to items or services reimbursed by any third-party payor, including commercial insurers, and some have transparency laws that require reporting price increases and related information. Certain state laws also regulate manufacturers' use of prescriber-identifiable data. Certain states also require implementation of commercial compliance programs and compliance with the pharmaceutical industry's voluntary compliance guidelines and the applicable compliance guidance promulgated by the federal government, or otherwise restrict payments or the provision of other items of value that may be made to healthcare providers and other potential referral sources; impose restrictions on marketing practices; or require drug manufacturers to track and report information related to payments, gifts, and other items of value to physicians and other healthcare providers. These laws may affect our future sales, marketing, and other promotional activities by imposing administrative and compliance burdens.

Because of the breadth of these laws and the narrowness of the statutory exceptions and regulatory safe harbors available under such laws, it is possible that certain business activities could be subject to challenge under one or more of such laws. The scope and enforcement of each of these laws is uncertain and subject to rapid change in the current environment of healthcare reform, especially in light of the lack of applicable precedent and regulations. Federal and state enforcement bodies have recently increased their scrutiny of interactions between pharmaceutical companies and providers and patients, which has led to a number of investigations, prosecutions, convictions and settlements in the healthcare industry. Ensuring that business arrangements with third parties comply with applicable healthcare laws, as well as responding to possible investigations by government authorities, can be time- and resource-consuming and can divert management's attention from the business, even if investigators ultimately find that no violation has occurred.

If our operations are found to be in violation of any of the laws or regulations described above or any other laws that apply to us, we may be subject penalties or other enforcement actions, including criminal and significant civil monetary penalties, damages, fines, disgorgement, imprisonment, exclusion from participation in government healthcare programs, corporate integrity agreements, debarment from receiving government contracts or refusal of new orders under existing contracts, reputational harm, diminished profits and future earnings, and the curtailment or restructuring of our operations, any of which could adversely affect our ability to operate our business and our results of operations.

To the extent that any of our products are sold in a foreign country, we may be subject to similar foreign laws and regulations, which may include, for instance, applicable post-marketing requirements, including safety surveillance, anti-fraud and abuse laws, and implementation of corporate compliance programs and reporting of payments or transfers of value to healthcare professionals.

Coverage and Reimbursement Generally

The commercial success of our product candidates and our ability to commercialize any approved product candidates successfully will depend in part on the extent to which governmental payor programs at the federal and state levels, including Medicare and Medicaid, private health insurers, and other third-party payors provide coverage for and establish adequate reimbursement levels for our product candidates. Government authorities, private health insurers, and other organizations generally decide which drugs they will pay for and establish reimbursement levels and potential access restrictions. Medicare is a federally funded program managed by the Centers for Medicare and Medicaid Services (CMS) through local contractors that administer coverage and reimbursement for certain healthcare items and services furnished to the elderly and disabled. 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, including supplemental rebate programs that prioritize coverage for drugs on the state Preferred Drug List. Similarly, government laws and regulations establish the parameters for coverage of prescription drugs by Tricare, the health care program for military personnel, retirees, and related beneficiaries. Many states have also created pharmacy assistance programs for individuals who do not qualify for federal programs. In the United States, private health insurers and other third-party payors often provide reimbursement for products and services based on the level at which the government provides reimbursement through the Medicare or Medicaid programs for such products and services.

In the U.S. and other potentially significant markets for our product candidates, government authorities and third-party payors are increasingly attempting to limit or regulate the price of medical products and services, particularly for new and innovative products and therapies, which often has resulted in average selling prices lower than they would otherwise be. For example, in the U.S., federal and state governments reimburse covered prescription drugs at varying rates generally below average wholesale price. Governmental and private payors may also establish certain access restrictions, such as prior approvals or evidence of failure on existing medications or therapies.

These restrictions and limitations influence the purchase of healthcare services and products. Third-party payors are developing increasingly sophisticated methods of controlling healthcare costs. Third-party payors may limit coverage to specific drug products on an approved list, or formulary, which might not include all of the FDA-approved drug products for a particular indication. Third-party payors also control costs by requiring prior authorization or imposing other dispensing restrictions before covering certain products and by broadening therapeutic classes to increase competition. Third-party payors are increasingly challenging the price and examining the medical necessity and cost-effectiveness of medical products and services, in addition to their safety and efficacy. Absent clinical differentiators, third-party payors may treat products as therapeutically equivalent and base formulary decisions on net cost. To lower the prescription cost, manufacturers frequently rebate a portion of the prescription price to the third-party payors.

Federal programs also impose price controls through mandatory ceiling prices on purchases by federal agencies and federally funded hospitals and clinics and mandatory rebates on retail pharmacy prescriptions paid by Medicaid and Tricare. These restrictions and limitations influence the purchase of healthcare services and products. Legislative proposals to reform healthcare or reduce costs under government programs may result in lower reimbursement for our product candidates or exclusion of our product candidates from coverage. In addition, government programs like Medicaid include substantial penalties for increasing commercial prices over the rate of inflation which can affect realization and return on investment.

Private payors often rely on the lead of the governmental payors in rendering coverage and reimbursement determinations. Therefore, achieving favorable CMS coverage and reimbursement is usually a significant gating issue for successful introduction of a new product. In addition, many government programs as a condition of participation mandate fixed discounts or rebates from manufacturers regardless of formulary position or utilization, and then rely on competition in the market to attain further price reductions, which can greatly reduce realization on the sale.

Further, the increased emphasis on managed healthcare in the U.S. and on country and regional pricing and reimbursement controls in the European Union will put additional pressure on product pricing, reimbursement, and utilization, which may adversely affect our future product sales and results of operations. These pressures can arise from rules and practices of managed care groups and health technology assessment bodies, competition within therapeutic classes, availability of generic equivalents, judicial decisions and governmental laws and regulations related to Medicare, Medicaid, and healthcare reform, pharmaceutical coverage and reimbursement policies, and pricing in general. Patients who are prescribed treatments for their conditions and providers performing the prescribed services generally rely on third-party payors to reimburse all or part of the associated healthcare costs. Sales of our product candidates will therefore depend substantially, both domestically and abroad, on the extent to which the costs of our products will be paid by health maintenance, managed care, pharmacy benefit and similar healthcare management organizations, or reimbursed by government health administration authorities, such as Medicare and Medicaid, private health insurers, and other third-party payors.

As a result of the above, we may need to conduct expensive pharmacoeconomic studies in order to demonstrate the medical necessity and cost-effectiveness of our products, in addition to the costs required to obtain the FDA and other comparable foreign regulatory authority approvals. Our product candidates may not be considered medically necessary or cost-effective, or the rebate percentages required to secure coverage may not yield an adequate margin over cost.

There is often pressure to renegotiate pricing and reimbursement levels, including, in particular, in connection with changes to Medicare. Third-party payors continue to demand discounted fee structures, and the trend toward consolidation among third-party payors tends to increase their bargaining power over price structures. If third-party payors reduce their rates for our products, then our revenue and profitability may decline and our operating margins will be reduced. Because some third-party payors rely on all or portions of Medicare payment systems to determine payment rates, changes to government healthcare programs that reduce payments under these programs may negatively impact payments from third-party payors. Our inability to maintain suitable financial arrangements with third-party payors could have a material adverse impact on our business. Additionally, the reimbursement process is complex and can involve lengthy delays. Third party payors may disallow, in whole or in part, providers' requests for reimbursement based on determinations that certain amounts are not reimbursable under plan coverage, that the drugs provided were not medically necessary, or that additional supporting documentation is necessary. Retroactive adjustments may change amounts realized from third party payors. Delays and uncertainties in the reimbursement process may adversely affect market acceptance and utilization of our products, resulting in reduced revenues. The unavailability or inadequacy of third-party coverage and reimbursement could negatively affect the market acceptance of our products and the future revenues we may expect to receive from those products. In addition, we are unable to predict what additional legislation or regulation relating to the healthcare industry or third-party coverage and reimbursement may be enacted in the future, or what effect such legislation or regulation would have on our business. Many hospitals implement a controlled and defined process for developing and approving formularies. Any marketing efforts that are determined to have violated such policies could result in the denial or removal of our products from that hospital's formulary.

Moreover, a payor's decision to provide coverage for a drug product does not imply that an adequate reimbursement rate will be approved. Adequate third-party reimbursement may not be available to enable us to maintain price levels sufficient to realize an appropriate return on our investment in drug development. Legislative proposals to reform healthcare or reduce costs under government insurance programs may result in lower reimbursement for our products and product candidates or exclusion of our products and product candidates from coverage. The cost containment measures that healthcare payors and providers are instituting and any healthcare reform could significantly reduce our revenues from the sale of any approved product candidates. We cannot provide any assurances that we will be able to obtain and maintain third-party coverage or adequate reimbursement for our product candidates in whole or in part.

Pharmacy benefit managers (*PBM*), rebates and pricing transparency are key areas of legislative and regulatory focus and there may be changes in the regulatory landscape that could have a significant impact on the pharmaceutical supply chain and drug pricing more generally, which could affect our business operations and prospects in unknown and material ways.

Healthcare Reform Measures

The U.S. and some foreign jurisdictions are considering or have enacted a number of legislative and regulatory proposals designed to change the healthcare system in ways that could affect our ability to sell our products profitably. Among policy makers and payors in the United States and elsewhere, there is significant interest in promoting changes in healthcare systems with the stated goals of containing healthcare costs, improving quality, and expanding access. In the United States, the pharmaceutical industry has been a particular focus of these efforts and has been significantly affected by major legislative initiatives.

For example, the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (*MMA*) established a prescription drug benefit program for Medicare beneficiaries. Under Part D, Medicare beneficiaries may enroll in prescription drug plans offered by private entities that provide coverage of outpatient prescription drugs. Part D plans include both standalone prescription drug benefit plans and prescription drug coverage as a supplement to Medicare Advantage plans. Unlike Medicare Part A and B, which do not utilize formularies to restrict coverage, Part D coverage varies by plan. With some exceptions, Part D prescription drug plan sponsors are not required to pay for all covered Part D drugs, and each drug plan can develop its own drug formulary that identifies which drugs it will cover and at what tier or level. However, Part D prescription drug formularies must include drugs within each therapeutic category and class of covered Part D drugs, though not necessarily all the drugs in each category or class. Any formulary used by a Part D prescription drug plan must be developed and reviewed by a pharmacy and therapeutic committee. Government payment for some of the costs of prescription drugs may increase demand for any products for which we receive marketing approval. However, Part D plans use competition for coverage to leverage manufacturer rebates. Further, the law requires manufacturers to absorb a significant percentage of the prescription price paid for NDA drugs, including 504(b)(2) drugs, during a beneficiary's coverage gap. The Bipartisan Budget Act of 2018 permanently increased manufacturer liability for the prescription price in the coverage gap from 50% to 70% beginning in 2019, while simultaneously accelerating closure of the gap. These cost reduction initiatives and other provisions of the legislation, as well as any negotiated price discounts for our future products covered by a Part D prescription drug plan, may decrease the coverage and reimbursement rate that we receive, lower the net price realized on our sales to pharmacies, or both. Moreover, while the *MMA* applies only to drug benefits for Medicare beneficiaries, private payors often follow Medicare coverage policy and payment limitations in setting their own payment rates. Any reduction in payment that results from Medicare Part D may result in a similar reduction in payments from non-governmental payors.

The ACA established the Patient-Centered Outcome Research Institute to organize and coordinate federally funded research to compare the effectiveness of different treatments for the same illness. Although the results of the comparative effectiveness studies are not intended to mandate coverage policies for public or private payors, it is not clear what effect, if any, the research will have on the sales of any product, if any such product or the condition that it is intended to treat is the subject of a study. It is also possible that comparative effectiveness research demonstrating benefits in a competitor's product could adversely affect the sales of our product candidates. If third-party payors do not consider our product candidates to be cost-effective compared to other available therapies, they may not cover our product candidates, once approved, as a benefit under their plans or, if they do, the level of payment may not be sufficient to allow us to sell our products on a profitable basis.

The ACA made other changes 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 care industry, and impose additional health policy reforms. The law expanded the eligibility criteria for Medicaid programs, thereby potentially increasing both the volume of sales and manufacturers' Medicaid rebate liability. The law also expanded the entities eligible for discounts under the 340B Drug Discount Program, which mandates discounts to certain hospitals, community centers, and other qualifying providers, although, with the exception of children's hospitals, these newly eligible entities are not eligible to receive discounted 340B pricing on orphan drugs and the Health Resources and Services Administration has narrowed its interpretation of which beneficiaries may fill prescriptions through 340B inventories. The law additionally extended manufacturer's Medicaid rebate liability to covered drugs dispensed to patients enrolled in Medicaid managed care organizations, increased the statutory minimum rebates a manufacturer must pay under the Medicaid Drug Rebate program, and created an alternative rebate formula for certain new formulations of certain existing products, which is intended to increase the amount of rebates due on those drugs. The revisions to the Medicaid rebate formula can have the further effect of increasing the required 340B discounts. Finally, the ACA imposes a significant annual fee on companies that manufacture or import branded prescription drug products. Substantial new provisions affecting compliance have also been enacted through the ACA and otherwise, including the reporting of drug sample distribution, which may require us to modify our business practices with healthcare practitioners. Moreover, in the coming years, additional changes could be made to governmental healthcare programs that could significantly impact the success of our product candidates.

The ACA also imposed an affirmative obligation to report and repay any overpayments, including those payments that resulted from violations of the Anti-Kickback Statute, false claims act, or civil monetary penalties statute, within sixty (60) days after such overpayment has been identified. Corresponding case law imposes an obligation on entities to exercise reasonable diligence in identifying such overpayments. The failure to timely report and repay is, itself, considered to constitute a violation of the False Claims Act.

The cost of pharmaceuticals continues to generate substantial governmental and third-party payor interest, and pharmaceutical pricing and marketing currently received a great deal of Congressional and administrative attention. There have been numerous initiatives on the federal and state levels in the United States for comprehensive reforms affecting the payment for, the availability of, and reimbursement for, healthcare services. In particular, there have been a number of federal and state proposals during the last few years regarding the pricing of pharmaceutical and biopharmaceutical products, limiting coverage and reimbursement for drugs and other medical products, government control and other changes to the healthcare system in the United States. Recent U.S. Congressional inquiries and proposed and enacted federal and state legislation have also been released and are designed to, among other things, bring more transparency to drug pricing, reduce the cost of prescription drugs under Medicare, review the relationship between pricing and manufacturer patient programs and reform government program reimbursement methodologies for drugs. Recent federal budget proposals have included measures to permit Medicare Part D plans to negotiate the price of certain drugs under Medicare Part B, to allow some states to negotiate drug prices under Medicaid, and to eliminate cost sharing for generic drugs for low-income patients. The U.S. Congress and the Trump Administration have indicated that they will continue to seek new legislative and administrative measures to control drug costs, including by addressing the role of PBMs in the supply chain. Current and future U.S. legislative healthcare reforms may result in price controls and other restrictions for any approved products, if covered, and could seriously harm our business. Drug pricing is and will remain a key bipartisan issue in the coming year. If drug pricing reform is not meaningfully addressed before the 2020 election, policies to be pursued in the future may be more aggressive, regardless of which party controls the White House. Given that drug pricing controls is a key legislative and administration priority, it is likely that additional pricing controls will be enacted and could harm our business, financial condition and results of operations. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing. Some states, such as California, have enacted transparency laws that require manufacturers to report drug price increases and related information. The boom in state laws targeting drug pricing is unprecedented and the requirements are not uniform from state to state, creating additional compliance and commercialization challenges for manufacturers. We further expect that the pharmaceutical industry will experience pricing pressures due to the trend toward managed healthcare, the increasing influence of managed care organizations, judicial interpretation of health care reform efforts, and additional legislative and regulatory proposals resulting in ongoing, relatively rapid changes to applicable laws and regulations. Our results of operations could be adversely affected by current and future healthcare reforms.

Government and private payors also increasingly require pre-approval of coverage for new or innovative devices or drug therapies or condition coverage on unsuccessful alternative treatment before they will reimburse healthcare providers that use such therapies. For some specialty drugs, payors are conditioning payment on successful treatment measured by objective metrics. 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 our ability to obtain adequate prices for our product candidates and operate profitably.

Since January 2017, Congress and the Trump Administration have been engaged in various efforts to repeal or materially modify various aspects of ACA. The results and effects of such ongoing efforts have varied after facing judicial and Congressional challenges but could affect our business operations and prospects in unknown ways, and it is unclear how ACA and other laws ultimately will be implemented. For example, on December 15, 2019, a federal district court in Texas struck down the ACA in its entirety, finding that the Tax Cuts and Jobs Act of 2017 (*TCJA*) rendered the individual mandate unconstitutional. The judge further concluded in *Texas v. Azar* that since the individual mandate is “essential” to the ACA, it could not be severed from the rest of the ACA and therefore, the entire ACA was unconstitutional. Despite its decision, however, the court did not issue an injunction and therefore, immediate compliance is not required. In addition, the Trump Administration announced that it will continue to administer the law until a formal decision is made by the U.S. Supreme Court. The Supreme Court recently announced that it will hear a challenge in *Texas v. United States*, though arguments have not yet been set. It is likely that the case will be scheduled for arguments early in the next term that starts in October 2020. Apart from *Texas v. United States*, ACA litigation continues across the country in district and appellate courts, and before the Supreme Court. The Supreme Court will issue at least two ACA-related decisions before the end of its current term: one on the risk corridors program (*Maine Community Health Options v. United States*) and the other on religious or moral exemptions to the contraceptive mandate (*Trump v. Pennsylvania* and *Little Sisters of the Poor v. Pennsylvania*). Both decisions are expected before July 2020. It is unclear how the eventual decisions from the Supreme Court and the various other courts across the country to repeal and replace the ACA will impact the ACA and our business. It is also unclear how regulations and sub-regulatory policy, which fluctuate continually, may affect interpretation and implementation of the ACA and its practical effects on our business, particularly entering an election year.

In the future, there may continue to be additional proposals relating to the reform of the U.S. healthcare system, some of which could further limit the prices we will be able to charge for our product candidates, or the amounts of reimbursement available for our product candidates. If future legislation were to impose direct governmental price controls or access restrictions, it could have a significant adverse impact on our business. Managed care organizations, as well as Medicaid and other government agencies, continue to seek price discounts. Some states have implemented, and other states are considering, measures to reduce costs of the Medicaid program, and some states are considering implementing measures that would apply to broader segments of their populations that are not Medicaid-eligible. Due to the volatility in the current economic and market dynamics, we are unable to predict the impact of any unforeseen or unknown legislative, regulatory, payor or policy actions, which may include cost containment and healthcare reform measures. Such policy actions could have a material adverse impact on our profitability.

These and other healthcare reform initiatives may result in additional reductions in Medicare and other healthcare funding, which could have a material adverse effect on our financial operations. 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 product candidates or additional pricing pressures.

The Foreign Corrupt Practices Act

The Foreign Corrupt Practices Act (*FCPA*) prohibits any U.S. individual or business from paying, offering, or authorizing payment or offering of anything of value, directly or indirectly, to any foreign official, political party, or candidate for the purpose of influencing any act or decision of the foreign entity in order to assist the individual or business in obtaining or retaining business. The *FCPA* also obligates companies whose securities are listed in the United States to comply with accounting provisions requiring the company to maintain books and records that accurately and fairly reflect all transactions of the corporation, including international subsidiaries, and to devise and maintain an adequate system of internal accounting controls for international operations. Activities that violate the *FCPA*, even if they occur wholly outside the United States, can result in criminal and civil fines, imprisonment, disgorgement, oversight, and debarment from government contracts.

Foreign Regulation

To the extent we choose to develop or sell any products outside of the U.S., we will be subject to a variety of foreign regulatory requirements of other countries regarding safety and efficacy and governing, among other things, clinical trials, marketing authorization, commercial sales, and distribution of our products. For example, in the European Union (*EU*), we must obtain authorization of a clinical trial application in each member state in which we intend to conduct a clinical trial prior to the pending introduction of a EU portal for EU-wide approvals. Whether or not we obtain FDA approval for a product, we would need to obtain the necessary approvals 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 can involve additional product testing and additional administrative review periods. The time required to obtain approval in other countries might differ from and be longer than that required to obtain FDA approval. The requirements governing the conduct of clinical trials, product licensing, pricing, and reimbursement vary greatly from country to country. Regulatory approval in one country does not ensure regulatory approval in another, but a failure or delay in obtaining regulatory approval in one country may negatively impact the regulatory process in others. As in the U.S., post-approval regulatory requirements, such as those regarding product manufacture, marketing, or distribution, would apply to any product that is approved outside the U.S.

Subsidiaries and Inter-Corporate Relationships

VistaGen Therapeutics, Inc., a California corporation, dba VistaStem Therapeutics (*VistaStem*), is our wholly-owned subsidiary and has a wholly-owned subsidiary, Artemis Neuroscience, Inc., a corporation incorporated pursuant to the laws of the State of Maryland. The operations of VistaStem, and its wholly owned subsidiary are managed by our senior management team based in South San Francisco, California.

Corporate History

VistaGen Therapeutics, Inc., a California corporation incorporated on May 26, 1998, dba VistaStem, is our wholly-owned subsidiary. Excaliber Enterprises, Ltd. (*Excaliber*), a publicly-held company (formerly OTCBB: EXCA) was incorporated under the laws of the State of Nevada on October 6, 2005. Pursuant to a strategic merger transaction on May 11, 2011, Excaliber acquired all outstanding shares of VistaStem in exchange for 341,823 shares of our common stock and assumed all of VistaStem's pre-Merger obligations (the *Merger*). Shortly after the Merger, Excaliber's name was changed to "VistaGen Therapeutics, Inc." (a Nevada corporation).

VistaStem, as the accounting acquirer in the Merger, recorded the Merger as the issuance of common stock for the net monetary assets of Excaliber, accompanied by a recapitalization. The accounting treatment for the Merger was identical to that resulting from a reverse acquisition, except that we recorded no goodwill or other intangible assets. A total of 78,450 shares of our common stock, representing the shares held by stockholders of Excaliber immediately prior to the Merger are reflected as outstanding for all periods presented in the Consolidated Financial Statements of the Company included in Item 8 of this Annual Report. Additionally, the Consolidated Balance Sheets reflect the \$0.001 par value of Excaliber's common stock.

The Consolidated Financial Statements included in Item 8 of this Annual Report represent the activity of VistaStem from May 26, 1998, and the consolidated activity of VistaStem and Excaliber (now VistaGen Therapeutics, Inc., a Nevada corporation), from May 11, 2011 (the date of the Merger) through March 31, 2019. The Consolidated Financial Statements also include the accounts of VistaStem's two inactive wholly-owned subsidiaries, Artemis Neuroscience, Inc., a Maryland corporation (*Artemis*), and VistaStem Canada, Inc., a corporation organized under the laws of Ontario, Canada (*VistaStem Canada*).

Research and Development

Conducting research and development is central to our business model. We have invested and expect to continue to invest significant time and capital in our research and development operations. Our research and development expenses were \$13.4 million and \$17.1 million for the fiscal years ended March 31, 2020 and 2019, respectively, including the noncash cost of \$4.25 million in fiscal 2019 for the acquisition of the PH94B and PH10 licenses from Pherin. We plan to increase our research and development expenses for the foreseeable future as we seek to complete the development of PH94B, PH10 and AV-101.

Employees

As of June 26, 2020, we employed nine full-time employees, four of whom have doctorate degrees. Five full-time employees work in research and development and laboratory support services and four full-time employees work in general and administrative roles. Staffing for all other functional areas is achieved through our diverse network of strategic relationships with multiple CROs, CDMOs, and other third-party service providers and consultants. These service providers and consultants provide us with support services on a flexible, real-time, as-needed basis, including services related to, among others, human resources and payroll, information technology, facilities, legal, investor and public relations, manufacturing, product development, regulatory affairs and FDA program management to complement our internal resources in these areas.

We have never had a work stoppage, and none of our employees is represented by a labor organization or under any collective bargaining agreement. We consider our employee relations to be good.

Facilities

We lease our office and laboratory space, which consists of approximately 10,900 square feet located in South San Francisco, California, under a lease expiring on July 31, 2022.

Legal Proceedings

None.

Environmental Regulation

Our business does not require us to comply with any extraordinary environmental regulations.

Available Information

We file reports and other information with the SEC, as required by the Exchange Act. We make available free of charge through our website (<http://www.vistagen.com>) our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and amendments to those reports filed or furnished pursuant to Sections 13(a) and 15(d) of the Exchange Act. We make these reports available through our website as soon as reasonably practicable after we electronically file such reports with, or furnish such reports to, the SEC. In addition, we regularly use our website to post information regarding our business, product development programs and governance, and we encourage investors to use our website, particularly the information in the section entitled "Investors," as a source of information about us. The foregoing references to our website are not intended to, nor shall they be deemed to, incorporate information on our website into this Annual Report on Form 10-K by reference.

Item 1A. Risk Factors

Investing in our securities involves a high degree of risk. You should consider carefully the risks and uncertainties described below, together with all other information in this Annual Report before investing in our securities. The risks described below are not the only risks facing our Company. Additional risks and uncertainties not currently known to us or that we currently deem to be immaterial may also materially adversely affect our business, financial condition and/or operating results. If any of the following risks are realized, our business, financial condition and/or operating results could be materially and adversely affected.

The COVID-19 pandemic has, and may continue to adversely impact our business.

In recent months, a new strain of coronavirus (COVID-19) has spread to many countries in the world and the outbreak has been declared a pandemic by the World Health Organization. The U.S. Secretary of Health and Human Services has also declared a public health emergency in the U.S. in response to the outbreak. Considerable uncertainty still surrounds the COVID-19 virus and its potential effects, and the extent of and effectiveness of responses taken on international, national and local levels. Measures taken to limit the impact of COVID-19, including shelter-in-place orders, social distancing measures, travel bans and restrictions, and business and government shutdowns have already resulted in significant negative economic impacts on a global basis.

As the coronavirus pandemic continues to rapidly evolve, we cannot at this time accurately predict the effects of these conditions on our operations. Uncertainties remain as to the ultimate geographic spread of the virus, the severity of the disease, the duration of the outbreak, and the length and scope of the travel restrictions and business closures imposed by the governments of impacted countries. The continued outbreak of COVID-19, or another infectious disease with similar characteristics, may lead to the implementation of further responses, including additional travel restrictions, government-imposed quarantines or stay-at-home orders, and other public health safety measures, which may result in further disruptions to our business and operations. The COVID-19 outbreak has had an impact on our business, and a continuing outbreak or future outbreaks may have several adverse effects on our business, results of operations and financial condition.

- ***Delayed product development:*** We have, and may continue to face delays or other disruptions to our ongoing clinical development programs for PH94B, PH10 and AV-101 due to the ongoing COVID-19 pandemic. In addition, regulatory oversight and actions regarding our products may be disrupted or delayed in regions impacted by COVID-19, including the U.S. and elsewhere, which may impact review and approval timelines for products in development. Although we remain invested in continuing our clinical development programs for our current product candidates, our research and development efforts may be impacted if our employees, our contract research organizations (CROs) and our third-party contract manufacturer(s) (CMOs) are advised to continue to work remotely as part of social distancing measures.
- ***Negative impacts on our suppliers and employees:*** COVID-19 or similar infectious diseases may impact the health of our employees, contractors or suppliers, reduce the availability of our workforce or those of companies with which we do business, divert our attention toward succession planning, or create disruptions in our supply or distribution networks. Since the beginning of the COVID-19 pandemic, we have experienced delays of the delivery of supplies of active pharmaceutical product (API) required to continue development of PH94B and PH10. Although our supply of raw materials and API remains sufficiently operational, we may experience adverse effects of such events, which may result in a significant, material disruption to clinical development programs, and our operations. Additionally, having shifted to remote working arrangements, we also face a heightened risk of cybersecurity attacks or data security incidents and are more dependent on internet and telecommunications access and capabilities.

COVID-19 has also created significant disruption to and volatility in national, regional and local economies and markets. Uncertainties related to, and perceived or experienced negative effects from, COVID-19 may cause significant volatility or decline in the trading price of our securities, capital market conditions and general economic environment. Our future results of operations and liquidity could be adversely impacted by supply chain disruptions and operational challenges faced by our CROs, CMOs and other contractors. Continued outbreaks of COVID-19 or a significant outbreak of contagious diseases in the human population could result in a widespread health crisis that could adversely affect the economies and financial markets of many countries, resulting in a further economic downturn or a global recession. Such events may limit or restrict our ability to access capital on favorable terms, or at all, lead to consolidation that negatively impacts our business, weaken demand, increase competition, cause us to reduce our capital spend further, or otherwise disrupt our business or make it more difficult to implement our strategic plans.

Risks Related to Product Development, Regulatory Approval and Commercialization

We depend heavily on the success of one or more of our current drug candidates and we cannot be certain that we will be able to obtain regulatory approval for, or successfully commercialize any of our product candidates.

We currently have no drug products for sale and may never be able to develop and commercialize marketable drug products. Our business currently depends heavily on the successful development, manufacturing, regulatory approval and commercialization of one or more of our current drug candidates, as well as, but to a more limited extent, our ability to acquire, license or produce, develop and commercialize additional product candidates. Each of our current drug candidates will require substantial additional nonclinical and clinical development, manufacturing and regulatory approval before any of them may be commercialized, and there can be no assurance that any of them will ever achieve regulatory approval. Any new chemical entity (NCE) we may produce through drug rescue activities will require substantial nonclinical development, all phases of clinical development, manufacturing and regulatory approval before it may be commercialized. The nonclinical and clinical development of our product candidates are, and the manufacturing and marketing of our product candidates will be, subject to extensive and rigorous review and regulation by numerous government authorities in the U.S. and in other countries where we intend to test and, if approved, market any product candidate. Before obtaining regulatory approvals for the commercial sale of any product candidate, we must demonstrate through numerous nonclinical and clinical studies that the product candidate is safe and effective for use in each target indication. Research and development of product candidates in the pharmaceutical industry is a long, expensive and uncertain process, and delay or failure can occur at any stage of any of nonclinical or clinical studies. This process takes many years and may also include post-marketing studies, surveillance obligations and drug safety programs, which would require the expenditure of substantial resources beyond the proceeds we have raised to date. Of the large number of drug candidates in development in the U.S., only a small percentage will successfully complete the required FDA regulatory approval process and will be commercialized. Accordingly, we cannot assure you that any of our current drug candidates or any future product candidates will be successfully developed or commercialized in the U.S. or any market outside the U.S.

We are not permitted to market our product candidates in the U.S. until we receive approval of a New Drug Application (NDA) from the FDA, or in any foreign countries until we receive the requisite approval from such countries. Obtaining FDA approval of a NDA is a complex, lengthy, expensive and uncertain process. The FDA may refuse to permit the filing of our NDA, delay, limit or deny approval of a NDA for many reasons, including, among others:

- if we submit a NDA and it is reviewed by a FDA advisory committee, the FDA may have difficulties scheduling an advisory committee meeting in a timely manner or the advisory committee may recommend against approval of our application or may recommend that the FDA require, as a condition of approval, additional nonclinical or clinical studies, limitations on approved labeling or distribution and use restrictions;
- a FDA advisory committee may recommend, or the FDA may require, a Risk Evaluation and Mitigation Strategies (REMS) safety program as a condition of approval or post-approval;
- a FDA advisory committee or the FDA or applicable regulatory agency may determine that there is insufficient evidence of overall effectiveness or safety in a NDA and require additional clinical studies;

- the FDA or the applicable foreign regulatory agency may determine that the manufacturing processes or facilities of third-party contract manufacturers with which we contract do not conform to applicable requirements, including current Good Manufacturing Practices (cGMPs); or
- the FDA or applicable foreign regulatory agency may change its approval policies or adopt new regulations.

Any of these factors, many of which are beyond our control, could jeopardize our ability to obtain regulatory approval for and successfully commercialize any current or future drug product candidate we may develop. Any such setback in our pursuit of regulatory approval for any product candidate would have a material adverse effect on our business and prospects.

In addition, we anticipate that certain of our product candidates, including PH94B and PH10, will be subject to regulation as combination products, which means that they are composed of both a drug product and device product. Although we do not contemplate doing so, if marketed individually, each component would be subject to different regulatory pathways and reviewed by different centers within the FDA. Our product candidates that are considered to be drug-device combination products will require review and coordination by FDA's drug and device centers prior to approval, which may delay approval. A combination product with a drug primary mode of action generally would be reviewed and approved pursuant to the drug approval processes under the Federal Food, Drug and Cosmetic Act of 1938. In reviewing the NDA application for such a product, however, FDA reviewers in the drug center could consult with their counterparts in the device center to ensure that the device component of the combination product met applicable requirements regarding safety, effectiveness, durability and performance. Under FDA regulations, combination products are subject to cGMP requirements applicable to both drugs and devices, including the Quality System (QS) regulations applicable to medical devices. Problems associated with the device component of the combination product candidate may delay or prevent approval.

We have been granted Fast Track designation from the FDA for development of PH94B for the treatment of social anxiety disorder (SAD) and AV-101 for the adjunctive treatment of major depressive disorder (MDD) and for the treatment of neuropathic pain (NP). However, these designations may not actually lead to faster development or regulatory review or approval processes for PH94B or AV-101. Further, there is no guarantee the FDA will grant Fast Track designation for PH94B or AV-101 as a treatment option for other CNS indications or for any of our other product candidates in the future.

The Fast Track designation is a program offered by the FDA, pursuant to certain mandates under the FDA Modernization Act of 1997, designed to facilitate drug development and to expedite the review of new drugs that are intended to treat serious or life-threatening conditions. Compounds selected must demonstrate the potential to address unmet medical needs. The FDA's Fast Track designation allows for close and frequent interaction with the FDA. A designated Fast Track drug may also be considered for priority review with a shortened review time, rolling submission, and accelerated approval if applicable. The designation does not, however, guarantee FDA approval or expedited approval of any application for the product candidate.

In December 2017, the FDA granted Fast Track designation for development of AV-101 for the adjunctive (add-on) treatment of MDD in patients with an inadequate response to current antidepressants. In September 2018, the FDA granted Fast Track designation for development of AV-101 for the treatment of NP. In December 2019, the FDA granted Fast Track designation for development of PH94B for the treatment of SAD. However, these FDA Fast Track designations may not lead to a faster development or regulatory review or approval process for PH94B or AV-101 and the FDA may withdraw Fast Track designation of PH94B or AV-101 for if it believes that the respective designation is no longer supported by data from our clinical development programs.

In addition, we may apply for Fast Track designation for PH94B, PH10 and AV-101 as a treatment option for other CNS indications. The FDA has broad discretion whether or not to grant a Fast Track designation, and even if we believe PH94B, PH10, AV-101 or other product candidates may be eligible for this designation, we cannot be sure that the review or approval will compare to conventional FDA procedures.

Results of earlier clinical trials may not be predictive of the results of later-stage clinical trials.

The results of preclinical studies and early clinical trials of PH94B, PH10, AV-101 and/or our other future product candidates, if any, including positive results, may not be predictive of the results of later-stage clinical trials. PH94B, PH10, AV-101 or any other future product candidates in later stages of clinical development may fail to show the desired safety and efficacy results despite having progressed through nonclinical studies and initial clinical trials. Many companies in the biopharmaceutical industry have suffered significant setbacks in later-stage clinical trials due to adverse safety profiles or lack of efficacy, notwithstanding promising results in earlier studies. Similarly, our future clinical trial results may not be successful for these or other reasons.

Moreover, nonclinical and clinical data are often susceptible to varying interpretations and analyses, and many companies that believed their product candidates performed satisfactorily in nonclinical studies and clinical trials nonetheless failed to obtain FDA approval. With respect to our current product candidates, if one or more of the future Phase 3 clinical trials of PH94B for SAD, any future clinical study of AV-101 or a future Phase 2 clinical trial of PH10 for MDD fail(s) to produce positive results, the development timeline and regulatory approval and commercialization prospects for PH94B, PH10 or AV-101 and, correspondingly, our business and financial prospects, could be materially adversely affected.

This drug candidate development risk is heightened by any changes in planned timing or nature of clinical trials compared to completed clinical trials. As product candidates are developed through preclinical to early- and late-stage clinical trials towards regulatory approval and commercialization, it is customary that various aspects of the development program, such as manufacturing and methods of administration, are altered along the way in an effort to optimize processes and results. While these types of changes are common and are intended to optimize the product candidates for later stage clinical trials, approval and commercialization, such changes do carry the risk that they will not achieve these intended objectives.

For example, the results of planned clinical trials have been affected by supply chain disruptions experienced by certain of our CMOs as a result of the ongoing COVID-19 pandemic. In addition, clinical development of our products may be further affected if we or any of our collaborators seek to optimize and scale-up production of a product candidate. In such case, we will need to demonstrate comparability between the newly manufactured drug substance and/or drug product relative to the previously manufactured drug substance and/or drug product. Demonstrating comparability may cause us to incur additional costs or delay initiation or completion of our clinical trials, including the need to initiate a dose escalation study and, if unsuccessful, could require us to complete additional nonclinical or clinical studies of our product candidates.

If serious adverse events or other undesirable side effects or safety concerns attributable to future clinical trials of our product candidates, it may adversely affect or delay our clinical development and commercialization of PH94B, PH10 or AV-101.

Undesirable side effects or safety concerns caused by our product candidates could cause us or regulatory authorities to interrupt, delay or halt clinical trials and could result in a more restrictive label or the delay or denial of regulatory approval. Although no treatment-related serious adverse events (SAEs) were observed in any clinical trials of our product candidates to date, if treatment-related SAEs or other undesirable side effects or safety concerns, or unexpected characteristics attributable to PH94B, PH10 and/or AV-101 are observed in any future clinical trials, including investigator-sponsored clinical trials, it may adversely affect or delay our clinical development and commercialization of the effected product candidate, and the occurrence of these events could have a material adverse effect on our business and financial prospects. Results of our future clinical trials could reveal a high and unacceptable severity and prevalence of adverse side effects. In such an event, our trials could be suspended or terminated and the FDA or other regulatory agency could order us to cease further development of or deny approval of our product candidates for any or all targeted indications. The drug-related side effects could affect patient recruitment or the ability of enrolled patients to complete the trial or result in potential product liability claims.

Additionally, if any of our product candidates receives marketing approval and we or others later identify undesirable or unacceptable side effects or safety concerns caused by these product candidates, a number of potentially significant negative consequences could result, including:

- regulatory authorities may withdraw, suspend, or limit approvals of such product and require us to take them off the market;
- regulatory authorities may require the addition of labeling statements, specific warnings, a contraindication or field alerts to physicians and pharmacies;
- regulatory authorities may require a medication guide outlining the risks of such side effects for distribution to patients, or that we implement a REMS or REMS-like plan to ensure that the benefits of the product outweigh its risks;
- we may be required to change the way a product is distributed or administered, conduct additional clinical trials or change the labeling of a product;
- we may be required to conduct additional post-marketing studies or surveillance;
- we may be subject to limitations on how we may promote the product;
- sales of the product may decrease significantly;
- we may be subject to regulatory investigations, government enforcement actions, litigation or product liability claims; and
- our products may become less competitive or our reputation may suffer.

Any of these events could prevent us or any collaborators from achieving or maintaining market acceptance of our product candidates or could substantially increase commercialization costs and expenses, which in turn could delay or prevent us from generating significant revenue from the sale of our product candidates.

Failures or delays in the commencement or completion of our planned clinical trials and nonclinical studies of PH94B, PH10, AV-101 or other our product candidates could result in increased costs to us and could delay, prevent or limit our ability to generate revenue and continue our business.

We will need to complete at least two pivotal Phase 3 clinical studies of PH94B, additional toxicology and other standard nonclinical and clinical safety studies, as well as certain standard smaller clinical studies prior to our submission of an NDA for regulatory approval of PH94B as an on-demand treatment for SAD or any other CNS indication. For PH10, we will need to complete at least one additional Phase 2 clinical study, two pivotal Phase 3 clinical trials, additional toxicology and other standard nonclinical and clinical safety studies, as well as certain standard smaller clinical studies prior to the submission of an NDA for regulatory approval of PH10 as treatment for MDD, or any other CNS indication. For AV-101, for treatment of any CNS indication, we will need to complete at least two Phase 2 clinical studies, two pivotal Phase 3 clinical trials, additional toxicology and other standard nonclinical and clinical safety studies, as well as certain standard smaller clinical studies prior to the submission of an NDA for regulatory approval. Successful completion of our nonclinical and clinical trials is a prerequisite to submitting an NDA and, consequently, the ultimate approval required before commercial marketing of any product candidate we may develop. We do not know whether any of our future-planned nonclinical and clinical trials of PH94B, PH10, AV-101 or any other product candidate will be completed on schedule, if at all, as the commencement and completion of nonclinical and clinical trials can be delayed or prevented for a number of reasons, including, among others:

- delays due to events resulting from the ongoing COVID-19 pandemic;
- the regulatory authority may deny permission to proceed with planned clinical trials or any other clinical trials we may initiate, or may place a planned or ongoing clinical trial on hold;
- delays in filing or receiving approvals from regulatory authorities of additional INDs that may be required;
- negative or ambiguous results from nonclinical or clinical studies;
- delays in reaching or failing to reach agreement on acceptable terms with prospective CROs, investigators and clinical trial sites, the terms of which can be subject to extensive negotiation and may vary significantly among different CROs, investigators and clinical trial sites;
- delays in the manufacturing of, or insufficient supply of product candidates necessary to conduct nonclinical or clinical trials, including delays in the manufacturing of sufficient supply of drug substance or finished drug product;
- inability to manufacture or obtain clinical supplies of a product candidate meeting required quality standards;
- difficulties obtaining Institutional Review Board (IRB) approval to conduct a clinical trial at a prospective clinical site or sites;
- challenges in recruiting and enrolling patients to participate in clinical trials, including the proximity of patients to clinical trial sites;
- eligibility criteria for a clinical trial, the nature of a clinical trial protocol, the availability of approved effective treatments for the relevant disease and competition from other clinical trial programs for similar indications;
- severe or unexpected adverse drug-related side effects experienced by patients in a clinical trial;
- delays in validating any endpoints utilized in a clinical trial;
- the regulatory authority may disagree with our clinical trial design and our interpretation of data from prior nonclinical studies or clinical trials, or may change the requirements for approval even after it has reviewed and commented on the design for our clinical trials;
- reports from nonclinical or clinical testing of other CNS indications or therapies that raise safety or efficacy concerns; and
- difficulties retaining patients who have enrolled in a clinical trial but may be prone to withdraw due to rigors of the clinical trial, lack of efficacy, side effects, personal issues or loss of interest.

Clinical trials may also be delayed or terminated prior to completion as a result of ambiguous or negative interim results. In addition, a clinical trial may be suspended or terminated by us, the regulatory authority, the IRBs at the sites where the IRBs are overseeing a clinical trial, a data and safety monitoring board (DSMB), overseeing the clinical trial at issue or other regulatory authorities due to a number of factors, including, among others:

- failure to conduct the clinical trial in accordance with regulatory requirements or approved clinical protocols;

- inspection of the clinical trial operations or trial sites by the regulatory authority that reveals deficiencies or violations that require us to undertake corrective action, including the imposition of a clinical hold;
- unforeseen safety issues, including any that could be identified in nonclinical carcinogenicity studies, adverse side effects or lack of effectiveness;
- changes in government regulations or administrative actions;
- problems with clinical supply materials that may lead to regulatory actions; and
- lack of adequate funding to continue nonclinical or clinical studies.

Changes in regulatory requirements, regulatory guidance or unanticipated events during our nonclinical studies and clinical trials of PH94B, PH10, AV-101 or other product candidates may occur, which may result in changes to nonclinical studies and clinical trial protocols or additional nonclinical studies and clinical trial requirements, which could result in increased costs to us and could delay our development timeline.

Changes in regulatory requirements, guidance or unanticipated events during our nonclinical studies and clinical trials of PH94B, PH10, AV-101 or other product candidates may force us to amend nonclinical studies and clinical trial protocols or the regulatory authority may impose additional nonclinical studies and clinical trial requirements. Amendments or changes to our clinical trial protocols would require resubmission to the regulatory authority and IRBs for review and approval, which may adversely impact the cost, timing or successful completion of clinical trials. Similarly, amendments to our nonclinical studies may adversely impact the cost, timing, or successful completion of those nonclinical studies. If we experience delays completing, or if we terminate, any of our nonclinical studies or clinical trials, or if we are required to conduct additional nonclinical studies or clinical trials, the commercial prospects for PH94B, PH10, AV-101 or other product candidates may be harmed and our ability to generate product revenue will be delayed.

We rely, and expect that we will continue to rely, on third parties to conduct our nonclinical and clinical trials of our current product candidates and will continue to do so for any other future product candidates. If these third parties do not successfully carry out their contractual duties and/or meet expected deadlines, completion of our nonclinical or clinical trials and development of PH94B, PH10, AV-101 or other future product candidates may be delayed and we may not be able to obtain regulatory approval for or commercialize PH94B, PH10, AV-101 or other future product candidates and our business could be substantially harmed.

By strategic design, we do not have the extensive internal staff resources to independently conduct nonclinical and clinical trials of our product candidates completely on our own. We rely on our network of strategic relationships with various academic research centers, medical institutions, nonclinical and clinical investigators, contract laboratories, CROs and other third parties to assist us to conduct and complete nonclinical and clinical trials of our product candidates. We enter into agreements with third-party CROs to provide monitors for and to manage data for our clinical trials, as well as provide other services necessary to prepare for, conduct and complete clinical trials. We rely heavily on these and other third-parties for execution of nonclinical and clinical trials for our product candidates and we control only certain aspects of their activities. As a result, we have less direct control over the conduct, timing and completion of these nonclinical and clinical trials and the management of data developed through nonclinical and clinical trials than would be the case if we were relying entirely upon our own internal staff resources. Communicating with outside parties can also be challenging, potentially leading to mistakes as well as difficulties in coordinating activities. CROs and other outside parties may:

- experience disruptions to their operations, such as reduced staffing and supply chain disruptions, as a result of the ongoing COVID-19 pandemic;
- have staffing difficulties and/or undertake obligations beyond their anticipated capabilities and resources;
- fail to comply with contractual obligations;
- experience regulatory compliance issues;
- undergo changes in priorities or become financially distressed; or
- form relationships with other entities, some of which may be our competitors.

These factors may materially adversely affect the willingness or ability of third parties to conduct our nonclinical and clinical trials and may subject us to unexpected cost increases that are beyond our control. Nevertheless, we are responsible for ensuring that each of our nonclinical studies and clinical trials is conducted and completed in accordance with the applicable protocol, legal, regulatory and scientific requirements and standards, and our reliance on CROs, or independent investigators does not relieve us of our regulatory responsibilities. We and our CROs, and any investigator in an investigator-sponsored study are required to comply with regulations and guidelines, including current Good Clinical Practice regulations (cGCPs) for conducting, monitoring, recording and reporting the results of clinical trials to ensure that the data and results are scientifically credible and accurate, and that the trial patients are adequately informed of the potential risks of participating in clinical trials. These regulations are enforced by the FDA, the Competent Authorities of the Member States of the European Economic Area and comparable foreign regulatory authorities for any products in clinical development. The FDA enforces cGCP regulations through periodic inspections of clinical trial sponsors, principal investigators and trial sites. If we, any of our CROs or any of our third-party collaborators fail to comply with applicable cGCPs, the clinical data generated in clinical trials involving our product candidates may be deemed unreliable and the FDA or comparable foreign regulatory authorities may require us to perform additional clinical trials before approving our marketing applications. We cannot assure you that, upon inspection, the FDA will determine that any of our clinical trials comply with cGCPs. In addition, our clinical trials must be conducted with product candidates produced under cGMPs and will require a large number of test patients. Our failure or the failure of our CROs or other third-party collaborators to comply with these regulations may require us to repeat clinical trials, which would delay the regulatory approval process and could also subject us to enforcement action up to and including civil and criminal penalties.

Although we design our clinical trials for our product candidates, our clinical development strategy involves having CROs and other third-party investigators and medical institutions conduct clinical trials of our product candidates. As a result, many important aspects of our drug development programs are outside of our direct control. In addition, although CROs, or independent investigators or medical institutions, as the case may be, may not perform all of their obligations under arrangements with us or in compliance with applicable regulatory requirements, under certain circumstances, we may be responsible and subject to enforcement action that may include civil penalties up to and including criminal prosecution for any violations of FDA laws and regulations during the conduct of clinical trials of our product candidates. If such third parties do not perform clinical trials of our product candidates in a satisfactory manner, breach their obligations to us or fail to comply with applicable regulatory requirements, the development and commercialization of our product candidates may be delayed or our development program materially and irreversibly harmed. In certain cases, including the Baylor Study and other investigator-sponsored clinical studies, we cannot control the amount and timing of resources these third-parties devote to clinical trials involving our product candidates. If we are unable to rely on nonclinical and clinical data collected by our third-party collaborators, we could be required to repeat, extend the duration of, or increase the size of our clinical trials and this could significantly delay commercialization and require significantly greater expenditures.

If our relationships with one or more of our third-party collaborators terminates, we may not be able to enter into arrangements with alternative third-party collaborators. If such third-party collaborators, including our CROs, do not successfully carry out their contractual duties or obligations or meet expected deadlines, if they need to be replaced or if the quality or accuracy of the clinical data they obtain is compromised due to their failure to adhere to applicable clinical protocols, regulatory requirements or for other reasons, any clinical trials that such third-parties are associated with may be extended, delayed or terminated, and we may not be able to obtain regulatory approval for or successfully develop and commercialize our product candidates. As a result, we believe that our financial results and the commercial prospects for our product candidates in the subject indication would be harmed, our costs would increase and our ability to generate revenue would be delayed.

We rely completely on third-parties to manufacture, formulate, hold and distribute supplies of our product candidates for all nonclinical and clinical studies, and we intend to continue to rely on third parties to produce all nonclinical, clinical and commercial supplies of our product candidates in the future.

By strategic design, we do not currently have, nor do we plan to acquire or develop, extensive internal infrastructure or technical capabilities to manufacture, formulate, hold or distribute supplies of our product candidates, for use in nonclinical and clinical studies or commercial scale. As a result, with respect to all of our product candidates, we rely, and will continue to rely, completely on CMOs to manufacture API and formulate, hold and distribute final drug product. The facilities used by our CMOs to manufacture PH94B, PH10 and AV-101 API and PH94B, PH10 and AV-101 final drug product are subject to a pre-approval inspection by the FDA and other comparable foreign regulatory agencies to assess compliance with applicable regulatory guidelines and requirements, including cGMPs, and may be required to undergo similar inspections by the FDA or other comparable foreign regulatory agencies, after we submit INDs, NDAs or relevant foreign regulatory submission equivalent to the applicable regulatory agency.

We do not directly control the manufacturing process or the supply or quality of materials used in the manufacturing and formulation of our product candidates, and, with respect to all of our product candidates, we are completely dependent on our CMOs to comply with all applicable cGMPs for the manufacturing of both API and finished drug product. If our CMOs cannot secure adequate supplies of suitable raw materials or successfully manufacture our product candidates, including PH94B, PH10 and AV-101 API and finished drug product, that conforms to our specifications and the strict regulatory requirements of the FDA or applicable foreign regulatory agencies, production of sufficient supplies of our product candidates, including PH94B, PH10 and AV-101 API and finished drug product, may be delayed and our CMOs may not be able to secure and/or maintain regulatory approval for their manufacturing facilities, or the FDA may take other actions, including the imposition of a clinical hold. In addition, we have no direct control over our CMOs' ability to maintain adequate quality control, quality assurance and qualified personnel. All of our CMOs are engaged with other companies to supply and/or manufacture materials or products for such other companies, which exposes our CMOs to regulatory risks for the production of such materials and products. As a result, failure to satisfy the regulatory requirements for the production of those materials and products may affect the regulatory clearance of our CMO's facilities generally or affect the timing of manufacture of PH94B, PH10 and AV-101 for required or planned nonclinical and/or clinical studies. If the FDA or an applicable foreign regulatory agency determines now or in the future that our CMOs' facilities are noncompliant, we may need to find alternative manufacturing facilities, which would adversely impact our ability to develop, obtain regulatory approval for or market our product candidates. Our reliance on CMOs also exposes us to the possibility that they, or third parties with access to their facilities, will have access to and may appropriate our trade secrets or other proprietary information.

With respect to PH94B, PH10 and AV-101, we do not yet have long-term supply agreements in place with our CMOs and each batch of PH94B, PH10 and AV-101 is or will be individually contracted under a separate supply agreement. If we engage new CMOs, such contractors must complete an inspection by the FDA and other applicable foreign regulatory agencies. We plan to continue to rely upon CMOs and, potentially, collaboration partners, to manufacture research and development scale, and, if approved, commercial quantities of our product candidates. Although we believe our current scale of API manufacturing for AV-101, and our contemplated scale of API manufacturing for PH94B and PH10, and the current and projected supply of PH94B, PH10 and AV-101 API and finished drug product will be adequate to support our planned nonclinical and clinical studies of PH94B, PH10 and AV-101, no assurance can be given that unanticipated supply shortages or CMO-related delays in the manufacture and formulation of PH94B, PH10 or AV-101 API and/or finished drug product will not occur in the future.

Additionally, we anticipate that PH94B and PH10 will be considered drug-device combination products. Third-party manufacturers may not be able to comply with cGMP requirements applicable to drug/device combination products, including applicable provisions of the FDA's or a comparable foreign regulatory authority's drug cGMP regulations, device cGMP requirements embodied in the Quality System Regulation (QSR) or similar regulatory requirements outside the U.S. Our failure, or the failure of our third-party manufacturers, to comply with applicable regulations could result in sanctions being imposed on us, including clinical holds, fines, injunctions, civil penalties, delays, suspension or withdrawal of approvals, license revocation, seizures or recalls of product candidates, operating restrictions and criminal prosecutions, any of which could significantly affect supplies of our product candidates. The facilities used by our CMOs to manufacture our product candidates must be approved by the FDA and comparable foreign regulatory authorities pursuant to inspections that will or may be conducted after we submit our NDA. We do not control the manufacturing process of, and are completely dependent on, our CMO partners for compliance with cGMPs and QSRs. If our CMOs cannot successfully manufacture material that conforms to our specifications and the strict regulatory requirements of the FDA or other comparable foreign regulatory authorities, they will not be able to secure and/or maintain regulatory approval for their manufacturing facilities. In addition, we have no control over 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 product 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 product candidates, if approved. CMOs may face manufacturing or quality control problems causing drug substance production and shipment delays or a situation where the contractor may not be able to maintain compliance with the applicable cGMP and QSR requirements. Any failure to comply with cGMP or QSR requirements or other FDA, EMA and comparable foreign regulatory requirements could adversely affect our clinical research activities and our ability to develop our product candidates and market our products following approval.

Even if we receive marketing approval for PH94B, PH10, AV-101 or any other product candidate in the U.S., we may never receive regulatory approval to market PH94B, PH10, AV-101 or any other product candidate outside of the U.S.

In order to market PH94B, PH10, AV-101 or any other product candidate outside of the U.S., we must establish and comply with the numerous and varying safety, efficacy and other regulatory requirements of other countries. Approval procedures vary among countries and can involve additional product candidate testing and additional administrative review periods. The time required to obtain approvals in other countries might differ from that required to obtain FDA approval. The marketing approval processes in other countries may implicate all of the risks detailed above regarding FDA approval in the U.S. as well as other risks. In particular, in many countries outside of the U.S., products must receive pricing and reimbursement approval before the product can be commercialized. Obtaining this approval can result in substantial delays in bringing products to market in such countries. Marketing approval in one country does not ensure marketing approval in another, but a failure or delay in obtaining marketing approval in one country may have a negative effect on the regulatory process in others. Failure to obtain marketing approval in other countries or any delay or other setback in obtaining such approval would impair our ability to market our product candidates in such foreign markets. Any such impairment would reduce the size of our potential market, which could have a material adverse impact on our business, results of operations and prospects.

If any of our product candidates are ultimately regulated as controlled substances, we, our CMOs, as well as future distributors, prescribers, and dispensers will be required to comply with additional regulatory requirements which could delay the marketing of our product candidates, and increase the cost and burden of manufacturing, distributing, dispensing, and prescribing our product candidates.

Before we can commercialize our product candidates in the U.S. or any market outside the U.S., the U.S. Drug Enforcement Administration (DEA) or its foreign counterpart may need to determine whether such product candidates will be considered to be a controlled substance, taking into account the recommendation of the FDA or its foreign counterpart, as the case may be. This may be a lengthy process that could delay our marketing of a product candidate and could potentially diminish any regulatory exclusivity periods for which we may be eligible, which would increase the cost associated with commercializing such products and, in turn, may have an adverse impact on our results of operations. Although we currently do not know whether the DEA or any foreign counterpart will consider any of our current or future product candidate to be controlled substances, we cannot yet give any assurance that such product candidates, including PH94B, PH10 and AV-101 will not be regulated as controlled substances.

If any of our product candidates are regulated as controlled substances, depending on the DEA controlled substance schedule in which the product candidates are placed or that of its foreign counterpart, we, our CMOs, and any future distributors, prescribers, and dispensers of the scheduled product candidates may be subject to significant regulatory requirements, such as registration, security, recordkeeping, reporting, storage, distribution, importation, exportation, inventory, quota and other requirements administered by the DEA or a foreign counterpart of the DEA as the case may be. Moreover, if any of our product candidates are regulated as controlled substances, we and our CMOs would be subject to initial and periodic DEA inspection. If we or our CMOs are not able to obtain or maintain any necessary DEA registrations or comparable foreign registrations, we may not be able to commercialize any product candidates that are deemed to be controlled substances or we may need to find alternative CMOs, which would take time and cause us to incur additional costs, delaying or limit our commercialization efforts.

Because of their restrictive nature, these laws and regulations could limit commercialization of our product candidates, should they be deemed to contain controlled substances. Failure to comply with the applicable controlled substance laws and regulations can also result in administrative, civil or criminal enforcement. The DEA or its foreign counterparts may seek civil penalties, refuse to renew necessary registrations, or initiate administrative proceedings to revoke those registrations. In some circumstances, violations could result in criminal proceedings or consent decrees. Individual states also independently regulate controlled substances.

If we are unable to establish sales and marketing capabilities or enter into agreements with third parties to market and sell our product candidates, we may not be able to generate any revenue.

We do not currently have any internal resources for the sale, marketing and distribution of pharmaceutical products, and we may not create such internal capabilities in the foreseeable future. Therefore, to market our product candidates, if approved by the FDA or any other regulatory body, we must make contractual arrangements with third parties to perform services related to sales, marketing, managerial and other non-technical capabilities relating to the commercialization of our product candidates, or establish those capabilities prior to market approval. If we are unable to establish adequate contractual arrangements for such sales, marketing and distribution capabilities, or if we are unable to do so on commercially reasonable terms, or if we are unable to establish such capabilities on our own, our business, results of operations, financial condition and prospects will be materially adversely affected.

Even if we receive marketing approval for our product candidates, our product candidates may not achieve broad market acceptance, which would limit the revenue that we generate from their sales.

The commercial success of our product candidates, if approved by the FDA or other applicable regulatory authorities, will depend upon the awareness and acceptance of our product candidates among the medical community, including physicians, patients and healthcare payors. Market acceptance of our product candidates, if approved, will depend on a number of factors, including, among others:

- the efficacy and safety of our product candidates as demonstrated in clinical trials, and, if required by any applicable regulatory authority in connection with the approval for the applicable indications, to provide patients with incremental health benefits, as compared with other available therapies;
- limitations or warnings contained in the labeling approved for our product candidates by the FDA or other applicable regulatory authorities;
- the clinical indications for which our product candidates are approved;
- availability of alternative treatments already approved or expected to be commercially launched in the near future;
- the potential and perceived advantages of our product candidates over current treatment options or alternative treatments, including future alternative treatments;
- the willingness of the target patient population to try new therapies and of physicians to prescribe these therapies;
- the strength of marketing and distribution support and timing of market introduction of competitive products;
- publicity concerning our products or competing products and treatments;
- pricing and cost effectiveness;
- the effectiveness of our sales and marketing strategies;
- our ability to increase awareness of our product candidates through marketing efforts;

- our ability to obtain sufficient third-party coverage or reimbursement; or
- the willingness of patients to pay out-of-pocket in the absence of third-party coverage.

If our product candidates are approved but do not achieve an adequate level of acceptance by patients, physicians and payors, we may not generate sufficient revenue from our product candidates to become or remain profitable. Before granting reimbursement approval, healthcare payors may require us to demonstrate that our product candidates, in addition to treating these target indications, also provide incremental health benefits to patients. Our efforts to educate the medical community and third-party payors about the benefits of our product candidates may require significant resources and may never be successful.

Our product candidates may cause undesirable safety concerns and side effects that could delay or prevent their regulatory approval, limit the commercial profile of an approved label, or result in significant negative consequences following marketing approval, if any.

Undesirable safety concerns and side effects caused by our product candidates could cause us or regulatory authorities to interrupt, delay or halt nonclinical studies and clinical trials and could result in a more restrictive label or the delay or denial of regulatory approval by the FDA or other regulatory authorities.

Further, clinical trials by their nature utilize a sample of potential patient populations. With a limited number of patients and limited duration of exposure, rare and severe side effects of our product candidates may only be uncovered with a significantly larger number of patients exposed to the product candidate. If our product candidates receive marketing approval and we or others identify undesirable safety concerns or side effects caused by such product candidates (or any other similar products) after such approval, a number of potentially significant negative consequences could result, including:

- regulatory authorities may withdraw or limit their approval of such product candidates;
- regulatory authorities may require the addition of labeling statements, such as a “black box” warning or a contraindication;
- we may be required to change the way such product candidates are distributed or administered, conduct additional clinical trials or change the labeling of the product candidates;
- we may be subject to regulatory investigations and government enforcement actions;
- we may decide to remove such product candidates from the marketplace;
- we could be sued and held liable for injury caused to individuals exposed to or taking our product candidates; and
- our reputation may suffer.

We believe that any of these events could prevent us from achieving or maintaining market acceptance of the affected product candidates and would substantially increase the costs of commercializing our product candidates and significantly impact our ability to successfully commercialize our product candidates and generate revenues.

Even if we receive marketing approval for our product candidates, we may still face future development and regulatory difficulties.

Even if we receive marketing approval for our product candidates, regulatory authorities may still impose significant restrictions on our product candidates, indicated uses or marketing or impose ongoing requirements for potentially costly post-approval studies. Our product candidates will also be subject to ongoing regulatory requirements governing the labeling, packaging, storage and promotion of the product and record keeping and submission of safety and other post-market information. The FDA and other regulatory authorities have significant post-marketing authority, including, for example, the authority to require labeling changes based on new safety information and to require post-marketing studies or clinical trials to evaluate serious safety risks related to the use of a drug. The FDA and other regulatory authorities also have the authority to require, as part of an NDA or post-approval, the submission of a REMS or comparable safety program. Any REMS or comparable safety program required by the FDA or other regulatory authority may lead to increased costs to assure compliance with new post-approval regulatory requirements and potential requirements or restrictions on the sale of approved products, all of which could lead to lower sales volume and revenue.

Manufacturers of drug and device products and their facilities are subject to continual review and periodic inspections by the FDA and other regulatory authorities for compliance with cGMPs and other regulations. If we or a regulatory agency discover problems with our product candidates, such as adverse events of unanticipated severity or frequency, or problems with the facility where our product candidates are manufactured, a regulatory agency may impose restrictions on our product candidates, the manufacturer or us, including requiring withdrawal of our product candidates from the market or suspension of manufacturing. If we, our product candidates, or the manufacturing facilities for our product candidates fail to comply with applicable regulatory requirements, a regulatory agency may, among other things:

- issue warning letters or untitled letters;
- seek an injunction or impose civil or criminal penalties or monetary fines;
- suspend or withdraw marketing approval;
- suspend any ongoing clinical trials;
- refuse to approve pending applications or supplements to applications submitted by us;
- suspend or impose restrictions on operations, including costly new manufacturing requirements; or
- seize or detain products, refuse to permit the import or export of products, or require that we initiate a product recall.

Competing therapies could emerge adversely affecting our opportunity to generate revenue from the sale of our product candidates.

The pharmaceutical industry is highly competitive. There are many public and private pharmaceutical companies, universities, governmental agencies and other research organizations actively engaged in the research and development of product candidates that may be similar to and compete with our product candidates or address similar markets. It is probable that the number of companies seeking to develop product candidates similar to and competitive with our product candidates will increase.

Currently, management is unaware of any FDA-approved oral adjunctive therapy for MDD patients with an inadequate response to standard antidepressants having the same mechanism of pharmacological action and safety profile as our orally-administered AV-101 or our intranasally-administered PH10. However, new antidepressant products with other mechanisms of pharmacological action or products approved for other indications, including the FDA-approved anesthetic ketamine hydrochloride administered intravenously, are being or may be used off-label for treatment of MDD, as well as other CNS indications for which AV-101 or PH10 may have therapeutic potential. Additionally, other non-pharmaceutical treatment options, such as psychotherapy and electroconvulsive therapy (ECT) are used before or instead of standard antidepressant medications to treat patients with MDD. Management is also unaware of any FDA-approved rapid-onset, on-demand treatment for SAD having the same mechanism of pharmacological action and safety profile as our PH94B.

In the field of new generation, oral adjunctive treatments for adult patients with MDD with an inadequate response to standard FDA-approved ADs, we believe our principal competitors may be Axsome's AX-05, Alkermes' ALKS-5461, Allergan's AGN-241751 and Sage's Sage-217. Additional potential competitors may include, but not be limited to, academic and private commercial clinics providing intravenous ketamine therapy on an off-label basis and Janssen's intranasally-administered Spravato (esketamine). With respect to PH94B and current FDA-approved treatment options for SAD in the U.S., our competition may include, but is not limited to, certain current generic ADs approved by the FDA for treatment of SAD and certain classes of drugs used on an off-label basis for treatment of SAD, including benzodiazepines such as alprazolam, and beta blockers such as propranolol.

Many of our potential competitors, alone or with their strategic partners, have substantially greater financial, technical and human resources than we do and significantly greater experience in the discovery, and development of product candidates, obtaining FDA and other regulatory approvals of treatments and the commercialization of those treatments. With respect to AV-101 and PH10, we believe that a range of pharmaceutical and biotechnology companies have programs to develop drug candidates for the treatment of depression, including MDD, Parkinson's disease levodopa-induced dyskinesia, neuropathic pain, epilepsy, and other neurological conditions and diseases, including, but not limited to, Abbott Laboratories, Acadia, Allergan, Alkermes, Aptynix, AstraZeneca, Axsome, Eli Lilly, GlaxoSmithKline, IntraCellular, Janssen, Lundbeck, Merck, Novartis, Ono, Otsuka, Pfizer, Relmada, Roche, Sage, Sumitomo Dainippon, and Takeda, as well as any affiliates of the foregoing companies. With respect to PH94B, in addition to potential competition from certain current FDA-approved antidepressants and off-label use of benzodiazepines and beta blockers, we believe additional drug candidates in development for SAD may include, but potentially not be limited to, an oral fatty acid amide hydrolase inhibitor in development by Janssen. Mergers and acquisitions in the biotechnology and pharmaceutical industries may result in even more resources being concentrated among a smaller number of our competitors. Our commercial opportunity could be reduced or eliminated if our competitors develop and commercialize products that are safer, more effective, have fewer or less severe side effects, are more convenient or are less expensive than any products that we may develop. Our competitors also may obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for ours, which could result in our competitors establishing a strong market position before we are able to enter the market.

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

Our drug development programs and the potential commercialization of our product candidates will require substantial additional cash to fund expenses. For some of our product candidates, we may decide to collaborate with pharmaceutical and biotechnology companies for the development and potential commercialization of those product candidates, such as the License and Collaboration Agreement we entered into with EverInsight Therapeutics, Inc. in June 2020 for the development and commercialization of PH94B in certain international markets.

We may derive revenue from research and development fees, license fees, milestone payments and royalties under any collaborative arrangement into which we enter, including the EverInsight Agreement and/or the Bayer Agreement. Our ability to generate revenue from these arrangements will depend on our collaborators' abilities to successfully perform the functions assigned to them in these arrangements. In addition, our collaborators may have the right to abandon research or development projects and terminate applicable agreements, including funding obligations, prior to or upon the expiration of the agreed upon terms. As a result, we can expect to relinquish some or all of the control over the future success of a product candidate that we license to a third party.

We face significant competition in seeking appropriate collaborators. Whether we reach a definitive agreement for collaboration will depend, among other things, upon our assessment of the collaborator's resources and expertise, the terms and conditions of the proposed collaboration and the proposed collaborator's evaluation of a number of factors. Those factors may include the design or results of nonclinical and clinical trials, the likelihood of approval by the FDA or similar regulatory authorities outside the United States, the potential markets for the subject product candidate, the costs and complexities of manufacturing and delivering such product candidate to patients, the potential of competing products, the existence of uncertainty with respect to our ownership of technology, which can exist if there is a challenge to such ownership without regard to the merits of the challenge and industry and market conditions generally. The collaborator may also consider alternative product candidates or technologies for similar indications that may be available to collaborate on and whether such collaboration could be more attractive than the one with us for our product candidate. The terms of any collaboration or other arrangements that we may establish may not be favorable to us.

We may also be restricted under existing collaboration agreements from entering into future agreements on certain terms with potential collaborators. Collaborations are complex and time-consuming to negotiate and document. In addition, there have been a significant number of recent business combinations among large pharmaceutical companies that have resulted in a reduced number of potential future collaborators.

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

In addition, any future collaboration that we enter into may not be successful. The success of our collaboration arrangements will depend heavily on the efforts and activities of our collaborators. Collaborators generally have significant discretion in determining the efforts and resources that they will apply to these collaborations. Disagreements between parties to a collaboration arrangement regarding clinical development and commercialization matters can lead to delays in the development process or commercializing the applicable product candidate and, in some cases, termination of the collaboration arrangement. These disagreements can be difficult to resolve if neither of the parties has final decision-making authority. Collaborations with pharmaceutical or biotechnology companies and other third parties often are terminated or allowed to expire by the other party. Any such termination or expiration would adversely affect us financially and could harm our business reputation.

We may not be successful in our efforts to identify or discover additional product candidates, or we may expend our limited resources to pursue a particular product candidate or indication and fail to capitalize on product candidates or indications that may be more profitable or for which there is a greater likelihood of success.

The success of our business depends primarily upon our ability to identify, develop and commercialize product candidates with commercial and therapeutic potential. We may fail to pursue additional development opportunities for PH94B, PH10 or AV-101, or identify additional product candidates for clinical development for a number of reasons. Our research methodology may be unsuccessful in identifying new product candidates or our product candidates may be shown to have harmful side effects or may have other characteristics that may make the products unmarketable or unlikely to receive marketing approval.

Because we currently have limited financial and management resources, we necessarily focus on a limited number of research and development programs and product candidates and are currently focused primarily on development of PH94B, PH10 and AV-101, with additional limited focus on NCE drug rescue and, through a third-party collaboration, regenerative medicine. As a result, we may forego or delay pursuit of opportunities with other product candidates or for other potential CNS-related indications for PH94B, PH10 and/or AV-101 that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial drugs or profitable market opportunities. Our spending on current and future research and development programs and product candidates for specific indications may not yield any commercially viable drugs. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may relinquish valuable rights to that product candidate through future collaboration, licensing or other royalty arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate.

If any of these events occur, we may be forced to abandon our development efforts for a program or programs, which would have a material adverse effect on our business and could potentially cause us to cease operations. Research and development programs to identify and advance new product candidates require substantial technical, financial and human resources. We may focus our efforts and resources on potential programs or product candidates that ultimately prove to be unsuccessful.

We are subject to healthcare laws and regulations, which could expose us to criminal sanctions, civil penalties, contractual damages, reputational harm and diminished profits and future earnings.

Although we do not currently have any products on the market, once we begin commercializing our product candidates, we may be subject to additional healthcare statutory and regulatory requirements and enforcement by the federal government and the states and foreign governments in which we conduct our business. Healthcare providers, physicians and others will play a primary role in the recommendation and prescription of our product candidates, if approved. Our future arrangements with third-party payors will expose us to broadly applicable fraud and abuse and other healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we market, sell and distribute our product candidates, if we obtain marketing approval. Restrictions under applicable federal and state healthcare laws and regulations include the following:

- The federal anti-kickback statute prohibits, among other things, persons from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, in cash or in kind, to induce or reward either the referral of an individual for, or the purchase, order or recommendation of, any good or service, for which payment may be made under federal healthcare programs such as Medicare and Medicaid.
- The federal False Claims Act imposes criminal and civil penalties, including those from civil whistleblower or qui tam actions, against individuals or entities for knowingly presenting, or causing to be presented, to the federal government, claims for payment that are false or fraudulent or making a false statement to avoid, decrease, or conceal an obligation to pay money to the federal government.
- The federal Health Insurance Portability and Accountability Act of 1996, as amended by the Health Information Technology for Economic and Clinical Health Act, imposes criminal and civil liability for executing a scheme to defraud any healthcare benefit program and also imposes obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information.
- The federal false statements statute prohibits knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false statement in connection with the delivery of or payment for healthcare benefits, items or services.
- The federal transparency requirements, sometimes referred to as the “Sunshine Act,” under the Patient Protection and Affordable Care Act, require manufacturers of drugs, devices, biologics and medical supplies that are reimbursable under Medicare, Medicaid, or the Children’s Health Insurance Program to report to the Department of Health and Human Services information related to physician payments and other transfers of value and physician ownership and investment interests.
- Analogous state laws and regulations, such as state anti-kickback and false claims laws and transparency laws, may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers, and some state laws require pharmaceutical companies to comply with the pharmaceutical industry’s voluntary compliance guidelines and the relevant compliance.
- Guidance promulgated by the federal government in addition to requiring drug manufacturers to report information related to payments to physicians and other healthcare providers or marketing expenditures and drug pricing.
- Foreign Corrupt Practices Act and its application to marketing and selling practices as well as to clinical trials.

Ensuring that our future business arrangements with third parties comply with applicable healthcare laws and regulations could be costly. It is possible that governmental authorities will conclude that our business practices do not comply with current or future statutes, regulations or case law involving applicable fraud and abuse or other healthcare laws and regulations. If our operations were found to be in violation of any of these laws or any other governmental regulations that may apply to us, we may be subject to significant civil, criminal and administrative penalties, damages, fines and exclusion from government funded healthcare programs, such as Medicare and Medicaid, any of which could substantially disrupt our operations. If any of the physicians or other providers or entities with whom we expect to do business are found to be out of compliance with applicable laws, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs.

The FDA and other regulatory agencies actively enforce the laws and regulations prohibiting the promotion of off-label uses. If we are found to have improperly promoted off-label uses, we may become subject to significant liability.

The FDA and other regulatory agencies strictly regulate the promotional claims that may be made about prescription products, such as PH94B, PH10 and AV-101, if approved. In particular, a product may not be promoted for uses that are not approved by the FDA or such other regulatory agencies as reflected in the product’s approved labeling. For example, if we receive FDA marketing approval for PH94B as a treatment of SAD, physicians may prescribe PH94B to their patients in a manner that is inconsistent with the FDA-approved label. However, if we are found to have promoted such off-label uses, we may become subject to significant liability. The federal government has levied large civil and criminal fines against companies for alleged improper off-label promotion and has enjoined several companies from engaging in off-label promotion. The FDA has also requested that companies enter into consent decrees or imposed permanent injunctions under which specified promotional conduct is changed or curtailed. If we cannot successfully manage the promotion of our product candidates, if approved, we could become subject to significant liability, which would materially adversely affect our business and financial condition.

Even if approved, reimbursement policies could limit our ability to sell our product candidates.

Market acceptance and sales of our product candidates will depend heavily on reimbursement policies and may be affected by healthcare reform measures. Government authorities and third-party payors, such as private health insurers and health maintenance organizations, decide which medications they will pay for and establish reimbursement levels for those medications. Cost containment is a primary concern in the United States healthcare industry and elsewhere. Government authorities and these third-party payors have attempted to control costs by limiting coverage and the amount of reimbursement for particular medications. We cannot be sure that reimbursement will be available for our product candidates and, if reimbursement is available, the level of such reimbursement. Reimbursement may impact the demand for, or the price of, our product candidates. If reimbursement is not available or is available only at limited levels, we may not be able to successfully commercialize our product candidates.

In some foreign countries, particularly in Canada and European countries, the pricing of prescription pharmaceuticals is subject to strict governmental control. In these countries, pricing negotiations with governmental authorities can take six months or longer after the receipt of regulatory approval and product launch. To obtain favorable reimbursement for the indications sought or pricing approval in some countries, we may be required to conduct a clinical trial that compares the cost-effectiveness of our product candidates with other available therapies. If reimbursement for our product candidates is unavailable in any country in which we seek reimbursement, if it is limited in scope or amount, if it is conditioned upon our completion of additional clinical trials, or if pricing is set at unsatisfactory levels, our operating results could be materially adversely affected.

We may seek FDA Orphan Drug designation for one or more of our product candidates. Even if we have obtained FDA Orphan Drug designation for a product candidate, there may be limits to the regulatory exclusivity afforded by such designation.

We may, in the future, choose to seek FDA Orphan Drug designation for one or more of our current or future product candidates. Even if we obtain Orphan Drug designation from the FDA for a product candidate, there are limitations to the exclusivity afforded by such designation. In the U.S., the company that first obtains FDA approval for a designated orphan drug for the specified rare disease or condition receives orphan drug marketing exclusivity for that drug for a period of seven years. This orphan drug exclusivity prevents the FDA from approving another application, including a full NDA to market the same drug for the same orphan indication, except in very limited circumstances, including when the FDA concludes that the later drug is safer, more effective or makes a major contribution to patient care. For purposes of small molecule drugs, the FDA defines “same drug” as a drug that contains the same active moiety and is intended for the same use as the drug in question. To obtain Orphan Drug status for a drug that shares the same active moiety as an already approved drug, it must be demonstrated to the FDA that the drug is safer or more effective than the approved orphan designated drug, or that it makes a major contribution to patient care. In addition, a designated orphan drug may not receive orphan drug exclusivity if it is approved for a use that is broader than the indication for which it received orphan designation. In addition, orphan drug exclusive marketing rights in the U.S. may be lost if the FDA later determines that the request for designation was materially defective or if the manufacturer is unable to assure sufficient quantity of the drug to meet the needs of patients with the rare disease or condition or if another drug with the same active moiety is determined to be safer, more effective, or represents a major contribution to patient care.

Our future growth may depend, in part, on our ability to penetrate foreign markets, where we would be subject to additional regulatory burdens and other risks and uncertainties.

Our future profitability may depend, in part, on our ability to commercialize our product candidates in foreign markets for which we may rely on collaboration with third parties. If we commercialize our product candidates in foreign markets, we would be subject to additional risks and uncertainties, including:

- our customers’ ability to obtain reimbursement for our product candidates in foreign markets;
- our inability to directly control commercial activities because we are relying on third parties;
- the burden of complying with complex and changing foreign regulatory, tax, accounting and legal requirements;
- different medical practices and customs in foreign countries affecting acceptance in the marketplace;
- import or export licensing requirements;
- longer accounts receivable collection times;
- longer lead times for shipping;
- language barriers for technical training;

- reduced protection of intellectual property rights, different standards of patentability and different availability of prior art in some foreign countries as compared with the U.S.;
- the existence of additional potentially relevant third party intellectual property rights;
- foreign currency exchange rate fluctuations; and
- the interpretation of contractual provisions governed by foreign laws in the event of a contract dispute.

Foreign sales of our product candidates could also be adversely affected by the imposition of governmental controls, political and economic instability, trade restrictions and changes in tariffs.

We are a development stage biopharmaceutical company with no current revenues or approved products, and limited experience developing new therapeutic product candidates, including conducting clinical trials and other areas required for the successful development and commercialization of therapeutic products, which makes it difficult to assess our future viability.

We are a development stage biopharmaceutical company. We currently have no approved products and currently generate no revenues, and we have not yet fully demonstrated an ability to overcome many of the fundamental risks and uncertainties frequently encountered by development stage companies in new and rapidly evolving fields of technology, particularly biotechnology. To execute our business plan successfully, we will need to accomplish the following fundamental objectives, either on our own or with collaborators:

- develop and obtain required regulatory approvals for commercialization of PH94B, PH10, AV-101 and/or other product candidates;
- maintain, leverage and expand our intellectual property portfolio;
- establish and maintain sales, distribution and marketing capabilities, and/or enter into strategic partnering arrangements to access such capabilities;
- gain market acceptance for our product candidates; and
- obtain adequate capital resources and manage our spending as costs and expenses increase due to research, production, development, regulatory approval and commercialization of product candidates.

Our future success is highly dependent upon our ability to successfully develop and commercialize any of our current product candidates, acquire or license additional product candidates, or discover, as well as produce, develop and commercialize proprietary NCEs using our stem cell technology, and we cannot provide any assurance that we will successfully develop and commercialize PH94B, PH10, AV-101 or acquire or license additional product candidates or discover and develop NCEs, or that, if produced, PH94B, PH10, AV-101 or any other product candidate will be successfully commercialized.

Business development and research and development programs designed to identify, acquire or license additional product candidates, or, as the case may be, produce DR NCEs require substantial technical, financial and human resources, whether or not any additional product candidate is acquired or licensed or NCEs are ultimately identified and produced.

In addition, we do not have a sales or marketing infrastructure, and we, including our executive officers, do not have any significant pharmaceutical sales, marketing or distribution experience. We may seek to collaborate with others to develop and commercialize PH94B, PH10, AV-101, drug rescue NCEs and/or other product candidates if and when they are acquired and developed, or we may seek to establish those commercial capabilities ourselves. If we enter into arrangements with third parties to perform sales, marketing and distribution services for our products, the resulting revenues or the profitability from these revenues to us are likely to be lower than if we had sold, marketed and distributed our products ourselves. In addition, we may not be successful entering into arrangements with third parties to sell, market and distribute PH94B, PH10, AV-101, any drug rescue NCEs or other product candidates or may be unable to do so on terms that are favorable to us. We likely will have little control over such third parties, and any of these third parties may fail to devote the necessary resources and attention to sell, market and distribute our products effectively. If we do not establish sales, marketing and distribution capabilities successfully, either on our own or in collaboration with third parties, we will not be successful in commercializing our product candidates.

We have limited operating history with respect to drug development, including our anticipated focus on the identification and acquisition of additional product candidates or the assessment of potential NCEs and no operating history with respect to the production of NCEs, and we may never be able to produce a NCE.

If we are unable to develop and commercialize PH94B, PH10, AV-101 or acquire or license additional product candidates, or produce suitable NCEs, we may not be able to generate sufficient revenues to execute our business plan, which likely would result in significant harm to our financial position and results of operations, which could adversely impact our stock price.

With respect to drug rescue, there are a number of factors, in addition to the utility of *CardioSafe 3D*, that may impact our ability to identify and produce, develop or out-license and commercialize NCEs, independently or with partners, including:

- our ability to identify potential candidates in the public domain, obtain sufficient quantities of them, and assess them using our bioassay systems;
- if we seek to rescue drug candidates that are not available to us in the public domain, the extent to which third parties may be willing to out-license or sell certain candidates to us on commercially reasonable terms;
- our medicinal chemistry collaborator's ability to design and produce proprietary NCEs based on the novel biology and structure-function insight we provide using *CardioSafe 3D*; and
- financial resources available to us to develop and commercialize lead NCEs internally, or, if we sell or out-license them to partners, the resources such partners choose to dedicate to development and commercialization of any NCEs they acquire or license from us.

Even if we do acquire additional product candidates or produce proprietary NCEs, we can give no assurance that we will be able to develop and commercialize them as marketable drugs, on our own or in collaboration with others. Before we generate any revenues from PH94B, PH10, AV-101 or additional acquired or licensed products candidates or any NCEs, we or our potential collaborators must complete preclinical and clinical development programs, submit clinical and manufacturing data to the FDA, qualify a third party CMO, receive regulatory approval in one or more jurisdictions, satisfy the FDA that our CMO is capable of manufacturing the product in compliance with cGMP, build a commercial organization, make substantial investments and undertake significant marketing efforts ourselves or in partnership with others. We are not permitted to market or promote any of our product candidates before we receive regulatory approval from the FDA or comparable foreign regulatory authorities, and we may never receive such regulatory approval for any of our product candidates.

If CardioSafe 3D fails to predict accurately and efficiently the cardiac effects, both toxic and nontoxic, of drug rescue candidates and drug rescue NCEs, then our drug rescue programs will be adversely affected.

Success of our subsidiary, VistaStem, is partly dependent on our ability to use *CardioSafe 3D* to identify and predict, accurately and efficiently, the potential toxic and nontoxic cardiac effects of drug rescue candidates and drug rescue NCEs. If *CardioSafe 3D* is not capable of providing physiologically relevant and clinically predictive information regarding human cardiac biology, our business will be adversely affected.

CardioSafe 3D may not be meaningfully more predictive of the behavior of human cells than existing methods.

Drug rescue programs are highly dependent upon *CardioSafe 3D* being more accurate, efficient and clinically predictive than long-established surrogate safety models, including animal cells and live animals, and immortalized, primary and transformed cells, currently used by pharmaceutical companies and others. We cannot give assurance that *CardioSafe 3D* will be more efficient or accurate at predicting the heart safety of new drug candidates than the testing models currently used. If *CardioSafe 3D* fails to provide a meaningful difference compared to existing or new models in predicting the behavior of human heart, respectively, their utility for drug rescue will be limited and our business will be adversely affected.

We may invest in producing drug rescue NCEs for which there proves to be no demand.

To generate revenue from our drug rescue activities, we must produce proprietary NCEs for which there proves to be demand within the healthcare marketplace, and, if we intend to out-license a particular NCE for development and commercialization prior to market approval, then also among pharmaceutical companies and other potential collaborators. However, we may produce NCEs for which there proves to be no or limited demand in the healthcare market and/or among pharmaceutical companies and others. If we misinterpret market conditions, underestimate development costs and/or seek to rescue the wrong drug rescue candidates, we may fail to generate sufficient revenue or other value, on our own or in collaboration with others, to justify our investments, and our business may be adversely affected.

We may experience difficulty in producing human cells and our future stem cell technology research and development efforts may not be successful within the timeline anticipated, if at all.

Our hPSC technology is technically complex, and the time and resources necessary to develop various human cell types and customized bioassay systems, although not significant at present, are difficult to predict in advance. We might decide to devote significant additional personnel and financial resources to research and development activities designed to expand, in the case of DR, and explore, in the case of drug discovery and RM, potential applications of our stem cell technology platform. In particular, we may conduct exploratory nonclinical RM programs involving blood, bone, cartilage, and/or liver cells. Although we and our third-party collaborators have developed proprietary protocols to produce multiple differentiated cell types, we could encounter difficulties in differentiating and producing sufficient quantities of particular cell types, even when following these proprietary protocols. These difficulties could result in delays in production of certain cells, assessment of certain drug rescue candidates and drug rescue NCEs, design and development of certain human cellular assays and performance of certain exploratory nonclinical RM studies. In the past, our stem cell research and development projects have been significantly delayed when we encountered unanticipated difficulties in differentiating hPSCs into heart and liver cells. Although we have overcome such difficulties in the past, we may have similar delays in the future, and we may not be able to overcome them or obtain any benefits from our future stem cell technology research and development activities. Any delay or failure by us, for example, to produce functional, mature blood, bone, cartilage, and liver cells could have a substantial and material adverse effect on our potential drug discovery, drug rescue and RM business opportunities and results of operations.

Restrictions on research and development involving human embryonic stem cells and religious and political pressure regarding such stem cell research and development could impair our ability to conduct or sponsor certain potential collaborative research and development programs and adversely affect our prospects, the market price of our common stock and our business model.

Some of our research and development programs may involve the use of human cells derived from our controlled differentiation of human embryonic stem cells (*hESCs*). Some believe the use of *hESCs* gives rise to ethical and social issues regarding the appropriate use of these cells. Our research related to differentiation of *hESCs* may become the subject of adverse commentary or publicity, which could significantly harm the market price of our common stock. Although now substantially less than in years past, certain political and religious groups in the U.S. and elsewhere voice opposition to *hESC* technology and practices. We may use *hESCs* derived from excess fertilized eggs that have been created for clinical use in *in vitro* fertilization (*IVF*) procedures and have been donated for research purposes with the informed consent of the donors after a successful *IVF* procedure because they are no longer desired or suitable for *IVF*. Certain academic research institutions have adopted policies regarding the ethical use of human embryonic tissue. These policies may have the effect of limiting the scope of future collaborative research opportunities with such institutions, thereby potentially impairing our ability to conduct certain research and development in this field that we believe is necessary to expand the DR capabilities of our technology, which would have a material adverse effect on our business.

The use of embryonic or fetal tissue in research (including the derivation of *hESCs*) in other countries is regulated by the government, and such regulation varies widely from country to country. Government-imposed restrictions with respect to use of *hESCs* in research and development could have a material adverse effect on us by harming our ability to establish critical collaborations, delaying or preventing progress in our research and development, and causing a decrease in the market interest in our stock.

The foregoing potential ethical concerns do not apply to our use of induced pluripotent stem cells (*iPSCs*) because their derivation does not involve the use of embryonic tissues.

We have assumed that the biological capabilities of iPSCs and hESCs are likely to be comparable. If it is discovered that this assumption is incorrect, our exploratory research and development activities focused on potential regenerative medicine applications of our stem cell technology platform could be harmed.

We may use both *hESCs* and *iPSCs* to produce human cells for our customized *in vitro* assays for drug discovery and drug rescue purposes. However, we anticipate that our future exploratory research and development, if any, focused on potential regenerative medicine applications of our stem cell technology platform primarily will involve *iPSCs*. With respect to *iPSCs*, we believe scientists are still somewhat uncertain about the clinical utility, life span, and safety of such cells, and whether such cells differ in any clinically significant ways from *hESCs*. If we discover that *iPSCs* will not be useful for whatever reason for potential regenerative medicine programs, this would negatively affect our ability to explore expansion of our platform in that manner, including, in particular, where it would be preferable to use *iPSCs* to reproduce rather than approximate the effects of certain specific genetic variations.

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

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

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

In addition, we may incur substantial costs to comply with current or future environmental, health and safety laws and regulations. These current or future laws and regulations may impair our research, development, or production efforts. Failure to comply with these laws and regulations also may result in substantial fines, penalties, or other sanctions, which could have a material adverse effect on our operations.

To the extent our research and development activities involve using iPSCs, we will be subject to complex and evolving laws and regulations regarding privacy and informed consent. Many of these laws and regulations are subject to change and uncertain interpretation, and could result in claims, changes to our research and development programs and objectives, increased cost of operations or otherwise harm the Company.

To the extent that we pursue research and development activities involving iPSCs, we will be subject to a variety of laws and regulations in the U.S. and abroad that involve matters central to such research and development activities, including obligations to seek informed consent from donors for the use of their blood and other tissue to produce, or have produced for us, iPSCs, as well as state and federal laws that protect the privacy of such donors. U.S. federal and state and foreign laws and regulations are constantly evolving and can be subject to significant change. If we engage in iPSC-related research and development activities in countries other than the U.S., we may become subject to foreign laws and regulations relating to human-subjects research and other laws and regulations that are often more restrictive than those in the U.S. In addition, both the application and interpretation of these laws and regulations are often uncertain, particularly in the rapidly evolving stem cell technology sector. Compliance with these laws and regulations can be costly, can delay or impede our research and development activities, result in negative publicity, increase our operating costs, require significant management time and attention and subject us to claims or other remedies, including fines or demands that we modify or cease existing business practices.

Legal, social and ethical concerns surrounding the use of iPSCs, biological materials and genetic information could impair our operations.

To the extent that our future stem cell research and development activities involve the use of iPSCs and the manipulation of human tissue and genetic information, the information we derive from such iPSC-related research and development activities could be used in a variety of applications, which may have underlying legal, social and ethical concerns, including the genetic engineering or modification of human cells, testing for genetic predisposition for certain medical conditions and stem cell banking. Governmental authorities could, for safety, social or other purposes, call for limits on or impose regulations on the use of iPSCs and genetic testing or the manufacture or use of certain biological materials involved in our iPSC-related research and development programs. Such concerns or governmental restrictions could limit our future research and development activities, which could have a material adverse effect on our business, financial condition and results of operations.

Our human cellular bioassay systems and human cells we derive from human pluripotent stem cells, although not currently subject to regulation by the FDA or other regulatory agencies as biological products or drugs, could become subject to regulation in the future.

The human cells we produce from hPSCs and our customized bioassay systems using such cells, including *CardioSafe 3D*, are not currently sold, for research purposes or any other purpose, to biotechnology or pharmaceutical companies, government research institutions, academic and nonprofit research institutions, medical research organizations or stem cell banks, and they are not therapeutic procedures. As a result, they are not subject to regulation as biological products or drugs by the FDA or comparable agencies in other countries. However, if, in the future, we seek to include human cells we derive from hPSCs in therapeutic applications or product candidates, such applications and/or product candidates would be subject to the FDA's pre- and post-market regulations. For example, if we seek to develop and market human cells we produce for use in performing RM applications, such as tissue engineering or organ replacement, we would first need to obtain FDA pre-market clearance or approval. Obtaining such clearance or approval from the FDA is expensive, time-consuming and uncertain, generally requiring many years to obtain, and requiring detailed and comprehensive scientific and clinical data. Notwithstanding the time and expense, these efforts may not result in FDA approval or clearance. Even if we were to obtain regulatory approval or clearance, it may not be for the uses that we believe are important or commercially attractive.

Risks Related to Our Financial Position

We have incurred significant net losses since inception and we will continue to incur substantial operating losses for the foreseeable future. We may never achieve or sustain profitability, which would depress the market price of our common stock and could cause you to lose all or a part of your investment.

We have incurred significant net losses in each fiscal year since our inception in 1998, including net losses of approximately \$20.8 million and \$24.6 million million during our fiscal years ended March 31, 2020 and 2019, respectively. At March 31, 2020, we had an accumulated deficit of approximately \$201.9 million. We do not know whether or when we will become profitable. Substantially all of our operating losses have resulted from costs incurred in connection with our research and development programs and from general and administrative costs associated with our operations. We expect to incur increasing levels of operating losses over the next several years and for the foreseeable future. Our prior losses, combined with expected future losses, have had and will continue to have an adverse effect on our stockholders' equity and working capital. We expect our research and development expenses to significantly increase in connection with nonclinical studies and clinical trials of our product candidates. In addition, if we obtain marketing approval for our product candidates, we may incur significant sales, marketing and outsourced-manufacturing expenses should we elect not to collaborate with one or more third parties for such services and capabilities. As a public company, we incur additional costs associated with operating as a public company. As a result, we expect to continue to incur significant and increasing operating losses for the foreseeable future. Because of the numerous risks and uncertainties associated with developing pharmaceutical products, we are unable to predict the extent of any future losses or when we will become profitable, if at all. Even if we do become profitable, we may not be able to sustain or increase our profitability on a quarterly or annual basis.

Our ability to become profitable depends upon our ability to generate revenues. To date, we have generated approximately \$17.7 million in revenues, consisting of receipt of non-dilutive cash payments from collaborators, sublicense revenue, and research and development grant awards from the NIH. We have not yet commercialized any product or generated any revenues from product sales, and we do not know when, or if, we will generate any revenue from product sales. We do not expect to generate significant revenue unless and until we obtain marketing approval of, and begin to experience sales of, PH94B, PH10, AV-101 or another future product candidate, or we enter into one or more development and commercialization agreements with respect to PH94B, PH10, AV-101 or one or more other future product candidates. Our ability to generate revenue depends on a number of factors, including, but not limited to, our ability to:

- initiate and successfully complete nonclinical and clinical trials that meet their prescribed endpoints;
- initiate and successfully complete all safety studies required to obtain U.S. and foreign marketing approval for our product candidates;
- timely complete and compose successful regulatory submissions such as NDAs or comparable documents for both the U.S. and foreign jurisdictions;
- commercialize our product candidates, if approved, by developing a sales force or entering into collaborations with third parties for sales and marketing capabilities; and
- achieve market acceptance of our product candidates in the medical community and with third-party payors.

Unless we enter into a commercialization collaboration or partnership with respect to the commercialization of our product candidates, we expect to incur significant sales and marketing costs as we prepare to commercialize our product candidates. Even if we initiate and successfully complete pivotal clinical trials of our product candidates, and our product candidates are approved for commercial sale, and despite expending these costs, our product candidates may not be commercially successful. We may not achieve profitability soon after generating product sales, if ever. If we are unable to generate product revenue, we will not become profitable and may be unable to continue operations without continued funding.

We require additional financing to execute our business plan and continue to operate as a going concern.

Our audited consolidated financial statements for the year ended March 31, 2020 included in this Annual Report were prepared assuming we will continue to operate as a going concern, although we and our auditors have indicated that our continuing losses and negative cash flows from operations raise substantial doubt about our ability to continue as such. Because we continue to experience net operating losses, our ability to continue as a going concern is subject to our ability to obtain necessary funding from outside sources, including obtaining additional funding from this offering as well as future sales of our securities or potentially obtaining loans and grant awards from financial institutions and/or government agencies where possible. Our continued net operating losses increase the difficulty in completing such sales or securing alternative sources of funding, and there can be no assurances that we will be able to obtain any future funding on favorable terms or at all. If we are unable to obtain sufficient financing from the sale of our securities or from alternative sources, we may be required to reduce, defer, or discontinue certain or all of our research and development activities or we may not be able to continue as a going concern.

Since our inception, most of our resources have been dedicated to research and development of AV-101 and the drug rescue capabilities of VistaStem's stem cell technology platform. In particular, we have expended substantial resources on research and development of methods and processes relating to the production of AV-101 API and drug product, advancing AV-101 through IND-enabling preclinical development, Phase 1 clinical safety studies, and into ongoing Phase 2 clinical development, including the Elevate Study completed in 2019, as well as research and development and regulatory expenses related to the production of PH94B and PH10 and our stem cell technology platform, including development of *CardioSafe* 3D for DR and our cardiac stem cell technology for potential RM applications in connection with the Bayer Agreement, and we expect to continue to expend substantial resources for the foreseeable future developing and commercializing our product candidates on our own or in collaborations. These expenditures will include costs associated with general and administrative costs, facilities costs, research and development, acquiring new technologies, manufacturing product candidates, conducting nonclinical experiments and clinical trials and obtaining regulatory approvals, as well as commercializing any products approved for sale.

At March 31, 2020, we had cash and cash equivalents of approximately \$1.4 million. We do not believe this amount, plus the proceeds to date from the LPC Agreement, is sufficient to enable us to fund our planned operations for at least the twelve months following the issuance of the financial statements included elsewhere in this Annual Report. We expect to seek additional capital to produce PH94B study material, conduct PH94B pivotal Phase 3 clinical trials, produce additional AV-101 study material for future nonclinical and clinical studies, conduct AV-101 Phase 3-enabling toxicology studies, conduct pivotal Phase 3 clinical studies of AV-101 in MDD, conduct AV-101 Phase 2 studies in LID, MDD, NP and SI, produce PH10 study material and conduct a Phase 2b clinical trial of PH10 in MDD, acquire or license and conduct research and development of additional product candidates and to fund our internal operations.

Further, we have no current source of revenue to sustain our present activities, and we do not expect to generate revenue until, and unless, we (i) out-license or sell a product candidate to a third-party, (ii) enter into additional license arrangements involving our stem cell technology, or (iii) obtain approval from the FDA or other regulatory authorities and successfully commercialize, on our own or through a future collaboration, one or more of our product candidates.

As the outcome of our ongoing research and development activities, including the outcome of future anticipated clinical trials is highly uncertain, we cannot reasonably estimate the actual amounts necessary to successfully complete the development and commercialization of our product candidates, on our own or in collaboration with others. As with prior periods, we will continue to incur costs associated with other development programs for PH94B, PH10 and AV-101. In addition, other unanticipated costs may arise. As a result of these and other factors, we will need to seek additional capital in the near term to meet our future operating requirements, including capital necessary to develop, obtain regulatory approval for, and to commercialize our product candidates, and may seek additional capital in the event there exists favorable market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. We have completed in the past, and are currently considering a range of potential financing transactions, including public or private equity or debt financings, government or other third-party funding, marketing and distribution arrangements and other collaborations, strategic alliances and licensing arrangements or a combination of these approaches, and we may complete additional financing arrangements later in 2019 and thereafter. Raising funds in the current economic environment may present additional challenges. Even if we believe we have sufficient funds for our current or future operating plans, we may seek additional capital if market conditions are favorable or if we have specific strategic considerations.

Our future capital requirements depend on many factors, including:

- the number and characteristics of the product candidates we pursue;
- the scope, progress, results and costs of researching and developing our product candidates, and conducting preclinical and clinical studies;
- the timing of, and the costs involved in, obtaining regulatory approvals for our product candidates;
- the cost of commercialization activities if any of our product candidates are approved for sale, including marketing, sales and distribution costs;
- the cost of manufacturing our product candidates and any products we successfully commercialize;
- our ability to establish and maintain strategic partnerships, licensing or other collaborative arrangements and the financial terms of such agreements;
- market acceptance of our product candidates;
- the effect of competing technological and market developments;
- our ability to obtain government funding for our research and development programs;
- the costs involved in obtaining, maintaining and enforcing patents to preserve our intellectual property;
- the costs involved in defending against such claims that we infringe third-party patents or violate other intellectual property rights and the outcome of such litigation;
- the timing, receipt and amount of potential future licensee fees, milestone payments, and sales of, or royalties on, our future products, if any; and
- the extent to which we may acquire or invest in additional businesses, product candidates and technologies.

Any additional fundraising efforts will divert certain members of our management team from their day-to-day activities, which may adversely affect our ability to develop and commercialize our product candidates. In addition, our ability to engage in certain types of capital raising transactions may be limited by the Listing Rules of the Nasdaq Stock Market and/or General Instruction I.B.6 of Form S-3 so long as the market value of our common stock held by non-affiliates remains below \$75 million. We cannot guarantee that future financing will be available in sufficient amounts, in a timely manner, or on terms acceptable to us, if at all. The terms of any future financing may adversely affect the holdings or the rights of our stockholders and the issuance of additional securities, whether equity or debt, by us, or the possibility of such issuance, may cause the market price of our shares to decline. The sale of additional equity securities and the conversion, exchange or exercise of certain of our outstanding securities will dilute all of our stockholders. The incurrence of debt could result in increased fixed payment obligations and we could be required to agree to certain restrictive covenants, such as limitations on our ability to incur additional debt, limitations on our ability to acquire, sell or license intellectual property rights and other operating restrictions that could adversely impact our ability to conduct our business. We could also be required to seek funds through arrangements with collaborative partners or otherwise at an earlier stage than otherwise would be desirable and we may be required to relinquish rights to some of our technologies or product candidates or otherwise agree to terms unfavorable to us, any of which may have a material adverse effect on our business, operating results and prospects.

If we are unable to obtain additional funding on a timely basis and on acceptable terms, we may be required to significantly curtail, delay or discontinue one or more of our research or product development programs or the commercialization of any product candidate or be unable to continue or expand our operations or otherwise capitalize on our business opportunities, as desired, which could materially affect our business, financial condition and results of operations.

Current volatile and/or recessionary conditions in the U.S. or abroad could adversely affect our business or our access to capital markets in a material manner.

To date, our principal sources of capital used to fund our development programs and other operations have been the net proceeds we received from sales of equity securities, as described herein. We have and will continue to use significant capital for the development of our product candidates, and, as such, we expect to seek additional capital from future issuance(s) of our securities, which may consist of issuances of equity and/or debt securities, to fund our planned operations.

Accordingly, our results of operations and the implementation of both our short-term and long-term business plan could be adversely affected by general conditions in the global economy, including conditions that are outside of our control, such as the impact of health and safety concerns from the current COVID-19 pandemic. The most recent global financial crisis caused by COVID-19 resulted in extreme volatility and disruptions in the capital and credit markets. A prolonged economic downturn could result in a variety of risks to our business and may have a material adverse effect on us, including limiting or restricting our ability to access capital on favorable terms, or at all, which would limit our ability to obtain adequate financing to maintain our operations.

We received funds from the Paycheck Protection Program enacted by Congress under the Coronavirus Aid, Relief and Economic Security Act, which funds must be repaid if we do not meet the criteria for forgiveness established by the U.S. Small Business Administration.

On April 22, 2020, we entered into a note payable agreement, pursuant to which we received net proceeds of approximately \$224,000 from a potentially forgivable loan from the U.S. Small Business Administration (SBA) pursuant to the Paycheck Protection Program (PPP) enacted by Congress under the Coronavirus Aid, Relief, and Economic Security Act (the CARES Act) administered by the SBA (the PPP Loan). The PPP Loan provides for working capital to the Company and matures on April 22, 2022. Under the CARES Act and the PPP Loan Agreement, all payments of both principal and interest are deferred until at least October 22, 2020. The PPP Loan will accrue interest at a rate of 1.00% per annum, and interest will continue to accrue throughout the period the PPP Loan is outstanding, or until it is forgiven. The CARES Act (including subsequent guidance issued by SBA and U.S. Department of the Treasury related thereto) provides that all or a portion of the PPP Loan may be forgiven upon our request to the Lender, subject to requirements in the PPP Loan Agreement and the CARES Act. Although no assurances can be given, the Company currently believes it will be able to satisfy the applicable requirements for forgiveness of the PPP Loan and expects that the PPP Loan will be forgiven.

We have identified material weaknesses in our internal control over financial reporting, and our business and stock price may be adversely affected if we do not adequately address those weaknesses or if we have other material weaknesses or significant deficiencies in our internal control over financial reporting.

We have identified material weaknesses in our internal control over financial reporting. In particular, we concluded that (i) the size of our staff does not permit appropriate segregation of duties to (a) permit appropriate review of accounting transactions and/or accounting treatment by multiple qualified individuals, and (b) prevent one individual from overriding the internal control system by initiating, authorizing and completing all transactions, and (ii) we utilize accounting software that does not prevent erroneous or unauthorized changes to previous reporting periods and/or can be adjusted so as to not provide an adequate auditing trail of entries made in the accounting software.

The existence of one or more material weaknesses or significant deficiencies could result in errors in our financial statements, and substantial costs and resources may be required to rectify any internal control deficiencies. If we cannot produce reliable financial reports, investors could lose confidence in our reported financial information, we may be unable to obtain additional financing to operate and expand our business and our business and financial condition could be harmed.

Raising additional capital will cause substantial dilution to our existing stockholders, may restrict our operations or require us to relinquish rights, and may require us to seek stockholder approval to authorize additional shares of our common stock.

We intend to pursue private and public equity offerings, debt financings, strategic collaborations and licensing arrangements during 2020 and beyond. To the extent that we raise additional capital through the sale of common stock or securities convertible or exchangeable into common stock, or to the extent, for strategic purposes, we convert or exchange certain of our outstanding securities into common stock, our current stockholders' ownership interest in our company will be substantially diluted. In addition, the terms of any such securities may include liquidation or other preferences that materially adversely affect rights of our stockholders. Debt financing, if available, would increase our fixed payment obligations and 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 collaboration, strategic partnerships and licensing arrangements with third parties, we may have to relinquish valuable rights to our product candidates, our intellectual property, future revenue streams or grant licenses on terms that are not favorable to us.

Some of our programs have been partially supported by government grant awards, which may not be available to us in the future.

Since inception, we have received substantial funds under grant award programs funded by state and federal governmental agencies, such as the NIH, the NIH's National Institute of Neurological Disease and Stroke (*NINDS*) and the NIMH, and the California Institute for Regenerative Medicine (*CIRM*). To fund a portion of our future research and development programs, we may apply for additional grant funding from such or similar governmental organizations. However, funding by these governmental organizations may be significantly reduced or eliminated in the future for a number of reasons, including the impact of the ongoing COVID-19 pandemic. For example, some programs are subject to a yearly appropriations process in Congress. In addition, we may not receive funds under future grants because of budgeting constraints of the agency administering the program. Therefore, we cannot assure you that we will receive any future grant funding from any government organization or otherwise. A restriction on the government funding available to us could reduce the resources that we would be able to devote to future research and development efforts. Such a reduction could delay the introduction of new products and hurt our competitive position.

Our ability to use net operating losses to offset future taxable income is subject to certain limitations.

As of March 31, 2020, we had federal and state net operating loss carryforwards of approximately \$125.1 million and \$64.1 million, respectively, which begin to expire in fiscal 2021 and will continue to expire in future periods. Under Section 382 of the Internal Revenue Code of 1986, as amended (the *Code*), changes in our ownership may limit the amount of our net operating loss carryforwards that could be utilized annually to offset our future taxable income, if any. This limitation would generally apply in the event of a cumulative change in ownership of our company of more than 50% within a three-year period. Any such limitation may significantly reduce our ability to utilize our net operating loss carryforwards and tax credit carryforwards before they expire. Any such limitation, whether as the result of future offerings, prior private placements, sales of our common stock by our existing stockholders or additional sales of our common stock by us in the future, could have a material adverse effect on our results of operations in future years. We have not completed a study to assess whether an ownership change for purposes of Section 382 has occurred, or whether there have been multiple ownership changes since our inception, due to the significant costs and complexities associated with such study.

General Company-Related Risks

If we fail to attract and retain senior management and key scientific personnel, we may be unable to successfully produce, develop and commercialize our product candidates.

Our success depends in part on our continued ability to attract, retain and motivate highly qualified management and scientific and technical personnel. We are highly dependent upon our Chief Executive Officer, President and Chief Scientific Officer, Chief Medical Officer, Chief Financial Officer, and Vice President – Corporate Development as well as our other employees, consultants and scientific collaborators. As of the date of this Annual Report, we have nine full-time employees, which may make us more reliant on our individual employees than companies with a greater number of employees. The loss of services of any of these individuals could delay or prevent the successful development of our product candidates or disrupt our administrative functions.

Although we have not historically experienced unique difficulties attracting and retaining qualified employees, we could experience such problems in the future. For example, competition for qualified personnel in the biotechnology and pharmaceuticals field is intense. We will need to hire additional personnel should we elect to expand our research and development and administrative activities. We may not be able to attract and retain quality personnel on acceptable terms.

In addition, we rely on a broad and diverse range of strategic consultants and advisors, including manufacturing, nonclinical and clinical development, and regulatory advisors and CROs, to assist us in designing and implementing our research and development and regulatory strategies and plans for our product candidates. Our consultants and advisors may be employed by employers other than us and may have commitments under consulting or advisory contracts with other entities that may limit their availability to us.

As we seek to advance development of our product candidates, we may need to expand our research and development capabilities and/or contract with third parties to provide these capabilities for us. As our operations expand, we expect that we will need to manage additional relationships with various strategic partners and other third parties. Future growth will impose significant added responsibilities on members of management. Our future financial performance and our ability to develop and commercialize our product candidates and to compete effectively will depend, in part, on our ability to manage any future growth effectively. To that end, we must be able to manage our research and development efforts effectively and hire, train and integrate additional management, administrative and technical personnel. The hiring, training and integration of new employees may be more difficult, costly and/or time-consuming for us because we have fewer resources than a larger organization. We may not be able to accomplish these tasks, and our failure to accomplish any of them could prevent us from successfully growing the Company.

If product liability lawsuits are brought against us, we may incur substantial liabilities and may be required to limit commercialization of our product candidates.

As we develop our product candidates, either on our own or in collaboration with others, we will face inherent risks of product liability as a result of the required clinical testing of such product candidates, and will face an even greater risk if we or our collaborators commercialize any such product candidates. For example, we may be sued if PH94B, PH10, AV-101, any NCE, other product candidate, or RM product candidate 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 product candidates. Even successful defense would require significant financial and management resources. Regardless of the merits or eventual outcome, liability claims may result in:

- decreased demand for product candidates that we may develop;
- injury to our reputation;
- withdrawal of clinical trial participants;
- costs to defend the related litigation;
- a diversion of management's time and our resources;
- substantial monetary awards to trial participants or patients; or
- product recalls, withdrawals or labeling, marketing or promotional restrictions.

Our inability to obtain and retain sufficient product liability insurance at an acceptable cost to protect against potential product liability claims could prevent or inhibit the commercialization of products we develop. Although we maintain general and product liability 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 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.

As a public company, we incur significant administrative workload and expenses to comply with U.S. regulations and requirements imposed by the Nasdaq Stock Market concerning corporate governance and public disclosure.

As a public company with common stock listed on the Nasdaq Capital Market, we must comply with various laws, regulations and requirements, including certain provisions of the Sarbanes-Oxley Act of 2002, as well as rules implemented by the SEC and the Nasdaq Stock Market. Complying with these statutes, regulations and requirements, including our public company reporting requirements, continues to occupy a significant amount of the time of management and involves significant accounting, legal and other expenses. Our efforts to comply with these regulations are likely to result in increased general and administrative expenses and management time and attention directed to compliance activities.

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

Our results of operations could be adversely affected by global political conditions, as well as general conditions in the global economy and in the global financial and stock markets. Global financial and political crises cause extreme volatility and disruptions in the capital and credit markets. A severe or prolonged economic downturn, such as the recent economic downturn triggered by the ongoing COVID-19 pandemic, could result in a variety of risks to our business, including, weakened demand for our product candidates and our ability to raise additional capital when needed on acceptable terms, if at all. A weak or declining economy could also strain our suppliers, possibly resulting in supply disruption, or cause our customers to delay making payments for our services. Any of the foregoing could harm our business and we cannot anticipate all of the ways in which the current economic climate and financial market conditions could adversely impact our business.

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

Natural disasters could severely disrupt our operations, and have a material adverse effect on our business, results of operations, financial condition and prospects. If a natural disaster, power outage or other event occurred that prevented us from using all or a significant portion of our headquarters, that damaged critical infrastructure, such as the manufacturing facilities of our third-party CMOs, or that otherwise disrupted operations, it may be difficult or, in certain cases, impossible for us to continue our business for a substantial period of time. The disaster recovery and business continuity plans we have in place may prove inadequate in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans, which could have a material adverse effect on our business.

Our business and operations would suffer in the event of cybersecurity or other system failures. Our business depends on complex information systems, and any failure to successfully maintain these systems or implement new systems to handle our changing needs could result in a material disruption of our product candidates' development programs or otherwise materially harm our operations.

In the ordinary course of our business, we collect and store sensitive data, including intellectual property, our proprietary business information and that of our suppliers, as well as personally identifiable information of employees. Similarly, our third-party CROs, CMOs and other contractors and consultants possess certain of our sensitive data. The secure maintenance of this information is material to our operations and business strategy. Despite the implementation of security measures, our internal computer systems and those of our third-party CROs, CMOs and other contractors and consultants are vulnerable to attacks by hackers, damage from computer viruses, unauthorized access, breach due to employee error, malfeasance or other disruptions, natural disasters, terrorism and telecommunication and electrical failures. Additionally, having shifted to remote working arrangements, we also face a heightened risk of cybersecurity attacks or data security incidents and are more dependent on internet and telecommunications access and capabilities. Any such attack or breach could compromise our networks and the information stored there could be accessed, publicly disclosed, lost or stolen. The legislative and regulatory landscape for privacy and data protection continues to evolve, and there has been an increasing amount of focus on privacy and data protection issues with the potential to affect our business, including recently enacted laws in a majority of states requiring security breach notification. Thus, any access, disclosure or other loss of information, including our data being breached at our partners or third-party providers, could result in legal claims or proceedings and liability under laws that protect the privacy of personal information, disruption of our operations, and damage to our reputation, which could adversely affect our business.

While we have not experienced any such system failure, accident, or security breach to date, if such an event were to occur and cause interruptions in our operations, it could result in a material disruption of our programs. For example, the loss of clinical trial data for PH94B, PH10, AV-101 or other product candidates could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. To the extent that any disruption or security breach results in a loss of or damage to our data or applications or other data or applications relating to our technology or product candidates, or inappropriate disclosure of confidential or proprietary information, we could incur liabilities and the further development of our product candidates could be delayed.

We may acquire businesses or product candidates, or form strategic alliances, in the future, and we may not realize the benefits of such acquisitions.

We may acquire additional businesses or product candidates, form strategic alliances or create joint ventures with third parties that we believe will complement or augment our existing business. If we acquire businesses with promising markets or technologies, we may not be able to realize the benefit of acquiring such businesses if we are unable to successfully integrate them with our existing operations and company culture. We may encounter numerous difficulties in developing, manufacturing and marketing any new product candidates resulting from a strategic alliance, licensing transaction or acquisition that delay or prevent us from realizing their expected benefits or enhancing our business. We cannot assure you that, following any such acquisition or licensing transaction, we will achieve the expected synergies to justify the transaction.

Current politics in the U.S. could diminish the value of the pharmaceutical industry, thereby diminishing the value of our securities.

The current political environment in the U.S. has led many incumbents and political candidates to propose various measures to reduce the prices for pharmaceuticals. As we near the U.S. presidential 2020 elections, it is likely that these proposals will receive increasing publicity which, in turn, may cause the investing public to reduce the perceived value of pharmaceutical companies. Any decrease in the overall perception of the pharmaceutical industry may have an adverse impact on our share price and may limit our ability to raise capital needed to continue our drug development programs.

Risks Related to Our Intellectual Property Rights

If we are unable to adequately protect our proprietary technology or obtain and maintain issued patents that are sufficient to protect our product candidates, others could compete against us more directly, which would have a material adverse impact on our business, results of operations, financial condition and prospects.

We strive to protect and enhance the proprietary technologies that we believe are important to our business, including seeking patents intended to cover our product candidates, their compositions and formulations, their methods of use and methods of manufacturing and any other inventions we consider important to the development of our business. We also rely on trade secrets to protect aspects of our business that are not amenable to, or that we do not consider appropriate for, patent protection.

Our success will depend significantly on our ability to obtain and maintain patent and other proprietary protection for commercially important technology, inventions and know-how related to our business, to defend and enforce our patents, to preserve the confidentiality of our trade secrets and to operate without infringing the valid and enforceable patents and proprietary rights of third parties. We also rely on know-how, continuing technological innovation and in-licensing opportunities to develop, strengthen and maintain the proprietary position of our product candidates. We own and have licensed patents and patent applications related to product candidates PH94B, PH10, AV-101 and also to hPSC technology.

Although we own and have licensed issued and allowed patents and patent applications relating to PH94B, PH10 and AV-101 in the U.S., selected countries in the EU and other jurisdictions, we cannot yet provide any assurances that any of our pending U.S. and additional foreign patent applications will mature into issued patents and, if they do, that any of our patents will include claims with a scope sufficient to protect our product candidates or otherwise provide any competitive advantage.

Moreover, other parties may have developed technologies that may be related or competitive to our approach and may have filed or may file patent applications and may have received or may receive patents that may overlap or conflict with our patent properties, for example, either by claiming the same methods or formulations or by claiming subject matter that could dominate our patent position. Such third-party patent positions may limit or even eliminate our ability to obtain or maintain patent protection.

The uncertainty about adequate protection includes changes to the patent laws through either legislative action to change statutory patent law or court action that may reinterpret existing law in ways affecting the scope or validity of issued patents. Moreover, relevant laws differ from country-to-country.

The patent positions of biotechnology and pharmaceutical companies, including our patent portfolio with respect to our product candidates, involve complex legal and factual questions, and, therefore, the issuance, scope, validity and enforceability of any additional patent claims that we may obtain cannot be predicted with certainty.

Our ability to obtain valid and enforceable patents depends in large measure on whether the differences between our technology and the prior art allow our inventions to be patentable over relevant prior art. Such prior art includes scientific publications, investment blogs, granted patents and published patent applications. Patent uncertainty cannot be eliminated because of the potential existence of other prior art about which we are currently unaware that may be relevant to our patent applications and patents, which may prevent a pending patent application from being granted or result in an issued patent being held invalid or unenforceable.

In addition, some patent-related uncertainty exists because of the challenge in finding and addressing all of the relevant and material prior art in the biotechnology and pharmaceutical fields. For example, there are numerous reports in the scientific literature of compounds that target similar cellular receptors as certain of our product candidates or that were evaluated in early (often pre-clinical) studies. In addition, even some reports in the trade press and public announcements made by us before the filing date of our AV-101 patent applications mentioned that AV-101 was in development for certain therapeutic purposes. For example, we published a web post on the NIH clinical trials website prior to our filing of our initial AV-101 patent applications, which describes unit doses for a then future study, but does not mention treatment of depression and does not provide any preclinical or clinical study data relating to depression or any other medical condition, disease or disorder. This post was not submitted to the United States Patent and Trademark Office (USPTO) in our two granted U.S. patents related to (i) unit dose formulations of AV-101 effective to treat depression and (ii) methods of treating depression with AV-101, respectively. However, it was submitted in two depression-related AV-101 patent applications that have similar claims and we have received Notices of Allowance from the USPTO in those applications. We are considering entering this web post in the record of the aforementioned two issued U.S. patents. Another source of uncertainty pertains to patent properties that were in-licensed by us for which prior art submissions were under the control of the licensor. We rely on these licensors to have satisfied the relevant disclosure obligations.

In the event any previously published prior art is deemed to be invalidating prior art, it may cause certain of our issued patents to be invalid and/or unenforceable which would cause us to lose at least part, and perhaps all, of the patent protection on our product candidates. Such a loss of patent protection would have a material adverse impact on our business.

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

The USPTO, the European Patent Office (EPO) and various other foreign governmental patent agencies require compliance with a number of procedural, documentary, fee payment and other provisions during the patent process. There are situations in which noncompliance can result in abandonment or lapse of a patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, competitors might be able to enter the market earlier than would otherwise have been the case.

Even if patents do successfully issue, third parties may challenge the validity, enforceability or scope of such issued patents or any other issued patents we own or license, which may result in such patents being narrowed, invalidated or held unenforceable.

United States and foreign patents and patent applications may be subject to various types of infringement and validity proceedings, including interference proceedings, *ex parte* reexamination, *inter partes* review proceedings, supplemental examination and challenges in district court. Patents may be subjected to opposition, post-grant review, invalidity actions, or comparable proceedings lodged in various foreign, both national and regional, patent offices or courts. These proceedings could result in loss of the patent or denial of the patent application or loss or reduction in the scope of one or more of the claims of the patent or patent in such a way that they no longer cover our product candidates or competitive products.

Furthermore, though an issued patent is presumed valid and enforceable, its issuance is not conclusive as to its validity or its enforceability and it may not provide us with adequate proprietary protection or competitive advantages against competitors with similar products. Even if a patent issues and is held to be valid and enforceable, competitors may be able to design around our patents, for example, by using pre-existing or newly developed technology. Other parties may develop and obtain patent protection for more effective technologies, designs or methods.

If we or one of our licensing partners initiated legal proceedings against a third-party to enforce a patent covering one of our product candidates, including patents related to PH94B, PH10 or AV-101, the defendant could counterclaim that the patent covering our product candidate is invalid and/or unenforceable. In patent litigation in the United States, defendant counterclaims alleging invalidity and/or unenforceability are commonplace. Grounds for a validity challenge include alleged failures to meet any of several statutory requirements, including lack of novelty, obviousness or non-enablement. Grounds for unenforceability assertions include allegations that someone connected with prosecution of the patent withheld relevant information from the USPTO or made a misleading statement during prosecution. Third parties may also raise similar claims before administrative bodies in the United States or abroad, even outside the context of litigation. If a defendant were to prevail on a legal assertion of invalidity and/or unenforceability, we would lose at least part, and perhaps all, of the patent protection on our product candidates. Such a loss of patent protection would have a material adverse impact on our business.

In addition, such patent-related proceedings may be costly. Thus, any patent properties that we may own or exclusively license ultimately may not provide commercially meaningful protection against competitors. Furthermore, an adverse decision in an interference proceeding can result in a third party receiving the patent right sought by us, which in turn could affect our ability to develop, market or otherwise commercialize our product candidates.

We may not be able to prevent the unauthorized disclosure or use of our technical knowledge or trade secrets by consultants, vendors, or former or current employees. The laws of some foreign countries do not protect our proprietary rights to the same extent as the laws of the United States, and we may encounter significant problems in protecting our proprietary rights in these countries. If these developments were to occur, they could have a material adverse effect on our sales.

Our ability to enforce our patent rights also depends on our ability to detect infringement. It is difficult to detect infringers who do not advertise the components or manufacturing processes that are used in their products. Moreover, it may be difficult or impossible to obtain evidence of infringement in a competitor's or potential competitor's product. Any litigation to enforce or defend our patent rights, even if we were to prevail, could be costly and time-consuming and would divert the attention of our management and key personnel from our business operations. We may not prevail in any lawsuits that we initiate and the damages or other remedies awarded if we were to prevail may not be commercially meaningful.

In addition, proceedings to enforce or defend our patents could put our patents at risk of being invalidated, held unenforceable, or interpreted narrowly. Such proceedings could also provoke third parties to assert claims against us, including that some or all of the claims in one or more of our patents are invalid or otherwise unenforceable. If any patents covering our product candidates are invalidated or found unenforceable, our financial position and results of operations would be materially and adversely impacted. In addition, if a court found that valid, enforceable patents held by third parties covered our product candidates, our financial position and results of operations would also be materially and adversely impacted.

Overall, the degree of future protection for our proprietary rights is uncertain, and we cannot ensure that:

- any issued patents related to PH94B, PH10, AV-101 or any pending patent applications, if issued and challenged by others, will include or maintain claims having a scope sufficient to protect PH94B, PH10, AV-101 or any other products or product candidates against generic or other competition, particularly considering that any patent rights to these compounds *per se* have expired;

- any of our pending patent applications will issue as patents at all;
- we will be able to successfully commercialize our product candidates, if approved, before our relevant patents expire;
- we were the first to make the inventions covered by each of our patents and pending patent applications;
- we were the first to file patent applications for these inventions;
- others will not develop similar or alternative technologies that do not infringe our patents;
- others will not use pre-existing technology to effectively compete against us;
- any of our patents, if issued, will ultimately be found to be valid and enforceable, including on the basis of prior art relating to our patent applications and patents;
- any patents currently held or issued to us in the future will provide a basis for an exclusive market for our commercially viable products, will provide us with any competitive advantages or will not be challenged by third parties;
- we will develop additional proprietary technologies or product candidates that are separately patentable; or
- our commercial activities or products will not infringe upon the patents or proprietary rights of others.

We also rely upon unpatented trade secrets, unpatented know-how and continuing technological innovation to develop and maintain our competitive position, which we seek to protect, in part, by confidentiality agreements with our employees and our collaborators and consultants. It is possible that technology relevant to our business will be independently developed by a person that is not a party to such an agreement. Furthermore, if the employees, collaborators and consultants who are parties to these agreements breach or violate the terms of these agreements, we may not discover or have adequate remedies for any such breach or violation, and we could lose our trade secrets through such breaches or violations. Further, our trade secrets could otherwise become known or be independently discovered by our competitors.

Third parties may initiate legal proceedings against us alleging that we infringe their intellectual property rights, which may prevent or delay our product development efforts and stop us from commercializing candidate products or increase the costs of commercializing them, if approved. Also, we may file counterclaims or initiate other legal proceedings against third parties to challenge the validity or scope of their intellectual property rights, the outcomes of which also would be uncertain and could have a material adverse effect on the success of our business.

We cannot assure that our business, product candidates and methods do not or will not infringe the patents or other intellectual property rights of third parties. Third parties may initiate legal proceedings against us or our licensors or collaborators alleging that we or our licensors or collaborators infringe their intellectual property rights. In addition, we or our licensors or collaborators may file counterclaims in such proceedings or initiate separate legal proceedings against third parties to challenge the validity or scope of their intellectual property rights, including in oppositions, interferences, reexaminations, *inter partes* reviews or derivation proceedings before the United States or other jurisdictions.

Our success will depend in part on our ability to operate without infringing the intellectual property and proprietary rights of third parties. Success also will depend on our ability to prevail in litigation if we are sued for infringement or to resolve litigation matters with rights and at costs favorable to us.

The pharmaceutical industry is characterized by extensive litigation regarding patents and other intellectual property rights. Other parties may allege that our product candidates or the use of our technologies infringes patent claims or other intellectual property rights held by them or that we are employing their proprietary technology without authorization. As we continue to develop and, if approved, commercialize our current product candidates and future product candidates, competitors may claim that our technology infringes their intellectual property rights as part of their business strategies designed to impede our successful commercialization. There may be third-party patents or patent applications with claims to materials, formulations, methods of manufacture or methods for treatment related to the use or manufacture of our product candidates. Because patent applications can take many years to issue, third parties may have currently pending patent applications that later result in issued patents that our product candidates may infringe, or that such third parties assert are infringed by our technologies.

The foregoing types of proceedings can be expensive and time-consuming and many of our own or our licensors' or collaborators' adversaries in these proceedings may have the ability to dedicate substantially greater resources to prosecuting these legal actions than we or our licensors or collaborators can. Our defense of litigation or other proceedings may fail and, even if successful, may result in substantial costs and distract our management and other employees. We may not be able to prevent, alone or with our licensors, misappropriation of our intellectual property rights, particularly in countries where the laws may not protect those rights as fully as in the United States or European Union.

The outcome of intellectual property litigation is subject to uncertainties that cannot be adequately quantified in advance. The coverage of patents is subject to interpretation by the courts, and the interpretation is not always uniform. If we are sued for patent infringement, we would need to demonstrate that our product candidates, products or methods either do not infringe the patent claims of the relevant patent or that the patent claims are invalid, and we may not be able to do this. Even if we are successful in these proceedings, we may incur substantial costs and the time and attention of our management and scientific personnel could be diverted in pursuing these proceedings, which could have a material adverse effect on us. In addition, we may not have sufficient financial resources to bring these actions to a successful conclusion.

An unfavorable outcome in the foregoing kinds of proceedings could require us or our licensors or collaborators to cease using the related technology or developing or commercializing our product candidates, or to attempt to license rights to it from the prevailing party. Our business could be harmed if the prevailing party does not offer us or our licensors or collaborators a license on commercially reasonable terms or at all. Even if we or our licensors or collaborators obtain a license, it may be non-exclusive, thereby giving our competitors access to the same technologies licensed to us or our licensors or collaborators.

In addition, we could be found liable for monetary damages, including treble damages and attorneys' fees, if we are found to have willfully infringed a patent. A finding of infringement could prevent us from commercializing our product candidates or force us to cease some of our business operations, which could materially harm our business.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a material adverse effect on the price of our common stock.

Patent and other types of intellectual property litigation can involve complex factual and legal questions, and their outcomes are uncertain. Any claim relating to intellectual property infringement that is successfully asserted against us may require us to pay substantial damages, including treble damages and attorney's fees if we are found to have willfully infringed a third party's patents, for past use of the asserted intellectual property and royalties and other consideration going forward if we are forced to take a license. In addition, if any such claim is successfully asserted against us and we could not obtain such a license, we may be forced to stop or delay developing, manufacturing, selling or otherwise commercializing our product candidates.

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

In addition, intellectual property litigation or claims could force us to do one or more of the following:

- cease developing, selling or otherwise commercializing our product candidates;
- pay substantial damages for past use of the asserted intellectual property;
- obtain a license from the holder of the asserted intellectual property, which license may not be available on reasonable terms, if at all; and
- in the case of trademark claims, redesign, or rename, some or all of our product candidates to avoid infringing the intellectual property rights of third parties, which may not be possible and, even if possible, could be costly and time-consuming.

Any of these risks coming to fruition could have a material adverse effect on our business, results of operations, financial condition and prospects.

We may be subject to claims challenging the inventorship or ownership of our patents and other intellectual property.

We enter into confidentiality and intellectual property assignment agreements with our employees, consultants, outside scientific collaborators, sponsored researchers and other advisors. These agreements generally provide that inventions conceived by the party in the course of rendering services to us will be our exclusive property. However, these agreements may not be honored and may not effectively assign intellectual property rights to us. For example, even if we have a consulting agreement in place with an academic advisor pursuant to which such academic advisor is required to assign any inventions developed in connection with providing services to us, such academic advisor may not have the right to assign such inventions to us, as it may conflict with his or her obligations to assign their intellectual property to his or her employing institution.

Litigation may be necessary to defend against these and other claims challenging inventorship or ownership. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, such as exclusive ownership of, or right to use, valuable intellectual property. Such an outcome could have a material adverse effect on our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees.

We do not seek to protect our intellectual property rights in all jurisdictions throughout the world and we may not be able to adequately enforce our intellectual property rights even in the jurisdictions where we seek protection.

Filing, prosecuting and defending patents on product candidates in all countries and jurisdictions throughout the world is prohibitively expensive, and our intellectual property rights in some countries outside the U.S. could be less extensive than those in the United States, assuming that rights are obtained in the U.S. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the U.S. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the U.S., or from selling or importing products made using our inventions in and into the United States or other jurisdictions. The statutory deadlines for pursuing patent protection in individual foreign jurisdictions are based on the priority date of each of our patent applications. For the pending patent applications relating to AV-101, as well as for other of the patent families that we own or license, the relevant statutory deadlines have not yet expired. Thus, for each of the patent families that we believe provide coverage for our lead product candidates or technologies, we will need to decide whether and where to pursue protection outside the U.S.

Competitors may use our technologies in jurisdictions where we do not pursue and obtain patent protection to develop their own products and further, may export otherwise infringing products to territories where we have patent protection, but enforcement is not as strong as that in the U.S. 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. Even if we pursue and obtain issued patents in particular jurisdictions, our patent claims or other intellectual property rights may not be effective or sufficient to prevent third parties from so competing.

The laws of some foreign countries do not protect intellectual property rights to the same extent as the laws of the U.S. 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 protection, especially those relating to biotechnology and pharmaceuticals. This could make it difficult for us to stop the infringement of our patents, if obtained, 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 under certain circumstances. In addition, many countries limit the enforceability of patents against third parties, including government agencies or government contractors. In these countries, patents may provide limited or no benefit. Patent protection must ultimately be sought on a country-by-country basis, which is an expensive and time-consuming process with uncertain outcomes. Accordingly, we may choose not to seek patent protection in certain countries, and we will not have the benefit of patent protection in such countries.

An unfavorable outcome could require us or our licensors or collaborators to cease using the related technology or developing or commercializing our product candidates, or to attempt to license rights to it from the prevailing party. Our business could be harmed if the prevailing party does not offer us or our licensors or collaborators a license on commercially reasonable terms or at all. Even if we or our licensors or collaborators obtain a license, it may be non-exclusive, thereby giving our competitors access to the same technologies licensed to us or our licensors or collaborators. In addition, we could be found liable for monetary damages, including treble damages and attorneys' fees, if we are found to have willfully infringed a patent. A finding of infringement could prevent us from commercializing our product candidates or force us to cease some of our business operations, which could materially harm our business.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a material adverse effect on the price of our common stock.

Furthermore, proceedings to enforce our patent rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly, could put our patent applications at risk of not issuing and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate and the damages or other remedies awarded, if any, may not be commercially meaningful. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license.

We are dependent, in part, on licensed intellectual property. If we were to lose our rights to licensed intellectual property, we may not be able to continue developing or commercializing our product candidates, if approved. If we breach any of the agreements under which we license the use, development and commercialization rights to our product candidates or technology from third parties or, in certain cases, we fail to meet certain development or payment deadlines, we could lose license rights that are important to our business.

For our PH10, PH94B and certain stem cell technologies, we are a party to a number of license agreements under which we are granted rights to intellectual properties that are or could become important to our business, and we expect that we may need to enter into additional license agreements in the future. Our existing license agreements impose, and we expect that future license agreements will impose on us, various development, regulatory and/or commercial diligence obligations, payment of fees, milestones and/or royalties and other obligations. If we fail to comply with our obligations under these agreements, or we are subject to a bankruptcy, the licensor may have the right to terminate the license, in which event we would not be able to develop or market products, which could be covered by the license. Our business could suffer, for example, if any current or future licenses terminate, if the licensors fail to abide by the terms of the license, if the licensed patents or other rights are found to be invalid or unenforceable, or if we are unable to enter into necessary licenses on acceptable terms.

As we have done previously, we may need to obtain licenses from third parties to advance our research or allow commercialization of our product candidates, and we cannot provide any assurances that third-party patents do not exist that might be enforced against our current product candidates or future products in the absence of such a license. We may fail to obtain any of these licenses on commercially reasonable terms, if at all. Even if we are able to obtain a license, it may be non-exclusive, thereby giving our competitors access to the same technologies licensed to us. In that event, we may be required to expend significant time and resources to develop or license replacement technology. If we are unable to do so, we may be unable to develop or commercialize the affected product candidates, which could materially harm our business and the third parties owning such intellectual property rights could seek either an injunction prohibiting our sales, or, with respect to our sales, an obligation on our part to pay royalties and/or other forms of compensation.

Licensing of intellectual property is of critical importance to our business and involves complex legal, business and scientific issues. Disputes may arise between us and our licensors regarding intellectual property subject to a license agreement, including:

- the scope of rights granted under the license agreement and other interpretation-related issues;
- whether and the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the licensing agreement;
- our right to sublicense patent and other rights to third parties under collaborative development relationships;
- our diligence obligations with respect to the use of the licensed technology in relation to our development and commercialization of our product candidates, and what activities satisfy those diligence obligations; and
- the ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and us and our partners.

If disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on acceptable terms, we may be unable to successfully develop and commercialize the affected product candidates.

We have entered into several licenses, both in-license agreements and out-license agreements, to support and leverage our various stem cell technology-related programs. We may enter into additional license(s) to third-party intellectual property that are necessary or useful to our business. Our current licenses, including the EverInsight Agreement and the Bayer Agreement, and any future licenses that we may enter into impose various royalty payments, milestone, and other obligations on us. For example, the licensor may retain control over patent prosecution and maintenance under a license agreement, in which case, we may not be able to adequately influence patent prosecution or prevent inadvertent lapses of coverage due to failure to pay maintenance fees. If we fail to comply with any of our obligations under a current or future license agreement, our licensor(s) may allege that we have breached our license agreement and may accordingly seek to terminate our license with them. In addition, future licensor(s) may decide to terminate our license at will. Termination of any of our current or future licenses could result in our loss of the right to use the licensed intellectual property, which could materially adversely affect our ability to develop and commercialize a product candidate or product, if approved, as well as harm our competitive business position and our business prospects.

In addition, if our licensors fail to abide by the terms of the license, if the licensors fail to prevent infringement by third parties, if the licensed patents or other rights are found to be invalid or unenforceable, or if we are unable to enter into necessary licenses on acceptable terms our business could suffer.

Some intellectual property which we have licensed may have been discovered through government funded programs and thus may be subject to federal regulations such as “march-in” rights, certain reporting requirements, and a preference for U.S. industry. Compliance with such regulations may limit our exclusive rights, subject us to expenditure of resources with respect to reporting requirements, and limit our ability to contract with non-U.S. manufacturers.

Some of the intellectual property rights we have licensed or will license in the future may have been generated through the use of U.S. government funding and may therefore be subject to certain federal regulations. As a result, the U.S. government may have certain rights to intellectual property embodied in our current or future product candidates pursuant to the Bayh-Dole Act of 1980 (*Bayh-Dole Act*). These U.S. government rights in certain inventions developed under a government-funded program include a non-exclusive, non-transferable, irrevocable worldwide license to use inventions for any governmental purpose.

In addition, the U.S. government has the right to require us to grant exclusive, partially exclusive, or non-exclusive licenses to any of these inventions to a third party if it determines that: (i) adequate steps have not been taken to commercialize the invention; (ii) government action is necessary to meet public health or safety needs; or (iii) government action is necessary to meet requirements for public use under federal regulations (also referred to as “march-in rights”). The U.S. government also has the right to take title to these inventions if we fail, or the applicable licensor fails, to disclose the invention to the government and fail to file an application to register the intellectual property within specified time limits. Also, the U.S. government may acquire title to these inventions in any country in which a patent application is not filed within specified time limits.

Intellectual property generated under a government funded program is further subject to certain reporting requirements, compliance with which may require us, or the applicable licensor, to expend substantial resources. In addition, the U.S. government requires that any products embodying the subject invention or produced through the use of the subject invention be manufactured substantially in the U.S. The manufacturing preference requirement can be waived if the owner of the intellectual property can show that reasonable but unsuccessful efforts have been made to grant licenses on similar terms to potential licensees that would be likely to manufacture substantially in the U.S. or that under the circumstances domestic manufacture is not commercially feasible. This preference for U.S. manufacturers may limit our ability to contract with non-U.S. product manufacturers for products covered by such intellectual property.

In the event we apply for additional U.S. government funding, and we discover compounds or drug candidates as a result of such funding, intellectual property rights to such discoveries may be subject to the applicable provisions of the Bayh-Dole Act.

If we do not obtain additional protection under the Hatch-Waxman Amendments and similar foreign legislation by extending the patent terms and obtaining data exclusivity for our product candidates, our business may be materially harmed.

In the U.S., depending upon the timing, duration and specifics of FDA marketing approval of our product candidates, one or more of the U.S. patents we own or license may be eligible for limited patent term restoration under the Drug Price Competition and Patent Term Restoration Act of 1984, 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, we may not be granted an extension because of, for example, failing to apply within applicable deadlines, failing to apply prior to expiration of relevant patents or otherwise failing to satisfy applicable requirements. For example, we may not be granted an extension, for example, if the active ingredient of PH94B, PH10 or AV-101 is used in another drug company’s product candidate and that product candidate is the first to obtain FDA approval.

Moreover, the applicable time period or the scope of patent protection afforded could be less than we request. If we are unable to obtain patent term extension or restoration or the term of any such extension is less than we request, our competitors may obtain approval of competing products following our patent expiration, and our ability to generate revenues could be materially adversely affected.

Similar kinds of patent term and regulatory and data protection periods are available outside of the U.S. We will pursue such opportunities to extend the exclusivity of our products, but we cannot predict the availability of such exclusivity pathways or that we will be successful in pursuing them.

Changes in U.S. patent law could diminish the value of patents in general, thereby impairing our ability to protect our products.

As is the case with other pharmaceutical and biotechnology companies, our success is heavily dependent on intellectual property, particularly patents. Obtaining and enforcing patents in the biotechnology industry involve both technological and legal complexity, and is therefore costly, time-consuming and inherently uncertain. In addition, the U.S. in recent years enacted and is currently implementing wide-ranging patent reform legislation: the Leahy-Smith America Invents Act, referred to as the America Invents Act. The America Invents Act includes a number of significant changes to U.S. patent law. These include provisions that affect the way patent applications will be prosecuted and may also affect patent litigation. It is not yet clear what, if any, impact the America Invents Act will have on the operation of our business. However, the America Invents Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of any patents that may issue from our patent applications, all of which could have a material adverse effect on our business and financial condition.

In addition, recent U.S. Supreme Court rulings have narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. The full impact of these decisions is not yet known. For example, on March 20, 2012 in *Mayo Collaborative Services, DBA Mayo Medical Laboratories, et al. v. Prometheus Laboratories, Inc.*, the Court held that several claims drawn to measuring drug metabolite levels from patient samples and correlating them to drug doses were not patentable subject matter. The decision appears to impact diagnostics patents that merely apply a law of nature via a series of routine steps and it has created uncertainty around the ability to obtain patent protection for certain inventions. Additionally, on June 13, 2013 in *Association for Molecular Pathology v. Myriad Genetics, Inc.*, the Court held that claims to isolated genomic DNA are not patentable, but claims to complementary DNA molecules are patent eligible because they are not a natural product. The effect of the decision on patents for other isolated natural products is uncertain.

Additionally, on March 4, 2014, the USPTO issued a memorandum to patent examiners providing guidance for examining claims that recite laws of nature, natural phenomena or natural products under the Myriad and Prometheus decisions. This guidance did not limit the application of Myriad to DNA but, rather, applied the decision to other natural products. Further, in 2015, in *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, the Court of Appeals for the Federal Circuit held that methods for detecting fetal genetic defects were not patent eligible subject matter. Other more recent court decisions and related USPTO examination guidelines must be taken into account, particularly as they relate to changes in what types of inventions are eligible for patent protection. Foreign patent and intellectual property laws also are evolving and are not predictable as to their impact on the Company and other biopharmaceutical companies.

In addition to increasing uncertainty regarding our ability to obtain future patents, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on these and other decisions by the U.S. Congress, the federal courts and the USPTO, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce any patents that may issue in the future.

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

Certain of our current employees have been, and certain of our future employees may have been, previously employed at other biotechnology or pharmaceutical companies, including our competitors or potential competitors. We also engage advisors and consultants who are concurrently employed at universities or who perform services for other entities.

Although we are not aware of any claims currently pending or threatened against us, we may be subject to claims that we or our employees, advisors or consultants have inadvertently or otherwise used or disclosed intellectual property, including trade secrets or other proprietary information, of a former employer or other third party. We have and may in the future also be subject to claims that an employee, advisor or consultant performed work for us that conflicts with that person's obligations to a third party, such as an employer, and thus, that the third party has an ownership interest in the intellectual property arising out of work performed for us. Litigation may be necessary to defend against these claims. Even if we are successful in defending against these claims, litigation could result in substantial costs and be a distraction to management. If we fail in defending such claims, in addition to paying monetary claims, we may lose valuable intellectual property rights or personnel. A loss of key personnel or their work product could hamper or prevent our ability to commercialize our product candidates, which would materially adversely affect our commercial development efforts.

Numerous factors may limit any potential competitive advantage provided by our intellectual property rights.

The degree of future protection afforded by our intellectual property rights is uncertain because intellectual property rights have limitations, and may not adequately protect our business, provide a barrier to entry against our competitors or potential competitors, or permit us to maintain our competitive advantage. Moreover, if a third party has intellectual property rights that cover the practice of our technology, we may not be able to fully exercise or extract value from our intellectual property rights. The following examples are illustrative:

- others may be able to develop and/or practice technology that is similar to our technology or aspects of our technology but that is not covered by the claims of patents, should such patents issue from our patent applications;
- we might not have been the first to make the inventions covered by a pending patent application that we own;
- we might not have been the first to file patent applications covering an invention;
- others may independently develop similar or alternative technologies without infringing our intellectual property rights;
- pending patent applications that we own or license may not lead to issued patents;
- patents, if issued, that we own or license may not provide us with any competitive advantages, or may be held invalid or unenforceable or be narrowed, as a result of legal challenges by our competitors;
- third parties may compete with us in jurisdictions where we do not pursue and obtain patent protection;
- we may not be able to obtain and/or maintain necessary or useful licenses on reasonable terms or at all; and
- the patents of others may have an adverse effect on our business.

Should any of these events occur, they could significantly harm our business and results of operations.

With regard to our stem cell technology, if, instead of identifying DR candidates based on information available to us in the public domain, we seek to in-license DR candidates from biotechnology, medicinal chemistry and pharmaceutical companies, academic, governmental and nonprofit research institutions, including the NIH, or other third parties, there can be no assurances that we will obtain material ownership or economic participation rights over intellectual property we may derive from such licenses or similar rights to the DR NCEs that we may produce and develop. If we are unable to obtain ownership or substantial economic participation rights over intellectual property related to DR NCEs we produce and develop, our DR business may be adversely affected.

Risks Related to our Securities

If we fail to comply with the continued listing requirements of the Nasdaq Capital Market, our common stock may be delisted and the price of our common stock and our ability to access the capital markets could be negatively impacted.

On January 31, 2020, we were notified by the Nasdaq Stock Market, LLC (*Nasdaq*) that we were not in compliance with the minimum bid price requirements set forth in Nasdaq Listing Rule 5550(a)(2) for continued listing on the Nasdaq Capital Market. Nasdaq Listing Rule 5550(a)(2) requires listed securities to maintain a minimum bid price of \$1.00 per share, and Nasdaq Listing Rule 5810(c)(3)(A) provides that a failure to meet the minimum bid price requirement exists if the deficiency continues for a period of 30 consecutive business days. The notification provided that we had 180 calendar days, or until July 29, 2020, to regain compliance with Nasdaq Listing Rule 5550(a)(2) (the *Bid Price Rule*). To regain compliance, the bid price of our common stock must have a closing bid price of at least \$1.00 per share for a minimum of 10 consecutive business days.

In addition, on March 30, 2020, we were notified by Nasdaq that we were not in compliance with Nasdaq Listing Rule 5550(b)(2) (the *MVLS Rule*) for continued listing on the Nasdaq Capital Market, as the market value of our listed securities was less than \$35 million for the previous 30 consecutive business days. Under Nasdaq Listing Rule 5810(c)(3)(C), we have a period of 180 calendar days, or until September 28, 2020, to regain compliance with the MVLS Rule. To regain compliance, during this 180-day compliance period, the market value of our listed securities must be \$35 million or more for a minimum of 10 consecutive business days.

On April 17, 2020, in response to the extraordinary market conditions caused by the COVID-19 pandemic, Nasdaq instituted a longer period of time for companies such as ours to regain compliance with certain continued listing requirements, including the Bid Price Rule. As a result, we now have until October 12, 2020 to regain compliance with the Bid Price Rule and the deadline to regain compliance with the MVLS Rule remains unchanged. If we do not regain compliance with the Bid Price Rule by October 12, 2020, an additional 180 days may be granted to regain compliance, so long as we meet the Nasdaq Capital Market continued listing requirements (including the MVLS Rule) and notify Nasdaq in writing of our intention to cure the deficiency during the second compliance period. If we do not qualify for the second compliance period or fail to regain compliance during the second 180-day period, then Nasdaq will notify us of its determination to delist our common stock, at which point we will have an opportunity to appeal the delisting determination to a hearings panel.

No assurance can be given that we will meet applicable Nasdaq continued listing standards. Failure to meet applicable Nasdaq continued listing standards could result in a delisting of our common stock, which could materially reduce the liquidity of our common stock and result in a corresponding material reduction in the price of our common stock. In addition, delisting could harm our ability to raise capital through alternative financing sources on terms acceptable to us, or at all, and may result in the inability to advance our drug development programs, potential loss of confidence by investors and employees, and fewer business development opportunities.

Market volatility may affect our stock price and the value of your investment.

The market price for our common stock, similar to other biopharmaceutical companies, is likely to be highly volatile. The market price of our common stock may fluctuate significantly in response to a number of factors, most of which we cannot control, including, among others:

- volatility resulting from uncertainty and general economic conditions caused by the ongoing COVID-19 pandemic;
- plans for, progress of or results from nonclinical and clinical development activities related to our product candidates;
- the failure of the FDA or other regulatory authority to approve our product candidates;
- announcements of new products, technologies, commercial relationships, acquisitions or other events by us or our competitors;
- the success or failure of other CNS therapies;
- regulatory or legal developments in the U.S. and other countries;
- announcements regarding our intellectual property portfolio;
- failure of our product candidates, if approved, to achieve commercial success;
- fluctuations in stock market prices and trading volumes of similar companies;
- general market conditions and overall fluctuations in U.S. equity markets;
- variations in our quarterly operating results;
- changes in our financial guidance or securities analysts' estimates of our financial performance;
- changes in accounting principles;

- our ability to raise additional capital and the terms on which we can raise it;
- sales or purchases of large blocks of our common stock, including sales or purchases by our executive officers, directors and significant stockholders;
- establishment of short positions by holders or non-holders of our stock or warrants;
- additions or departures of key personnel;
- discussion of us or our stock price by the press and by online investor communities; and
- other risks and uncertainties described in these risk factors.

Future sales and issuances of our common stock may cause our stock price to decline.

Sales or issuances of a substantial number of shares of our common stock in the public market, or the perception that such sales or issuances are occurring or might occur, could significantly reduce the market price of our common stock and impair our ability to raise adequate capital through the sale of additional equity securities.

The stock market in general, and small biopharmaceutical companies like ours in particular, have frequently experienced significant volatility in the market prices for securities that often has been unrelated to the operating performance of the underlying companies. These broad market and industry fluctuations may adversely affect the market price of our common stock, regardless of our actual operating performance. In certain situations in which the market price of a stock has been volatile, holders of that stock have instituted securities class action litigation against the company that issued the stock. If any of our stockholders were to bring a lawsuit against us, the defense and disposition of the lawsuit could be costly and divert the time and attention of our management and harm our operating results. Additionally, if the trading volume of our common stock remains low and limited there will be an increased level of volatility and you may not be able to generate a return on your investment.

A portion of our total outstanding shares are restricted from immediate resale but may be sold into the market in the near future. Future sales of shares by existing stockholders could cause our stock price to decline, even if our business is doing well.

Sales of a substantial number of shares of our common stock in the public market could occur at any time. These sales, or the perception in the market that the holders of a large number of shares intend to sell shares, could reduce the market price of our common stock. Historically, there has been a limited public market for shares of our common stock. Future sales and issuances of a substantial number of shares of our common stock in the public market, including shares issued upon the conversion of our Series A Preferred, Series B Preferred or Series C Preferred, and the exercise of outstanding options and warrants for common stock which are issuable upon exercise, in the public market, or the perception that these sales and issuances are occurring or might occur, could significantly reduce the market price for our common stock and impair our ability to raise adequate capital through the sale of equity securities.

A limited number of institutional stockholders could limit your ability to influence the outcome of key transactions, including changes in control.

A limited number of institutional stockholders own a substantial portion of our outstanding preferred stock, consisting of shares of our Series A Preferred, Series B Preferred, and Series C Preferred, all of which is convertible, at the option of the holders (but subject to certain beneficial ownership restrictions), into a substantial number of shares of our common stock. Accordingly, should a few of these institutional holders convert their shares of preferred stock into common stock, such stockholders may exert influence over us and over the outcome of any corporate actions requiring approval of holders of our common stock, including the election of directors and amendments to our organizational documents, such as increases in our authorized shares of common stock, any merger, consolidation or sale of all or substantially all of our assets or any other significant corporate transactions. These stockholders may also delay or prevent a change of control of the Company, even if such a change of control is approved by our Board and would benefit our other stockholders. Furthermore, the interests of such institutional stockholders may not always coincide with your interests or the interests of other common stockholders and an institutional holder may act in a manner that advances its best interests and not necessarily those of other stockholders.

If equity research analysts do not publish research or reports about our business or if they issue unfavorable commentary or downgrade our common stock, the price of our common stock could decline.

The trading market for our common stock relies in part on the research and reports that equity research analysts publish about us and our business. We do not control these analysts. The price of our common stock could decline if one or more equity research analysts downgrade our common stock or if such analysts issue other unfavorable commentary or cease publishing reports about us or our business.

There may be additional issuances of shares of preferred stock in the future.

Our Restated Articles of Incorporation, as amended (the *Articles*), permit us to issue up to 10.0 million shares of preferred stock. Our Board has authorized the issuance of (i) 500,000 shares of Series A Preferred, all of which shares are issued and outstanding at March 31, 2020; (ii) 4.0 million shares of Series B 10% Convertible Preferred stock, of which approximately 1.2 million shares remain issued and outstanding at March 31, 2020; and (iii) 3.0 million shares of Series C Convertible Preferred Stock, of which approximately 2.3 million shares are issued and outstanding at March 31, 2020. Our Board could authorize the issuance of additional series of preferred stock in the future and such preferred stock could grant holders preferred rights to our assets upon liquidation, the right to receive dividends before dividends would be declared to holders of our common stock, and the right to the redemption of such shares, possibly together with a premium, prior to the redemption of the common stock. In the event and to the extent that we do issue additional preferred stock in the future, the rights of holders of our common stock could be impaired thereby, including without limitation, with respect to liquidation.

We do not intend to pay dividends on our common stock and, consequently, our stockholders' ability to achieve a return on their investment will depend on appreciation in the price of our common stock.

We have never declared or paid any cash dividend on our common stock and do not currently intend to do so in the foreseeable future. We currently anticipate that we will retain future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends in the foreseeable future. Therefore, the success of an investment in shares of our common stock will depend upon any future appreciation in their value. There is no guarantee that shares of our common stock will appreciate in value or even maintain the price at which our stockholders purchased them.

We incur significant costs to ensure compliance with corporate governance, federal securities law and accounting requirements.

We are subject to the reporting requirements of the Securities Exchange Act of 1934, as amended (*Exchange Act*), which requires that we file annual, quarterly and current reports with respect to our business and financial condition, and the rules and regulations implemented by the SEC, the Sarbanes-Oxley Act of 2002, the Dodd-Frank Act, and the Public Company Accounting Oversight Board, each of which imposes additional reporting and other obligations on public companies. We have incurred and will continue to incur significant costs to comply with these public company reporting requirements, including accounting and related audit costs, legal costs to comply with corporate governance requirements and other costs of operating as a public company. These legal and financial compliance costs will continue to require us to divert a significant amount of resources that we could otherwise use to achieve our research and development and other strategic objectives.

The filing and internal control reporting requirements imposed by federal securities laws, rules and regulations on companies that are not “smaller reporting companies” under federal securities laws are rigorous and, once we are no longer a smaller reporting company, we may not be able to meet them, resulting in a possible decline in the price of our common stock and our inability to obtain future financing. Certain of these requirements may require us to carry out activities we have not done previously and complying with such requirements may divert management’s attention from other business concerns, which could have a material adverse effect on our business, results of operations, financial condition and cash flows. Any failure to adequately comply with applicable federal securities laws, rules or regulations could subject us to fines or regulatory actions, which may materially adversely affect our business, results of operations and financial condition.

In addition, changing laws, regulations and standards relating to corporate governance and public disclosure are creating uncertainty for public companies, increasing legal and financial compliance costs and making some activities more time consuming. These laws, regulations and standards are subject to varying interpretations, in many cases due to their lack of specificity, and, as a result, their application in practice may evolve over time as new guidance is provided by regulatory and governing bodies. This could result in continuing uncertainty regarding compliance matters and higher costs necessitated by ongoing revisions to disclosure and governance practices. We will continue to invest resources to comply with evolving laws, regulations and standards, however this investment may result in increased general and administrative expenses and a diversion of management’s time and attention from revenue-generating activities to compliance activities. If our efforts to comply with new laws, regulations and standards differ from the activities intended by regulatory or governing bodies due to ambiguities related to their application and practice, regulatory authorities may initiate legal proceedings against us and our business may be adversely affected.

Item 1B. Unresolved Staff Comments

The disclosures in this section are not required since we qualify as a smaller reporting company.

Item 2. Properties

Our corporate headquarters and laboratories are located at 343 Allerton Avenue, South San Francisco, California 94080, where we occupy approximately 10,900 square feet of office and lab space under a lease expiring on July 31, 2022. We believe that our facilities are suitable and adequate for our current and foreseeable needs.

Item 3. Legal Proceedings

None.

Item 4. Mine Safety Disclosures

Not applicable.

PART II**Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities****Market Information**

Our common stock was approved for listing and has traded since May 11, 2016 on The Nasdaq Capital Market under the symbol “VTGN”. From June 21, 2011 through May 10, 2016, our common stock traded on the OTC Marketplace, under the symbol “VSTA”. There was no established trading market for our common stock prior to June 21, 2011.

Shown below is the range of high and low sales prices for our common stock for the periods indicated as reported by the Nasdaq Capital Market. The market quotations reflect inter-dealer prices, without retail mark-up, mark-down or commissions and may not necessarily represent actual transactions.

	<u>High</u>	<u>Low</u>
Year Ended March 31, 2020		
First quarter ended June 30, 2019	\$ 1.35	\$ 0.52
Second quarter ended September 30, 2019	\$ 1.32	\$ 0.38
Third quarter ended December 31, 2019	\$ 1.49	\$ 0.29
Fourth quarter ended March 31, 2020	\$ 0.90	\$ 0.30
Year Ended March 31, 2019		
First quarter ended June 30, 2018	\$ 1.76	\$ 0.81
Second quarter ended September 30, 2018	\$ 1.53	\$ 1.20
Third quarter ended December 31, 2018	\$ 2.44	\$ 1.26
Fourth quarter ended March 31, 2019	\$ 1.86	\$ 1.05

On June 26, 2020 the closing price of our common stock on the Nasdaq Capital Market was \$0.5191 per share.

As of June 26, 2020, we had 55,773,682 shares of common stock outstanding and approximately 7,000 stockholders of record. On the same date, two stockholders held all 500,000 outstanding restricted shares of our Series A Preferred Stock, which shares are convertible into 750,000 shares of common stock; two stockholders held 1,160,240 outstanding shares of our Series B 10% Convertible Preferred Stock (*Series B Preferred*), which shares are convertible into 1,160,240 shares of common stock, excluding shares of our common stock which may be issued in payment of accrued dividends upon conversion of the Series B Preferred; and one stockholder held all 2,318,012 outstanding shares of our Series C Preferred stock, which shares are convertible into 2,318,012 shares of common stock.

Dividend Policy

We have never paid or declared any cash dividends on our common stock, and we do not anticipate paying any cash dividends on our common stock in the foreseeable future. Our Series B Preferred accrues dividends at a rate of 10% per annum, which dividends are payable solely in unregistered shares of our common stock at the time the Series B Preferred is converted into common stock.

Recent Sales of Unregistered Securities

We have issued the following securities in private placement transactions which were not registered under the Securities Act of 1933, as amended (*Securities Act*), and that have not been previously reported in a Quarterly Report on Form 10-Q or a Current Report on Form 8-K:

In April 2020, in a self-directed private placement, we sold to an accredited investor units to purchase an aggregate of 125,000 unregistered shares of our common stock and four-year warrants to purchase 125,000 shares of our common stock at an exercise price of \$0.50 per share and we received cash proceeds of \$50,000 (the *Spring 2020 Private Placement*). The shares of common stock and warrants offered and sold as a part of the Spring 2020 Private Placement were issued in private placement transactions exempt from registration under the Securities Act, in reliance on Section 4(2) thereof and Rule 506 of Regulation D promulgated thereunder. The Company expects to use the proceeds from the Spring 2020 Private Placement for general working capital.

On June 24, 2020, we issued 233,645 unregistered shares of our common stock having a fair value of \$125,000 to an accredited investor as partial compensation under the terms of a consulting contract in connection with the execution of the EverInsight Agreement. The shares of common stock were issued in a private placement transaction exempt from registration under the Securities Act, in reliance on Section 4(2) thereof and Rule 506 of Regulation D promulgated thereunder.

Item 6. Selected Financial Data

The disclosures in this section are not required because we qualify as a smaller reporting company under federal securities laws.

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

Cautionary Note Regarding Forward-Looking Statements

This Annual Report on Form 10-K (Annual Report) includes forward-looking statements. All statements contained in this Annual Report other than statements of historical fact, including statements regarding our future results of operations and financial position, our business strategy and plans, and our objectives for future operations, are forward-looking statements. The words "believe," "may," "estimate," "continue," "anticipate," "intend," "expect" and similar expressions are intended to identify forward-looking statements. We have based these forward-looking statements largely on our current expectations and projections about future events and trends that we believe may affect our financial condition, results of operations, business strategy, short-term and long-term business operations and objectives, and financial needs. These forward-looking statements are subject to a number of risks, uncertainties and assumptions. Our business is subject to significant risks including, but not limited to, our ability to obtain additional financing, the results of our research and development efforts, the results of nonclinical and clinical testing, the effect of regulation by the United States Food and Drug Administration (FDA) and other agencies, the impact of competitive products, product development, commercialization and technological difficulties, the effect of our accounting policies, and other risks as detailed in the section entitled "Risk Factors" in this Annual Report. Further, even if our product candidates appear promising at various stages of development, our share price may decrease such that we are unable to raise additional capital without significant dilution or other terms that may be unacceptable to our management, Board of Directors and stockholders.

Moreover, we operate in a very competitive and rapidly changing environment. New risks emerge from time to time. It is not possible for our management or Board to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. In light of these risks, uncertainties and assumptions, the future events and trends discussed in this Annual Report may not occur and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements.

You should not rely upon forward-looking statements as predictions of future events. The events and circumstances reflected in the forward-looking statements may not be achieved or occur. Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, levels of activity, performance or achievements. We are under no duty to update any of these forward-looking statements after the date of this Annual Report or to conform these statements to actual results or revised expectations. If we do update one or more forward-looking statements, no inference should be drawn that we will make additional updates with respect to those or other forward-looking statements.

Business Overview

We are a multi-asset, clinical-stage biopharmaceutical company committed to developing differentiated new generation medications for anxiety, depression and other central nervous system (CNS) diseases and disorders with high unmet need. Our pipeline includes three clinical-stage CNS drug candidates, each with a differentiated mechanism of action, an exceptional safety profile in all clinical studies to date, and therapeutic potential in multiple CNS markets. We aim to become a fully-integrated biopharmaceutical company that develops and commercializes innovative CNS therapies for large and growing mental health and neurology markets where current treatments are inadequate to meet the needs of millions of patients and caregivers worldwide.

PH94B Neuroactive Nasal Spray for Anxiety-related Disorders

PH94B neuroactive nasal spray is an odorless, first-in-class, fast-acting synthetic neurosteroid with therapeutic potential in a wide range of neuropsychiatric indications involving anxiety or phobia. Conveniently self-administered in microgram doses without systemic exposure, we are initially developing PH94B as a potential fast-acting, non-sedating, non-addictive new generation treatment of social anxiety disorder (SAD). SAD affects over 20 million Americans and, according to the National Institutes of Health (NIH), is the third most common psychiatric condition after depression and substance abuse. A person with SAD feels symptoms of anxiety or fear in certain social situations, such as meeting new people, dating, being on a job interview, answering a question in class, or having to talk to a cashier in a store. Doing everyday things in front of people - such as eating or drinking in front of others or using a public restroom - also causes anxiety or fear. A person with SAD is afraid that he or she will be humiliated, judged, and rejected. The fear that people with SAD have in social situations is so strong that they feel it is beyond their ability to control. As a result, SAD gets in the way of going to work, attending school, or doing everyday things in situations with potential for interpersonal interaction. People with SAD may worry about these and other things for weeks before they happen. Sometimes, they end up staying away from places or events where they think they might have to do something that will embarrass or humiliate them. Some people with SAD have performance anxiety. They feel physical symptoms of fear and anxiety in performance situations, such as giving a lecture, a speech or a presentation at school or work, as well as playing a sports game, or dancing or playing a musical instrument on stage. Without treatment, SAD can last for many years or a lifetime and prevent a person from reaching his or her full potential.

Only three drugs, all oral antidepressants (ADs), are approved by the U.S Food and Drug Administration (FDA) specifically for treatment of SAD. These FDA-approved chronic ADs have slow onset of therapeutic effect (often taking many weeks to months) and significant side effects (often beginning soon after administration). Slow onset of effect, chronic administration and significant side effects may make the FDA-approved ADs inadequate or inappropriate treatment alternatives for many individuals affected by SAD episodically. VistaGen's PH94B is fundamentally differentiated from all current anxiolytics, including all ADs approved by the FDA for treatment of SAD. Intranasal self-administration of only approximately 3.2 micrograms of PH94B binds to nasal chemosensory receptors that, in turn, activate key neural circuits in the brain that lead to rapid suppression of fear and anxiety. In Phase 2 and pilot Phase 3 clinical studies to date, PH94B has not shown psychological side effects (such as dissociation or hallucinations), systemic exposure, sedation or other side effects and safety concerns that may be caused by the current ADs approved by the FDA for treatment of SAD, as well as by benzodiazepines and beta blockers, which are not approved by the FDA to treat SAD but which may be prescribed by psychiatrists and physicians for treatment of SAD on an off-label basis.

In a peer-reviewed, published double-blind, placebo-controlled Phase 2 clinical trial, PH94B neuroactive nasal spray was significantly more effective than placebo in reducing both public-speaking (performance) anxiety ($p=0.002$) and social interaction anxiety ($p=0.009$) in laboratory challenges of individuals with SAD within 15 minutes of self-administration of a non-systemic 1.6 microgram dose of PH94B. Based on its novel mechanism of pharmacological action, rapid-onset of therapeutic effects and exceptional safety and tolerability profile in Phase 2 and pilot Phase 3 clinical trials to date, we are preparing for Phase 3 clinical development of PH94B for treatment of SAD in adults. Our goal is to develop and commercialize PH94B as the first FDA-approved, fast-acting, on-demand, at-home treatment for SAD. Additional potential anxiety-related neuropsychiatric indications for PH94B include general anxiety disorder, peripartum anxiety (pre- and post-partum anxiety), preoperative or pre-testing (e.g., pre-MRI) anxiety, panic disorder, post-traumatic stress disorder and specific social phobias. The FDA has granted Fast Track designation for development of our PH94B neuroactive nasal spray for on-demand treatment of SAD, the FDA's first such designation for a drug candidate for SAD.

In addition to development of PH94B as a potential treatment for SAD, in April 2020, we announced plans to expand clinical development of PH94B to include treatment of adjustment disorder, an emotional or behavioral reaction considered excessive or out of proportion to a stressful event or major life change, occurring within three months of the stressor, and/or significantly impairing a person's social, occupational and/or other important areas of functioning. We plan to submit our proposed protocol for an exploratory Phase 2a study of PH94B for treatment of adjustment disorder with anxiety due to stressors related to the COVID-19 pandemic to the FDA through the Coronavirus Treatment Acceleration Program (CTAP). The proposed Phase 2 study will be conducted in New York City on an open-label basis and involve approximately 30 subjects suffering from adjustment disorder with anxiety from stressors related to the pandemic.

PH10 Neuroactive Nasal Spray for Depression and Suicidal Ideation

PH10 neuroactive nasal spray is an odorless, fast-acting synthetic neurosteroid with therapeutic potential in a wide range of neuropsychiatric indications involving depression and suicidal ideation. Conveniently self-administered in microgram doses without systemic exposure, we are initially developing PH94B as a potential fast-acting, non-sedating, non-addictive new generation treatment of major depressive disorder (MDD).

Depression is a serious medical illness and a global public health concern that can occur at any time over a person's life. While most people will experience depressed mood at some point during their lifetime, MDD is different. MDD is the chronic, pervasive feeling of utter unhappiness and suffering, which impairs daily functioning. Symptoms of MDD include diminished pleasure or loss of interest in activities, changes in appetite that result in weight changes, insomnia or oversleeping, psychomotor agitation, loss of energy or increased fatigue, feelings of worthlessness or inappropriate guilt, difficulty thinking, concentrating or making decisions, and thoughts of death or suicide and attempts at suicide. Current FDA-approved medications available in the multi-billion-dollar global AD market often fall far short of satisfying the unmet medical needs of millions suffering from the debilitating effects of depression.

While current FDA-approved ADs are widely used, about two-thirds of patients with MDD do not respond to their initial AD treatment. Inadequate response to current ADs is among the key reasons MDD is one of the leading public health concerns in the United States, creating a significant unmet medical need for new agents with fundamentally different mechanisms of action and side effect and safety profiles.

PH10 is a new generation antidepressant with a mechanism of action that is fundamentally different from all current ADs. After self-administration, a non-systemic microgram-level dose of PH10 binds to nasal chemosensory receptors that, in turn, activate key neural circuits in the brain that can lead to rapid-onset antidepressant effects, but without the psychological side effects (such as dissociation and hallucinations) or safety concerns that maybe be caused by ketamine-based therapy (KBT), including intravenous ketamine or esketamine nasal spray, or the significant side effects of current ADs. In an exploratory 30-patient Phase 2a clinical trial, PH10, self-administered at a dose of 6.4 micrograms, was well-tolerated and demonstrated significant ($p=0.022$) rapid-onset antidepressant effects, which were sustained over an 8-week period, as measured by the Hamilton Depression Rating Scale (HAM-D), without side effects or safety concerns that may be caused by KBT. Based on positive results from this exploratory Phase 2a study, we are preparing for Phase 2b clinical development of PH10 in MDD. With its exceptional safety profile during clinical development to date, we believe PH10, as a convenient at-home therapy, has potential for multiple applications in global depression markets, including as a stand-alone front-line therapy for MDD, as an add-on therapy to augment current FDA-approved ADs for patients with MDD who have an inadequate response to standard ADs, and to prevent relapse following successful treatment with KBT.

AV-101, an Oral NMDA Receptor Antagonist

AV-101 (4-Cl-KYN) targets the NMDAR (N-methyl-D-aspartate receptor), an ionotropic glutamate receptor in the brain. Abnormal NMDAR function is associated with numerous CNS diseases and disorders. AV-101 is an oral prodrug of 7-chloro-kynurenic acid (7-Cl-KYNA), which is a potent and selective full antagonist of the glycine co-agonist site of the NMDAR that inhibits the function of the NMDAR. Unlike ketamine and many other NMDAR antagonists, 7-Cl-KYNA is not an ion channel blocker. In all studies to date, AV-101 has exhibited no dissociative or hallucinogenic psychological side effects or safety concerns similar to those that may be caused by amantadine and KBT. With its exceptionally few side effects and excellent safety profile, AV-101 has potential to be a differentiated oral, new generation treatment for multiple large-market CNS indications where current treatments are inadequate to meet high unmet patient needs. The FDA has granted Fast Track designation for development of AV-101 as both a potential adjunctive treatment for MDD and as a non-opioid treatment for neuropathic pain.

We recently completed a double-blind, placebo-controlled, multi-center Phase 2 clinical trial of AV-101 as a potential adjunctive treatment, together with a standard FDA-approved oral AD (either a selective serotonin reuptake inhibitor (SSRI) or a serotonin norepinephrine reuptake inhibitor (SNRI)), in MDD patients who had an inadequate response to a stable dose of a standard AD (the *Elevate Study*). Topline results of the *Elevate Study* (n=199) indicated that the AV-101 treatment arm (1440 mg) did not differentiate from placebo on the primary endpoint (change in the Montgomery-Åsberg Depression Rating Scale (MADRS-10) total score compared to baseline), potentially due to sub-therapeutic levels of 7-Cl-KYNA in the brain. As in prior clinical studies, AV-101 was well tolerated, with no psychotomimetic side effects or drug-related serious adverse events.

Recent discoveries from successful AV-101 preclinical studies suggest that there is a substantially increased brain concentration of AV-101 and its active metabolite, 7-Cl-KYNA, when AV-101 is given together with probenecid, a safe and well-known oral anion transport inhibitor used to treat gout. These surprising effects were first revealed in our recent preclinical studies, although they are consistent with well-documented clinical studies of probenecid increasing the therapeutic benefits of several unrelated classes of approved drugs, including certain antibacterial, anticancer and antiviral drugs. When probenecid was administered adjunctively with AV-101 in an animal model, substantially increased brain concentrations of both AV-101 (7-fold) and of 7-Cl-KYNA (35-fold) were discovered. We also recently identified that some of the same kidney transporters that reduce drug concentrations in the blood, by excretion in the urine, are also found in the blood brain barrier and function to reduce 7-Cl-KYNA levels in the brain by pumping it out of the brain and back into the blood. In the recent preclinical studies with AV-101 and probenecid, we discovered that blocking those transporters in the blood brain barrier with probenecid resulted, as noted above, in a substantially increased brain concentration of 7-Cl-KYNA. This 7-Cl-KYNA efflux-blocking effect of probenecid, with the resulting increased brain levels and duration of 7-Cl-KYNA, suggests the potential impact of AV-101 with probenecid could result in far more profound therapeutic benefits for patients with MDD and other NMDAR-focused CNS diseases and disorders than demonstrated in the *Elevate Study*. Some of the new discoveries from our recent AV-101 preclinical studies with adjunctive probenecid were presented by a collaborator of VistaGen at the British Pharmacological Society's Pharmacology 2019 annual conference in Edinburgh, UK in December 2019.

In addition, a Phase 1b target engagement study completed after the *Elevate Study* by the Baylor College of Medicine (*Baylor*) with financial support from the U.S. Department of Veterans Affairs (VA), involved 10 healthy volunteer U.S. military Veterans who received single doses of AV-101 (720 mg or 1440 mg) or placebo, in a double-blind, randomized, cross-over controlled trial. The primary goal of the study was to identify and define a dose-response relationship between AV-101 and multiple electrophysiological (*EEG*) biomarkers related to NMDAR function, as well as blood biomarkers associated with suicidality (the *Baylor Study*). The findings from the *Baylor Study* suggest that, in healthy Veterans, the higher dose of AV-101 (1440 mg) was associated with dose-related increase in the 40 Hz Auditory Steady State Response (*ASSR*), a robust measure of the integrity of inhibitory interneuron synchronization that is associated with NMDAR inhibition. Findings from the successful *Baylor Study* were presented at the 58th Annual Meeting of the American College of Neuropsychopharmacology (*ACNP*) in Orlando, Florida in December 2019.

The successful *Baylor Study* and the recent discoveries in our preclinical studies involving AV-101 and adjunctive probenecid suggest that it may be possible to increase therapeutic concentrations and duration of 7-Cl-KYNA in the brain, and thus increase NMDAR antagonism in MDD patients with an inadequate response to standard ADs when AV-101 and probenecid are combined. During 2020, we plan to conduct additional AV-101 preclinical studies with adjunctive probenecid to evaluate its potential applicability to MDD, suicidal ideation and other NMDAR-focused CNS indications for which we have existing preclinical data with AV-101 as a monotherapy, including epilepsy, levodopa-induced dyskinesia, and neuropathic pain, to determine the most appropriate path forward for potential future clinical development and commercialization of AV-101.

VistaStem Therapeutics – Stem Cell Technology for Drug Rescue and Regenerative Medicine

In addition to our current CNS drug candidates, we have stem cell technology-based, pipeline-enabling programs through our wholly-owned subsidiary, VistaStem Therapeutics (*VistaStem*). VistaStem is focused on applying human pluripotent stem cell (*hPSC*) technologies, including our customized cardiac bioassay system, *CardioSafe 3D*, to discover and develop small molecule New Chemical Entities (*NCEs*) for our CNS pipeline or out-licensing. In addition, VistaStem's stem cell technologies involving hPSC-derived blood, cartilage, heart and liver cells have multiple potential applications in the cell therapy (*CT*) and regenerative medicine (*RM*) fields.

To advance potential CT and RM applications of VistaStem's hPSC technologies related to heart cells, we licensed to BlueRock Therapeutics LP, a next generation CT/RM company formed jointly by Bayer AG and Versant Ventures, rights to develop and commercialize certain proprietary technologies relating to the production of cardiac stem cells for the treatment of heart disease. As a result of its acquisition of BlueRock Therapeutics in 2019, Bayer AG now holds rights to develop and commercialize VistaStem's hPSC technologies relating to the production of heart cells for the treatment of heart disease (the *Bayer Agreement*). In a manner similar to the Bayer Agreement, we may pursue additional collaborations involving rights to develop and commercialize VistaStem's hPSC technologies for production of blood, cartilage, and/or liver cells for CT and RM applications, including, among other indications, treatment of arthritis, cancer and liver disease.

Critical Accounting Policies and Estimates

We consider certain accounting policies related to revenue recognition, determination of right of use assets under lease transactions and related lease obligations, impairment of long-lived assets, research and development, stock-based compensation, warrant liability and income taxes to be critical accounting policies that require the use of significant judgments and estimates relating to matters that are inherently uncertain and may result in materially different results under different assumptions and conditions. The preparation of financial statements in conformity with United States generally accepted accounting principles (GAAP) requires us to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes to the consolidated financial statements. These estimates include useful lives for property and equipment and related depreciation calculations, and assumptions for valuing options, warrants and other stock-based compensation. Our actual results could differ from these estimates.

Revenue Recognition

We have historically generated revenue principally from collaborative research and development arrangements, licensing and technology access fees and government grants. We adopted Accounting Standards Update (ASU) No. 2014-09, *Revenue from Contracts with Customers (Topic 606)* and its related amendments, collectively referred to as ASC (*Accounting Standards Codification*) Topic 606, as of April 1, 2018, using the modified retrospective transition method. At adoption and through our fiscal year ended March 31, 2020, we have only the Bayer Agreement as a potential revenue generating arrangement. Upon adoption of ASC Topic 606, there was no change to the units of accounting previously identified with respect to the Bayer Agreement under legacy GAAP, which are now considered performance obligations under ASC Topic 606, and there was no change to the revenue recognition pattern for the performance obligation. Accordingly, there was no cumulative effect change to our opening accumulated deficit balance upon the adoption of ASC Topic 606. We did not recognize any revenue in our fiscal years ended March 31, 2020 or 2019. The EverInsight Agreement was executed subsequent to the completion of our fiscal year ended March 31, 2020 and we have not yet assessed the impact of Topic 606 on it.

Under ASC Topic 606, we recognize revenue when our customer obtains control of promised goods or services, in an amount that reflects the consideration that we expect to receive in exchange for those goods or services. To determine revenue recognition for arrangements that we determine are within the scope of Topic 606, we perform the following five steps: (i) identify the contract with a customer; (ii) identify the performance obligations in the contract; (iii) determine the transaction price, including variable consideration, if any; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when (or as) we satisfy a performance obligation. We only apply the five-step model to contracts when it is probable that we will collect the consideration to which we are entitled in exchange for the goods or services we transfer to a customer.

Once a contract is determined to be within the scope of Topic 606, we assesses the goods or services promised within each contract and determine those that are performance obligations. Arrangements that include rights to additional goods or services that are exercisable at a customer's discretion are generally considered options. We assess whether these options provide a material right to the customer and if so, they are considered performance obligations. The exercise of a material right may be accounted for as a contract modification or as a continuation of the contract for accounting purposes.

We assess whether each promised good or service is distinct for the purpose of identifying the performance obligations in the contract. This assessment involves subjective determinations and requires judgments about the individual promised goods or services and whether such are separable from the other aspects of the contractual relationship. Promised goods and services are considered distinct provided that: (i) the customer can benefit from the good or service either on its own or together with other resources that are readily available to the customer (that is, the good or service is capable of being distinct) and (ii) our promise to transfer the good or service to the customer is separately identifiable from other promises in the contract (that is, the promise to transfer the good or service is distinct within the context of the contract). In assessing whether a promised good or service is distinct in the evaluation of a collaboration arrangement subject to Topic 606, we consider factors such as the research, manufacturing and commercialization capabilities of the collaboration partner and the availability of the associated expertise in the general marketplace. We also consider the intended benefit of the contract in assessing whether a promised good or service is separately identifiable from other promises in the contract. If a promised good or service is not distinct, we are required to combine that good or service with other promised goods or services until we identifies a bundle of goods or services that is distinct.

The transaction price is then determined and allocated to the identified performance obligations in proportion to their standalone selling prices (SSP) on a relative SSP basis. SSP is determined at contract inception and is not updated to reflect changes between contract inception and satisfaction of the performance obligations. Determining the SSP for performance obligations requires significant judgment. In developing the SSP for a performance obligation, we consider applicable market conditions and relevant Company-specific factors, including factors that were contemplated in negotiating the agreement with the customer and estimated costs. In certain circumstances, we may apply the residual method to determine the SSP of a good or service if the standalone selling price is considered highly variable or uncertain. We validate the SSP for performance obligations by evaluating whether changes in the key assumptions used to determine the SSP will have a significant effect on the allocation of arrangement consideration between multiple performance obligations.

If the consideration promised in a contract includes a variable amount, we estimate the amount of consideration to which we will be entitled in exchange for transferring the promised goods or services to a customer. We determine the amount of variable consideration by using the expected value method or the most likely amount method. We include the unconstrained amount of estimated variable consideration in the transaction price. The amount included in the transaction price is constrained to the amount for which it is probable that a significant reversal of cumulative revenue recognized will not occur. At the end of each subsequent reporting period, we re-evaluate the estimated variable consideration included in the transaction price and any related constraint, and if necessary, adjust our estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis in the period of adjustment.

If an arrangement includes development and regulatory milestone payments, we evaluate whether the milestones are considered probable of being reached and estimate the amount to be included in the transaction price using the most likely amount method. If it is probable that a significant revenue reversal would not occur, the associated milestone value is included in the transaction price. Milestone payments that are not within our control or the licensee's control, such as regulatory approvals, are generally not considered probable of being achieved until those approvals are received.

In determining the transaction price, we adjust consideration for the effects of the time value of money if the timing of payments provides us with a significant benefit of financing. We do not assess whether a contract has a significant financing component if the expectation at contract inception is such that the period between payment by the licensee and the transfer of the promised goods or services to the licensee will be one year or less. For arrangements with licenses of intellectual property that include sales-based royalties, including milestone payments based on the level of sales, and the license is deemed to be the predominant item to which the royalties relate, we recognize royalty revenue and sales-based milestones at the later of (i) when the related sales occur, or (ii) when the performance obligation to which the royalty has been allocated has been satisfied.

We then recognize as revenue the amount of the transaction price that is allocated to the respective performance obligation when (or as) each performance obligation is satisfied at a point in time or over time, and if over time, based on the use of an output or input method.

Right of use assets and lease obligations

We adopted Accounting Standards Update No. 2016-02, "*Leases (Topic 842)*" (ASU 2016-02) effective April 1, 2019. ASU 2016-02 requires that we determine, at the inception of an arrangement, whether the arrangement is or contains a lease, based on the unique facts and circumstances present. Operating lease assets represent our right to use an underlying asset for the lease term (*Right of use assets*) and operating lease liabilities represent our obligation to make lease payments arising from the lease. Right of use assets and operating lease liabilities are recognized at the commencement date of the lease based upon the present value of lease payments over the lease term. When determining the lease term, we include options to extend or terminate the lease when it is reasonably certain, at inception, that we will exercise that option. The interest rate implicit in lease contracts is typically not readily determinable; accordingly, we use our incremental borrowing rate, which is the rate that would be incurred to borrow on a collateralized basis over a similar term an amount equal to the lease payments in a similar economic environment, based upon the information available at the commencement date. The lease payments used to determine our operating lease assets may include lease incentives, stated rent increases and escalation clauses linked to rates of inflation, when determinable, and are recognized in determining our Right of use assets. Our operating lease is reflected in the right-of-use asset – operating lease; operating lease obligation - current portion; and operating lease obligation - non-current portion in our consolidated balance sheets.

Lease expense for minimum lease payments is recognized on a straight-line basis over the lease term. As a result of our adoption of ASU 2016-02, we no longer recognize deferred rent on the consolidated balance sheet. Short-term leases, defined as leases that have a lease term of 12 months or less at the commencement date, are excluded from this treatment and are recognized on a straight-line basis over the term of the lease. Variable lease payments are amounts owed by us to a lessor that are not fixed, such as reimbursement for common area maintenance costs for our facility lease; and are expensed when incurred.

Financing leases, formerly referred to as capitalized leases, are treated similarly to operating leases except that the asset subject to the lease is included in the appropriate fixed asset category, rather than recorded as a Right of use asset, and depreciated over its estimated useful life, or lease term, if shorter.

Impairment of Long-Lived Assets

In accordance with ASC 360-10, *Property, Plant & Equipment—Overall*, we review long-lived assets for impairment whenever events or changes in circumstances indicate that the carrying amount of property and equipment may not be recoverable. Determination of recoverability is based on an estimate of undiscounted future cash flows resulting from the use of the asset and its eventual disposition. In the event that such cash flows are not expected to be sufficient to recover the carrying amount of the assets, we write down the assets to their estimated fair values and recognize the loss in the Consolidated Statements of Operations and Comprehensive Loss.

Research and Development Expenses

Research and development expenses are composed of both internal and external costs. Internal costs include salaries and employment-related expenses, including stock-based compensation expense, of scientific personnel and direct project costs. External research and development expenses consist primarily of costs associated with clinical and nonclinical development of PH94B, PH10, and AV-101, stem cell research and development costs, and costs related to the application and prosecution of patents related to AV-101, PH94B, PH10 and our stem cell technology platform. All such costs are charged to expense as incurred.

We also record accruals for estimated ongoing clinical trial costs. Clinical trial costs represent costs incurred by contract research organizations (CROs) and clinical trial sites. Progress payments are generally made to CROs, clinical sites, investigators and other professional service providers. We analyze the progress of the clinical trial, including levels of subject enrollment, invoices received and contracted costs when evaluating the adequacy of accrued liabilities. Significant judgments and estimates must be made in determining the clinical trial accrual in any reporting period. Actual results could differ from those estimates under different assumptions. Revisions are charged to research and development expense in the period in which the facts that give rise to the revision become known.

Costs incurred in obtaining product or technology licenses are charged immediately to research and development expense if the product or technology licensed has not achieved regulatory approval or reached technical feasibility and has no alternative future uses. In September 2018, we acquired an exclusive license to develop and commercialize PH94B and an option to acquire a license to develop and commercialize PH10 by issuing an aggregate of 1,630,435 unregistered shares of our common stock having a fair market value of \$2,250,000. In October 2018, we exercised our option to acquire an exclusive license to develop and commercialize PH10 by issuing 925,926 shares of our unregistered common stock having a fair market value of \$2,000,000. Since, at the date of each acquisition, neither product candidate had achieved regulatory approval and each requires significant additional development and expense, we recorded the costs related to acquiring the licenses and the option as research and development expense.

Stock-Based Compensation

We recognize compensation cost for all stock-based awards to employees and non-employee consultants based on the grant date fair value of the award. We record stock-based compensation expense over the period during which the employee or other grantee is required to perform services in exchange for the award, which generally represents the scheduled vesting period. We have not granted restricted stock awards to employees or consultants nor do we have any awards with market or performance conditions. Prior to our April 1, 2019 adoption of ASU 2018-07, *Compensation-Stock Compensation (Topic 718), Improvements to Nonemployee Share-Based Payment Accounting (ASU 2018-07)*, we historically re-measured the fair value of option grants to non-employees as they vested and any resulting increase in value was recognized as an expense during the period over which the services were performed. Under ASU 2018-17, expense recognition for grants to non-employees follows the same methodology as for employees. Noncash expense attributable to compensatory grants of our common stock to non-employees is determined by the quoted market price of the stock on the date of grant and is either recognized as fully-earned at the time of the grant or expensed ratably over the term of the related service agreement, depending on the terms of the specific agreement.

We use the Black-Scholes option pricing model to estimate the fair value of stock-based awards as of the grant date. The Black-Scholes model is complex and dependent upon key data input estimates. The primary data inputs with the greatest degree of judgment are the expected term of the stock options and the estimated volatility of our stock price. The Black-Scholes model is highly sensitive to changes in these two inputs. The expected term of the options represents the period of time that options granted are expected to be outstanding. We use the simplified method in accordance with guidance provided by the Securities and Exchange Commission (SEC) to estimate the expected term as an input into the Black-Scholes option pricing model. We determine expected volatility using the historical method, which, because of the relatively limited period during which our stock has been publicly traded on a major exchange and its historically limited trading volume, is based on the historical daily trading data of the common stock of a peer group of public companies over the expected term of the option.

Warrants Issued in Connection with Equity Financing

We generally account for warrants issued in connection with equity financings as a component of equity, unless there is a deemed possibility that we may have to settle the warrants in cash or the warrants contain other features requiring them to be treated as liabilities. For warrants issued with the possibility of cash settlement or otherwise requiring liability treatment, we record the fair value of the issued warrants as a liability at each reporting period and record changes in the estimated fair value as noncash gain or loss in the Consolidated Statements of Operations and Comprehensive Loss.

Income Taxes

We account for income taxes using the asset and liability approach for financial reporting purposes. We recognize deferred tax assets and liabilities for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases and operating loss and tax credit carryforwards. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that includes the enactment date. Valuation allowances are established, when necessary, to reduce the deferred tax assets to an amount expected to be realized.

Recent Accounting Pronouncements

See Note 3 to the Consolidated Financial Statements included in Item 8 in this Annual Report on Form 10-K for information on recent accounting pronouncements.

Financial Operations Overview and Results of Operations

Net Loss

We have not yet achieved recurring revenue-generating status from any of our product candidates or technologies. Since inception, we have devoted substantial time and effort to developing AV-101 for multiple CNS indications, including manufacturing research, process development and production of AV-101 drug substance and finished drug product, preclinical efficacy and safety studies, and clinical efficacy and safety studies in CNS indications. In addition, beginning during our fiscal year ended March 31, 2019 (*Fiscal 2019*), we have devoted substantial resources focused on development and commercialization of PH94B and PH10, for which we are actively pursuing initiatives to advance manufacturing research, process development and production programs for drug substance and finished drug product, additional preclinical safety studies, and clinical efficacy and safety studies in multiple neuropsychiatry indications. Also, from-time-to-time, we have devoted resources to VistaStem's stem cell technology research and development, bioassay development and small molecule drug rescue initiatives, as well as creating, protecting and patenting intellectual property (*IP*) related to our product candidates and stem cell technologies, with the corollary initiatives of recruiting and retaining personnel and raising working capital. As of March 31, 2020, we had an accumulated deficit of approximately \$201.9 million. Our net loss for the fiscal year ended March 31, 2020 (*Fiscal 2020*) and Fiscal 2019 was approximately \$20.8 million and \$24.6 million, respectively. We expect losses to continue for the foreseeable future, primarily as we engage in further development of PH94B, PH10 and AV-101, execute our drug rescue programs and pursue potential drug development and regenerative medicine opportunities.

Summary of Our Fiscal Year Ended March 31, 2020

During Fiscal 2020, we continued to advance our manufacturing, preclinical and clinical development, and regulatory initiatives necessary to develop and commercialize our CNS product Phase 3 clinical development of PH94B for SAD, PH10 for MDD and AV-101 for MDD and other NMDAR-focused indications. In addition, we continued to expand the regulatory and intellectual property foundation to support broad clinical development and, ultimately, commercialization of our product candidates in the U.S. and foreign markets, and on a limited basis, advance drug rescue applications of our stem cell technology to further expand our CNS pipeline.

As discussed previously in *Business Overview*, during Fiscal 2020, we completed the Elevate Study of AV-101 in MDD. In December 2019, pursuant to our Material Transfer Cooperative Research and Development Agreement with the VA and our arrangements with Baylor, Baylor completed a successful Phase 1b target engagement study of AV-101 which involved dosing of healthy volunteer U.S. Military Veterans to define a dose-response relationship between AV-101 and relevant biomarkers related to NMDAR function and other biomarkers possibly related to suicidal ideation in U.S. Military Veterans.

We continue to pursue initiatives to secure a broad portfolio of patent protection for our CNS product candidates that covers the treatment of multiple CNS indications, chemical synthesis methods, and, for AV-101, unit dose formulations effective to treat depression and other CNS indications. With respect to CNS treatments, we obtained patents in several countries for the treatment of depression and we have recently received a Notice of Allowance from the U.S. Patent and Trademark Office for our patent application related to treatment of dyskinesia in Parkinson's disease patients receiving levodopa therapy. For AV-101, we are also pursuing additional patent applications related to treatment of, among other NMDAR-focused indications, depression, epilepsy, neuropathic pain, obsessive-compulsive disorder, suicidal ideation and tinnitus. Additional patent applications for other aspects of prognostic testing and treatment using AV-101 are under consideration.

With respect to financing activities in Fiscal 2020, subsequent to the completion of our underwritten public offering of common stock in February 2019, which generated \$11.5 million in gross proceeds to us, we have completed or initiated the following:

- During the quarter ended December 31, 2019, we completed a self-directed private placement of units consisting of unregistered shares of our common stock and warrants to purchase unregistered shares of our common stock pursuant to which we received cash proceeds of \$650,000, and a self-directed private placement of warrants to purchase unregistered shares of our common stock pursuant to which we received cash proceeds of \$300,000. Additionally, we modified certain outstanding warrants issued in earlier completed private placement transactions to reduce their exercise price and certain holders exercised their modified warrants pursuant to which we received \$410,000 in cash proceeds.

- In January 2020, we completed a self-placed registered direct public offering under our effective registration statement on Form S-3 and concurrent private placement of warrants to purchase shares of our common stock, pursuant to which we received approximately \$2.7 million in cash proceeds
- In March 2020, we entered into a purchase agreement and a registration rights agreement with Lincoln Park Capital Fund (*LPC*) pursuant to which LPC committed to purchase up to \$10,250,000 of our common stock at market-based prices over a period of 24 months (the *LPC Agreement*). During March 2020, we sold 500,000 unregistered shares of our common stock to LPC under the purchase agreement at a price of \$0.50 per share for gross cash proceeds of \$250,000. Subsequent to filing the registration statement required under the LPC Agreement and its effectiveness on April 14, 2020, through June 26, 2020, we have sold an additional 6,201,995 shares of our common stock to LPC pursuant to the LPC Agreement, resulting in the receipt of aggregate cash proceeds of \$2,840,200..

As a matter of course, we continue to minimize, to the greatest extent possible, cash commitments and expenditures for both internal and external research and development and general and administrative services. To further advance the nonclinical and clinical development of PH94B, PH10, AV-101 and our stem cell technology platform, as well as support our operating activities, we continue to carefully manage our routine operating costs, including our internal employee related expenses, as well as external costs relating to regulatory consulting, contract research and development, investor relations and corporate development, legal, acquisition and protection of intellectual property, public company compliance and other professional services and internal costs.

Comparison of Fiscal Years Ended March 31, 2020 and 2019

The following table summarizes the results of our operations for the fiscal years ended March 31, 2020 and 2019 (amounts in thousands).

	Fiscal Year Ended March 31,	
	2020	2019
Operating expenses:		
Research and development	13,374	17,098
General and administrative	7,427	7,458
Total operating expenses	<u>20,801</u>	<u>24,556</u>
Loss from operations	(20,801)	(24,556)
Interest income (expense), net	30	(8)
Loss on extinguishment of accounts payable	-	(23)
Loss before income taxes	(20,771)	(24,587)
Income taxes	(3)	(2)
Net loss	(20,774)	(24,589)
Accrued dividend on Series B Preferred Stock	(1,264)	(1,140)
Net loss attributable to common stockholders	<u>\$ (22,038)</u>	<u>\$ (25,729)</u>

Revenue

We reported no revenue for either Fiscal 2020 or Fiscal 2019 and, through March 31, 2020, we have no recurring revenue generating arrangements, including arrangements with respect to PH94B, PH10, AV-101 or other potential product candidates. While we may potentially receive payments or royalties in the future under our December 2016 Bayer Agreement or our June 2020 EverInsight Agreement with respect to PH94B, in the event certain performance-based milestones and commercial sales are achieved, there can be no assurance that either agreement will provide revenue to us in the near term or at all.

Research and Development Expense

Research and development expense decreased to approximately \$13.4 million for Fiscal 2020 compared to approximately \$17.1 million in Fiscal 2019. The Fiscal 2019 acquisition of the PH94B license and the PH10 option and license through the issuance of our common stock, which resulted in an aggregate of \$4.25 million of noncash expense, primarily accounts for the decrease. The absence of the license acquisition expense in FY 2020 was partially offset by cash expenses attributable to nonclinical activities, including manufacturing, and regulatory activities supporting the continuing development of PH94B for SAD and PH10 for MDD, as well as the completion of the Elevate Study and various AV-101 nonclinical activities, including manufacturing additional quantities of AV-101 and other developmental studies. Other noncash expenses included in research and development expense (excluding the noncash PH94B and PH10 license and option acquisition in Fiscal 2019), primarily stock compensation and lab equipment depreciation, accounted for approximately \$1.4 million in both Fiscal 2020 and Fiscal 2019.

The following table indicates the primary components of research and development expense for each of the periods (amounts in thousands):

	Fiscal Years Ended March 31,	
	2020	2019
Salaries and benefits	\$ 1,381	\$ 1,806
Stock-based compensation	1,287	1,259
Consulting and other professional services	533	264
Technology licenses and royalties	546	571
Project-related research, licenses and supplies:		
Elevate study and other AV-101 expenses	6,483	8,126
PH94B and PH10 project expenses	2,448	246
PH94B and PH10 licenses and option	-	4,250
Stem cell and all other	110	105
	<u>9,041</u>	<u>12,727</u>
Rent	535	419
Depreciation	49	49
All other	2	3
	<u>2</u>	<u>3</u>
Total Research and Development Expense	\$ 13,374	\$ 17,098

Salaries and benefits expense reported for Fiscal 2019 includes a total of approximately \$319,000 for bonus payments made to our Chief Medical Officer (CMO), Chief Scientific Officer (CSO) and members of our scientific staff during the second quarter of Fiscal 2019 based on achievement of goals and objectives for our fiscal year ended March 31, 2018, which bonus payments had not been accrued at March 31, 2018, plus the Fiscal 2019 accrual of approximately \$192,000 for bonuses attributable to Fiscal 2019 goals and objectives that were accrued during Fiscal 2019. No accrual has been made for officer or staff bonus payments attributable to Fiscal 2020. Partially offsetting the absence of bonus expense in Fiscal 2020 is the impact of modest salary increases granted to our CMO, CSO and members of our scientific staff effective in April 2019.

Noncash stock-based compensation expense varied only slightly between Fiscal 2020 and Fiscal 2019. Stock-based compensation expense reflects the amortization of option grants made to our CSO, CMO, scientific staff and certain consultants since June 2016, all earlier outstanding grants having become fully vested and amortized. Grants awarded after March 31, 2019 account for approximately \$331,000 of expense in Fiscal 2020, partially offset by the impact of certain November 2016, September 2017 and February 2018 grants that became fully vested and amortized during Fiscal 2020. Additionally, grants made during Fiscal 2019 reflect a full year of expense amortization in Fiscal 2020 versus a partial year of expense recorded in Fiscal 2019. Stock-based compensation expense for Fiscal 2019 reflected the modification in August 2018 of outstanding options held by our CMO, CSO and members of our scientific staff having exercise prices over \$1.56 per share to reduce the exercise price to \$1.50 per share, resulting in the immediate recognition of \$104,000 attributable to the modification. Expense attributable to recent option grants is generally being amortized over two-year to three-year vesting periods, with one-quarter of the grants made in August 2018, May 2019, during the quarter ended December 31, 2019 and in January 2020 being immediately vested and expensed upon grant, in accordance with the terms of the respective grants.

Consulting services reflects fees incurred for project-based scientific, nonclinical and clinical development and regulatory advisory services rendered to us by third parties, generally, in Fiscal 2019, by members of our Scientific Advisory Board and CNS Clinical and Regulatory Advisory Board. The increase in Fiscal 2020 expense primarily reflects consulting and analytical services in support of our PH94B and PH10 initiatives.

Technology license expense reflects both recurring annual license fees, as well as legal counsel and other costs related to patent prosecution and protection pursuant to our stem cell technology license agreements, our AV-101 patents, or that we have elected to pursue for commercial purposes. In both periods, this expense includes legal counsel and other costs we have incurred to advance various patent applications in the U.S. and numerous foreign countries, primarily with respect to AV-101 and our stem cell technology platform, but also nominally with respect to our PH94B and PH10 intellectual property portfolios.

AV-101 project expense for each of the periods presented primarily reflects the costs of conducting the Elevate Study in MDD, including various CRO, investigator and clinical site costs, as well as expense incurred to manufacture additional quantities of AV-101 for potential future clinical development of AV-101 in a number of potential CNS indications.

Expenses for Fiscal 2020 related to PH94B and PH10 primarily reflect manufacturing and regulatory initiatives necessary to facilitate pivotal Phase 3 clinical development of PH94B for SAD and to facilitate Phase 2 development of PH10 for MDD. As disclosed earlier, noncash expense of \$4.25 million in 2018 related to the acquisition of the PH94B license and the PH10 option and license and represents the fair value of an aggregate of 2,556,361 unregistered shares of our common stock issued to Pherin in September and October 2018 under the terms of the license and option agreements.

Stem cell and other project related expenses reflects costs associated with drug rescue applications of our stem cell technology in both years.

The increase in rent expense reflects our implementation of ASC 842 effective April 1, 2019 and the requirement to recognize, as an operating lease, a right-of-use asset and a lease liability, both of which must be amortized over the expected lease term, for our South San Francisco office and laboratory facility lease. The underlying lease reflects commercial property rents prevalent in the South San Francisco real estate market at the time of our November 2016 lease amendment extending the lease of our headquarters facilities in South San Francisco by five years from July 31, 2017 to July 31, 2022. In implementing ASC 842, we also projected that we would exercise a five-year option to extend our tenancy under the lease when it expires in 2022, which extension would be subject to market rent conditions at that time. We allocate total rent expense for our South San Francisco facility between research and development expense and general and administrative expense based generally on square footage dedicated to each function. Refer to Note 15, *Commitments, Contingencies, Guarantees and Indemnifications*, in the accompanying Consolidated Financial Statements in Item 8, Part II of this Annual Report for additional information.

General and Administrative Expense

General and administrative (G&A) expense was essentially flat at \$7.4 million in Fiscal 2020, compared to \$7.5 million in Fiscal 2019. Increased noncash stock compensation and warrant modification expenses were generally offset by decreases in cash based salaries and benefits and investor and public relations expenses. Noncash G&A expense accounted for approximately \$3,543,000 and \$2,622,000 in Fiscal 2020 and Fiscal 2019, respectively. Such noncash expenses included, in both periods, stock compensation expense, a portion of investor and public relations expense, a portion of rent expense, and warrant modification expense. The following table indicates the primary components of general and administrative expense for each of the periods (amounts in thousands):

	Fiscal Years Ended March 31,	
	2020	2019
Salaries and benefits	\$ 1,382	\$ 1,972
Stock-based compensation	2,533	2,184
Board fees	185	163
Legal, accounting and other professional fees	575	503
Investor and public relations	933	1,690
Insurance	348	281
Travel expenses	81	174
Rent and utilities	354	288
Warrant modification expense	827	26
All other expenses	209	177
	<u>\$ 7,427</u>	<u>\$ 7,458</u>

Salaries and benefits expense reported for Fiscal 2019 includes a total of approximately \$435,000 for bonus payments made to our Chief Executive Officer (CEO), Chief Financial Officer (CFO), Vice President-Corporate Development (VP-Corporate Development) and a non-officer member of our administrative staff during the second quarter of Fiscal 2019 based on achievement of goals and objectives for our fiscal year ended March 31, 2018, which bonus payments had not been accrued at March 31, 2018, plus the Fiscal 2019 accrual of approximately \$247,000 for bonuses attributable to Fiscal 2019 goals and objectives that were accrued during Fiscal 2019. No accrual has been made for officer or staff bonus payments attributable to Fiscal 2020. Partially offsetting the absence of bonus expense in Fiscal 2020 is the impact of modest salary increases granted to our CEO, CFO, and VP-Corporate Development effective in April 2019.

Fiscal 2020 noncash stock-based compensation expense reflects the amortization of option grants made to our CEO, CFO, VP-Corporate Development, administrative personnel, independent members of our Board and certain consultants since June 2016, all earlier outstanding grants having become fully vested and amortized. Grants awarded after March 31, 2019 account for approximately \$872,000 of expense in Fiscal 2020, partially offset by the impact of certain November 2016, September 2017 and February 2018 grants that became fully vested and amortized during Fiscal 2020, reducing expense by approximately \$292,000 compared to Fiscal 2019. Additionally, grants made during Fiscal 2019 reflect a full year of expense amortization in Fiscal 2020 versus a partial year of expense recorded in Fiscal 2019. Stock-based compensation expense for Fiscal 2019 reflected the modification in August 2018 of outstanding options held by our CEO, CFO, VP-Corporate Development and administrative staff having exercise prices over \$1.56 per share to reduce the exercise price to \$1.50 per share, resulting in the immediate recognition of \$154,000 attributable to the modification. Expense attributable to recent option grants is generally being amortized over two-year to three-year vesting periods, with one-quarter of the grants made in August 2018, May 2019, during the quarter ended December 31, 2019 and in January 2020 being immediately vested and expensed upon grant, in accordance with the terms of the respective grants.

Board fees represents fees paid as consideration for Board and Board Committee services to the independent members of our Board. The Fiscal 2020 increase reflects the impact of the addition of a new independent member to our Board in January 2019.

Legal, accounting and other professional fees for Fiscal 2020 and Fiscal 2019 includes expense related to routine legal fees as well as the accounting expense related to the annual audit of the prior year's financial statements and the reviews of the quarterly financial statements for the then-current fiscal year. In Fiscal 2020 and Fiscal 2019, we also incurred \$101,000 and \$95,000, respectively, attributable to services provided by international business development consultants.

Investor and public relations expense includes the fees of our various external service providers for a broad spectrum of investor relations and public relations services, and well as market awareness and strategic advisory and support functions and initiatives that included numerous meetings in multiple U.S. and foreign markets and other communication activities focused on expanding global market awareness of the Company, its CNS product candidate pipeline and technologies and its research and development programs, including among registered investment professionals and investment advisors, individual and institutional investors, and prospective strategic collaborators for development and commercialization of our product candidates in major pharmaceutical markets worldwide. During Fiscal 2020, in addition to cash fees and expenses we incurred for such activities, we recognized approximately \$106,000 of noncash expense attributable to the amortization of the fair value of stock and warrants granted in the prior fiscal year to various corporate development, investor relations, and market awareness service providers. During Fiscal 2019, in addition to cash fees and expenses, we granted: (i) in the first quarter, an aggregate of 100,000 unregistered shares of our common stock to certain financial advisory service providers as full or partial compensation for their services and recognized noncash expense of approximately \$123,000 representing the fair value of the stock at the time of issuance; (ii) in the second quarter, an aggregate of 50,000 unregistered shares of our common stock and four-year warrants to purchase an aggregate of 288,000 unregistered shares of our common stock having an aggregate fair value of approximately \$336,000 to various corporate development, investor relations, and market awareness service providers, pursuant to which we recognized aggregate noncash expense of approximately \$257,000; and (iii) in the fourth quarter, 25,000 registered shares of our common stock pursuant to our 2016 Amended and Restated Stock Incentive Plan having a fair value of \$41,500 as partial compensation for investor relations services, pursuant to which we recognized noncash expense of approximately \$14,000. The balance of the fair value of the securities granted in the second and fourth quarters of Fiscal 2019 was recorded as a prepaid expense at March 31, 2019 and was amortized over the remaining service period of the respective contracts during Fiscal 2020.

In both periods, travel expense reflects costs associated with management presentations and meetings held in multiple U.S. and international markets with both existing and potential registered investment professionals and investment advisors, individual and institutional investors, and prospective strategic collaborators for development and commercialization of our product candidates in major pharmaceutical markets worldwide.

The increase in rent expense reflects our implementation of ASC 842 effective April 1, 2019 and the requirement to recognize, as an operating lease, a right-of-use asset and a lease liability, both of which must be amortized over the expected lease term, for our South San Francisco office and laboratory facility lease. The underlying lease reflects commercial property rents prevalent in the South San Francisco real estate market at the time of our November 2016 lease amendment extending the lease of our headquarters facilities in South San Francisco by five years from July 31, 2017 to July 31, 2022. In implementing ASC 842, we also projected that we would exercise a five-year option to extend our tenancy under the lease when it expires in 2022, which extension would be subject to market rent conditions at that time. We allocate total rent expense for our South San Francisco facility between research and development expense and general and administrative expense based generally on square footage dedicated to each function. Refer to Note 15, *Commitments, Contingencies, Guarantees and Indemnifications*, in the accompanying Consolidated Financial Statements in Item 8, Part II of this Annual Report for additional information.

In the third quarter of Fiscal 2020, we completed the Winter 2019 Warrant Modification during which we modified outstanding warrants issued in connection with earlier completed private placements, including warrants issued in the Fall 2019 Private Placement, to purchase an aggregate of approximately 6.6 million unregistered shares of our common stock to temporarily reduce, for a period of two years or until the expiration of the warrant, if sooner, the exercise price of such warrants to \$0.50 per share, in order to more closely align the exercise price of the warrants with the trading price of our common stock at such time. Following the two-year period during which the exercise price is reduced, the exercise price will revert to its pre-modification price. We determined that the Winter 2019 Warrant Modification increased the fair value of the warrants by \$702,500, which we recognized as noncash warrant modification expense.

Additionally, during the third quarter of Fiscal 2020, we issued Additional Warrants to purchase an aggregate of 325,000 additional shares of our common stock to the participants in the Fall 2019 Private Placement to increase the number of unregistered shares of common stock issuable upon exercise of the warrants from 50% to 100%. The Additional Warrants are immediately exercisable through March 31, 2024 at an exercise price of \$0.50 per share. We determined that the fair value of the Additional Warrants was \$88,800, which we also recognized as noncash warrant modification expense.

Further, during the third quarter of Fiscal 2020, we completed the December 19, 2019 Warrant Modification, during which we modified outstanding warrants previously issued as a part of a completed private placement to purchase a total of 80,431 shares of our unregistered common stock to permanently reduce the exercise price of such warrants to \$0.805 per share and to extend the term of such warrants through December 31, 2022, in order to more closely align the exercise price of the warrants with the current trading price of our common stock and to provide additional time for the holders to exercise the warrants. We determined that the December 19, 2019 Warrant Modification increased the fair value of the warrants by \$35,600, which we recognized as noncash warrant modification expense. Total noncash warrant modification expense for Fiscal 2020 was \$826,900. Refer to Note 9, *Capital Stock*, in the accompanying Consolidated Financial Statements in Item 8, Part II of this Annual Report for additional information.

During Fiscal 2020, we modified certain warrants issued in the Summer 2018 Private Placement to comply with certain provisions of The Nasdaq Stock Market Rules applicable to the private placement by increasing the exercise price of such warrants to purchase an aggregate of 304,000 shares of our common stock from \$1.50 per share to \$1.59 per share or \$1.69 per share, depending on the effective date of the related subscription agreement. As additional consideration for the modification, we granted the investors additional warrants to purchase an aggregate of 23,800 unregistered shares of our common stock at an exercise price of \$1.75 per share through February 28, 2022. We determined that the modification decreased the fair value of the modified warrants, which decrease is not recognized; however, the fair value of the new warrants was determined to be \$25,800, which we recognized as noncash warrant modification expense.

Interest and Other Expenses, Net

Interest income, net of interest expense, totaled \$30,100 for Fiscal 2020, compared to interest expense of \$8,000 for Fiscal 2019. The following table indicates the primary components of interest income and expense for each of the periods (amounts in thousands):

	Fiscal Years Ended March 31,	
	2020	2019
Interest income	\$ 45	\$ -
Interest expense on financing leases and insurance premium financing	(15)	(8)
Interest income (expense), net	<u>\$ 30</u>	<u>\$ (8)</u>

Following the completion of our underwritten public offering in February 2019, which generated \$11.5 million in gross proceeds to us, during the quarter ended June 30, 2019, we deposited a portion of the proceeds in an interest-bearing cash equivalent account and earned interest income. Interest expense in both periods relates primarily to interest paid on insurance premium financing notes and on a lease of office equipment treated as a capitalized lease in Fiscal 2019 and as a financing lease subject to ASC 842 in Fiscal 2020.

During the third quarter of Fiscal 2019, in connection with a private placement, we settled an outstanding professional service payable by accepting a subscription agreement in the amount of \$40,000 and issuing the corresponding number of shares of common stock and warrants. The fair value of the common stock and warrant issued in settlement of the payable was determined to be \$62,700 on the effective date of the agreement. Accordingly, we recognized a loss on extinguishment of accounts payable in the amount of \$22,700 in Fiscal 2019.

We recognized \$1,263,600 and \$1,139,900 in Fiscal 2020 and Fiscal 2019, respectively, representing the 10% cumulative noncash dividend payable on our Series B Preferred as an additional deduction in arriving at net loss attributable to common stockholders in the Consolidated Statement of Operations and Comprehensive Loss included in Item 8, Part II of this Annual Report. The dividends are payable in unregistered shares of our common stock upon the conversion of Series B Preferred shares. There have been no conversions of outstanding shares of Series B Preferred into common shares since August 2016.

Liquidity and Capital Resources

Since our inception in May 1998 through March 31, 2020, we have financed our operations and technology acquisitions primarily through the issuance and sale of our equity and debt securities for cash proceeds of approximately \$83.3 million, as well as from an aggregate of approximately \$17.7 million of government research grant awards (excluding the fair market value of government sponsored and funded clinical trials), strategic collaboration payments, intellectual property licensing and other revenues. Additionally, we have issued equity securities with an approximate value at issuance of \$38.1 million in noncash acquisitions of product licenses and in settlements of certain liabilities, including liabilities for professional services rendered to us or as compensation for such services.

At March 31, 2020, we had cash and cash equivalents of approximately \$1.4 million. As more completely described in Note 9, *Capital Stock*, in the accompanying Consolidated Financial Statements included in Part II, Item 8 of this Annual Report, on March 24, 2020, we entered into the LPC Agreement and a registration rights agreement with Lincoln Park pursuant to which Lincoln Park committed to purchase up to \$10,250,000 of our common stock at market-based prices over a period of 24 months. On March 24, 2020, we sold 500,000 shares of our common stock to Lincoln Park under at a price of \$0.50 per share for cash proceeds of \$250,000 (the *Initial Purchase*). To satisfy our obligations under the registration rights agreement, we filed a Registration Statement on Form S-1 (the *LPC Registration Statement*) with the SEC on March 31, 2020, which the SEC declared effective on April 14, 2020 (Registration No. 333-237514). Subsequent to the effectiveness of the LPC Registration Statement, which included the shares issued in the Initial Purchase, through June 26, 2020, we have sold an additional 6,201,995 registered shares of our common stock and have received aggregate cash proceeds of \$2,840,200. Additionally, in April 2020, in a self-directed private placement, we sold to an accredited investor units to purchase an aggregate of 125,000 unregistered shares of our common stock and four-year warrants to purchase 125,000 shares of our common stock at an exercise price of \$0.50 per share and we received cash proceeds of \$50,000 (the *Spring 2020 Private Placement*).

Nevertheless, in the absence of additional financing from the sale of our securities, government research grant awards, strategic collaboration payments, intellectual property licensing or other sources, we believe that our cash position at March 31, 2020, together with the proceeds from the LPC Agreement received to date, the Spring 2020 Private Placement and the net cash receipt of approximately \$4.475 million from the upfront payment we expect to receive pursuant to the EverInsight Agreement, will not be sufficient to fund our planned operations for the twelve months following the issuance of these financial statements and raises substantial doubt that we can continue as a going concern. During the next twelve months, subject to securing appropriate and adequate financing, we plan to prepare for and launch a Phase 2a study of PH94B for treatment of adjustment disorder with anxiety due to stressors related to the COVID-19 pandemic, a Phase 3 clinical trial of PH94B for SAD, prepare for a Phase 2b clinical study and certain nonclinical studies involving PH10, PH94B and AV-101 and prepare for and potentially launch a Phase 2b clinical trial of PH10 for MDD. When necessary and advantageous, we plan to raise additional capital, through the sale of our equity securities in one or more (i) private placements to accredited investors, (i) public offerings and/or (ii) in strategic licensing and development collaborations involving one or more of our drug candidates in markets outside the United States. Subject to certain restrictions, our Registration Statement on Form S-3 (Registration No. 333-234025) (the *S-3 Registration Statement*), which became effective on October 7, 2019, is available for future sales of our equity securities in one or more public offerings from time to time. While we may make additional sales of our equity securities under the S-3 Registration Statement, we do not have an obligation to do so.

As we have been in the past, we expect that, when and as necessary, we will be successful in raising additional capital from the sale of our equity securities either in one or more public offerings or in one or more private placement transactions with individual accredited investors and institutions. In addition to the potential sale of our equity securities, we may also seek to enter research, development and/or commercialization collaborations that could generate revenue or provide funding, including non-dilutive funding, for development of one or more of our CNS product candidates. We may also seek additional government grant awards or agreements similar to our relationships with Baylor and the VA in connection with the Baylor Study. Such strategic collaborations may provide non-dilutive resources to advance our strategic initiatives while reducing a portion of our future cash outlays and working capital requirements. We may also pursue intellectual property arrangements similar to the Bayer Agreement with other parties. Although we may seek additional collaborations that could generate revenue and/or provide non-dilutive funding for development of our product candidates, as well as new government grant awards and/or agreements, no assurance can be provided that any such collaborations, awards or agreements will occur in the future.

Our future working capital requirements will depend on many factors, including, without limitation, the scope and nature of opportunities related to our success and the success of certain other companies in clinical trials, including our development and commercialization of our current product candidates and various applications of our stem cell technology platform, the availability of, and our ability to obtain, government grant awards and agreements, and our ability to enter into collaborations on terms acceptable to us. To further advance the clinical development of PH94B, PH10, and AV-101 and, to a lesser extent, our stem cell technology platform, as well as support our operating activities, we plan to continue to carefully manage our routine operating costs, including our employee headcount and related expenses, as well as costs relating to regulatory consulting, contract research and development, investor relations and corporate development, legal, acquisition and protection of intellectual property, public company compliance and other professional services and operating costs.

Notwithstanding the foregoing, there can be no assurance that future financings or government or other strategic collaborations will be available to us in sufficient amounts, in a timely manner, or on terms acceptable to us, if at all. If we are unable to obtain substantial additional financing on a timely basis when needed during 2020 and beyond, our business, financial condition, and results of operations may be harmed, the price of our stock may decline, we may be required to reduce, defer, or discontinue certain of our research and development activities and we may not be able to continue as a going concern. As noted above, these Consolidated Financial Statements do not include any adjustments that might result from the negative outcome of this uncertainty.

Cash and Cash Equivalents

The following table summarizes changes in cash and cash equivalents for the periods stated (in thousands):

	Fiscal Years Ended March 31,	
	2020	2019
Net cash used in operating activities	\$ (15,757)	\$ (14,528)
Net cash used in investing activities	-	(174)
Net cash provided by financing activities	<u>4,012</u>	<u>17,424</u>
Net (decrease) increase in cash and cash equivalents	(11,745)	2,722
Cash and cash equivalents at beginning of period	<u>13,100</u>	<u>10,378</u>
Cash and cash equivalents at end of period	<u>\$ 1,355</u>	<u>\$ 13,100</u>

The increase in cash used in operations results primarily from the conduct of our Elevate Study, which commenced at the end of the fourth quarter of our fiscal year ended March 31, 2018 and continued through the third quarter of Fiscal 2020, and nonclinical manufacturing advancements related to PH94B and PH10 during Fiscal 2020. Cash used in investing activities in Fiscal 2019 reflects the cost of tenant improvements at our office and laboratory facilities in South San Francisco, California, substantially all of which were reimbursed by our landlord under the terms of our November 2016 lease extension, which reimbursement is reflected in operating activities. Cash provided by financing activities in Fiscal 2020 reflects the cash proceeds from our Fall 2019 Private Placement, our Fall 2019 Warrant Offering, the exercise of certain warrants following the modification of their exercise prices, proceeds from our January 2020 Registered Direct Offering and initial transactions under the LPC Agreement, net of routine payments on our insurance premium financing notes and lease. Cash provided by financing activities in Fiscal 2019 primarily reflects the cash proceeds from our Spring 2019 Public Offering, our Summer 2018 and Fall 2018 Private Placements, and warrant and option exercises, net of routine payments on our insurance premium financing notes and lease.

Off-Balance Sheet Arrangements

Other than contractual obligations incurred in the normal course of business, we do not have any off-balance sheet financing arrangements or liabilities, guarantee contracts, retained or contingent interests in transferred assets or any obligation arising out of a material variable interest in an unconsolidated entity. VistaStem has two inactive, wholly owned subsidiaries, Artemis Neuroscience, Inc., a Maryland corporation, and VistaStem Canada, Inc., an Ontario corporation.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

The disclosures in this section are not required because we qualify as a smaller reporting company under federal securities laws.

Item 8. Financial Statements and Supplementary Data

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Stockholders and Board of Directors
VistaGen Therapeutics, Inc.
South San Francisco, California

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of VistaGen Therapeutics, Inc. as of March 31, 2020 and 2019, the related consolidated statements of operations and comprehensive loss, cash flows, and stockholders' equity (deficit) for each of the two fiscal years in the period ended March 31, 2020, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company at March 31, 2020 and 2019, and the results of its operations and its cash flows for each of the two years in the period ended March 31, 2020, in conformity with accounting principles generally accepted in the United States of America.

Going Concern Uncertainty

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 2 to the consolidated financial statements, the Company has not yet generated sustainable revenues, has suffered recurring losses and negative cash flows from operations and has a stockholders' deficit, all of which raise substantial doubt about its ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 2. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinion

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

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

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

/s/ OUM & CO. LLP

San Francisco, California
June 29, 2020

We have served as the Company's auditor since 2006.

VISTAGEN THERAPEUTICS, INC.
CONSOLIDATED BALANCE SHEETS
(Amounts in dollars, except share amounts)

	<u>March 31,</u> <u>2020</u>	<u>March 31,</u> <u>2019</u>
ASSETS		
Current assets:		
Cash and cash equivalents	\$ 1,355,100	\$ 13,100,300
Receivable from supplier	-	300,000
Prepaid expenses and other current assets	225,100	228,600
Total current assets	1,580,200	13,628,900
Property and equipment, net	209,600	312,700
Right of use asset - operating lease	3,579,600	-
Deferred offering costs	355,100	22,300
Security deposits and other assets	47,800	47,800
Total assets	\$ 5,772,300	\$ 14,011,700
LIABILITIES AND STOCKHOLDERS' EQUITY (DEFICIT)		
Current liabilities:		
Accounts payable	\$ 1,836,600	\$ 1,055,000
Accrued expenses	561,500	1,685,600
Current note payable	56,500	57,300
Operating lease obligation - current portion	313,400	-
Financing lease obligation - current portion	3,300	3,000
Total current liabilities	2,771,300	2,800,900
Non-current liabilities:		
Accrued dividends on Series B Preferred Stock	5,011,800	3,748,200
Deferred rent liability	-	381,100
Operating lease obligation - non-current portion	3,715,600	-
Financing lease obligation - non-current portion	3,000	6,300
Total non-current liabilities	8,730,400	4,135,600
Total liabilities	11,501,700	6,936,500
Commitments and contingencies (Note 15)		
Stockholders' equity (deficit):		
Preferred stock, \$0.001 par value; 10,000,000 shares authorized at March 31, 2020 and 2019:		
Series A Preferred, 500,000 shares authorized, issued and outstanding at March 31, 2020 and 2019	500	500
Series B Preferred; 4,000,000 shares authorized at March 31, 2020 and 2019; 1,160,240 shares issued and outstanding at March 31, 2020 and 2019	1,200	1,200
Series C Preferred; 3,000,000 shares authorized at March 31, 2020 and 2019; 2,318,012 shares issued and outstanding at March 31, 2020 and 2019	2,300	2,300
Common stock, \$0.001 par value; 175,000,000 and 100,000,000 shares authorized at March 31, 2020 and 2019, respectively; 49,348,707 and 42,758,630 shares issued and outstanding at March 31, 2020 and 2019, respectively	49,300	42,800
Additional paid-in capital	200,092,800	192,129,900
Treasury stock, at cost, 135,665 shares of common stock held at March 31, 2020 and 2019	(3,968,100)	(3,968,100)
Accumulated deficit	(201,907,400)	(181,133,400)
Total stockholders' equity (deficit)	(5,729,400)	7,075,200
Total liabilities and stockholders' equity (deficit)	\$ 5,772,300	\$ 14,011,700

See accompanying notes to consolidated financial statements.

VISTAGEN THERAPEUTICS, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS
(Amounts in dollars, except share amounts)

	Fiscal Years Ended March 31,	
	2020	2019
Operating expenses:		
Research and development	\$ 13,374,200	\$ 17,098,500
General and administrative	7,427,300	7,457,800
Total operating expenses	<u>20,801,500</u>	<u>24,556,300</u>
Loss from operations	(20,801,500)	(24,556,300)
Other income (expenses), net:		
Interest income (expense), net	30,100	(8,000)
Loss on extinguishment of debt	-	(22,700)
Loss before income taxes	(20,771,400)	(24,587,000)
Income taxes	(2,600)	(2,600)
Net loss and comprehensive loss	\$ (20,774,000)	\$ (24,589,600)
Accrued dividend on Series B Preferred stock	(1,263,600)	(1,139,900)
Net loss attributable to common stockholders	<u>\$ (22,037,600)</u>	<u>\$ (25,729,500)</u>
Basic and diluted net loss attributable to common stockholders per common share	<u>\$ (0.50)</u>	<u>\$ (0.90)</u>
Weighted average shares used in computing basic and diluted net loss attributable to common stockholders per common share	<u>43,869,523</u>	<u>28,562,490</u>

See accompanying notes to consolidated financial statements

VISTAGEN THERAPEUTICS, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS
(Amounts in dollars)

	Fiscal Years Ended March 31,	
	2020	2019
Cash flows from operating activities:		
Net loss	\$ (20,774,000)	\$ (24,589,600)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	103,100	91,200
Stock-based compensation	3,820,800	3,443,400
Expense related to modification of warrants	826,900	25,800
Amortization of fair value of common stock issued for services	92,100	391,100
Fair value of common stock issued for product licenses and option	-	4,250,000
Amortization of fair value of warrants issued for services	13,800	119,700
Loss on settlement of accounts payable	-	22,700
Changes in operating assets and liabilities:		
Receivable from supplier	300,000	(300,000)
Prepaid expenses and other current assets	182,600	589,000
Right of use asset - operating lease	335,400	-
Operating lease liability	(267,000)	-
Accounts payable and accrued expenses	(390,700)	1,338,700
Deferred rent	-	90,500
Net cash used in operating activities	<u>(15,757,000)</u>	<u>(14,527,500)</u>
Cash flows from property and investing activities:		
Purchases of equipment and acquisition of tenant improvements	-	(174,000)
Net cash used in investing activities	<u>-</u>	<u>(174,000)</u>
Cash flows from financing activities:		
Net proceeds from issuance of common stock and warrants, including Units	3,349,000	17,041,000
Proceeds from exercise of warrants	410,000	605,700
Proceeds from sale of warrants	300,000	-
Net proceeds from sale of common stock under equity line	249,400	-
Repayment of capital lease obligations	(3,000)	(2,700)
Repayment of notes payable	(293,600)	(220,500)
Net cash provided by financing activities	<u>4,011,800</u>	<u>17,423,500</u>
Net (decrease) increase in cash and cash equivalents	<u>(11,745,200)</u>	<u>2,722,000</u>
Cash and cash equivalents at beginning of fiscal year	13,100,300	10,378,300
Cash and cash equivalents at end of fiscal year	<u>\$ 1,355,100</u>	<u>\$ 13,100,300</u>
Supplemental disclosure of cash flow activities:		
Cash paid for interest	\$ 14,800	\$ 8,000
Cash paid for income taxes	\$ 2,600	\$ 2,600
Supplemental disclosure of noncash activities:		
Insurance premiums settled by issuing note payable	\$ 292,800	\$ 224,000
Accrued dividends on Series B Preferred	\$ 1,263,600	\$ 1,139,900
Fair value of common stock issued reported as deferred offering costs	\$ 284,400	\$ -
Accounts payable settled by issuing common stock	\$ -	\$ 40,000

See accompanying notes to consolidated financial statements.

VISTAGEN THERAPEUTICS, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY (DEFICIT)

 Fiscal Years Ended March 31, 2019 and 2020
 (Amounts in dollars, except share amounts)

	Series A Preferred Stock		Series B Preferred Stock		Series C Preferred Stock		Common Stock		Additional Paid-in	Treasury	Accumulated	Total Stockholders' Equity
	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	Capital	Stock	Deficit	(Deficit)
Balances at March 31, 2018	500,000	\$ 500	1,160,240	\$ 1,200	2,318,012	\$ 2,300	23,068,280	\$ 23,100	\$67,401,400	(3,968,100)	\$(156,543,800)	\$ 6,916,600
Proceeds from sale of common stock for cash in February 2019 Public Offering, net of underwriting discount and expenses	-	-	-	-	-	-	11,500,000	11,500	10,376,900	-	-	10,388,400
Proceeds from sale of common stock and warrants for cash and settlement of professional services payable in private placement offerings	-	-	-	-	-	-	5,025,939	5,000	6,626,400	-	-	6,631,400
Proceeds from exercise of warrants	-	-	-	-	-	-	403,800	400	605,300	-	-	605,700
Proceeds from exercise of stock options	-	-	-	-	-	-	29,250	-	43,900	-	-	43,900
Accrued dividends on Series B Preferred stock	-	-	-	-	-	-	-	-	(1,139,900)	-	-	(1,139,900)
Stock-based compensation expense	-	-	-	-	-	-	-	-	3,443,400	-	-	3,443,400
Fair value of common stock issued for PH94B license and PH10 option and license	-	-	-	-	-	-	2,556,361	2,600	4,247,400	-	-	4,250,000
Fair value of common stock and warrants issued for services	-	-	-	-	-	-	175,000	200	499,300	-	-	499,500
Increase in fair value attributable to	-	-	-	-	-	-	-	-	25,800	-	-	25,800

warrant modifications													
Net loss for the fiscal year ended March 31, 2019	-	-	-	-	-	-	-	-	-	-	(24,589,600)	(24,589,600)	
Balances at March 31, 2019	<u>500,000</u>	<u>\$ 500</u>	<u>1,160,240</u>	<u>\$ 1,200</u>	<u>2,318,012</u>	<u>\$ 2,300</u>	<u>42,758,630</u>	<u>\$ 42,800</u>	<u>\$192,129,900</u>	<u>3,968,100</u>	<u>\$181,133,400</u>	<u>\$ 7,075,200</u>	
Proceeds from sale of units of common stock and warrants for cash in private placements	-	-	-	-	-	-	650,000	600	649,400	-	-	650,000	
Proceeds from sale of warrants in private placement	-	-	-	-	-	-	-	-	300,000	-	-	300,000	
Proceeds from sale of units of common stock and warrants for cash in public offering and concurrent private placement	-	-	-	-	-	-	3,870,077	3,900	2,695,100	-	-	2,699,000	
Issuance of commitment shares and net proceeds of initial sale of common stock under equity line	-	-	-	-	-	-	1,250,000	1,200	525,100	-	-	526,300	
Proceeds from exercise of warrants	-	-	-	-	-	-	820,000	800	409,200	-	-	410,000	
Accrued dividends on Series B Preferred stock	-	-	-	-	-	-	-	-	(1,263,600)	-	-	(1,263,600)	
Stock-based compensation expense	-	-	-	-	-	-	-	-	3,820,800	-	-	3,820,800	
Increase in fair value attributed to warrant modifications and additional warrants issued	-	-	-	-	-	-	-	-	826,900	-	-	826,900	
Net loss for the fiscal year ended March 31, 2020	-	-	-	-	-	-	-	-	-	-	(20,774,000)	(20,774,000)	
Balances at March 31, 2020	<u>500,000</u>	<u>\$ 500</u>	<u>1,160,240</u>	<u>\$ 1,200</u>	<u>2,318,012</u>	<u>\$ 2,300</u>	<u>49,348,707</u>	<u>\$ 49,300</u>	<u>\$200,092,800</u>	<u>3,968,100</u>	<u>\$201,907,400</u>	<u>\$(5,729,400)</u>	

VISTAGEN THERAPEUTICS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

1. Description of Business

Overview

VistaGen Therapeutics, Inc., a Nevada corporation (which may be referred to as *VistaGen*, the *Company*, *we*, *our*, or *us*), is a multi-asset, clinical-stage biopharmaceutical company committed to developing differentiated new generation medications for anxiety, depression and other central nervous system (CNS) diseases and disorders with high unmet need. Our pipeline includes three clinical-stage CNS drug candidates, each with a differentiated mechanism of action, an exceptional safety profile in all clinical studies to date, and therapeutic potential in multiple CNS markets. We aim to become a fully-integrated biopharmaceutical company that develops and commercializes innovative CNS therapies for large and growing mental health and neurology markets where current treatments are inadequate to meet the needs of millions of patients and caregivers worldwide.

PH94B Neuroactive Nasal Spray for Anxiety-related Disorders

PH94B neuroactive nasal spray is an odorless, first-in-class, fast-acting synthetic neurosteroid with therapeutic potential in a wide range of neuropsychiatric indications involving anxiety or phobia. Conveniently self-administered in microgram doses without systemic exposure, we are initially developing PH94B as a potential fast-acting, non-sedating, non-addictive new generation treatment of social anxiety disorder (SAD). SAD affects over 20 million Americans and, according to the National Institutes of Health (NIH), is the third most common psychiatric condition after depression and substance abuse. A person with SAD feels symptoms of anxiety or fear in certain social situations, such as meeting new people, dating, being on a job interview, answering a question in class, or having to talk to a cashier in a store. Doing everyday things in front of people - such as eating or drinking in front of others or using a public restroom - also causes anxiety or fear. A person with SAD is afraid that he or she will be humiliated, judged, and rejected. The fear that people with SAD have in social situations is so strong that they feel it is beyond their ability to control. As a result, SAD gets in the way of going to work, attending school, or doing everyday things in situations with potential for interpersonal interaction. People with SAD may worry about these and other things for weeks before they happen. Sometimes, they end up staying away from places or events where they think they might have to do something that will embarrass or humiliate them. Some people with SAD have performance anxiety. They feel physical symptoms of fear and anxiety in performance situations, such as giving a lecture, a speech or a presentation at school or work, as well as playing a sports game, or dancing or playing a musical instrument on stage. Without treatment, SAD can last for many years or a lifetime and prevent a person from reaching his or her full potential.

Only three drugs, all oral antidepressants (ADs), are approved by the U.S Food and Drug Administration (FDA) specifically for treatment of SAD. These FDA-approved chronic ADs have slow onset of therapeutic effect (often taking many weeks to months) and significant side effects (often beginning soon after administration). Slow onset of effect, chronic administration and significant side effects may make the FDA-approved ADs inadequate or inappropriate treatment alternatives for many individuals affected by SAD episodically. VistaGen's PH94B is fundamentally differentiated from all current anxiolytics, including all ADs approved by the FDA for treatment of SAD. Intranasal self-administration of only approximately 3.2 micrograms of PH94B binds to nasal chemosensory receptors that, in turn, activate key neural circuits in the brain that lead to rapid suppression of fear and anxiety. In Phase 2 and pilot Phase 3 clinical studies to date, PH94B has not shown psychological side effects (such as dissociation or hallucinations), systemic exposure, sedation or other side effects and safety concerns that may be caused by the current ADs approved by the FDA for treatment of SAD, as well as by benzodiazepines and beta blockers, which are not approved by the FDA to treat SAD but which may be prescribed by psychiatrists and physicians for treatment of SAD on an off-label basis.

In a peer-reviewed, published double-blind, placebo-controlled Phase 2 clinical trial, PH94B neuroactive nasal spray was significantly more effective than placebo in reducing both public-speaking (performance) anxiety ($p=0.002$) and social interaction anxiety ($p=0.009$) in laboratory challenges of individuals with SAD within 15 minutes of self-administration of a non-systemic 1.6 microgram dose of PH94B. Based on its novel mechanism of pharmacological action, rapid-onset of therapeutic effects and exceptional safety and tolerability profile in Phase 2 and pilot Phase 3 clinical trials to date, we are preparing for Phase 3 clinical development of PH94B for treatment of SAD in adults. Our goal is to develop and commercialize PH94B as the first FDA-approved, fast-acting, on-demand, at-home treatment for SAD. Additional potential anxiety-related neuropsychiatric indications for PH94B include general anxiety disorder, peripartum anxiety (pre- and post-partum anxiety), preoperative or pre-testing (e.g., pre-MRI) anxiety, panic disorder, post-traumatic stress disorder and specific social phobias. The FDA has granted Fast Track designation for development of our PH94B neuroactive nasal spray for on-demand treatment of SAD, the FDA's first such designation for a drug candidate for SAD.

In addition to development of PH94B as a potential treatment for SAD, in April 2020, we announced plans to expand clinical development of PH94B to include treatment of adjustment disorder, an emotional or behavioral reaction considered excessive or out of proportion to a stressful event or major life change, occurring within three months of the stressor, and/or significantly impairing a person's social, occupational and/or other important areas of functioning. We plan to submit our proposed protocol for an exploratory Phase 2a study of PH94B for treatment of adjustment disorder with anxiety due to stressors related to the COVID-19 pandemic to the FDA through the Coronavirus Treatment Acceleration Program (CTAP). The proposed Phase 2 study will be conducted in New York City on an open-label basis and involve approximately 30 subjects suffering from adjustment disorder with anxiety from stressors related to the pandemic.

VISTAGEN THERAPEUTICS, INC.
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

PH10 Neuroactive Nasal Spray for Depression and Suicidal Ideation

PH10 neuroactive nasal spray is an odorless, fast-acting synthetic neurosteroid with therapeutic potential in a wide range of neuropsychiatric indications involving depression and suicidal ideation. Conveniently self-administered in microgram doses without systemic exposure, we are initially developing PH94B as a potential fast-acting, non-sedating, non-addictive new generation treatment of major depressive disorder (*MDD*).

Depression is a serious medical illness and a global public health concern that can occur at any time over a person's life. While most people will experience depressed mood at some point during their lifetime, *MDD* is different. *MDD* is the chronic, pervasive feeling of utter unhappiness and suffering, which impairs daily functioning. Symptoms of *MDD* include diminished pleasure or loss of interest in activities, changes in appetite that result in weight changes, insomnia or oversleeping, psychomotor agitation, loss of energy or increased fatigue, feelings of worthlessness or inappropriate guilt, difficulty thinking, concentrating or making decisions, and thoughts of death or suicide and attempts at suicide. Current FDA-approved medications available in the multi-billion-dollar global AD market often fall far short of satisfying the unmet medical needs of millions suffering from the debilitating effects of depression.

While current FDA-approved ADs are widely used, about two-thirds of patients with *MDD* do not respond to their initial AD treatment. Inadequate response to current ADs is among the key reasons *MDD* is one of the leading public health concerns in the United States, creating a significant unmet medical need for new agents with fundamentally different mechanisms of action and side effect and safety profiles.

PH10 is a new generation antidepressant with a mechanism of action that is fundamentally different from all current ADs. After self-administration, a non-systemic microgram-level dose of PH10 binds to nasal chemosensory receptors that, in turn, activate key neural circuits in the brain that can lead to rapid-onset antidepressant effects, but without the psychological side effects (such as dissociation and hallucinations) or safety concerns that maybe be caused by ketamine-based therapy (KBT), including intravenous ketamine or esketamine nasal spray, or the significant side effects of current ADs. In an exploratory 30-patient Phase 2a clinical trial, PH10, self-administered at a dose of 6.4 micrograms, was well-tolerated and demonstrated significant ($p=0.022$) rapid-onset antidepressant effects, which were sustained over an 8-week period, as measured by the Hamilton Depression Rating Scale (HAM-D), without side effects or safety concerns that may be caused by KBT. Based on positive results from this exploratory Phase 2a study, we are preparing for Phase 2b clinical development of PH10 in *MDD*. With its exceptional safety profile during clinical development to date, we believe PH10, as a convenient at-home therapy, has potential for multiple applications in global depression markets, including as a stand-alone front-line therapy for *MDD*, as an add-on therapy to augment current FDA-approved ADs for patients with *MDD* who have an inadequate response to standard ADs, and to prevent relapse following successful treatment with KBT.

AV-101, an Oral NMDA Receptor Antagonist

AV-101 (4-Cl-KYN) targets the NMDAR (N-methyl-D-aspartate receptor), an ionotropic glutamate receptor in the brain. Abnormal NMDAR function is associated with numerous CNS diseases and disorders. AV-101 is an oral prodrug of 7-chloro-kynurenic acid (7-Cl-KYNA), which is a potent and selective full antagonist of the glycine co-agonist site of the NMDAR that inhibits the function of the NMDAR. Unlike ketamine and many other NMDAR antagonists, 7-Cl-KYNA is not an ion channel blocker. In all studies to date, AV-101 has exhibited no dissociative or hallucinogenic psychological side effects or safety concerns similar to those that may be caused by amantadine and KBT. With its exceptionally few side effects and excellent safety profile, AV-101 has potential to be a differentiated oral, new generation treatment for multiple large-market CNS indications where current treatments are inadequate to meet high unmet patient needs. The FDA has granted Fast Track designation for development of AV-101 as both a potential adjunctive treatment for *MDD* and as a non-opioid treatment for neuropathic pain.

We recently completed a double-blind, placebo-controlled, multi-center Phase 2 clinical trial of AV-101 as a potential adjunctive treatment, together with a standard FDA-approved oral AD (either a selective serotonin reuptake inhibitor (*SSRI*) or a serotonin norepinephrine reuptake inhibitor (*SNRI*)), in *MDD* patients who had an inadequate response to a stable dose of a standard AD (the *Elevate Study*). Topline results of the *Elevate Study* ($n=199$) indicated that the AV-101 treatment arm (1440 mg) did not differentiate from placebo on the primary endpoint (change in the Montgomery-Åsberg Depression Rating Scale (MADRS-10) total score compared to baseline), potentially due to sub-therapeutic levels of 7-Cl-KYNA in the brain. As in prior clinical studies, AV-101 was well tolerated, with no psychotomimetic side effects or drug-related serious adverse events.

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Recent discoveries from successful AV-101 preclinical studies suggest that there is a substantially increased brain concentration of AV-101 and its active metabolite, 7-Cl-KYNA, when AV-101 is given together with probenecid, a safe and well-known oral anion transport inhibitor used to treat gout. These surprising effects were first revealed in our recent preclinical studies, although they are consistent with well-documented clinical studies of probenecid increasing the therapeutic benefits of several unrelated classes of approved drugs, including certain antibacterial, anticancer and antiviral drugs. When probenecid was administered adjunctively with AV-101 in an animal model, substantially increased brain concentrations of both AV-101 (7-fold) and of 7-Cl-KYNA (35-fold) were discovered. We also recently identified that some of the same kidney transporters that reduce drug concentrations in the blood, by excretion in the urine, are also found in the blood brain barrier and function to reduce 7-Cl-KYNA levels in the brain by pumping it out of the brain and back into the blood. In the recent preclinical studies with AV-101 and probenecid, we discovered that blocking those transporters in the blood brain barrier with probenecid resulted, as noted above, in a substantially increased brain concentration of 7-Cl-KYNA. This 7-Cl-KYNA efflux-blocking effect of probenecid, with the resulting increased brain levels and duration of 7-Cl-KYNA, suggests the potential impact of AV-101 with probenecid could result in far more profound therapeutic benefits for patients with MDD and other NMDAR-focused CNS diseases and disorders than demonstrated in the Elevate Study. Some of the new discoveries from our recent AV-101 preclinical studies with adjunctive probenecid were presented by a collaborator of VistaGen at the British Pharmacological Society's Pharmacology 2019 annual conference in Edinburgh, UK in December 2019.

In addition, a Phase 1b target engagement study completed after the Elevate Study by the Baylor College of Medicine (*Baylor*) with financial support from the U.S. Department of Veterans Affairs (VA), involved 10 healthy volunteer U.S. military Veterans who received single doses of AV-101 (720 mg or 1440 mg) or placebo, in a double-blind, randomized, cross-over controlled trial. The primary goal of the study was to identify and define a dose-response relationship between AV-101 and multiple electrophysiological (*EEG*) biomarkers related to NMDAR function, as well as blood biomarkers associated with suicidality (the *Baylor Study*). The findings from the Baylor Study suggest that, in healthy Veterans, the higher dose of AV-101 (1440 mg) was associated with dose-related increase in the 40 Hz Auditory Steady State Response (*ASSR*), a robust measure of the integrity of inhibitory interneuron synchronization that is associated with NMDAR inhibition. Findings from the successful Baylor Study were presented at the 58th Annual Meeting of the American College of Neuropsychopharmacology (*ACNP*) in Orlando, Florida in December 2019.

The successful Baylor Study and the recent discoveries in our preclinical studies involving AV-101 and adjunctive probenecid suggest that it may be possible to increase therapeutic concentrations and duration of 7-Cl-KYNA in the brain, and thus increase NMDAR antagonism in MDD patients with an inadequate response to standard ADs when AV-101 and probenecid are combined. During 2020, we plan to conduct additional AV-101 preclinical studies with adjunctive probenecid to evaluate its potential applicability to MDD, suicidal ideation and other NMDAR-focused CNS indications for which we have existing preclinical data with AV-101 as a monotherapy, including epilepsy, levodopa-induced dyskinesia, and neuropathic pain, to determine the most appropriate path forward for potential future clinical development and commercialization of AV-101.

VistaStem Therapeutics – Stem Cell Technology for Drug Rescue and Regenerative Medicine

In addition to our current CNS drug candidates, we have stem cell technology-based, pipeline-enabling programs through our wholly-owned subsidiary, VistaStem Therapeutics (*VistaStem*). VistaStem is focused on applying human pluripotent stem cell (*hPSC*) technologies, including our customized cardiac bioassay system, *CardioSafe 3D*, to discover and develop small molecule New Chemical Entities (*NCEs*) for our CNS pipeline or out-licensing. In addition, VistaStem's stem cell technologies involving hPSC-derived blood, cartilage, heart and liver cells have multiple potential applications in the cell therapy (*CT*) and regenerative medicine (*RM*) fields.

To advance potential CT and RM applications of VistaStem's hPSC technologies related to heart cells, we licensed to BlueRock Therapeutics LP, a next generation CT/RM company formed jointly by Bayer AG and Versant Ventures, rights to develop and commercialize certain proprietary technologies relating to the production of cardiac stem cells for the treatment of heart disease. As a result of its acquisition of BlueRock Therapeutics in 2019, Bayer AG now holds rights to develop and commercialize VistaStem's hPSC technologies relating to the production of heart cells for the treatment of heart disease (the *Bayer Agreement*). In a manner similar to the Bayer Agreement, we may pursue additional collaborations involving rights to develop and commercialize VistaStem's hPSC technologies for production of blood, cartilage, and/or liver cells for CT and RM applications, including, among other indications, treatment of arthritis, cancer and liver disease.

Subsidiaries

As noted above, VistaStem is our wholly-owned subsidiary. Our Consolidated Financial Statements in this Annual Report on Form 10-K (*Annual Report*) also include the accounts of VistaStem's two wholly-owned inactive subsidiaries, Artemis Neuroscience, Inc., a Maryland corporation, and VistaStem Canada, Inc., a corporation organized under the laws of Ontario, Canada.

2. Basis of Presentation and Going Concern

The accompanying Consolidated Financial Statements have been prepared assuming that we will continue as a going concern. As a clinical-stage biopharmaceutical company having not yet developed commercial products or achieved sustainable revenues, we have experienced negative cash flows from operations and recurring losses resulting in a deficit of \$201.9 million accumulated from inception (May 1998) through March 31, 2020. We expect losses and negative cash flows from operations to continue for the foreseeable future as we engage in further development of PH94B, PH10 and AV-101, execute our drug rescue programs and pursue potential drug development and regenerative medicine opportunities.

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Since our inception in May 1998 through March 31, 2020, we have financed our operations and technology acquisitions primarily through the issuance and sale of our equity and debt securities for cash proceeds of approximately \$83.3 million, as well as from an aggregate of approximately \$17.7 million of government research grant awards (excluding the fair market value of government sponsored and funded clinical trials), strategic collaboration payments, intellectual property licensing and other revenues. Additionally, we have issued equity securities with an approximate value at issuance of \$38.1 million in noncash acquisitions of product licenses and in settlements of certain liabilities, including liabilities for professional services rendered to us or as compensation for such services.

At March 31, 2020, we had cash and cash equivalents of approximately \$1.4 million. As more completely described in Note 9, *Capital Stock*, on March 24, 2020, we entered into a purchase agreement and a registration rights agreement with Lincoln Park Capital Fund (*Lincoln Park*) pursuant to which Lincoln Park committed to purchase up to \$10,250,000 of our common stock at market-based prices over a period of 24 months (the *LPC Agreement*). On March 24, 2020, we sold 500,000 shares of our common stock to Lincoln Park under the purchase agreement at a price of \$0.50 per share for cash proceeds of \$250,000 (the *Initial Purchase*). To satisfy our obligations under the registration rights agreement, we filed a Registration Statement on Form S-1 (the *LPC Registration Statement*) with the Securities and Exchange Commission (the *SEC*) on March 31, 2020, which the SEC declared effective on April 14, 2020 (Registration No. 333-237514). Subsequent to the effectiveness of the LPC Registration Statement, which included the shares issued in the Initial Purchase, through June 26, 2020, we have sold an additional 6,201,995 registered shares of our common stock to Lincoln Park and have received aggregate cash proceeds of \$2,840,200. Additionally, in April 2020, in a self-directed private placement, we sold to an accredited investor units to purchase an aggregate of 125,000 unregistered shares of our common stock and four-year warrants to purchase 125,000 shares of our common stock at an exercise price of \$0.50 per share and we received cash proceeds of \$50,000 (the *Spring 2020 Private Placement*).

Nevertheless, in the absence of additional financing from the sale of our securities, government research grant awards, strategic collaboration payments, intellectual property licensing or other sources, we believe that our cash position at March 31, 2020, together with the proceeds from the LPC Agreement received to date, the Spring 2020 Private Placement, and the net cash receipt of approximately \$4.475 million from the upfront payment we expect to receive pursuant to the EverInsight Agreement (described more completely in Note 16, *Subsequent Events*), will not be sufficient to fund our planned operations for the twelve months following the issuance of these financial statements and raises substantial doubt that we can continue as a going concern. During the next twelve months, subject to securing appropriate and adequate financing, we plan to prepare for and launch a Phase 2a study of PH94B for treatment of adjustment disorder with anxiety due to stressors related to the COVID-19 pandemic, a Phase 3 clinical trial of PH94B for SAD, prepare for a Phase 2b clinical study and certain nonclinical studies involving PH10, PH94B and AV-101 and prepare for and potentially launch a Phase 2b clinical trial of PH10 for MDD. When necessary and advantageous, we plan to raise additional capital, through the sale of our equity securities in one or more (i) private placements to accredited investors, (i) public offerings and/or (ii) in strategic licensing and development collaborations involving one or more of our drug candidates in markets outside the United States. Subject to certain restrictions, our Registration Statement on Form S-3 (Registration No. 333-234025) (the *S-3 Registration Statement*), which became effective on October 7, 2019, is available for future sales of our equity securities in one or more public offerings from time to time. While we may make additional sales of our equity securities under the S-3 Registration Statement, we do not have an obligation to do so.

As we have been in the past, we expect that, when and as necessary, we will be successful in raising additional capital from the sale of our equity securities either in one or more public offerings or in one or more private placement transactions with individual accredited investors and institutions. In addition to the potential sale of our equity securities, we may also seek to enter research, development and/or commercialization collaborations that could generate revenue or provide funding, including non-dilutive funding, for development of one or more of our CNS product candidates. We may also seek additional government grant awards or agreements similar to our relationships with Baylor and the VA in connection with the Baylor Study. Such strategic collaborations may provide non-dilutive resources to advance our strategic initiatives while reducing a portion of our future cash outlays and working capital requirements. We may also pursue intellectual property arrangements similar to the EverInsight Agreement and the Bayer Agreement with other parties. Although we may seek additional collaborations that could generate revenue and/or provide non-dilutive funding for development of our product candidates, as well as new government grant awards and/or agreements, no assurance can be provided that any such collaborations, awards or agreements will occur in the future.

Our future working capital requirements will depend on many factors, including, without limitation, the scope and nature of opportunities related to our success and the success of certain other companies in clinical trials, including our development and commercialization of our current product candidates and various applications of our stem cell technology platform, the availability of, and our ability to obtain, government grant awards and agreements, and our ability to enter into collaborations on terms acceptable to us. To further advance the clinical development of PH94B, PH10, and AV-101 and, to a lesser extent, our stem cell technology platform, as well as support our operating activities, we plan to continue to carefully manage our routine operating costs, including our employee headcount and related expenses, as well as costs relating to regulatory consulting, contract research and development, investor relations and corporate development, legal, acquisition and protection of intellectual property, public company compliance and other professional services and operating costs.

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Notwithstanding the foregoing, there can be no assurance that our current strategic collaborations under the EverInsight Agreement and the Bayer Agreement will generate revenue from future potential milestone payments, or that future financings or government or other strategic collaborations will be available to us in sufficient amounts, in a timely manner, or on terms acceptable to us, if at all. If we are unable to obtain substantial additional financing on a timely basis when needed during 2020 and beyond, our business, financial condition, and results of operations may be harmed, the price of our stock may decline, we may be required to reduce, defer, or discontinue certain of our research and development activities and we may not be able to continue as a going concern. As noted above, these Consolidated Financial Statements do not include any adjustments that might result from the negative outcome of this uncertainty.

3. Summary of Significant Accounting Policies

Use of Estimates

The preparation of financial statements in conformity with U.S. generally accepted accounting principles (*U.S. GAAP*) requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities, the disclosure of contingent assets and liabilities at the date of the financial statements, and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates. Significant estimates include, but are not limited to, those relating to stock-based compensation, revenue recognition, research and development expenses, determination of right of use assets under lease transactions and related lease obligations, and the assumptions used to value warrants, warrant modifications and warrant liabilities.

Principles of Consolidation

The accompanying consolidated financial statements include the Company's accounts, VistaStem's accounts and the accounts of VistaStem's two wholly-owned inactive subsidiaries, Artemis Neurosciences and VistaStem Canada. All material intercompany accounts and transactions have been eliminated in consolidation.

Cash and Cash Equivalents

Cash and cash equivalents are considered to be highly liquid investments with maturities of three months or less at the date of purchase.

Property and Equipment

Property and equipment is stated at cost. Repairs and maintenance costs are expensed in the period incurred. Depreciation is calculated using the straight-line method over the estimated useful lives of the assets. The estimated useful lives of property and equipment range from three to seven years. Leasehold improvements are amortized over the shorter of the lease term or the useful life of the improvements.

Impairment of Long-Lived Assets

Our long-lived assets consist of property and equipment. Long-lived assets to be held and used are tested for recoverability whenever events or changes in business circumstances indicate that the carrying amount of the assets may not be fully recoverable. Factors that we consider in deciding when to perform an impairment review include significant underperformance of the business in relation to expectations, significant negative industry or economic trends, and significant changes or planned changes in our use of the assets. An impairment loss would be recognized when estimated undiscounted future cash flows expected to result from the use of an asset are less than its carrying amount. The impairment loss would be based on the excess of the carrying value of the impaired asset over its fair value, determined based on discounted cash flows. To date, we have not recorded any impairment losses on long-lived assets.

Deferred Offering Costs

Deferred offering costs are expenses directly related to our current S-3 Registration Statement (the *Shelf Registration*), which became effective on October 7, 2019, and expenses transferred from our predecessor registration statement on Form S-3, which became effective on May 12, 2017, and the LPC Registration Statement which we filed on March 31, 2020 and which became effective on April 14, 2020. These costs consist of legal, accounting, printing, SEC filing fees, and, as appropriate, Nasdaq filing fees, and, in the case of the LPC Registration Statement, the issuance-date fair value of certain shares of our common stock issued to Lincoln Park under the terms of the LPC Agreement. Deferred costs associated with the Shelf Registration are reclassified to additional paid-in capital on a pro-rata basis as we complete offerings under the S-3 Registration Statement, with any remaining deferred costs to be charged to results of operations at the end of the three-year life of the S-3 Registration Statement. During the fiscal years ended March 31, 2020 and 2019, we charged deferred offering costs of \$300 and \$4,800, respectively, to additional paid-in capital as a result of offerings under the Shelf Registration. Deferred costs associated with the LPC Registration Statement are reclassified to additional paid-in capital on a pro-rata basis as we complete sales of our common stock pursuant to the LPC Agreement, with any remaining deferred costs to be charged to results of operations at the end of the two-year life of the LPC Agreement. We charged deferred offering costs of \$8,100 to additional paid-in capital during the fiscal year ended March 31, 2020 as a result of sales of our common stock under the LPC Agreement.

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Revenue Recognition

We have historically generated revenue principally from collaborative research and development arrangements, licensing and technology transfer agreements, including strategic licenses or sublicenses, and government grants. We adopted Accounting Standards Update (ASU) No. 2014-09, *Revenue from Contracts with Customers (Topic 606)* and its related amendments, collectively referred to as ASC (*Accounting Standards Codification*) Topic 606, as of April 1, 2018, using the modified retrospective transition method. At adoption and currently, we have only the Bayer Agreement as a potential revenue generating arrangement. Upon adoption of ASC Topic 606, there was no change to the units of accounting previously identified with respect to the Bayer Agreement under legacy GAAP, which are now considered performance obligations under ASC Topic 606, and there was no change to the revenue recognition pattern for the performance obligation. Accordingly, there was no cumulative effect change to our opening accumulated deficit upon the adoption of ASC Topic 606. The EverInsight Agreement, described more completely in Note 16, *Subsequent Events*, was executed subsequent to the completion of our fiscal year ended March 31, 2020 and we have not yet assessed the impact of Topic 606 on it.

Under ASC Topic 606, we recognize revenue when our customer obtains control of promised goods or services, in an amount that reflects the consideration that we expect to receive in exchange for those goods or services. To determine revenue recognition for arrangements that we determine are within the scope of Topic 606, we perform the following five steps: (i) identify the contract with a customer; (ii) identify the performance obligations in the contract; (iii) determine the transaction price, including variable consideration, if any; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when (or as) we satisfy a performance obligation. We only apply the five-step model to contracts when it is probable that we will collect the consideration to which we are entitled in exchange for the goods or services we transfer to a customer.

Once a contract is determined to be within the scope of Topic 606, we assesses the goods or services promised within each contract and determine those that are performance obligations. Arrangements that include rights to additional goods or services that are exercisable at a customer's discretion are generally considered options. We assess whether these options provide a material right to the customer and if so, they are considered performance obligations. The exercise of a material right may be accounted for as a contract modification or as a continuation of the contract for accounting purposes.

We assess whether each promised good or service is distinct for the purpose of identifying the performance obligations in the contract. This assessment involves subjective determinations and requires judgments about the individual promised goods or services and whether such are separable from the other aspects of the contractual relationship. Promised goods and services are considered distinct provided that: (i) the customer can benefit from the good or service either on its own or together with other resources that are readily available to the customer (that is, the good or service is capable of being distinct) and (ii) our promise to transfer the good or service to the customer is separately identifiable from other promises in the contract (that is, the promise to transfer the good or service is distinct within the context of the contract). In assessing whether a promised good or service is distinct in the evaluation of a collaboration arrangement subject to Topic 606, we consider factors such as the research, manufacturing and commercialization capabilities of the collaboration partner and the availability of the associated expertise in the general marketplace. We also consider the intended benefit of the contract in assessing whether a promised good or service is separately identifiable from other promises in the contract. If a promised good or service is not distinct, we are required to combine that good or service with other promised goods or services until we identify a bundle of goods or services that is distinct.

The transaction price is then determined and allocated to the identified performance obligations in proportion to their standalone selling prices (SSP) on a relative SSP basis. SSP is determined at contract inception and is not updated to reflect changes between contract inception and satisfaction of the performance obligations. Determining the SSP for performance obligations requires significant judgment. In developing the SSP for a performance obligation, we consider applicable market conditions and relevant Company-specific factors, including factors that were contemplated in negotiating the agreement with the customer and estimated costs. In certain circumstances, we may apply the residual method to determine the SSP of a good or service if the standalone selling price is considered highly variable or uncertain. We validate the SSP for performance obligations by evaluating whether changes in the key assumptions used to determine the SSP will have a significant effect on the allocation of arrangement consideration between multiple performance obligations.

If the consideration promised in a contract includes a variable amount, we estimate the amount of consideration to which we will be entitled in exchange for transferring the promised goods or services to a customer. We determine the amount of variable consideration by using the expected value method or the most likely amount method. We include the unconstrained amount of estimated variable consideration in the transaction price. The amount included in the transaction price is constrained to the amount for which it is probable that a significant reversal of cumulative revenue recognized will not occur. At the end of each subsequent reporting period, we re-evaluate the estimated variable consideration included in the transaction price and any related constraint, and if necessary, adjust our estimate of the overall transaction price. Any such adjustments are recorded on a cumulative catch-up basis in the period of adjustment.

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If an arrangement includes development and regulatory milestone payments, we evaluate whether the milestones are considered probable of being reached and estimate the amount to be included in the transaction price using the most likely amount method. If it is probable that a significant revenue reversal would not occur, the associated milestone value is included in the transaction price. Milestone payments that are not within our control or the licensee's control, such as regulatory approvals, are generally not considered probable of being achieved until those approvals are received.

In determining the transaction price, we adjust consideration for the effects of the time value of money if the timing of payments provides us with a significant benefit of financing. We do not assess whether a contract has a significant financing component if the expectation at contract inception is such that the period between payment by the licensee and the transfer of the promised goods or services to the licensee will be one year or less. For arrangements with licenses of intellectual property that include sales-based royalties, including milestone payments based on the level of sales, and the license is deemed to be the predominant item to which the royalties relate, we recognize royalty revenue and sales-based milestones at the later of (i) when the related sales occur, or (ii) when the performance obligation to which the royalty has been allocated has been satisfied.

We then recognize as revenue the amount of the transaction price that is allocated to the respective performance obligation when (or as) each performance obligation is satisfied at a point in time or over time, and if over time, based on the use of an output or input method.

Research and Development Expenses

Research and development expenses are composed of both internal and external costs. Internal costs include salaries and employment-related expenses, including stock-based compensation expense, of scientific personnel and direct project costs. External research and development expenses consist primarily of costs associated with clinical and nonclinical development of PH94B, PH10 and AV-101, stem cell research and development costs, and costs related to the application and prosecution of patents related to AV-101 and our stem cell technology platform. All such costs are charged to expense as incurred.

We also record accruals for estimated ongoing clinical trial costs. Clinical trial costs represent costs incurred by contract research organizations (CROs) and clinical trial sites. Progress payments are generally made to CROs, clinical sites, investigators and other professional service providers. We analyze the progress of the clinical trial, including levels of subject enrollment, invoices received and contracted costs when evaluating the adequacy of accrued liabilities. Significant judgments and estimates must be made in determining the clinical trial accrual in any reporting period. Actual results could differ from those estimates under different assumptions. Revisions are charged to research and development expense in the period in which the facts that give rise to the revision become known.

Costs incurred in obtaining product or technology licenses are charged immediately to research and development expense if the product or technology licensed has not achieved regulatory approval or reached technical feasibility and has no alternative future uses. In September 2018, we acquired an exclusive license to develop and commercialize PH94B and an option to acquire a license to develop and commercialize PH10 by issuing an aggregate of 1,630,435 unregistered shares of our common stock having a fair market value of \$2,250,000. In October 2018, we exercised our option to acquire an exclusive license to develop and commercialize PH10 by issuing 925,926 shares of our unregistered common stock having a fair market value of \$2,000,000. Since, at the date of each acquisition, neither product candidate had achieved regulatory approval and each requires significant additional development and expense, we recorded the costs related to acquiring the licenses and the option as research and development expense.

Stock-Based Compensation

We recognize compensation cost for all stock-based awards to employees and non-employee consultants based on the grant date fair value of the award. We record stock-based compensation expense over the period during which the employee or other grantee is required to perform services in exchange for the award, which generally represents the scheduled vesting period. We have not granted restricted stock awards to employees or consultants nor do we have any awards with market or performance conditions. Prior to our April 1, 2019 adoption of ASU 2018-07, *Compensation-Stock Compensation (Topic 718), Improvements to Nonemployee Share-Based Payment Accounting (ASU 2018-07)*, we historically re-measured the fair value of option grants to non-employees as they vested and any resulting increase in value was recognized as an expense during the period over which the services were performed. Under ASU 2018-17, expense recognition for grants to non-employees follows the same methodology as for employees. Noncash expense attributable to compensatory grants of our common stock to non-employees is determined by the quoted market price of the stock on the date of grant and is either recognized as fully-earned at the time of the grant or expensed ratably over the term of the related service agreement, depending on the terms of the specific agreement.

Income Taxes

We account for income taxes using the asset and liability approach for financial reporting purposes. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases and operating loss and tax credit carryforwards. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that includes the enactment date. Valuation allowances are established, when necessary, to reduce the deferred tax assets to an amount expected to be realized.

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Right of Use Assets and Operating Lease Obligations

We adopted Accounting Standards Update No. 2016-02, “Leases (Topic 842)” (ASU 2016-02) effective April 1, 2019. ASU 2016-02 requires that we determine, at the inception of an arrangement, whether the arrangement is or contains a lease, based on the unique facts and circumstances present. Operating lease assets represent our right to use an underlying asset for the lease term (*Right of use assets*) and operating lease liabilities represent our obligation to make lease payments arising from the lease. Right of use assets and operating lease liabilities are recognized at the commencement date of the lease based upon the present value of lease payments over the lease term. When determining the lease term, we include options to extend or terminate the lease when it is reasonably certain, at inception, that we will exercise that option. The interest rate implicit in lease contracts is typically not readily determinable; accordingly, we use our incremental borrowing rate, which is the rate that would be incurred to borrow on a collateralized basis over a similar term an amount equal to the lease payments in a similar economic environment, based upon the information available at the commencement date. The lease payments used to determine our operating lease assets may include lease incentives, stated rent increases and escalation clauses linked to rates of inflation, when determinable, and are recognized in determining our Right of use assets. Our operating lease is reflected in the Right-of-use asset – operating lease; Operating lease obligation - current portion; and Operating lease obligation - non-current portion in our consolidated balance sheets.

Lease expense for minimum lease payments is recognized on a straight-line basis over the lease term. As a result of our adoption of ASU 2016-02, we no longer recognize deferred rent on the consolidated balance sheet. Short-term leases, defined as leases that have a lease term of 12 months or less at the commencement date, are excluded from this treatment and are recognized on a straight-line basis over the term of the lease. Variable lease payments are amounts owed by us to a lessor that are not fixed, such as reimbursement for common area maintenance costs for our facility lease; and are expensed when incurred.

Financing leases, formerly referred to as capitalized leases, are treated similarly to operating leases except that the asset subject to the lease is included in the appropriate fixed asset category, rather than recorded as a Right of use asset, and depreciated over its estimated useful life, or lease term, if shorter.

Concentrations of Credit Risk

Financial instruments, which potentially subject us to concentrations of credit risk, consist of cash and cash equivalents. Our investment policies limit any such investments to short-term, low-risk instruments. We deposit cash and cash equivalents with quality financial institutions which are insured to the maximum of federal limitations. Balances in these accounts may exceed federally insured limits at times.

Fair Value Measurements

We do not use derivative instruments for hedging of market risks or for trading or speculative purposes. When applicable, we follow the principles of fair value accounting as they relate to our financial assets and financial liabilities. Fair value is defined as the estimated exit price received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date, rather than an entry price that represents the purchase price of an asset or liability. Where available, fair value is based on observable market prices or parameters, or derived from such prices or parameters. Where observable prices or inputs are not available, valuation models are applied. These valuation techniques involve some level of management estimation and judgment, the degree of which is dependent on several factors, including the instrument’s complexity. The required fair value hierarchy that prioritizes observable and unobservable inputs used to measure fair value into three broad levels is described as follows:

- *Level 1* — Quoted prices (unadjusted) in active markets that are accessible at the measurement date for assets or liabilities. The fair value hierarchy gives the highest priority to Level 1 inputs.
- *Level 2* — Inputs other than Level 1 that are observable, either directly or indirectly, such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.
- *Level 3* — Unobservable inputs (*i.e.*, inputs that reflect the reporting entity’s own assumptions about the assumptions that market participants would use in estimating the fair value of an asset or liability) are used when little or no market data is available. The fair value hierarchy gives the lowest priority to Level 3 inputs.

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A financial instrument's categorization within the valuation hierarchy is based upon the lowest level of input that is significant to the fair value measurement. Where quoted prices are available in an active market, securities are classified as Level 1 of the valuation hierarchy. If quoted market prices are not available for the specific financial instrument, then we estimate fair value by using pricing models, quoted prices of financial instruments with similar characteristics or discounted cash flows. In certain cases where there is limited activity or less transparency around inputs to valuation, financial assets or liabilities are classified as Level 3 within the valuation hierarchy.

We carried no assets or liabilities that are measured on a recurring basis at fair value at March 31, 2020 or 2019.

Warrants Issued in Connection with Equity Financing

We generally account for warrants issued in connection with equity financings as a component of equity, unless there is a deemed possibility that we may have to settle the warrants in cash or the warrants contain other features requiring them to be treated as liabilities. For warrants issued with the possibility of cash settlement, or otherwise requiring liability treatment, we record the fair value of the issued warrants as a liability at each reporting period and record changes in the estimated fair value as noncash gain or loss in the Consolidated Statements of Operations and Comprehensive Loss.

Reclassifications

Certain prior year amounts in the Consolidated Financial Statements have been reclassified to conform to the current year's presentation.

Comprehensive Loss

We have no components of other comprehensive loss other than net loss, and accordingly our comprehensive loss is equivalent to our net loss for the periods presented.

Loss per Common Share Attributable to Common Stockholders

Basic net loss attributable to common stockholders per share of common stock excludes the effect of dilution and is computed by dividing net loss increased by the accrual for dividends on our Series B Preferred by the weighted-average number of shares of common stock outstanding for the period. Diluted net loss attributable to common stockholders per share of common stock reflects the potential dilution that could occur if securities or other contracts to issue shares of common stock were exercised or converted into shares of common stock. In calculating diluted net loss attributable to common stockholders per share, we have generally not increased the denominator to include the number of potentially dilutive common shares assumed to be outstanding during the period using the treasury stock method because the result is antidilutive.

As a result of our net loss for both years presented, potentially dilutive securities were excluded from the computation of diluted loss per share, as their effect would be antidilutive.

Basic and diluted net loss attributable to common stockholders per share was computed as follows:

	Fiscal Years Ended March 31,	
	2020	2019
Numerator:		
Net loss attributable to common stockholders for basic and diluted earnings		
per share	\$ (22,037,600)	\$ (25,729,500)
Denominator:		
Weighted average basic and diluted common shares outstanding	43,869,523	28,562,490
Basic and diluted net loss attributable to common stockholders per common share	\$ (0.50)	\$ (0.90)

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Potentially dilutive securities excluded in determining diluted net loss per common share for the fiscal years ended March 31, 2020 and 2019 are as follows:

	As of March 31,	
	2020	2019
Series A Preferred stock issued and outstanding ⁽¹⁾	750,000	750,000
Series B Preferred stock issued and outstanding ⁽²⁾	1,160,240	1,160,240
Series C Preferred stock issued and outstanding ⁽³⁾	2,318,012	2,318,012
Outstanding options under the Company's Amended and Restated 2016 (formerly 2008) Stock Incentive Plan and 2019 Omnibus Equity Incentive Plan	10,003,088	6,626,088
Outstanding warrants to purchase common stock	26,555,281	21,453,402
Total	40,786,621	32,307,742

⁽¹⁾ Assumes exchange under the terms of the October 11, 2012 Note Exchange and Purchase Agreement, as amended

⁽²⁾ Assumes exchange under the terms of the Certificate of Designation of the Relative Rights and Preferences of the Series B 10% Convertible Preferred Stock, effective May 5, 2015; excludes common shares issuable in payment of dividends on Series B Preferred upon conversion

⁽³⁾ Assumes exchange under the terms of the Certificate of Designation of the Relative Rights and Preferences of the Series C Convertible Preferred Stock, effective January 25, 2016

Recent Accounting Pronouncements

We believe the following recent accounting pronouncements or changes in accounting pronouncements are of significance or potential significance to the Company.

In February 2016, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) 2016-02, *Leases (ASC 842)*, which replaced the existing guidance in ASC 840, *Leases*, and which sets out the principles for the recognition, measurement, presentation and disclosure of leases for both parties to a contract (i.e. lessees and lessors). The new standard requires lessees to apply a dual approach, classifying leases as either finance or operating leases based on the principle of whether or not the lease is effectively a financed purchase by the lessee. This classification will determine whether lease expense is recognized based on an effective interest method or on a straight-line basis over the term of the lease, respectively. A lessee is also required to record a right-of-use asset and a lease liability for all leases with a term of greater than 12 months regardless of their classification. Leases with a term of 12 months or less will be accounted for similar to the current guidance for operating leases. We adopted this standard effective with our fiscal year beginning April 1, 2019. At adoption, we recognized approximately \$4.3 million as total lease liabilities and \$3.9 million as total right-of-use assets in our Consolidated Balance Sheet and derecognized a deferred rent liability of approximately \$0.4 million attributable to the operating lease of our primary office and laboratory facilities recorded in accordance with prior guidance. In connection with our adoption of ASC 842, we evaluated our contracts with clinical research and manufacturing organizations and determined that such contracts do not contain embedded leases.

In June 2018, the FASB issued ASU 2018-07, *Compensation-Stock Compensation (Topic 718), Improvements to Nonemployee Share-Based Payment Accounting (ASU 2018-07)*. ASU 2018-07 expands the scope of Topic 718 to include share-based payment transactions for acquiring goods and services from nonemployees. ASU 2018-07 aligns the accounting for share-based payment awards issued to employees and non-employees. Under ASU 2018-07, the existing guidance regarding share-based transactions with employees also applies to share-based transactions with non-employees, as long as the transaction is not effectively a form of financing, with the exception of specific guidance related to the attribution of compensation cost. The cost of non-employee awards will continue to be recorded as if the grantor had paid cash for the goods or services. In addition, the contractual term may be used in lieu of an expected term in the option-pricing model for non-employee awards. We adopted ASU 2018-07 effective with our fiscal year beginning April 1, 2019 and it did not have a material impact on our consolidated financial statements.

Other accounting standards that have been issued or proposed by the FASB or other standards-setting bodies that do not require adoption until a future date are not expected to have a material impact on our consolidated financial statements upon adoption.

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4. Receivable from Supplier

This amount reflects the balance of a prepayment made to a contract manufacturing organization that was refunded by the organization in May 2019 due to the termination of the underlying contract prior to March 31, 2019.

5. Prepaid Expenses and Other Current Assets

Prepaid expenses and other current assets consist of the following:

	March 31,	
	2020	2019
Clinical and nonclinical materials and contract services	\$ 115,200	\$ 5,900
Fair value of securities issued for professional services	-	105,900
Insurance	107,200	96,300
All other	2,700	20,500
	<u>\$ 225,100</u>	<u>\$ 228,600</u>

6. Property and Equipment

Property and equipment consists of the following:

	March 31,	
	2020	2019
Laboratory equipment	\$ 892,500	\$ 892,500
Tenant improvements	214,400	214,400
Computers and network equipment	54,600	54,600
Office furniture and equipment	84,600	84,600
	<u>1,246,100</u>	<u>1,246,100</u>
Accumulated depreciation and amortization	(1,036,500)	(933,400)
Property and equipment, net	<u>\$ 209,600</u>	<u>\$ 312,700</u>

The following table summarizes depreciation and amortization expense attributable to owned and leased property and equipment for the fiscal years ended March 31, 2020 and 2019:

	Fiscal Years Ended March 31,	
	2020	2019
Owned assets	\$ 100,200	\$ 88,300
Leased assets	2,900	2,900
Total depreciation and amortization	<u>\$ 103,100</u>	<u>\$ 91,200</u>

Other than certain leased office equipment, none of our assets were subject to third party security interests at March 31, 2020 or 2019.

7. Accrued Expenses

Accrued expenses consist of:

	March 31,	
	2020	2019
Accrued expenses for clinical and nonclinical materials, development and contract services	\$ 462,300	\$ 1,067,600
Accrued compensation	-	439,200
Accrued professional services	76,500	172,100
All other	22,700	6,700
	<u>\$ 561,500</u>	<u>\$ 1,685,600</u>

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8. Note Payable

The following table summarizes our note payable:

	<u>March 31, 2020</u>			<u>March 31, 2019</u>		
	<u>Principal Balance</u>	<u>Accrued Interest</u>	<u>Total</u>	<u>Principal Balance</u>	<u>Accrued Interest</u>	<u>Total</u>
7.30% (2020) and 7.75% (2019) Note payable to insurance premium financing company (current)	\$ 56,500	\$ -	\$ 56,500	\$ 57,300	\$ -	\$ 57,300

In February 2019, we executed a 7.75% promissory note in the face amount of \$63,500 in connection with certain insurance policy premiums. The note was payable in monthly installments of \$6,600, including principal and interest, through December 2019 and had a balance of \$57,300 at March 31, 2019. In May 2019, we executed a 7.15% promissory note in the principal amount of \$230,200 in connection with other insurance policy premiums. That note was payable in monthly installments of \$23,800, including principal and interest, through March 2020, when it was paid in full. In February 2020, we executed a 7.30% promissory note in the principal amount of \$62,000 in connection with renewal of the insurance policy that began in February 2019. That note is payable in monthly installments of \$6,500, including principal and interest, through December 2020, and has a balance of \$56,500 at March 31, 2020.

9. Capital Stock**Common Stock**

At our Annual Meeting of Stockholders on September 5, 2019, as approved by and recommended to our stockholders by our Board, our stockholders approved an amendment to our Restated Articles of Incorporation to increase the authorized number of shares of common stock that we may issue from 100.0 million shares to 175.0 million shares. The amendment became effective on September 6, 2019, upon our filing of a certificate of amendment with the Nevada Secretary of State. In connection with an underwritten public offering of our common stock and warrants in May 2016, our common stock was approved for listing on the Nasdaq Capital Market. Our common stock has been trading on the Nasdaq Capital Market under the symbol "VTGN" since May 11, 2016.

Series A Preferred Stock

In December 2011, our Board authorized the creation of a series of up to 500,000 shares of Series A Preferred, par value \$0.001 (*Series A Preferred*). Each restricted share of Series A Preferred is currently convertible at the option of the holder into one and one-half restricted shares of our common stock. The Series A Preferred ranks prior to the common stock for purposes of liquidation preference.

The Series A Preferred has no separate dividend rights, however, whenever the Board declares a dividend on the common stock, each holder of record of a share of Series A Preferred shall be entitled to receive an amount equal to such dividend declared on one share of common stock multiplied by the number of shares of common stock into which such share of Series A Preferred could be converted on the applicable record date.

Except with respect to transactions upon which the Series A Preferred shall be entitled to vote separately as a class, the Series A Preferred has no voting rights. The restricted common stock into which the Series A Preferred is convertible shall, upon issuance, have all of the same voting rights as other issued and outstanding shares of our common stock.

In the event of the liquidation, dissolution or winding up of our affairs, after payment or provision for payment of our debts and other liabilities, the holders of Series A Preferred then outstanding shall be entitled to receive distributions out of our assets, if any, an amount per share of Series A Preferred calculated by taking the total amount available for distribution to holders of all of our outstanding common stock before deduction of any preference payments for the Series A Preferred, divided by the total of (x), all of the then outstanding shares of our common stock, plus (y) all of the shares of our common stock into which all of the outstanding shares of the Series A Preferred can be converted before any payment shall be made or any assets distributed to the holders of the common stock or any other junior stock.

At March 31, 2020 and 2019, there were 500,000 restricted shares of Series A Preferred outstanding, convertible into 750,000 shares of our common stock at the option of the two respective holders.

Series B Preferred Stock

In July 2014, our Board authorized the creation of a class of Series B Preferred Stock, par value \$0.001 (*Series B Preferred*). In May 2015, we filed a Certificate of Designation of the Relative Rights and Preferences of the Series B 10% Preferred Stock of VistaGen Therapeutics, Inc. (*Certificate of Designation*) with the Nevada Secretary of State to designate 4.0 million shares of our authorized preferred stock as Series B Preferred.

VISTAGEN THERAPEUTICS, INC.
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Each share of Series B Preferred is convertible, at the option of the holder (*Voluntary Conversion*), into one (1) share of our common stock, subject to adjustment only for customary stock dividends, reclassifications, splits and similar transactions set forth in the Certificate of Designation. Outstanding shares of Series B Preferred are also convertible automatically on a one-to-one basis into shares of our common stock (*Automatic Conversion*) upon the closing or effective date of any of the following transactions or events: (i) a strategic transaction involving AV-101 with an initial up-front cash payment to us of at least \$10.0 million; (ii) a registered public offering of our common stock with aggregate gross proceeds to us of at least \$10.0 million; or (iii) for 20 consecutive trading days, our common stock trades at least 20,000 shares per day with a daily closing price of at least \$12.00 per share; provided, however, that Automatic Conversion and Voluntary Conversion (collectively, *Conversion*) are subject to certain beneficial ownership blockers as set forth in the Certificate of Designation and/or securities purchase agreements. Following the completion of our underwritten public offering in May 2016, which occurred concurrently with and facilitated the listing of our common stock on the NASDAQ Capital Market, approximately 2.4 million shares of Series B Preferred were converted automatically into approximately 2.4 million shares of our common stock pursuant to the Automatic Conversion provision. There have been no conversions of Series B Preferred since August 2016.

Prior to Conversion, shares of Series B Preferred accrue in-kind dividends (payable only in unregistered shares of our common stock) at a rate of 10% per annum (*Accrued Dividends*). The Accrued Dividends are payable on the date of either a Voluntary Conversion or Automatic Conversion in that number of shares of common stock equal to the Accrued Dividends. At March 31, 2020, we have recognized a liability in the amount of \$5,011,800 for Accrued Dividends in the accompanying Consolidated Balance Sheet at March 31, 2020, based on the Series B Preferred issued and outstanding through that date. We have recognized a deduction from net loss of \$1,263,600 and \$1,139,900 related to dividends on Series B Preferred in arriving at net loss attributable to common stockholders in the accompanying Consolidated Statement of Operations and Comprehensive Loss for the fiscal years ended March 31, 2020 and 2019, respectively.

In the event of the liquidation, dissolution or winding-up of our affairs, after payment or provision for payment of our debts and other liabilities, the Holders of the Series B Preferred then outstanding shall be entitled to receive distributions out of our assets, if any, of an amount equal to the Stated Value of the Series B Preferred (\$7.00 per share), plus any accrued and unpaid dividends thereon, before any distribution or payment shall be made to the holders of any junior securities, including holders of our common stock. If our assets are insufficient to pay, in full, such amounts, then the entire assets to be distributed to the holders of the Series B Preferred shall be ratably distributed among the holders in accordance with the respective amounts that would be payable on such shares if all amounts payable thereon were paid in full. Upon liquidation, each share of Series B Preferred ranks pari-passu with our Series A Preferred and our Series C Preferred (defined below). The liquidation value of the Series B Preferred at March 31, 2020 is approximately \$13,134,400.

At March 31, 2020 and 2019, there were 1,160,240 shares of Series B Preferred outstanding, which shares are subject to beneficial ownership blockers and are exchangeable at the option of the two respective holders by Voluntary Conversion, or pursuant to Automatic Conversion to the extent not otherwise subject to beneficial ownership blockers, into an aggregate of 1,160,240 shares of our common stock, excluding shares of our common stock which may be issued in payment of Accrued Dividends upon conversion.

Series C Preferred Stock

In January 2016, our Board authorized the creation of and we filed a Certificate of Designation of the Relative Rights and Preferences of the Series C Convertible Preferred Stock of VistaGen Therapeutics, Inc. (the *Series C Preferred Certificate of Designation*) with the Nevada Secretary of State to designate 3.0 million shares of our preferred stock, par value \$0.001 per share, as Series C Convertible Preferred Stock (*Series C Preferred*).

In the event of the liquidation, dissolution or winding up of our affairs, after payment or provision for payment of our debts and other liabilities, the holders of Series C Preferred then outstanding shall be entitled to receive, out of our assets, if any, an amount per share of Series C Preferred calculated by taking the total amount available for distribution to holders of all of our outstanding common stock before deduction of any preference payments for the Series C Preferred, divided by the total of (x), all of the then outstanding shares of our common stock, plus (y) all of the shares of our common stock into which all of the outstanding shares of the Series C Preferred can be exchanged before any payment shall be made or any assets distributed to the holders of the common stock or any other junior stock. Upon liquidation, each share of Series C Preferred ranks pari-passu with our Series B Preferred and our Series A Preferred.

Each share of Series C Preferred is convertible, at the option of the holder into one share of our common stock, subject to certain beneficial ownership limitations as set forth in the Series C Preferred Certificate of Designation. Shares of the Series C Preferred do not accrue dividends, and holders of the Series C Preferred have no voting rights. At March 31, 2020 and 2019, one holder and its affiliates held all 2,318,012 outstanding shares of Series C Preferred.

During our fiscal years ended March 31, 2019 and 2020, we completed private placement and public offerings as described below.

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Common Stock and Warrants Issued in Summer 2018 Private Placement

Between June 2018 and October 2018, we completed a self-placed private placement with accredited investors, pursuant to which we sold units, at a purchase price of \$1.25 per unit, consisting of 4,605,000 unregistered shares of our common stock and warrants, exercisable through February 28, 2022, to purchase 4,605,000 unregistered shares of our common stock at an exercise price of \$1.50 per share (the *Summer 2018 Private Placement*). The purchasers of the units have no registration rights with respect to the shares of common stock, warrants or the shares of common stock issuable upon exercise of the warrants comprising the units sold. The warrants are not exercisable until at least six months and one day following the date of issuance. We received aggregate cash proceeds of \$5,756,200 in connection with the Summer 2018 Private Placement and the entire amount of the proceeds was credited to stockholders' equity. Refer to Note 16, *Subsequent Events*, for disclosure regarding filing of a registration statement including the shares of common stock underlying the warrants issued in the Summer 2018 Private Placement.

Common Stock and Warrants Issued in Fall 2018 Private Placement

The Summer 2018 Private Placement was oversubscribed. To accommodate additional investor interest, during October 2018, we accepted subscription agreements from accredited investors, pursuant to which we sold to such investors units, at a unit purchase price equal to \$0.15 above the closing quoted market price of our common stock on the Nasdaq Capital Market on the effective date of the investor's subscription agreement, consisting of an aggregate of 420,939 unregistered shares of our common stock and four-year, immediately exercisable warrants to purchase 420,939 unregistered shares of our common stock at a per share exercise price equal to the closing quoted market price of our common stock on the Nasdaq Capital Market on the effective date of the investor's subscription agreement (the *Fall 2018 Private Placement*). The purchasers of the units have no registration rights with respect to the shares of common stock, warrants or the shares of common stock issuable upon exercise of the warrants comprising the units sold. We received aggregate cash proceeds of \$812,500 in connection with the Fall 2018 Private Placement and settled an outstanding professional service payable by accepting a subscription agreement in the amount of \$40,000 and issuing the corresponding number of shares of common stock and warrants. The entire amount of the proceeds of the Fall 2018 Private Placement was credited to stockholders' equity. The fair value of the common stock and warrant issued in the Fall 2018 Private Placement in settlement of the professional services payable was determined to be \$62,700 on the effective date of the agreement. Accordingly, we recognized a loss on extinguishment of accounts payable in the amount of \$22,700 in our Consolidated Statement of Operations and Comprehensive Loss for the fiscal year ended March 31, 2019. Refer to Note 16, *Subsequent Events*, for disclosure regarding filing of a registration statement including the shares of common stock underlying the warrants issued in the Fall 2018 Private Placement.

Modification of Warrants issued in Summer 2018 Private Placement

Subsequent to the completion of the Summer 2018 Private Placement, we amended warrants to purchase an aggregate of 304,000 shares of our common stock issued to investors who submitted Summer 2018 Private Placement subscription agreements between October 3, 2018 and October 5, 2018 to increase the exercise price of their warrants from \$1.50 per share to \$1.59 per share or \$1.69 per share, depending on the effective date of the related subscription agreement, to comply with certain provisions of The Nasdaq Stock Market Rules applicable to the private placement. As additional consideration for agreeing to the increase in the warrant exercise price, we granted the investors additional warrants to purchase an aggregate of 23,800 unregistered shares of our common stock at an exercise price of \$1.75 per share through February 28, 2022. We calculated the fair value of the modified warrants immediately before and after the modification using the Black Scholes Option Pricing Model and determined that the increase in the exercise price resulted in a decrease in the fair value of the warrants, which decrease is not recognized. We calculated the fair value of the 23,800 additional warrants using the Black-Scholes Option Pricing Model and the weighted average assumptions indicated in the table below, recognizing \$25,800 as the fair value of the new warrants and as warrant modification expense, included as a component of general and administrative expenses, in our Consolidated Statement of Operations and Comprehensive Loss for the fiscal year ended March 31, 2019.

Assumption:	New Warrants
Market price per share	\$ 1.80
Exercise price per share	\$ 1.75
Risk-free interest rate	2.83%
Remaining contractual term in years	3.25
Volatility	88.80%
Dividend rate	0.0%
Number of warrant shares	23,800
Weighted average fair value per share	\$ 1.08

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Issuance of Common Stock for Product Licenses and Option

As indicated in Note 3, *Summary of Significant Accounting Policies*, in September 2018 we issued an aggregate of 1,630,435 shares of our unregistered common stock having a fair market value of \$2,250,000, based on the \$1.38 per share quoted closing market price of our common stock on the Nasdaq Capital Market, to Pherin to acquire an exclusive worldwide license to develop and commercialize PH94B and an option to acquire a similar license for PH10. In October 2018, we exercised our option to acquire an exclusive worldwide license to develop and commercialize PH10 by issuing 925,926 shares of our unregistered common stock having a fair market value of \$2,000,000, based on the \$2.16 per share closing quoted market price of our common stock on the Nasdaq Capital Market, to Pherin under the terms of the PH10 license agreement. Under the terms of the PH94B and PH10 license agreements, we are obligated to make additional cash payments and pay royalties to Pherin in the event that certain regulatory and performance-based milestones and commercial sales are achieved. Additionally, in connection with the license agreements, we are obligated to pay to Pherin monthly support payments of \$10,000 for a term of 18 months, however no monthly support payment is required during the 18-month period identified in the PH10 license agreement if support payments are being made under the terms of the PH94B license agreement. The support payments required under the PH94B license agreement terminated in March 2020 and will terminate in April 2020 under the PH10 license agreement.

Common Stock Issued in Spring 2019 Public Offering

During the quarter ended March 31, 2019, we completed an underwritten public offering of 11,500,000 shares of our common stock, including the overallotment option, at a public offering price of \$1.00 per share, resulting in gross proceeds to us of \$11,500,000, pursuant to our shelf registration statement on Form S-3 (File No. 333-215671), previously filed with the SEC (the *Spring 2019 Public Offering*). We received net proceeds of approximately \$10.4 million after deducting underwriter's commission and offering expenses.

Common Stock and Warrants Issued in Fall 2019 Private Placement

Between October 30, 2019 and November 7, 2019, in a self-placed private placement and pursuant to subscription agreements received from certain accredited investors, we sold to such investors units, at a purchase price of \$1.00 per unit, consisting of an aggregate of 650,000 unregistered shares of our common stock and warrants, exercisable beginning six months and one day following issuance and through November 1, 2023, to purchase 325,000 unregistered shares of our common stock at an exercise price of \$2.00 per share (the *Fall 2019 Private Placement*). We received cash proceeds of \$650,000 from the Fall 2019 Private Placement.

As further described below under "Winter 2019 Warrant Modification," in December 2019, we modified the warrants issued in connection with the Fall 2019 Private Placement to (i) reduce the exercise price from \$2.00 per share to \$0.50 per share and (ii) to allow for the warrants to become immediately exercisable. Further, we issued warrants to purchase an aggregate of 325,000 additional shares of our common stock to the participants in the Fall 2019 Private Placement (the *Additional Warrants*) to increase the number of unregistered shares of common stock issuable upon exercise of the warrants from 50% to 100%. The Additional Warrants are immediately exercisable through March 31, 2024 at an exercise price of \$0.50 per share.

We calculated the fair value of the Additional Warrants using the Black Scholes Option Pricing Model and the weighted average assumptions indicated in the table below, recognizing \$88,800 as the fair value of the new warrants and as warrant modification expense, included as a component of general and administrative expenses, in our Consolidated Statement of Operations and Comprehensive Loss for the fiscal year ended March 31, 2020.

Assumption:	Additional Warrants
Market price per share	\$ 0.44
Exercise price per share	\$ 0.50
Risk-free interest rate	1.59%
Contractual term in years	4.32
Volatility	86.64%
Dividend rate	0.0%
Number of warrant shares	325,000
Weighted average fair value per share	\$ 0.27

Winter 2019 Warrant Modification

On December 4, 2019, we modified outstanding warrants previously issued as a part of completed private placements to temporarily reduce, for a period of two years or, if sooner, until the expiration of the warrant, the exercise price of such warrants to \$0.50 per share, in order to more closely align the exercise price of the warrants with the trading price of our common stock at such time (the *Winter 2019 Warrant Modification*). Following the two-year period during which the exercise price is reduced, the exercise price of each then-outstanding modified warrant will revert to its pre-modification price. As a result of the Winter 2019 Warrant Modification, outstanding warrants to purchase a total of approximately 6.6 million unregistered shares of our common stock were modified.

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We calculated the fair value of the modified warrants, including those issued in the Fall 2019 Private Placement, immediately before and after the modification using the Black Scholes Option Pricing Model for pre-modification valuations and for post-modification valuations for warrants expiring in less than two years. For the warrants expiring after the December 4, 2021 exercise price reversion date, we ran a binomial model using 24 steps, one for each month, and lognormal distribution to estimate our stock price at December 4, 2021, the termination date for the exercise price reduction. We then compared the exercise value of each warrant at each estimated stock price to the remaining option value if the warrant was not exercised on December 4, 2021 and allowed to revert to its original exercise price. For any estimated stock price above \$0.50 per share (an in-the-money warrant), we determined that the holders would convert their warrants. For any estimated stock price below \$0.50 per share, we determined that the holders would continue to hold their warrants. Given the significant reductions in exercise price (the pre-modification exercise prices ranged from \$1.50 to \$2.24 per share), if the warrants are not exercised prior to December 4, 2021, the Black-Scholes values upon the reversion of the exercise prices are very low, such that there is nominal additional value for continuing to hold the warrants. Accordingly, our estimated post-modification fair value for warrants having an expiration date later than the two-year exercise price reversion date, December 4, 2021, is equal to the value of an option determined using the Black Scholes Option Pricing Model having an exercise price of \$0.50 per share and a two-year term and related assumptions. The table below indicates the pre- and post-modification weighted average assumptions used in our valuations. We recognized the incremental fair value, \$702,500, as warrant modification expense, included as a component of general and administrative expenses, in our Consolidated Statement of Operations and Comprehensive Loss for the fiscal year ended March 31, 2020.

Assumption:	Pre- modification	Post- modification
Market price per share	\$ 0.44	\$ 0.44
Exercise price per share	\$ 1.85	\$ 0.50
Risk-free interest rate	1.58%	1.58%
Remaining contractual term in years	2.25	1.91
Volatility	87.5%	88.1%
Dividend rate	0.0%	0.0%
Number of warrant shares	6,611,759	6,611,759
Weighted average fair value per share	\$ 0.08	\$ 0.19

Following the Winter 2019 Warrant Modification, investors holding a total of 820,000 warrants elected to exercise their warrants at the reduced price of \$0.50 per share, resulting in proceeds to us of \$410,000. Refer to Note 16, *Subsequent Events*, for disclosure regarding filing of a registration statement including the shares of common stock underlying essentially all of the warrants subject to the Winter 2019 Warrant Modification.

December 19, 2019 Warrant Modification

On December 19, 2019, we modified outstanding warrants previously issued as a part of a completed private placement to permanently reduce the exercise price of such warrants to \$0.805 per share and to extend the term of such warrants through December 31, 2022, in order to more closely align the exercise price of the warrants with the current trading price of our common stock and to provide additional time for the holders to exercise the warrants (the *December 19, 2019 Warrant Modification*). As a result of the December 19, 2019 Warrant Modification, outstanding warrants to purchase a total of 80,431 shares of common stock were modified.

We calculated the fair value of the modified warrants immediately before and after the modification using the Black Scholes Option Pricing Model and the weighted average assumptions indicated in the table below. We recognized the incremental fair value, \$35,600, as warrant modification expense, included as a component of general and administrative expenses, in our Consolidated Statement of Operations and Comprehensive Loss for the fiscal year ended March 31, 2020.

Assumption:	Pre- modification	Post- modification
Market price per share	\$ 0.805	\$ 0.805
Exercise price per share	\$ 7.00	\$ 0.805
Risk-free interest rate	1.57%	1.65%
Remaining contractual term in years	0.58	3.034
Volatility	98.7%	84.9%
Dividend rate	0.0%	0.0%
Number of warrant shares	80,431	80,431
Weighted average fair value per share	\$ 0.00	\$.044

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Warrants issued in Winter 2019 Warrant Offering

In December 2019, we commenced a self-placed private placement of warrants to purchase unregistered shares of our common stock at an offering price of \$0.15 per warrant (the *Winter 2019 Warrant Offering*). Warrants offered and sold in the Winter 2019 Warrant Offering have an exercise price of \$0.50 per share and term of three years from the issuance date. Over the course of the Winter 2019 Warrant Offering, we sold warrants to purchase a total of 2.0 million unregistered shares of common stock for cash proceeds to us of \$300,000, which we accounted for with a corresponding credit to additional paid-in capital, an equity account. Refer to Note 16, *Subsequent Events*, for disclosure regarding filing of a registration statement including the shares of common stock underlying the warrants issued in the Winter 2019 Warrant Offering.

Registered Direct Offering of Common Stock and Concurrent Warrant Offering

In January 2020, we entered into a self-placed securities purchase agreement with certain accredited investors pursuant to which we received gross cash proceeds of \$2.75 million upon the sale of an aggregate of 3,870,077 shares of our common stock at a purchase price of \$0.71058 per share (the *January 2020 Offering*). Concurrently with the January 2020 Offering, we also commenced a private placement in which we issued and sold warrants (the *January 2020 Warrants*) exercisable for an aggregate of 3,870,077 unregistered shares of our common stock (the *Warrant Shares*), having an exercise price of \$0.73 per Warrant Share. The 3,870,077 shares of common stock sold in the January 2020 Offering (but not the January 2020 Warrants or the Warrant Shares) were offered and sold pursuant to a prospectus, dated September 30, 2019, and a prospectus supplement dated January 24, 2020, in connection with a takedown from our shelf registration statement on Form S-3 (File No. 333-234025).

The January 2020 Warrants contain customary provisions allowing for adjustment to the exercise price and number of Warrant Shares issuable only in the event of any stock dividend and split, reverse stock split, recapitalization, reorganization or similar transaction, as described in the January 2020 Warrants. In addition, subject to limited exceptions, holders of the January 2020 Warrants will not have the right to exercise any portion of their respective January 2020 Warrants if the holder, together with any affiliates, would beneficially own in excess of 4.99% of the number of shares of our common stock outstanding immediately after giving effect to such exercise. The January 2020 Warrants are exercisable from any time after the six-month anniversary of issuance (the *Initial Exercise Date*) and will expire on the fifth year anniversary of the Initial Exercise Date. Refer to Note 16, *Subsequent Events*, for disclosure regarding filing of a registration statement including the shares of common stock underlying the January 2020 Warrants.

Common Stock Purchase Agreement with Lincoln Park

On March 24, 2020, we entered into a purchase agreement and a registration rights agreement with Lincoln Park Capital Fund (*LPC*) pursuant to which LPC committed to purchase up to \$10,250,000 of our common stock at market-based prices over a period of 24 months (the *LPC Agreement*). On March 24, 2020, we sold 500,000 unregistered shares of our common stock (the *Initial Purchase Shares*) to LPC under the purchase agreement at a price of \$0.50 per share for gross cash proceeds of \$250,000 (the *Initial Purchase*) and we also issued 750,000 unregistered shares of our common stock to LPC under the terms of the LPC Agreement (the *Commitment Shares*). To satisfy our obligations under the registration rights agreement, we filed a Registration Statement on Form S-1 (the *LPC Registration Statement*) with the SEC on March 31, 2020 (Registration No. 333-237514), which the SEC declared effective on April 14, 2020 (the *Commencement Date*). The LPC Registration Statement included registration of the Initial Purchase Shares and the Commitment Shares. The fair value of the Commitment Shares, \$284,400, determined based on the quoted closing market price of our common stock on March 24, 2020, is a component of deferred offering costs attributable to this offering, which costs are amortized ratably to additional paid-in capital as we sell shares of our common stock to LPC under the LPC Agreement.

Following the Commencement Date, on any business day over the term of the LPC Agreement, we have the right, in our sole discretion, to direct LPC to purchase up to 100,000 shares on such business day (the "*Regular Purchase*") (subject to adjustment under certain circumstances as provided in the LPC Agreement). The purchase price per share for each such Regular Purchase will be based on prevailing market prices of our common stock immediately preceding the time of sale as computed under the LPC Agreement. In each case, LPC's maximum commitment in any single Regular Purchase may not exceed \$1,000,000. In addition to Regular Purchases, provided that we present LPC with a purchase notice for the full amount allowed for a Regular Purchase, we may also direct LPC to make accelerated purchases and additional accelerated purchases as described in the LPC Agreement. Although LPC has no right to require us to sell any shares of our common stock to LPC, LPC is obligated to make purchases as we direct, subject to certain conditions. In all instances, we may not sell shares of our common stock to LPC under the LPC Agreement if such sales would result in LPC beneficially owning more than 9.99% of our common stock. There are no upper limits on the price per share that LPC must pay for shares of our common stock. See Note 16, *Subsequent Events*, for disclosure regarding sales of our common stock under the LPC Agreement after March 31, 2020.

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Issuance of Common Stock and Warrants to Professional Services Providers

During our fiscal year ended March 31, 2019, we issued the following securities in private placement transactions as compensation for various professional services. In all cases, we recorded the related noncash expense as a component of general and administrative expense in the Consolidated Statement of Operations and Comprehensive Loss for the fiscal year ended March 31, 2019.

- During the quarter ended June 30, 2018, we issued an aggregate of 100,000 unregistered shares of our common stock having a fair value on the dates of issuance of \$123,000 as full or partial compensation to an investor relations service provider and under a financial advisory agreement.
- During the quarter ended September 30, 2018, we issued 50,000 shares of our unregistered common stock having a fair value on the date of issuance of \$68,000 as partial compensation to a corporate awareness service provider.
- During the quarter ended September 30, 2018, we also issued four-year warrants to three service providers to purchase an aggregate of 288,000 unregistered shares of our common stock at an exercise price of \$1.50 per share as full or partial compensation for investor relations and corporate awareness services. We valued the warrants at an aggregate fair value of \$266,900 using the Black-Scholes Option Pricing Model and the following grant date weighted average assumptions: exercise price per share: \$1.50; market price per share: \$1.40; risk-free interest rate: 2.71%; contractual term: 4 years; volatility: 94.17%; dividend rate: 0%; deriving a value per warrant share of \$0.93. The fair value of the common stock and warrants was recognized in expense ratably over the term of the underlying contracts.
- During the quarter ended March 31, 2019, we issued 25,000 registered shares of our common stock having a fair value of \$41,500 on the date of issuance from our Amended and Restated 2016 Stock Incentive Plan to an investor relations and social media service provider. The fair value of the common stock was recognized in expense ratably over the term of the underlying contract.

Stock Option Exercises

During the quarter ended March 31, 2019, our Chief Executive Officer and Chief Scientific Officer and a member of our Board exercised outstanding stock options to purchase an aggregate of 29,250 shares of our common stock and we received cash proceeds of \$43,900. There were no stock option exercises during the fiscal year ended March 31, 2020.

Warrants Outstanding

Following the Winter 2019 Warrant Modifications, the December 19, 2019 Warrant Modification, the Winter 2019 Warrant Offering and the issuance of the January 2020 Warrants and the other transactions described above, the following table summarizes outstanding and exercisable warrants to purchase shares of our common stock as of March 31, 2020. The weighted average exercise price of outstanding and exercisable warrants at March 31, 2020 was \$1.64 per share and \$1.82 per share, respectively.

Exercise Price per Share	Expiration Date	Warrants Outstanding at March 31, 2020	Warrants Exercisable at March 31, 2020
\$ 0.50	5/20/2020 to 3/31/2024	8,116,759	7,791,759
\$ 0.73	7/25/2025	3,870,077	-
\$ 0.805	12/31/2022	80,431	80,431
\$ 1.50	12/13/2022	9,596,200	9,596,200
\$ 1.82	3/7/2023	1,388,931	1,388,931
\$ 3.51	12/31/2021	50,000	50,000
\$ 5.30	5/16/2021	2,705,883	2,705,883
\$ 7.00	9/2/2020 to 3/3/2023	747,000	747,000
		26,555,281	22,360,204

Of the warrants outstanding at March 31, 2020, 2,705,883 shares of common stock underlying the warrants exercisable at \$5.30 per share issued in our May 2016 public offering, 1,388,931 shares of common stock underlying the warrants exercisable at \$1.82 per share issued in our September 2017 public offering and 9,596,200 shares of common stock underlying the warrants exercisable at \$1.50 per share issued in our December 2017 public offering are registered for resale by the warrant holders. The common shares issuable upon exercise of our remaining outstanding warrants are unregistered at March 31, 2020; however, refer to Note 16, *Subsequent Events*, for disclosure regarding filing of a registration statement including the shares of common stock underlying a significant number of the warrants issued in earlier private placements and currently exercisable at \$0.50 per share. At March 31, 2020, none of our outstanding warrants are subject to down round anti-dilution protection features. With the exception of the January 2020 Warrants exercisable at \$0.73 per share to purchase 3,870,077 shares of our common stock, which have a cashless exercise feature prior to an effective registration statement, all of the outstanding warrants are exercisable by the holders only by payment in cash of the stated exercise price per share. Refer to Note 16, *Subsequent Events*, for disclosure regarding filing of a registration statement including the shares of common stock underlying the January 2020 Warrants.

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Reserved Shares

At March 31, 2020, we have reserved shares of our common stock for future issuance as follows:

Upon exchange of all shares of Series A Preferred currently issued and outstanding ⁽¹⁾	750,000
Upon exchange of all shares of Series B Preferred currently issued and outstanding ⁽²⁾	5,096,738
Upon exchange of all shares of Series C Preferred currently issued and outstanding ⁽³⁾	2,318,012
Pursuant to warrants to purchase common stock:	
Subject to outstanding warrants	26,555,281
Pursuant to stock incentive plans:	
Subject to outstanding options under the Amended and Restated 2016 Stock Incentive Plan and the 2019 Omnibus Equity Incentive Plan	10,003,088
Available for future grants under the 2019 Omnibus Equity Incentive Plan	6,730,162
Available for future issuance under the 2019 Employee Stock Purchase Plan	1,000,000
	<u>17,733,250</u>
Reserved for issuance under Lincoln Park Purchase Agreement	<u>8,750,000</u>
Total	<u><u>61,203,281</u></u>

⁽¹⁾ Assumes exchange under the terms of the October 11, 2012 Note Exchange and Purchase Agreement

⁽²⁾ Assumes exchange under the terms of the Certificate of Designation of the Relative Rights and Preferences of the Series B 10% Convertible Preferred Stock, effective May 5, 2015; includes 3,936,498 shares of common stock reserved for payment of dividends on Series B Preferred upon conversion. Refer to *Series B Preferred Stock*, above, for additional information regarding payment of dividends in common stock.

⁽³⁾ Assumes exchange under the terms of the Certificate of Designation of the Relative Rights and Preferences of the Series C Convertible Preferred Stock, effective January 25, 2016

At March 31, 2020, we have 64,583,677 authorized shares of our common stock not subject to reserves and available for future issuance.

10. Research and Development Expenses

We recorded research and development expenses of approximately \$13.4 million and \$17.1 million in the fiscal years ended March 31, 2020 and 2019, respectively, including approximately \$1.4 million and \$5.6 million of noncash expense in the fiscal years ended March 31, 2020 and 2019, respectively. Research and development expense is composed of employee compensation expenses, including stock-based compensation, direct project expenses, notably including costs attributable to our AV-101 clinical trial in MDD in both years, as well as other preclinical and nonclinical projects for PH94B, PH10 and AV-101, and costs to maintain and prosecute our intellectual property suite, including new patent applications for AV-101 for various indications. As indicated in Note 9, *Capital Stock*, research and development expense for the fiscal year ended March 31, 2019 included noncash expense of \$4.25 million attributable to the acquisition of the PH94B and PH10 licenses and the PH10 option.

11. Income Taxes

The provision for income taxes for the periods presented in the Consolidated Statements of Operations and Comprehensive Loss represents minimum California franchise tax, Maryland and North Carolina income tax.

Income tax expense (benefit) differed from the amounts computed by applying the statutory federal income tax rate of 21% to pretax income (loss) as a result of the following:

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	Fiscal Years Ended March 31,	
	2020	2019
Computed expected tax benefit	(21.00)%	(21.00)%
State income taxes, net of federal benefit	0.01%	0.00%
Tax effect of warrant modifications	0.84%	0.00%
Tax effect of research and development credits	(1.60)%	(1.92)%
Tax effect of stock compensation	2.39%	0.00%
Tax effect of other non-deductible items	0.00%	0.74%
Expired net operating loss carryforwards	0.36%	0.00%
Change in valuation allowance (federal only)	19.02%	22.19%
Income tax expense	<u>0.02%</u>	<u>0.01%</u>

Deferred income taxes reflect the net tax effect of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Significant components of our deferred tax assets are as follows:

	March 31,	
	2020	2019
Deferred tax assets:		
Net operating loss carryovers	\$ 30,607,500	\$ 27,190,900
Basis differences in property and equipment	9,100	(2,700)
Research and development credit carryforwards	2,256,400	1,840,400
Stock based compensation	3,919,900	3,516,600
Operating lease Right of Use asset	95,400	-
Accruals and reserves	66,500	207,100
Total deferred tax assets	36,954,800	32,752,300
Valuation allowance	(36,954,800)	(32,752,300)
Net deferred tax assets	<u>\$ -</u>	<u>\$ -</u>

Realization of deferred tax assets is dependent upon future earnings, if any, the timing and amount of which are uncertain. Accordingly, the deferred tax assets have been fully offset by a valuation allowance. The valuation allowance increased by \$4,202,500 and \$7,499,900 during the fiscal years ended March 31, 2020 and 2019, respectively.

As of March 31, 2020, we had U.S. federal net operating loss carryforwards of approximately \$125,125,100, which will expire in fiscal years 2021 through 2038. As of March 31, 2020, we had state net operating loss carryforwards of approximately \$64,123,000, which will expire in fiscal years 2029 through 2040. Federal net operating losses incurred in our fiscal years 2019, 2020 and thereafter will not expire. We also have federal and state research and development tax credit carryforwards of approximately \$2,068,800 and \$1,189,600, respectively. The federal tax credits will expire at various dates beginning in the year 2029, unless previously utilized. The state tax credits do not expire and will carry forward indefinitely until utilized.

On March 27, 2020 the U.S. enacted the Coronavirus Aid, Relief, and Economic Security Act (the CARES Act) which provides economic relief in response to the coronavirus pandemic. The CARES Act, among other things, includes provisions to allow certain net operating losses to be carried-back up to five years, to increase interest deduction limitations, and to make technical corrections to tax depreciation methods for qualified improvement property. The CARES Act may affect the corporate income taxes imposed by state governments and may result in future responses by state legislatures, some of which could have retroactive effect. The Company evaluated the provisions of the CARES Act and determined that it did not result in a material impact on the Company's March 31, 2020 income tax accounts.

U.S. federal and state tax laws include substantial restrictions on the utilization of net operating loss carryforwards in the event of an ownership change of a corporation. We have not performed a change in ownership analysis since our inception in 1998 and accordingly some or all of our net operating loss carryforwards may not be available to offset future taxable income, if any.

We file income tax returns in the U.S. federal, Canada and various U.S. state jurisdictions. We are subject to U.S. federal and state income tax examinations by tax authorities for tax years 1998 through 2019 due to net operating losses that are being carried forward for tax purposes, but we are not currently under examination by tax authorities in any jurisdiction.

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Uncertain Tax Positions

Our unrecognized tax benefits at March 31, 2020 and 2019 relate entirely to research and development tax credits. The total amount of unrecognized tax benefits at March 31, 2020 and 2019 is \$814,600 and \$668,700, respectively. If recognized, none of the unrecognized tax benefits would impact our effective tax rate. The following table summarizes the activity related to our unrecognized tax benefits.

	Fiscal Years Ended March 31,	
	2020	2019
Unrecognized benefit - beginning of period	\$ 668,700	\$ 451,600
Current period tax position increases	146,000	210,100
Prior period tax position increases (decreases)	(100)	7,000
Unrecognized benefit - end of period	<u>\$ 814,600</u>	<u>\$ 668,700</u>

Our policy is to recognize interest and penalties related to income taxes as components of interest expense and other expense, respectively. We incurred no interest or penalties related to unrecognized tax benefits in the years ended March 31, 2020 or 2019. We do not anticipate any significant changes of our uncertain tax positions within twelve months of this reporting date.

12. Licensing, Sublicensing and Collaborative Agreements*License Agreements with Pherin Pharmaceuticals, Inc. (Pherin)*

In September 2018 we issued 1,630,435 shares of our unregistered common stock having a fair market value of \$2,250,000 to Pherin to acquire an exclusive worldwide license to develop and commercialize PH94B for social anxiety disorder and an option to acquire a similar license for PH10 for MDD. In October 2018, we exercised our option to acquire an exclusive worldwide license to develop and commercialize PH10 by issuing an additional 925,926 shares of our unregistered common stock having a fair market value of \$2,000,000 to Pherin under the terms of the PH10 license agreement. Under the terms of the PH94B and PH10 license agreements, we are obligated to make additional cash payments and pay royalties to Pherin in the event that certain regulatory and performance-based milestones and commercial sales are achieved. Additionally, in connection with the license agreements, we are obligated to pay to Pherin monthly support payments of \$10,000 for a term of 18 months, however no monthly support payment is required during the 18-month period identified in the PH10 license agreement if support payments are being made under the terms of the PH94B license agreement. The support payments required under the PH94B license agreement terminated in March 2020 and will terminate in April 2020 under the PH10 license agreement.

BlueRock Therapeutics Sublicense Agreement

In December 2016, we entered into an Exclusive License and Sublicense Agreement with BlueRock Therapeutics, LP, a next generation regenerative medicine company established in December 2016 by Bayer AG and Versant Ventures (*BlueRock Therapeutics*), pursuant to which BlueRock Therapeutics received exclusive rights to utilize certain technologies exclusively licensed by us from University Health Network (*UHN*) for the production of cardiac stem cells for the treatment of heart disease. As a result of its acquisition of BlueRock Therapeutics in 2019, Bayer AG now holds the rights to develop and commercialize our hPSC technologies relating to the production of heart cells for the treatment of heart disease (the *Bayer Agreement*). We retained rights to cardiac stem cell technology licensed from UHN related to small molecule, protein and antibody drug discovery, drug rescue and drug development, including small molecules with cardiac regenerative potential, as well as small molecule, protein and antibody testing involving cardiac cells. To date, we have recognized \$1.25 million in sublicense revenue, in our fiscal year ended March 31, 2017, under the Bayer Agreement.

Cato Research Ltd.

We have built a long-term strategic development relationship with Cato Research Ltd. (*CRL*), now known as Cato Research LLC, a global contract research and development organization, or CRO, and an affiliate of one of our larger institutional stockholders. CRL has provided us with access to essential CRO services and regulatory expertise supporting our AV-101 preclinical and clinical development programs, including our AV-101 MDD clinical study, and other significant development projects related to PH94B and PH10. We recorded research and development expenses for CRO services provided by CRL in the amounts of \$3,802,600 and \$3,969,100 for the fiscal years ended March 31, 2020 and 2019, respectively.

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13. Stock Option Plans, Employee Stock Purchase Plan, and 401(k) Plan

At March 31, 2020, we have the following share-based compensation plans, which are described below:

- **Amended and Restated 2016 Stock Incentive Plan (the 2016 Plan); and**
- **2019 Omnibus Equity Incentive Plan (the 2019 Plan)**

Description of the 2016 Plan

Our Board unanimously approved the Company's Amended and Restated 2016 Stock Incentive Plan, formerly titled the 2008 Stock Incentive Plan (the 2016 Plan), on July 26, 2016, and the 2016 Plan was approved by our stockholders at our 2016 Annual Meeting of Stockholders on September 26, 2016, and further amended to increase the number of shares authorized for issuance therefrom at our 2017 Annual Meeting of Stockholders on September 15, 2017. The 2016 Plan provided for the grant of stock options, restricted shares of common stock, stock appreciation rights and dividend equivalent rights, collectively referred to as "Awards". Stock options granted under the 2016 Plan were either incentive stock options under the provisions of Section 422 of the Internal Revenue Code of 1986, as amended (the Code), or non-qualified stock options. We could grant incentive stock options only to employees of the Company or any parent or subsidiary of the Company. Awards other than incentive stock options could be granted to employees, directors and consultants. A total of 10.0 million shares of our common stock were authorized for issuance under the 2016 Plan, of which options to purchase approximately 7.8 million shares remain outstanding at March 31, 2020. Upon the adoption of our 2019 Plan, no further grants were permissible under the 2016 Plan and approximately 1.4 million authorized shares were transferred to the 2019 Plan and became issuable therefrom. All options granted from the 2016 Plan remain operative under the terms of the respective grants.

Description of the 2019 Plan

Our Board approved the VistaGen Therapeutics, Inc. 2019 Omnibus Equity Incentive Plan on May 27, 2019, and our stockholders adopted it and ratified all previously issued grants on September 5, 2019. The principal features of the 2019 plan are summarized below.

The 2019 Plan provides for the grant of stock options, stock appreciation rights (SARs), restricted stock, restricted stock units, and other stock-based awards, and performance awards, collectively referred to as "Awards". Awards may be granted under the 2019 Plan to officers, employees and consultants of the Company and our subsidiaries and to our non-employee directors. Incentive stock options may be granted only to employees of the Company or one of our subsidiaries. The 2019 Plan is administered by the Compensation Committee of the Board. The Compensation Committee, in its discretion, selects the individuals to whom awards may be granted, the time or times at which such awards are granted, and the terms of such awards. The Compensation Committee may delegate its authority to the extent permitted by applicable law.

The Compensation Committee sets stock option exercise prices and terms, except that stock options must be granted with an exercise price not less than 100% of the fair market value of the common stock on the date of grant. The Compensation Committee may grant either incentive stock options, which must comply with Section 422 of the Code, or nonqualified stock options. At the time of grant, the Compensation Committee determines the terms and conditions of stock options, including the quantity, exercise price, vesting periods, term (which cannot exceed ten years) and other conditions on exercise.

The Compensation Committee may grant SARs as a right in tandem with the number of shares underlying stock options granted under the 2019 Plan or as a freestanding award. Upon exercise, SARs entitle the holder to receive payment per share in stock or cash, or in a combination of stock and cash, equal to the excess of the share's fair market value on the date of exercise over the grant price of the SAR.

The Compensation Committee may also grant awards of restricted stock, which are shares of common stock subject to specified restrictions, and restricted stock units, which represent the right to receive shares of the common stock in the future. These awards may be made subject to repurchase, forfeiture or vesting restrictions at the Compensation Committee's discretion. The restrictions may be based on continuous service with the Company or the attainment of specified performance goals, as determined by the Compensation Committee. Stock units may be paid in stock or cash or a combination of stock and cash, as determined by the Compensation Committee.

The Compensation Committee may condition the grant, exercise, vesting, or settlement of any award on such performance conditions as it may specify. We refer to these awards as "performance awards." The Compensation Committee may select such business criteria or other performance measures as it may deem appropriate in establishing any performance conditions. At March 31, 2020, the Compensation Committee has not granted any performance awards.

A total of 7,500,000 shares of common stock were initially authorized for issuance under the 2019 Plan. As noted previously, all awards outstanding under the 2016 Plan at the time the 2019 Plan was adopted remain subject to the 2016 Plan. Upon approval of the 2019 Plan, all shares of common stock remaining authorized and available for issuance under the 2016 Plan, approximately 1.4 million shares, automatically became available for issuance under the 2019 Plan. Additionally, any shares subject to outstanding awards under the 2016 Plan that subsequently expire, terminate, or are surrendered or forfeited for any reason without issuance of shares also become available for issuance under the 2019 Plan. Further, if any award under the 2019 Plan is canceled, terminates, expires or lapses for any reason prior to the issuance of shares or if shares are issued under the 2019 Plan and thereafter are forfeited to us, the shares subject to such awards and the forfeited shares will again be available for grant under the 2019 Plan. At March 31, 2020, a total of 6,730,162 shares remain available for grant under the 2019 Plan.

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No more than 25% of any equity-based awards granted under the 2019 Plan will vest on the grant date of such award. This requirement does not apply to (i) substitute awards resulting from acquisitions or (ii) shares delivered in lieu of fully vested cash awards. In addition, the minimum vesting requirement does not apply to the Compensation Committee's discretion to provide for accelerated exercisability or vesting of any award, including in cases of retirement, death, disability or a change in control, in the terms of the award or otherwise. Awards are not transferable other than by will or the laws of descent and distribution, except that in certain instances transfers may be made to or for the benefit of designated family members of the participant for no consideration.

In the event of a change in control of the Company, the Compensation Committee may accelerate the time period relating to the exercise of any award. In addition, the Compensation Committee may take other action, including (a) providing for the purchase of any award for an amount of cash or other property that could have been received upon the exercise of such award had the award been currently exercisable, (b) adjusting the terms of the award in a manner determined by the Compensation Committee to reflect the change in control, or (c) causing an award to be assumed, or new rights substituted therefor, by another entity with appropriate adjustments to be made regarding the number and kind of shares and exercise prices of the award. "Change in Control" is defined under the 2019 Plan and requires consummation of the applicable transaction.

Unless earlier terminated by the Board, the 2019 Plan will terminate, and no further awards may be granted, on September 5, 2029, which is ten years after the date on which it was approved by our stockholders. The Board may amend, suspend or terminate the 2019 Plan at any time. To the extent necessary to comply with applicable provisions of U.S. federal securities laws, state corporate and securities laws, the Code, the rules of any applicable stock exchange or national market system, and the rules of any non-U.S. jurisdiction applicable to Awards granted to residents therein, we will obtain stockholder approval of any such amendment to the 2019 Plan in such a manner and to such a degree as required. The amendment, suspension or termination of the 2019 Plan or the amendment of an outstanding award generally may not, without a participant's consent, materially impair the participant's rights under an outstanding award.

During our fiscal year ended March 31, 2020, we granted from the 2019 Plan and the 2016 Plan:

- options from the 2016 Plan to purchase an aggregate of 1,220,000 shares of our common stock at a then above-market exercise price of \$1.00 per share to the independent members of our Board, our officers and employees and certain consultants in May 2019. The options vested 25% upon grant with the remaining shares vesting ratably over three years for independent directors, officers and employees, and over two years for consultants;
- options from the 2019 Plan to one of our officers to purchase 170,000 shares of our common stock at a then above-market exercise price of \$1.00 per share, which May 2019 grant was contingent upon the approval of the 2019 Plan by our stockholders. Our stockholders approved the 2019 Plan at our Annual Meeting in September 2019 and ratified the contingent grant. The option vested 25% upon approval of the 2019 Plan and the remaining shares are vesting ratably over three years;
- options from our 2019 Plan to the independent members of our Board, our officers and employees and certain consultants to purchase an aggregate of 1,990,000 shares of our common stock at exercise prices ranging from \$0.50 per share to \$1.41 per share during the quarter ended December 31, 2019. Options granted to Board members, officers, employees and most consultants were vested 25% at grant, with the remaining options vesting ratably over the following 24 months. In the case of options granted to certain consultants, the options were vested 25% at grant but the remaining vesting period was less than 24 months to coincide with remaining contractual terms;
- options from our 2019 Plan to purchase 75,000 shares of our common stock at an exercise price of \$0.7074 per share to a consultant as partial compensation under a professional services contract in January 2020. The options were vested 25% upon grant with the remaining shares vesting ratably over the next twelve months.

During our fiscal year ended March 31, 2019, we granted from the 2016 Plan:

- options to purchase an aggregate of 860,000 shares of our common stock at an exercise price of \$1.27 per share to the independent members of our Board, to all of our officers except our Chief Executive Officer, and to all non-officer employees in August 2018;
- options to purchase an aggregate of 250,000 shares of our common stock at exercise prices ranging from \$1.52 per share to \$2.20 per share to various scientific, legal, investor relations, and financial and strategic advisory consultants in October 2018;
- an option to purchase 25,000 shares of our common stock at an exercise price of \$1.74 per share to a new independent member of our Board in January 2019;
- an option to purchase 220,000 shares of our common stock at an exercise price of \$1.70 per share to our Chief Executive Officer in January 2019; and
- 25,000 shares of registered common stock having a fair value of \$41,500 on the date of grant to an investor relations and social media consultant. Noncash expense related to this grant is being amortized ratably over the contractual period as a component of general and administrative expense not included in stock compensation expense.

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The following table summarizes stock-based compensation expense related to option grants to our officers, independent directors, consultants and service providers included in the accompanying Consolidated Statement of Operations and Comprehensive Loss for the years ended March 31, 2020 and 2019.

	Fiscal Year Ended March 31,	
	2020	2019
Research and development expense	\$ 1,287,200	\$ 1,259,400
General and administrative expense	2,533,600	2,184,000
Total stock-based compensation expense	\$ 3,820,800	\$ 3,443,400

We used the Black-Scholes Option Pricing model with the following weighted average assumptions to determine share-based compensation expense related to option grants during the fiscal years ended March 31, 2020 and 2019:

	Fiscal Years Ended March 31,	
	2020	2019
	(weighted average)	(weighted average)
Exercise price	\$ 1.14	\$ 1.45
Market price on date of grant	\$ 1.05	\$ 1.45
Risk-free interest rate	1.79%	2.84%
Expected term (years)	5.41	6.32
Volatility	86.99%	96.58%
Expected dividend yield	0.00%	0.00%
Fair value per share at grant date	\$ 0.73	\$ 1.15

The expected term of options represents the period that our share-based compensation awards are expected to be outstanding. We have calculated the weighted-average expected term of the options using the simplified method as prescribed by Securities and Exchange Commission Staff Accounting Bulletins No. 107 and No. 110 (*SAB No. 107 and 110*). The utilization of SAB No. 107 and 110 is based on the lack of relevant historical option exercises and relevant historical data due to the relatively limited period during which our stock has been publicly traded on a major exchange and the historical lack of liquidity in freely-tradable shares of our common stock. Those factors also resulted in our decision to utilize the historical volatilities of a peer group of public companies' stock over the expected term of the option in determining our expected volatility assumptions. The risk-free interest rate for periods related to the expected life of the options is based on the U.S. Treasury yield curve in effect at the time of grant. The expected dividend yield is zero, as we have not paid any dividends and do not anticipate paying dividends in the near future. We recognize the effect of forfeitures as they occur.

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The following table summarizes stock option activity for the fiscal years ended March 31, 2019 and 2018 under the 2019 Plan and the 2016 Plan:

	Fiscal Years Ended March 31,			
	2020		2019	
	Number of Shares	Weighted Average Exercise Price	Number of Shares	Weighted Average Exercise Price
Options outstanding at beginning of period	6,626,088	\$ 1.48	5,300,338	\$ 2.43
Options granted	3,455,000	\$ 1.14	1,355,000	\$ 1.45
Options exercised	-	\$ -	(29,250)	\$ 1.50
Options forfeited	-	\$ -	-	\$ -
Options expired	(78,000)	\$ 1.50	-	\$ -
Options outstanding at end of period	<u>10,003,088</u>	\$ 1.36	<u>6,626,088</u>	\$ 1.48
Options exercisable at end of period	<u>7,936,290</u>	\$ 1.39	<u>4,303,972</u>	\$ 1.53
Weighted average grant-date fair value of options granted during the period		<u>\$ 0.73</u>		<u>\$ 1.15</u>

In August 2018, as permitted by the terms of the 2016 Plan, the Board approved the modification of outstanding options held by independent members of our Board, our officers and our employees that had exercise prices higher than \$1.56 per share to reduce the exercise prices thereof to \$1.50 per share. We calculated the fair value of such options immediately before and after the modification using the Black-Scholes Option Pricing Model and the weighted average assumptions indicated in the table below. We immediately recognized the additional fair value attributable to vested options, \$258,100, as stock compensation expense, which is included in the expense reported above for the fiscal year ended March 31, 2019. The additional fair value resulting from the modification, approximately \$142,200, is being expensed over the remaining vesting period of the modified options.

Assumption:	Pre- modification	Post- modification
Market price per share	\$ 1.49	\$ 1.49
Exercise price per share	\$ 3.57	\$ 1.50
Risk-free interest rate	2.77%	2.77%
Remaining expected term in years	5.08	5.08
Volatility	94.9%	94.9%
Dividend rate	0.0%	0.0%
Number of option shares	2,419,503	2,419,503
Weighted average fair value per share	\$ 0.91	\$ 1.08

The following table summarizes information on stock options outstanding and exercisable under the 2019 Plan and the 2016 Plan as of March 31, 2020.

	Options Outstanding			Options Exercisable		
	Exercise Price	Number Outstanding	Weighted Average Remaining Years until Expiration	Weighted Average Exercise Price	Number Exercisable	Weighted Average Exercise Price
\$ 0.50 to \$1.00	1,815,000	9.30	\$ 0.90	1,040,422	\$ 0.84	
\$ 1.16	2,000,000	7.84	\$ 1.16	2,000,000	\$ 1.16	
\$ 1.20 to \$1.41	2,525,000	9.13	\$ 1.35	1,455,466	\$ 1.33	
\$ 1.50 to \$1.52	2,412,253	6.65	\$ 1.50	2,302,069	\$ 1.50	
\$ 1.56 to \$1.99	1,115,000	7.86	\$ 1.63	1,017,082	\$ 1.61	
\$ 2.20 to \$15.00	135,835	6.28	\$ 6.03	121,251	\$ 6.49	
	<u>10,003,088</u>	8.12	\$ 1.36	<u>7,936,290</u>	\$ 1.39	

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At March 31, 2020, there were 6,730,162 registered shares of our common stock remaining available for grant under the 2019 Plan. There were no option exercises during the fiscal year ended March 31, 2020. Two officers and a member of our Board exercised outstanding stock options to purchase an aggregate of 29,250 shares of our common stock during the fiscal year ended March 31, 2019.

Aggregate intrinsic value is the sum of the amount by which the fair value of the underlying common stock exceeds the aggregate exercise price of the outstanding options (*in-the-money-options*). Based on the \$0.44 per share quoted closing market price of our common stock on March 31, 2020, there was no intrinsic value in any of our outstanding options at that date.

As of March 31, 2020, there was approximately \$1,778,700 of unrecognized compensation cost related to non-vested share-based compensation awards from the 2019 Plan and the 2016 Plan, which cost is expected to be recognized through August 2021.

2019 Employee Stock Purchase Plan

Our Board approved the VistaGen Therapeutics, Inc. 2019 Employee Stock Purchase Plan (the 2019 ESPP) on June 13, 2019. Our stockholders approved the 2019 ESPP at our annual meeting on September 5, 2019. The principal terms of our 2019 ESPP are summarized below.

The 2019 ESPP is intended to qualify as an “employee stock purchase plan” under Section 423 of the Code. The Compensation Committee of the Board administers the 2019 ESPP. The Compensation Committee has authority to construe, interpret and apply the terms of the 2019 ESPP. As approved by our stockholders, a maximum of 1,000,000 shares of our common stock may be purchased under the 2019 ESPP.

The 2019 ESPP is generally expected to operate in consecutive semi-annual periods referred to as “option periods.” The first option period commenced on January 1, 2020 and will end on the last trading day in the semi-annual period ending June 30, 2020, with successive option periods expected to begin on the first day of January and July and to terminate on the last trading day of June and December, respectively. Option periods may not last longer than the maximum period permitted under Section 423 of the Code, which generally limits the length of such offerings to either 5 years or 27 months, depending on the terms of the offering. Generally, all full-time employees of the Company and its subsidiaries will be eligible to participate in an option period

On the first day of each option period (the *Grant Date*), each eligible employee for that option period will be granted an option to purchase shares of our common stock. Each participant’s option will permit the participant to purchase a number of shares determined by dividing the employee’s accumulated payroll deductions for the option period by the applicable purchase price. A participant must designate in his or her enrollment package the percentage (if any) of compensation to be deducted during that option period for the purchase of stock under the 2019 ESPP. The participant’s payroll deduction election will generally remain in effect for future option periods unless terminated by the participant. A participant may elect to withdraw from any option period prior to the last day of the option period, in which case the participant’s payroll deductions will be refunded and the participant’s outstanding options will terminate.

Each participant’s payroll deductions under the 2019 ESPP will be credited to a liability account in his or her name under the 2019 ESPP. The aggregate liability for participant payroll deductions at March 31, 2020 was \$14,700, which is included in accrued expenses in the accompanying Consolidated Balance Sheet at that date.

Each option granted under the 2019 ESPP will automatically be exercised on the last day of the respective option period (referred to as the *Exercise Date*). The number of shares acquired by a participant upon exercise of his or her option will be determined by dividing the participant’s 2019 ESPP account balance as of the Exercise Date for the option period by the purchase price of the option. The purchase price for each option is generally equal to the lesser of (i) 85% of the fair market value of a share of our common stock on the applicable Grant Date, or (ii) 85% of the fair market value of a share of our common stock on the applicable Exercise Date. A participant’s 2019 ESPP account will be reduced upon exercise of his or her option by the amount used to pay the purchase price of the shares acquired by the participant. Following exercise of the option, any excess amount in a participant’s account will be refunded following the Exercise Date. No interest will be paid to any participant under the 2019 ESPP.

Participation in the 2019 ESPP is subject to the following limits:

- A participant cannot contribute less than 1% or more than 15% of his or her compensation to the purchase of stock under the 2019 ESPP in any one payroll period;
- A participant cannot accrue rights to purchase more than \$25,000 of stock (valued at the Grant Date of the applicable offering period and without giving effect to any discount reflected in the purchase price for the stock) for each calendar year in which an option is outstanding; and
- A participant will not be granted an option under the 2019 ESPP if it would cause the participant to own stock and/or hold outstanding options to purchase common stock constituting 5.0% or more of the total combined voting power or value of all classes of stock of the Company or of its parent or one of its subsidiaries or to the extent it would exceed certain other limits under the Code.

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The \$25,000 annual purchase and the 5% ownership limitations referred to above are required under the Code.

As is customary in stock incentive plans of this nature, the number of shares of stock available under the 2019 ESPP or subject to outstanding options, is subject to adjustment in the event of certain reorganizations, combinations, recapitalization of shares, stock splits, reverse stock split, subdivision or other similar change in respect of our common stock. A participant's rights with respect to options or the purchase of shares under the 2019 ESPP, as well as payroll deductions credited to his or her 2019 ESPP account, may not be assigned, transferred, pledged or otherwise disposed of in any way except by will or the laws of descent and distribution.

The Board generally may amend, suspend, or terminate the 2019 ESPP at any time and in any manner, except that stockholder approval is required to increase the number of shares authorized for issuance under the 2019 ESPP and for certain other amendments. No amendment to the 2019 ESPP may materially adversely affect the option rights previously granted to a participant under the 2019 ESPP, except as required by law or regulation.

Our 2019 ESPP became effective on January 1, 2020 and will continue in effect until the earlier of such time as all of the shares of the Company's common stock subject to the 2019 ESPP have been sold under the 2019 ESPP or December 31, 2030, unless terminated earlier by the Board. At March 31, 2020, no option periods had been completed nor shares of common stock purchased by employees under the 2019 ESPP.

401(k) Plan

Through a third-party agent, we maintain a retirement and deferred savings plan for our employees. This plan is intended to qualify as a tax-qualified plan under Section 401(k) of the Internal Revenue Code. The retirement and deferred savings plan provides that each participant may contribute a portion of his or her pre-tax compensation, subject to statutory limits. Under the plan, each employee is fully vested in his or her deferred salary contributions. Employee contributions are held and invested by the plan's trustee. The retirement and deferred savings plan also permits us to make discretionary contributions, subject to established limits and a vesting schedule. To date, we have not made any discretionary contributions to the retirement and deferred savings plan on behalf of participating employees.

14. Related Party Transactions

Cato Holding Company (*CHC*), doing business as Cato BioVentures (*CBV*), is the parent of Cato Research Ltd. (*CRL*), now known as Cato Research LLC. *CRL* is a contract research, development and regulatory services organization (*CRO*) that we have engaged for a wide range of material aspects related to the nonclinical and clinical development and regulatory affairs associated with our efforts to develop and commercialize AV-101 for MDD, including our ELEVATE Study, and other potential CNS indications, PH94B, PH10, and other potential product candidates. At March 31, 2020, *CBV* held approximately 2% of our outstanding common stock.

In July 2017, we entered into a Master Services Agreement (*MSA*) with *CRL*, which replaced a substantially similar May 2007 master services agreement, pursuant to which *CRL* may assist us in the evaluation, development, commercialization and marketing of our potential product candidates, and provide regulatory and strategic consulting services as requested from time to time. Specific projects or services are and will be delineated in individual work orders negotiated from time-to-time under the *MSA*. Under the terms of work orders issued pursuant to the July 2017 *MSA*, we incurred expenses of \$3,802,600 and \$3,969,100 for the fiscal years ended March 31, 2020 and 2019, respectively. We anticipate periodic expenses for *CRO* services from *CRL* related to nonclinical and clinical development of, and regulatory affairs related to, PH94B, PH10, AV-101 and other potential product candidates will remain significant in future periods.

As disclosed in Note 9, *Capital Stock*, in September 2018, we issued an aggregate of 1,630,435 shares of our unregistered common stock having a fair market value of \$2,250,000 to acquire an exclusive worldwide license to develop and commercialize PH94B and an option to acquire a similar license for PH10. In October 2018, we issued an additional 925,926 shares of our unregistered common stock having a fair market value of \$2,000,000 to exercise the option to acquire an exclusive worldwide license to develop and commercialize PH10. The acquisition of the licenses and option was recorded as research and development expense. Additionally, under the terms of the PH94B license acquired in September 2018, we recorded as research and development expense \$120,000 and \$70,000 of monthly cash support payments to Pherin in the fiscal years ended March 31, 2020 and 2019, respectively. At March 31, 2020, Pherin held approximately 3% of our outstanding Common Stock.

We have engaged the consulting firm headed by one of the independent members of our Board to provide various market research studies and commercial modeling projects for certain of our CNS pipeline candidates and recorded research and development expense of \$108,400 and \$11,700 for the fiscal years ended March 31, 2020 and 2019, respectively, related to such studies. We recorded no amounts payable at March 31, 2020 or 2019 related to these studies.

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15. Commitments, Contingencies, Guarantees and Indemnifications

From time to time, we may become involved in claims and other legal matters arising in the ordinary course of business. Management is not currently aware of any claims made or other legal matters that will have a material adverse effect on our consolidated financial position, results of operations or our cash flows.

We indemnify our officers and directors for certain events or occurrences while the officer or director is or was serving at our request in such capacity. The term of the indemnification period is for the officer's or director's lifetime. We will indemnify the officers or directors against any and all expenses incurred by the officers or directors because of their status as one of our directors or executive officers to the fullest extent permitted by Nevada law. We have never incurred costs to defend lawsuits or settle claims related to these indemnification agreements. We have a director and officer insurance policy which limits our exposure and may enable us to recover a portion of any future amounts paid. We believe the fair value of these indemnification agreements is minimal. Accordingly, there are no liabilities recorded for these agreements at March 31, 2020 or 2019.

In the normal course of business, we provide indemnifications of varying scopes under agreements with other companies, typically clinical research organizations, investigators, clinical sites, suppliers and others. Pursuant to these agreements, we generally indemnify, hold harmless, and agree to reimburse the indemnified parties for losses suffered or incurred by the indemnified parties in connection with the use or testing of our product candidates or with any U.S. patents or any copyright or other intellectual property infringement claims by any third party with respect to our product candidates. The terms of these indemnification agreements are generally perpetual. The potential future payments we could be required to make under these indemnification agreements is unlimited. We maintain liability insurance coverage that limits our exposure. We believe the fair value of these indemnification agreements is minimal. Accordingly, we have not recorded any liabilities for these agreements at March 31, 2020 or 2019.

Leases

Financing Lease

At March 31, 2020 and 2019, the following assets are subject to financing lease obligations and included in property and equipment:

	March 31,	
	2020	2019
Office equipment	\$ 14,700	\$ 14,700
Accumulated depreciation	(9,400)	(6,500)
Net book value	\$ 5,300	\$ 8,200

Amortization expense for assets recorded under financing leases is included in depreciation expense. Future minimum payments, by year and in the aggregate, required under our financing lease are as follows:

Fiscal Years Ending March 31,

2021	\$ 3,300
2022	3,000
Future minimum lease payments	6,300
Less imputed interest included in minimum lease payments	(700)
Present value of minimum lease payments	5,600
Less current portion	(3,300)
Financing lease obligation - non-current portion	\$ 2,300

Operating Lease

We lease our headquarters office and laboratory space in South San Francisco, California under the terms of a lease that expires on July 31, 2022 and that provides an option to renew for an additional five years at then-current market rates. Consistent with the guidance in ASC 842, effective beginning April 1, 2019, we have recorded this lease in our Consolidated Balance Sheet as an operating lease. For the purpose of determining the right-of-use asset and associated lease liability, we determined that the renewal of this lease is reasonably probable. The lease of our South San Francisco facilities does not include any restrictions or covenants requiring special treatment under ASC 842.

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The following table summarizes the presentation of the operating lease in our Condensed Consolidated Balance Sheet at March 31, 2020:

	As of March 31, 2020
<i>Assets</i>	
Right of use asset – operating lease	\$ 3,579,600
<i>Liabilities</i>	
Current operating lease obligation	\$ 313,400
Non-current operating lease obligation	3,715,600
Total operating lease liability	\$ 4,029,000

The following table summarizes the effect of operating lease costs in our consolidated statements of operations:

	For the Fiscal Year Ended March 31, 2020
Operating lease cost	\$ 692,300

The minimum (base rental) lease payments related to our South San Francisco operating lease are expected to be as follows:

Fiscal Years Ending March 31,	
2021	\$ 645,800
2022	668,400
2023	726,000
2024	766,000
2025	789,000
Thereafter	1,931,400
Total lease expense	5,526,600
Less imputed interest	(1,497,600)
Present value of operating lease liabilities	\$ 4,029,000

The remaining lease term, including the assumed five-year extension at the expiration of the current lease period, and the discount rate assumption for our South San Francisco operating lease is as follows:

	As of March 31, 2020
Assumed remaining lease term in years	7.33
Assumed discount rate	8.54%

The interest rate implicit in lease contracts is typically not readily determinable and, as such, we used our estimated incremental borrowing rate based on information available at the adoption of ASC 842, which represents an internally developed rate that would be incurred to borrow, on a collateralized basis, over a similar term, an amount equal to the lease payments in a similar economic environment.

Supplemental disclosure of cash flow information related to our operating leases included in cash flows used by operating activities in the consolidated statements of cash flows is as follows:

	For the Fiscal Year Ended March 31, 2020
Cash paid for amounts included in the measurement of lease liabilities	\$ 753,900

During the fiscal year end March 31, 2020, other than the initial adoption of ASC 842 that required right of use assets and lease liabilities to be recorded, we recorded no new right of use assets arising from new lease liabilities.

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We also lease a small office in the San Francisco Bay Area under a month-to-month arrangement at insignificant cost and have made an accounting policy election not to apply the ASC 842 operating lease recognition requirements to such short-term lease. We recognize the lease payments for this lease in general and administrative expense over the lease term. We recorded rent expense of \$14,000 and \$13,200 for the fiscal years ended March 31, 2020 and 2019, respectively, attributable to this lease.

Debt Repayment

At March 31, 2020, future minimum principal payments on an outstanding note related to an insurance premium financing arrangement in the remaining principal amount of \$56,500, which will be repaid in monthly principal and interest installments of \$6,500 through December 2020.

16. Subsequent Events

We have evaluated subsequent events through the date of this Annual Report and have identified the following material events and transactions that occurred after March 31, 2020:

Sales of Common Stock under the LPC Agreement

Subsequent to the effectiveness of the LPC Registration Statement on April 14, 2020, and through June 26, 2020, we have sold an additional 6,201,995 registered shares of our common stock to Lincoln Park and have received aggregate cash proceeds of \$2,840,200.

Grants of Stock Options from the 2019 Stock Incentive Plan

On April 23, 2020, when the quoted market price of our common stock was \$0.398 per share, the Compensation Committee of the Board granted options from our 2019 Plan to our independent directors, officers and employees and to certain consultants to purchase an aggregate of 1,555,000 shares of our common stock at an exercise price of \$0.398 per share. The options were vested 25% upon grant with the remaining shares vesting over two years. On April 24, 2020, when the quoted market price of our common stock was also \$0.398 per share, we granted options from our 2019 Plan to purchase 25,000 shares of our common stock to another consultant. Those options were also vested 25% upon grant with the remaining shares vesting over two years. On May 8, 2020, when the quoted market price of our common stock was \$0.42 per share, the Board granted options from our 2019 Plan to additional consultants to purchase an aggregate of 225,000 shares of our common stock at an exercise price of \$0.42 per share. The options were vested 25% upon grant with the remaining shares vesting over one year. On June 19, 2020 and June 24, 2020, when the quoted market price of our common stock was \$0.5124 per share and \$0.535 per share, respectively, we also granted options from our 2019 Plan to additional consultants to purchase 60,000 shares at \$0.5124 per share on June 19, 2020 and 80,000 shares at \$0.55 per share on June 24, 2020. In each of the June 2020 grants, the options were vested 25% upon grant with the remaining shares vesting over one year.

Sale of Common Stock and Warrants in the Spring 2020 Private Placement

In April 2020, in a self-directed private placement, we sold to an accredited investor units to purchase an aggregate of 125,000 unregistered shares of our common stock and four-year warrants to purchase 125,000 shares of our common stock at an exercise price of \$0.50 per share and we received cash proceeds of \$50,000 (the *Spring 2020 Private Placement*).

PPP Loan Agreement

On April 22, 2020, we entered into a note payable agreement with Silicon Valley Bank as lender (the *Lender*) (the *PPP Loan Agreement*), pursuant to which we received net proceeds of approximately \$224,000 from a potentially forgivable loan from the U. S. Small Business Administration (*SBA*) pursuant to the Paycheck Protection Program (*PPP*) enacted by Congress under the Coronavirus Aid, Relief, and Economic Security Act (the *CARES Act*) administered by the SBA (the "*PPP Loan*"). The PPP Loan provides for working capital to the Company and matures on April 22, 2022. Under the CARES Act and the PPP Loan Agreement, all payments of both principal and interest are deferred until at least October 22, 2020. The PPP Loan will accrue interest at a rate of 1.00% per annum, and interest will continue to accrue throughout the period the PPP Loan is outstanding, or until it is forgiven. The CARES Act (including subsequent guidance issued by SBA and U.S. Department of the Treasury related thereto) provides that all or a portion of the PPP Loan may be forgiven upon our request to the Lender, subject to requirements in the PPP Loan Agreement and the CARES Act.

Registration Statement for shares underlying warrants issued in Private Placements

On May 1, 2020, we filed a registration statement on Form S-3 (Registration No. 333-237968) to register approximately 12.1 million shares of common stock underlying outstanding warrants that we had issued in earlier private placement offerings, including the Summer 2018 Private Placement, the Fall 2018 Private Placement, the Fall 2019 Private Placement, the Winter 2019 Warrant Offering, the January 2020 Warrants and the Spring 2020 Private Placement, as well as common stock underlying warrants that had been previously issued to various consultants as full or partial compensation for their services. We also registered approximately 0.8 million shares of unregistered outstanding common stock held by former holders of warrants who had exercised such warrants subsequent to the Winter 2019 Warrant Modification. Further, we registered the approximately 0.1 million shares of common stock issued in the Spring 2020 Private Placement. The SEC declared the registration statement effective on May 13, 2020. As a result of the effectiveness of this registration statement, the shares of common stock underlying essentially all of our outstanding warrants has been registered.

PH94B Sublicense Agreement

On June 24, 2020, we entered into a strategic licensing and collaboration agreement for the clinical development and commercialization of PH94B with EverInsight Therapeutics Inc., a biopharmaceutical company focused on developing and commercializing transformative pharmaceutical products for patients in Greater China and other parts of Asia (the *EverInsight Agreement*). Under the terms of the EverInsight Agreement, EverInsight will be responsible for clinical development, regulatory submissions and commercialization of PH94B for treatment of SAD, and potentially other anxiety-related indications, in markets in Greater China, South Korea and Southeast Asia. EverInsight will make a non-dilutive upfront payment of \$5.0 million to us, and we are eligible to receive additional development and commercial milestone payments in the future, upon successful attainment of specific milestones. We expect to receive net cash proceeds of approximately \$4.475 million, after sublicense and consulting payments which we are obligated to make pursuant to our PH94B license from

Pherin and other consulting agreements. On June 24, 2020, we issued 233,645 unregistered shares of our common stock, valued at \$125,000, as partial compensation to a consultant for services related to the EverInsight Agreement.

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17. Supplemental Financial Information (Unaudited)

The following table presents the unaudited statements of operations data for each of the eight quarters in the period ended March 31, 2020. The information has been presented on the same basis as the audited financial statements and all necessary adjustments, consisting only of normal recurring adjustments, have been included in the amounts below to present fairly the unaudited quarterly results when read in conjunction with the audited financial statements and related notes. The operating results for any quarter should not be relied upon as necessarily indicative of results for any future period.

Quarterly Results of Operations (Unaudited)
(in thousands, except share and per share amounts)

	Three Months Ended				Total Fiscal Year 2020
	June 30, 2019	September 30, 2019	December 31, 2019	March 31, 2020	
Operating expenses:					
Research and development	\$ 4,314	\$ 4,205	\$ 3,015	\$ 1,840	\$ 13,374
General and administrative	1,910	1,146	2,948	1,423	7,427
Total operating expenses	<u>6,224</u>	<u>5,351</u>	<u>5,963</u>	<u>3,263</u>	<u>20,801</u>
Loss from operations	(6,224)	(5,351)	(5,963)	(3,263)	(20,801)
Other expenses, net:					
Interest income (expense), net	16	15	2	(3)	30
Loss before income taxes	(6,208)	(5,336)	(5,961)	(3,266)	(20,771)
Income taxes	(2)	-	-	(1)	(3)
Net loss and comprehensive loss	<u>(6,210)</u>	<u>(5,336)</u>	<u>(5,961)</u>	<u>(3,267)</u>	<u>(20,774)</u>
Accrued dividend on Series B Preferred stock	(302)	(314)	(322)	(326)	(1,264)
Net loss attributable to common stockholders	<u>\$ (6,512)</u>	<u>\$ (5,650)</u>	<u>\$ (6,283)</u>	<u>\$ (3,593)</u>	<u>\$ (22,038)</u>
Basic and diluted net loss per common share attributable to common stockholders	<u>\$ (0.15)</u>	<u>\$ (0.13)</u>	<u>\$ (0.15)</u>	<u>\$ (0.08)</u>	<u>\$ (0.50)</u>
Weighted average shares used in computing basic and diluted net loss per common share attributable to common stockholders	<u>42,622,965</u>	<u>42,622,965</u>	<u>43,158,889</u>	<u>47,094,781</u>	<u>43,869,523</u>

	Three Months Ended				Total Fiscal Year 2019
	June 30, 2018	September 30, 2018	December 31, 2018	March 31, 2019	
Operating expenses:					
Research and development	\$ 2,744	\$ 5,261	\$ 5,335	\$ 3,758	\$ 17,098
General and administrative	1,466	2,171	1,857	1,964	7,458
Total operating expenses	<u>4,210</u>	<u>7,432</u>	<u>7,192</u>	<u>5,722</u>	<u>24,556</u>
Loss from operations	(4,210)	(7,432)	(7,192)	(5,722)	(24,556)
Other expenses, net:					
Interest expense, net	(2)	(3)	(2)	(1)	(8)
Loss on extinguishment of accounts payable	-	-	(23)	-	(23)
Loss before income taxes	(4,212)	(7,435)	(7,217)	(5,723)	(24,587)
Income taxes	(2)	-	-	-	(2)
Net loss and comprehensive loss	<u>(4,214)</u>	<u>(7,435)</u>	<u>(7,217)</u>	<u>(5,723)</u>	<u>(24,589)</u>
Accrued dividend on Series B Preferred stock	(274)	(284)	(291)	(291)	(1,140)
Net loss attributable to common stockholders	<u>\$ (4,488)</u>	<u>\$ (7,719)</u>	<u>\$ (7,508)</u>	<u>\$ (6,014)</u>	<u>\$ (25,729)</u>
Basic and diluted net loss per common share attributable to common stockholders	<u>\$ (0.20)</u>	<u>\$ (0.30)</u>	<u>\$ (0.24)</u>	<u>\$ (0.17)</u>	<u>\$ (0.90)</u>
Weighted average shares used in computing basic and diluted net loss per common share attributable to common stockholders	<u>22,987,066</u>	<u>25,815,245</u>	<u>30,696,312</u>	<u>35,113,753</u>	<u>28,562,490</u>

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

None.

Item 9A. Controls and Procedures

Disclosure Controls and Procedures.

As required by Rule 13a-15(b) under the Securities Exchange Act of 1934, as amended, (the *Exchange Act*) our Chief Executive Officer (*CEO*) and our Chief Financial Officer (*CFO*) conducted an evaluation as of the end of the period covered by this Annual Report on Form 10-K, of the effectiveness of our disclosure controls and procedures as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act. Based on that evaluation, our CEO and our CFO each concluded that our disclosure controls and procedures are effective to provide reasonable assurance that information required to be disclosed in the reports that we file or submit under the Exchange Act, (i) is recorded, processed, summarized and reported within the time periods specified in the Securities and Exchange Commission's rules and forms and (ii) is accumulated and communicated to our management, including our CEO and our CFO, as appropriate to allow timely decisions regarding required disclosure.

Management's Report on Internal Control Over Financial Reporting.

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as such term is defined in Exchange Act Rules 13a-15(f) and 15d-15(f). Our internal control system is designed to provide reasonable assurance to our management and Board of Directors regarding the reliability of financial reporting and the preparation and fair presentation of financial statements for external purposes in accordance with U.S. generally accepted accounting principles.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Therefore, even those systems determined to be effective can provide only reasonable assurance of achieving their control objectives. Smaller reporting companies may face additional limitations in achieving control objectives. Smaller reporting companies typically employ fewer individuals who are often tasked with a wide range of responsibilities, making it difficult to segregate duties. Often, one or two individuals control many, or all, aspects of the smaller reporting company's general and financial operations, placing such individual(s) in a position to override any system of internal control. Additionally, projections of an evaluation of current effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the controls may deteriorate.

Management has assessed the effectiveness of our internal control over financial reporting for our fiscal year ended March 31, 2020. Management's assessment was based on criteria set forth in *Internal Control - Integrated Framework (2013)*, issued by the Committee of Sponsoring Organizations of the Treadway Commission (*COSO*). Based upon this assessment, management concluded that, as of March 31, 2020, our internal control over financial reporting was not effective, based upon those criteria, as a result of the material weaknesses identified below.

A material weakness is a deficiency or combination of deficiencies in internal control over financial reporting, such that there is a reasonable possibility that a material misstatement of the annual or interim financial statements will not be prevented or detected on a timely basis.

Specifically, management identified the following control weaknesses: (i) the size of the Company's staff does not permit appropriate segregation of duties to (a) permit appropriate review of accounting transactions and/or accounting treatment by multiple qualified individuals, and (b) prevent one individual from overriding the internal control system by initiating, authorizing and completing all transactions; and (ii) the Company utilizes accounting software that does not prevent erroneous or unauthorized changes to previous reporting periods and/or can be adjusted so as to not provide an adequate audit trail of entries made in the accounting software. The Company does not believe that these control weaknesses have resulted in any deficient financial reporting because each of our CEO and CFO is aware of his responsibilities under the SEC's reporting requirements and personally certifies our financial reports. Further, the Company has implemented a series of manual checks and balances to verify that no previous reporting period has been improperly modified and that no unauthorized entries have been made in the current reporting period.

Accordingly, while the Company has identified certain material weaknesses in its system of internal control over financial reporting, it believes that it has taken reasonable and sufficient steps to ascertain that the financial information contained in this Annual Report is in accordance with U.S. generally accepted accounting principles. Management has determined that current resources would be more appropriately applied elsewhere and when resources permit, they will alleviate the material weaknesses through various steps, which may include the addition of qualified financial personnel and/or the acquisition and implementation of alternative accounting software.

As a result of the enactment of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, and the resulting amendment of Section 404 of the Sarbanes-Oxley Act of 2002, as a smaller reporting company, we are not required to provide an attestation report by our independent registered public accounting firm regarding internal control over financial reporting for the fiscal year ended March 31, 2020 or thereafter, until such time as we are no longer eligible for the exemption for smaller issuers set forth within the Sarbanes-Oxley Act.

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this Item is incorporated herein by reference to the information that will be contained in our proxy statement related to the 2020 Annual Meeting of Stockholders, which we intend to file with the Securities and Exchange Commission on or before July 29, 2020 pursuant to General Instruction G(3) of Form 10-K.

Item 11. Executive Compensation

The information required by this Item is incorporated herein by reference to the information that will be contained in our proxy statement related to the 2020 Annual Meeting of Stockholders, which we intend to file with the Securities and Exchange Commission on or before July 29, 2020 pursuant to General Instruction G(3) of Form 10-K.

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

The information required by this Item is incorporated herein by reference to the information that will be contained in our proxy statement related to the 2020 Annual Meeting of Stockholders, which we intend to file with the Securities and Exchange Commission on or before July 29, 2020 pursuant to General Instruction G(3) of Form 10-K.

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

The information required by this Item is incorporated herein by reference to the information that will be contained in our proxy statement related to the 2020 Annual Meeting of Stockholders, which we intend to file with the Securities and Exchange Commission on or before July 29, 2020 pursuant to General Instruction G(3) of Form 10-K.

Item 14. Principal Accounting Fees and Services

The information required by this Item is incorporated herein by reference to the information that will be contained in our proxy statement related to the 2020 Annual Meeting of Stockholders, which we intend to file with the Securities and Exchange Commission on or before July 29, 2020 pursuant to General Instruction G(3) of Form 10-K.

PART IV**Item 15. Exhibits, Financial Statement Schedules****(a)(1) Financial Statements**

See Index to Financial Statements under Item 8 on page 90.

(a)(2) Consolidated Financial Statement Schedules

Consolidated financial statement schedules are omitted because they are not applicable or are not required or the information required to be set forth therein is included in the Consolidated Financial Statements or notes thereto.

(a)(3) Exhibits

The exhibits listed in the Exhibit Index below are filed or incorporated by reference as part of this report.

Exhibit Index

<u>Exhibit No.</u>	<u>Description</u>
2.1*	Agreement and Plan of Merger by and among Excaliber Enterprises, Ltd., VistaGen Therapeutics, Inc. and Excaliber Merger Subsidiary, Inc.
3.4	Articles of Merger filed with the Nevada Secretary of State on May 24, 2011, incorporated by reference from Exhibit 3.1 to the Company's Current Report on Form 8-K filed on May 31, 2011.
3.5	Certificate of Designations Series A Preferred, incorporated by reference from Exhibit 3.1 to the Company's Current Report on Form 8-K filed on December 23, 2011.
3.6	Certificate of Change filed with the Nevada Secretary of State on August 11, 2014 incorporated by reference from Exhibit 3.1 to the Company's Current Report on Form 8-K filed on August 14, 2014.
3.7	Certificate of Designation of the Relative Rights and Preferences of the Series B 10% Convertible Preferred Stock of VistaGen Therapeutics, Inc., filed with the Nevada Secretary of State on May 7, 2015, incorporated by reference from Exhibit 3.1 to the Company's Current Report on Form 8-K filed on May 13, 2015.
3.9	Certificate of Designation of the Relative Rights and Preferences of the Series C Convertible Preferred Stock of VistaGen Therapeutics, Inc., dated January 25, 2016, incorporated by reference from Exhibit 3.1 to the Company's Current Report on Form 8-K filed on January 29, 2016.
3.10	Restated Articles of Incorporation of VistaGen Therapeutics, Inc., dated August 16, 2016, incorporated by reference from Exhibit 3.1 to the Company's Current Report on Form 8-K, filed on August 17, 2016.
3.11	Second Amended and Restated Bylaws of VistaGen Therapeutics, Inc., dated August 16, 2016, incorporated by reference from Exhibit 3.2 to the Company's Current Report on Form 8-K, filed on August 16, 2016.
3.12	Certificate of Amendment to the Restated and Amended Articles of Incorporation of VistaGen Therapeutics, Inc., dated September 15, 2017; incorporated by reference from Exhibit 3.1 to the Company's Current Report on Form 8-K, filed on September 20, 2017.
3.13	Certificate of Amendment to the Restated and Amended Articles of Incorporation, as amended, of VistaGen Therapeutics, Inc., dated September 6, 2019; incorporated by reference from Exhibit 3.1 to the Company's Current Report on Form 8-K, filed on September 6, 2019.
10.22*	License Agreement by and between Mount Sinai School of Medicine of New York University and the Company, dated October 1, 2004.
10.26*	License Agreement, dated October 24, 2001, by and between the University of Maryland, Baltimore, Cornell Research Foundation and Artemis Neuroscience, Inc.
10.40*	Employment Agreement, by and between, VistaGen and Shawn K. Singh, dated April 28, 2010, as amended May 9, 2011.
10.41*	Employment Agreement, by and between, VistaGen and H. Ralph Snodgrass, PhD, dated April 28, 2010, as amended May 9, 2011.
10.49	License Agreement No. 1, dated as of October 24, 2011 between University Health Network and VistaGen Therapeutics, Inc., incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K filed on November 30, 2011.
10.57	License Agreement No. 2, dated as of March 19, 2012 between University Health Network and VistaGen Therapeutics, Inc., incorporated by reference from Exhibit 10.57 to the Company's Annual Report on Form 10-K filed on July 2, 2012.
10.67	Note Exchange and Purchase Agreement dated as of October 11, 2012 by and between VistaGen Therapeutics, Inc. and Platinum Long Term Growth VII, LLP, incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K filed on October 16, 2012.
10.73	Amendment to Note Exchange and Purchase Agreement as of November 14, 2012 between VistaGen Therapeutics Inc. and Platinum Long Term Growth VII, LLP, incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K filed on November 20, 2012.

- [10.75](#) Amendment No. 2 to Note Exchange and Purchase Agreement as of January 31, 2013 between VistaGen Therapeutics Inc. and Platinum Long Term Growth VII, LLP, incorporated by reference from Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed on February 14, 2013.
- [10.76](#) Amendment No. 3 to Note Exchange and Purchase Agreement as of February 22, 2013 between VistaGen Therapeutics Inc. and Platinum Long Term Growth VII, LLP, incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K filed on February 28, 2013.
- [10.77](#) Form of Warrant to Purchase Common Stock issued to independent members of the Company's Board of Directors and its executive officers on March 3, 2013, incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K filed on March 6, 2013.
- [10.83](#) Lease between Bayside Area Development, LLC and VistaGen Therapeutics, Inc. (California) dated April 24, 2013, incorporated by reference from Exhibit 10.83 to the Company's Annual Report on Form 10-K filed July 18, 2013.
- [10.84](#) Indemnification Agreement effective May 20, 2013 between the Company and Jon S. Saxe, incorporated by reference from Exhibit 10.84 to the Company's Annual Report on Form 10-K filed on July 18, 2013.
- [10.85](#) Indemnification Agreement effective May 20, 2013 between the Company and Shawn K. Singh, incorporated by reference from Exhibit 10.85 to the Company's Annual Report on Form 10-K filed on July 18, 2013.
- [10.86](#) Indemnification Agreement effective May 20, 2013 between the Company and H. Ralph Snodgrass, incorporated by reference from Exhibit 10.86 to the Company's Annual Report on Form 10-K filed on July 18, 2013.
- [10.87](#) Indemnification Agreement effective May 20, 2013 between the Company and Brian J. Underdown, incorporated by reference from Exhibit 10.87 to the Company's Annual Report on Form 10-K filed on July 18, 2013.
- [10.88](#) Indemnification Agreement effective May 20, 2013 between the Company and Jerrold D. Dotson, incorporated by reference from Exhibit 10.88 to the Company's Annual Report on Form 10-K filed on July 18, 2013.
- [10.111](#) Exchange Agreement, by and between VistaGen Therapeutics, Inc., and Platinum Long Term Growth VII, LLC and Montsant Partners, LLC, dated January 25, 2016, incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K filed on January 29, 2016.
- [10.112](#) Indemnification Agreement effective April 8, 2016 between the Company and Jerry B. Gin, incorporated by reference from Exhibit 10.112 to the Company's Annual Report on Form 10-K filed on June 24, 2016.
- [10.113](#) Underwriting Agreement, by and between Chardan Capital Markets, LLC and WallachBeth Capital, LLC, as representatives of the several underwriters, and VistaGen Therapeutics, Inc., dated May 10, 2016, incorporated by reference from Exhibit 1.1 to the Company's Current Report on Form 8-K filed on May 16, 2016.
- [10.114](#) Warrant Agency Agreement, by and between Computershare, Inc. and VistaGen Therapeutics, Inc., dated May 16, 2016, incorporated by reference from Exhibit 4.1 to the Company's Current Report on Form 8-K filed on May 16, 2016.
- [10.115](#) Form of Warrant; incorporated by reference from Exhibit 4.2 to the Company's Current Report on Form 8-K filed on May 16, 2016.
- [10.116](#) Second Amendment to Employment Agreement by and between VistaGen Therapeutics, Inc. and Shawn K. Singh, dated June 22, 2016, incorporated by reference from Exhibit 10.116 to the Company's Annual Report on Form 10-K filed on June 24, 2016.
- [10.117](#) Second Amendment to Employment Agreement by and between VistaGen Therapeutics, Inc. and H. Ralph Snodgrass, Ph.D., dated June 22, 2016, incorporated by reference from Exhibit 10.117 to the Company's Annual Report on Form 10-K filed on June 24, 2016.
- [10.118](#) Second Amendment to Lease between Bayside Area Development and the Company, effective November 10, 2016, incorporated by reference from Exhibit 10.1 to the Company's Quarterly report on Form 10-Q filed on November 15, 2016.
- [10.119](#) Indemnification Agreement effective November 10, 2016 between the Company and Mark A. Smith, incorporated by reference from Exhibit 10.2 to the Company's Quarterly report on Form 10-Q filed on November 15, 2016.
- [10.120+](#) Exclusive License and Sublicense Agreement by and between VistaGen Therapeutics, Inc. and Apollo Biologics LP, effective December 9, 2016, incorporated by reference from Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed on May 11, 2017.
- [10.121+](#) Patent License Amendment Agreement between VistaGen Therapeutics Inc. and University Health Network effective December 9, 2016, incorporated by reference from Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q/A filed on May 1, 2017.
- [10.122](#) Amended and Restated 2016 Stock Incentive Plan (formerly the VistaGen Therapeutics, Inc. 2008 Stock Incentive Plan), incorporated by reference from Exhibit 10.122 to the Company's Annual Report on Form 10-K filed on June 29, 2017.
- [10.123](#) Underwriting Agreement, dated as of August 31, 2017, by and between VistaGen Therapeutics, Inc. and Oppenheimer & Co. Inc., incorporated by reference from Exhibit 1.1 to the Company's Current Report on Form 8-K filed on August 31, 2017.
- [10.124](#) Form of Series A1 Warrant, incorporated by reference from Exhibit 4.1 to the Company's Current Report on Form 8-K filed on August 31, 2017.
- [10.126](#) Underwriting Agreement, dated as of December 11, 2017, by and between VistaGen Therapeutics, Inc. and Oppenheimer & Co. Inc., incorporated by reference from Exhibit 1.1 to the Company's Current Report on Form 8-K filed on December 13, 2017.

10.127	Form of Warrant, incorporated by reference from Exhibit 4.1 to the Company's Current Report on Form 8-K filed on December 13, 2017.
10.128	Form of Summer 2018 Private Placement Subscription Agreement, incorporated by reference from the Company's Current Report on Form 8-K filed on August 9, 2018.
10.129	Form of Summer 2018 Private Placement Warrant, incorporated by reference from the Company's Current Report on Form 8-K filed on August 9, 2018.
10.130+	License Agreement (PH94B), by and between VistaGen Therapeutics, Inc. and Pherin Pharmaceuticals, Inc., dated September 11, 2018, incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K filed on September 13, 2018
10.131+	Option Agreement, by and between VistaGen Therapeutics, Inc. and Pherin Pharmaceuticals, Inc., dated September 11, 2018, incorporated by reference from Exhibit 10.2 to the Company's Current Report on Form 8-K filed on September 13, 2018.
10.132+	License Agreement (PH10), by and between VistaGen Therapeutics, Inc. and Pherin Pharmaceuticals, Inc., dated October 24, 2018, incorporated by reference from Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q/A filed on October 30, 2018.
10.133	Form of Fall 2018 Private Placement Subscription Agreement, incorporated by reference from Exhibit 10.4 to the Company's Quarterly Report on Form 10-Q filed on October 29, 2018.
10.134	Form of Fall 2018 Private Placement Warrant, incorporated by reference from Exhibit 10.5 to the Company's Quarterly Report on Form 10-Q filed on October 29, 2018.
10.135	Indemnification Agreement, dated January 10, 2019, by and between VistaGen Therapeutics, Inc. and Ann Cunningham, incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K filed on January 15, 2019.
10.136	Indemnification Agreement, dated November 10, 2016, by and between VistaGen Therapeutics, Inc. and Mark A. McPartland, incorporated by reference from Exhibit 10.136 to the Company's Annual Report on Form 10-K filed on June 25, 2019.
10.137	Underwriting Agreement, dated as of February 26, 2019, by and between VistaGen Therapeutics, Inc. and William Blair & Company, LLC, incorporated by reference from Exhibit 1.1 to the Company's Current Report on Form 8-K filed on March 4, 2019.
10.138	Master Services Agreement, dated July 11, 2017, by and between VistaGen Therapeutics, Inc. and Cato Research Ltd., incorporated by reference from Exhibit 10.138 to the Company's Annual Report on Form 10-K filed on June 25, 2019.
10.139	VistaGen Therapeutics, Inc. 2019 Omnibus Equity Incentive Plan, incorporated by reference from Exhibit 99.1 to the Company's Registration Statement on Form S-8 filed on October 1, 2019.
10.140	VistaGen Therapeutics, Inc. 2019 Employee Stock Purchase Plan, incorporated by reference from Exhibit 99.2 to the Company's Registration Statement on Form S-8 filed on October 1, 2019.
10.141	Form of Fall 2019 Private Placement Subscription Agreement, incorporated by reference from Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed on November 7, 2019.
10.142	Form of Fall 2019 Private Placement Warrant, incorporated by reference from Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q filed on November 7, 2019.
10.143	Form of Securities Purchase Agreement, dated January 24, 2020 between the Company and each purchaser named in the signature pages thereto, incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K filed on January 27, 2020.
10.144	Form of Warrant, dated January 24, 2020, incorporated by reference from Exhibit 10.2 to the Company's Current Report on Form 8-K filed on January 27, 2020.
10.145	Purchase Agreement, by and between VistaGen Therapeutics, Inc. and Lincoln Park Capital Fund, LLC, dated March 24, 2020, incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K, filed March 26, 2020.
10.146	Registration Rights Agreement, by and between VistaGen Therapeutics, Inc. and Lincoln Park Capital Fund, LLC, dated March 24, 2020, incorporated by reference from Exhibit 10.2 to the Company's Current Report on Form 8-K, filed March 26, 2020
10.147	Note Payable Agreement by and between VistaGen Therapeutics, Inc. and Silicon Valley Bank, dated April 22, 2020, incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K, filed April 27, 2020.
10.148#	License and Collaboration Agreement between VistaGen Therapeutics, Inc. and EverInsight Therapeutics Inc. incorporated by reference from Exhibit 10.1 to the Company's Current Report on Form 8-K, filed June 26, 2020.
23.1	Consent of Independent Registered Public Accounting Firm, filed herewith.
31.1	Certification of the Company's Chief Executive Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002, filed herewith.
31.2	Certification of the Company's Chief Financial Officer pursuant to Section 302 of the Sarbanes-Oxley Act of 2002, filed herewith.
32.1	Certification of the Company's Chief Executive Officer and Chief Financial Officer pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, filed herewith.
101.INS	XBRL Instance Document, filed herewith
101.SCH	XBRL Taxonomy Extension Schema, filed herewith
101.CAL	XBRL Taxonomy Extension Calculation Linkbase, filed herewith
101.DEF	XBRL Taxonomy Extension Definition Linkbase, filed herewith
101.LAB	XBRL Taxonomy Extension Label Linkbase, filed herewith
101.PRE	XBRL Taxonomy Extension Presentation Linkbase, filed herewith

* Incorporated by reference from the like-numbered exhibit filed with our Current Report on Form 8-K on May 16, 2011.

+ Confidential treatment has been granted for certain confidential portions of this agreement.

Pursuant to Item 601(b)(10) of Regulation S-K, certain confidential portions of this exhibit (indicated by "[*****]") have been omitted as the Company has determined (i) the omitted information is not material and (ii) the omitted information would likely cause harm to the Company if publicly disclosed.

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, in the City of South San Francisco, State of California, on the 29th day of June, 2020.

VistaGen Therapeutics, Inc.

Date: June 29, 2020

By: /s/ Shawn K. Singh

Shawn K. Singh, J.D.

Chief Executive Officer

In accordance with the Exchange Act, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

Signature	Title	Date
<u>/s/ Shawn K. Singh</u> Shawn K. Singh, JD	Chief Executive Officer, and Director <i>(Principal Executive Officer)</i>	June 29, 2020
<u>/s/ Jerrold D. Dotson</u> Jerrold D. Dotson	Vice President and Chief Financial Officer <i>(Principal Financial and Accounting Officer)</i>	June 29, 2020
<u>/s/ H. Ralph Snodgrass</u> H. Ralph Snodgrass, Ph.D	President, Chief Scientific Officer and Director	June 29, 2020
<u>/s/ Jon S. Saxe</u> Jon S. Saxe	Chairman of the Board of Directors	June 29, 2020
<u>/s/ Ann M. Cunningham</u> Ann M. Cunningham	Director	June 29, 2020
<u>/s/ Jerry B. Gin, Ph.D</u> Jerry B. Gin, Ph.D.	Director	June 29, 2020
<u>/s/ Brian J. Underdown</u> Brian J. Underdown, Ph. D	Director	June 29, 2020

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-8 (File Nos. 333-234026, 333-223556 and 333-208354), Form S-3 (File Nos. 333-237968, 333-234025 and 333-215671) and Form S-1 (No. 333-237514) of VistaGen Therapeutics, Inc. of our report dated June 29, 2020 (which report expresses an unqualified opinion and includes an explanatory paragraph expressing substantial doubt about the Company's ability to continue as a going concern), relating to the consolidated financial statements of VistaGen Therapeutics, Inc., which appears in this Annual Report on Form 10-K.

/s/ OUM & CO. LLP

San Francisco, California

June 29, 2020

CERTIFICATION

I, Shawn K. Singh, certify that:

1. I have reviewed this Annual Report on Form 10-K of VistaGen Therapeutics, Inc., a Nevada corporation;
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 the 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 internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(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.

June 29, 2020

/s/ Shawn K. Singh
Shawn K. Singh, JD
Principal Executive Officer

CERTIFICATION

I, Jerrold D. Dotson, certify that:

1. I have reviewed this Annual Report on Form 10-K of VistaGen Therapeutics, Inc., a Nevada corporation;
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 the 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 internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(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.

June 29, 2020

/s/ Jerrold D. Dotson
Jerrold D. Dotson
Principal Financial Officer

**CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

Pursuant to 18 U.S.C. § 1350, as created by Section 906 of the Sarbanes-Oxley Act of 2002, the undersigned officer of VistaGen Therapeutics, Inc. (the “Company”) hereby certifies, to such officer’s knowledge, that:

(i) the accompanying Annual Report on Form 10-K of the Company for the annual period ended March 31, 2020 (the “Report”) fully complies with the requirements of Section 13(a) or Section 15(d), as applicable, of the Securities Exchange Act of 1934, as amended; and

(ii) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

June 29, 2020

/s/ Shawn K. Singh
Shawn K. Singh, JD
Principal Executive Officer

/s/ Jerrold D. Dotson
Jerrold D. Dotson
Principal Financial Officer
