BIO-PATH HOLDINGS INC
Form 10-K
March 19, 2019

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

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

For the fiscal year ended December 31, 2018

OR

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

For the transition period from _____ to _____

Commission file number 001-36333

BIO-PATH HOLDINGS, INC.

(Exact name of registrant as specified in its charter)

Delaware	87-0652870

(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)
4710 Bellaire Boulevard, Suite 210, Bellaire, Texas (Address of principal executive offices)	77401 (Zip Code)

Registrant's telephone number, including area code: (832) 742-1357

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 x

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

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 x No ¨

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes x No ¨

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

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated

filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ¨	Accelerated filer ¨
Non-accelerated filer x	Smaller reporting company x
	Emerging growth company ¨

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

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

As of March 15, 2019, there were 2,507,239 shares of the registrant's common stock issued and outstanding. The aggregate market value of the voting stock held by non-affiliates of the registrant was approximately $15,884,741 as of June 29, 2018, the last business day of the registrant's most recently completed second fiscal quarter, based on the last sales price of the registrant's common stock as reported on The Nasdaq Capital Market on such date, after adjustment for the 1-for-20 reverse stock split that occurred effective as of 5:00 p.m. Eastern Time on January 17, 2019. For purposes of the preceding sentence only, all directors, executive officers and beneficial owners of 10% or more of the shares of the registrant's common stock are assumed to be affiliates.

DOCUMENTS INCORPORATED BY REFERENCE: NONE

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Unless the context requires otherwise, references in this Annual Report on Form 10-K to "we," "our," "us," "the Company" and "Bio-Path" refer to Bio-Path Holdings, Inc. and its subsidiary. Bio-Path Holdings, Inc.'s wholly-owned subsidiary, Bio-Path, Inc., is sometimes referred to herein as "Bio-Path Subsidiary."

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This Annual Report on Form 10-K contains "forward-looking statements" within the meaning of Section 27A of the Securities Act and Section 21E of the Exchange Act. Forward-looking statements can be identified by words such as "anticipate," "expect," "intend," "plan," "believe," "seek," "estimate," "project," "goal," "strategy," "future," "likely," "may," variations of these words and similar references to future periods, although not all forward-looking statements contain these identifying words. Forward-looking statements are neither historical facts nor assurances of future performance. Instead, they are based on our current beliefs, expectations and assumptions regarding the future of our business, future plans and strategies, projections, anticipated events and trends, the economy and other future conditions. Because forward-looking statements relate to the future, they are subject to inherent risks, uncertainties and changes in circumstances, including those discussed in "Item 1A. Risk Factors" of this Annual Report on Form 10-K. As a result, our actual results may differ materially from those expressed or forecasted in the forward-looking statements, and you should not rely on such forward-looking statements. You should carefully read "Item 1A. Risk Factors" of this Annual Report on Form 10-K completely and with the understanding that our actual future results may be materially different from those expressed or forecasted in this Annual Report on Form 10-K. We can give no assurances that any of the events anticipated by the forward-looking statements will occur or, if any of them do, what impact they will have on our results of operations and financial condition. Forward-looking statements include, but are not limited to, statements about:

- our lack of significant revenue to date, our history of recurring operating losses and our expectation of future operating losses;
- our need for substantial additional capital and our need to delay, reduce or eliminate our drug development and commercialization efforts if we are unable to raise additional capital;
- the highly-competitive nature of the pharmaceutical and biotechnology industry and our ability to compete effectively;
- the success of our plans to use collaboration arrangements to leverage our capabilities;
- our ability to retain and attract key personnel;
- the risk of misconduct of our employees, agents, consultants and commercial partners;
- disruptions to our operations due to expansions of our operations;
- the costs we would incur if we acquire or license technologies, resources or drug candidates;
- risks associated with product liability claims;
- our reliance on information technology systems and the liability or interruption associated with cyber-attacks or other breaches of our systems;
- our ability to use net operating loss carryforwards;
- provisions in our charter documents and state law that may prevent a change in control;
- work slowdown or stoppage at government agencies could negatively impact our business;
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our need to complete extensive clinical trials and the risk that we may not be able to demonstrate the safety and efficacy of our drug candidates;

- risks that that our clinical trials may be delayed or terminated;
- our ability to obtain domestic and foreign regulatory approval for our drug candidates;
- changes in existing laws and regulations affecting the healthcare industry;
- our reliance on third parties to conduct clinical trials for our drug candidates;
- our ability to maintain orphan drug exclusivity for our drug candidates;
- our reliance on third parties for manufacturing our clinical drug supplies;
- risks associated with the manufacture of our drug candidates;
- our ability to establish sales and marketing capabilities relating to our drug candidates;
- market acceptance of our drug candidates;
- third-party payor reimbursement practices;
- our ability to adequately protect the intellectual property of our drug candidates;
- infringement on the intellectual property rights of third parties;
- costs and time relating to litigation regarding intellectual property rights;
- our ability to adequately prevent disclosure by our employees or others of trade secrets and other proprietary information;
- our need to raise additional capital;
- the volatility of the trading price of our common stock;
- our common stock being thinly traded;
- our ability to issue shares of common or preferred stock without approval from our stockholders;
- our ability to pay cash dividends;
- costs and expenses associated with being a public company;
- a material weakness identified in our internal controls over financial reporting; and
- our ability to maintain compliance with the listing standards of the Nasdaq Capital Market.

Any forward-looking statement made by us in this Annual Report on Form 10-K is based only on information currently available to us and speaks only as of the date on which it is made. We undertake no obligation to publicly update any forward-looking statement, whether as a result of new information, future developments or otherwise. However, you should carefully review the risk factors set forth in other reports or documents we file from time to time with the U.S. Securities and Exchange Commission (“SEC”).

PART I

ITEM 1. BUSINESS

Overview

We are a clinical and preclinical stage oncology focused RNAi nanoparticle drug development company utilizing a novel technology that achieves systemic delivery for target specific protein inhibition for any gene product that is over-expressed in disease. Our drug delivery and antisense technology, called DNAbilize®, is a platform that uses P-ethoxy, which is a deoxyribonucleic acid (DNA) backbone modification that is intended to protect the DNA from destruction by the body's enzymes when circulating *in vivo,* incorporated inside of a neutral charged lipid bilayer. We believe this combination allows for high efficiency loading of antisense DNA into non-toxic, cell-membrane-like structures for delivery of the antisense drug substance into cells. *In vivo,* the DNAbilize® delivered antisense drug substances are systemically distributed throughout the body to allow for reduction or elimination of proteins in blood diseases and solid tumors. DNAbilize® is a registered trademark of the Company.

Using DNAbilize® as a platform for drug development and manufacturing, we currently have three antisense drug candidates in development to treat at least five different cancer disease indications. Our lead drug candidate, prexigebersen (pronounced prex" i je ber' sen), is in the efficacy portion of a Phase 2 clinical trial for acute myeloid leukemia ("AML") in combination with low-dose cytarabine ("LDAC") and in combination with decitabine. On March 6, 2019, we announced intended amendments to this Phase 2 clinical trial to, among other things, add prexigebersen in combination with decitabine for myelodysplastic syndrome ("MDS") and close prexigebersen in combination with LDAC. In addition, preclinical efficacy studies are underway for triple combination prexigebersen, decitabine and Venclexta in AML. Prexigebersen is also being studied in the safety portion of a Phase 2a clinical trial for chronic myeloid leukemia ("CML") in combination with dasatinib. Prexigebersen was shown to enhance chemotherapy efficacy in preclinical solid tumor models, and we intend to file an Investigational New Drug ("IND") application for prexigebersen in solid tumors in 2019.

Our second drug candidate, Liposomal Bcl-2 ("BP1002"), targets the protein Bcl-2, which is responsible for driving cell survival in up to 60% of all cancers. We are currently preparing an IND application for BP1002 in addition to completing additional IND enabling studies. We intend to initiate a Phase 1 clinical trial of BP1002 in refractory/relapsed lymphoma and chronic lymphocytic leukemia ("CLL") patients once we receive approval from the U.S. Food and Drug Administration ("FDA").

Our third drug candidate, Liposomal Stat3 ("BP1003"), targets the Stat3 protein and is currently in preclinical development in a pancreatic patient derived tumor model. Preclinical models have shown BP1003 to successfully penetrate pancreatic tumors and to significantly enhance the efficacy of standard frontline treatments. Our lead indication for BP1003 is pancreatic cancer due to the severity of this disease and the lack of effective, life-extending treatments. We intend to initiate IND enabling studies of BP1003 in 2019.

Our DNAbilize® technology-based products are available for out-licensing or partnering. We intend to apply our drug delivery technology template to new disease-causing protein targets as a means to develop new nanoparticle antisense RNAi drug candidates. We have a new product identification template in place to define a process of scientific, preclinical, commercial and intellectual property evaluation of potential new drug candidates for inclusion into our drug product development pipeline. As we expand, we will look at indications where a systemic delivery is needed and antisense RNAi nanoparticles can be used to slow, reverse or cure a disease, either alone or in combination with another drug. On July 19, 2017, we announced that the United States Patent and Trademark Office ("USPTO") issued a notice of allowance for claims related to DNAbilize®, including its use in the treatment of cancers, autoimmune diseases and infectious diseases.

We have certain intellectual property as the basis for our current drug products in clinical development, prexigebersen, BP1002 and BP1003. We are developing RNAi antisense nanoparticle drug candidates based on our own patented technology to treat cancer and autoimmune disorders where targeting a single protein may be advantageous and result in reduced patient adverse effects as compared to small molecule inhibitors with off-target and non-specific effects. We have composition of matter and method of use intellectual property for the design and manufacture of antisense RNAi nanoparticle drug products.

Our pipeline for development of antisense therapeutics is set forth in the table below:

Figure 1. Bio-Path Pipeline for Development of Therapeutics

* Received orphan drug designation from the U.S. FDA for AML and CML and from the European Medicines Agency (EMA) for AML

Ribonucleic acid (RNA) is a biologically significant type of molecule consisting of a chain of nucleotide units. Each nucleotide consists of a nitrogenous base, a ribose sugar and a phosphate. Although similar in some ways to DNA, RNA differs from DNA in a few important structural details. RNA is transcribed from DNA by enzymes called RNA polymerases and is generally further processed by other enzymes. RNA is central to protein synthesis. DNA carries the genetic information of a cell and consists of thousands of genes. Each gene serves as a recipe on how to build a protein molecule. Proteins perform important tasks for the cell functions or serve as building blocks. The flow of information from the genes determines the protein composition and thereby the functions of the cell.

The DNA is situated in the nucleus of the cell, organized into chromosomes. Every cell must contain the genetic information and the DNA is therefore duplicated before a cell divides (replication). When proteins are needed, the corresponding genes are transcribed into RNA (transcription). The RNA is first processed so that non-coding parts are removed (processing) and is then transported out of the nucleus (transport). Outside the nucleus, the proteins are built based upon the code in the RNA (translation).

Our basic drug development concept is to block expression of proteins that cause disease. RNA is essential in the process of creating proteins. We intend to develop drugs and drug delivery systems that work by delivering short strands of DNA material (antisense DNA) that block the production of proteins associated with disease (Figure 2).

Figure 2.

Antisense DNA therapeutics is the field of designing short DNA sequences that are complementary to an RNA for a protein of interest with the intention of inhibiting the production of the targeted protein. The DNA will find the matching RNA and form a complex. The complexed RNA will not have access to the protein-making machinery, which prevents the cell from translating it into a protein. Thus, protein production is turned off and levels of the targeted protein are reduced in the cell. This gene-specific process of controlling protein expression has led to great interest in using antisense DNA to shut off the production of proteins involved in disease. Antisense therapeutics have been in development for over 20 years; however, there have been many challenges to antisense therapeutics that have prevented or reduced the successful distribution and transfer of DNA into cells. Of all delivery methods in use today, we believe only DNAbilize® has the potential to overcome the most common challenges associated with antisense therapeutics.

Challenges associated with antisense therapeutics generally fall into two categories: (i) maintaining the stability of the DNA inside of the body as it is transported to the target cell and (ii) achieving efficient delivery and transfer of the DNA into the cell. DNA stability in the blood and lymphatic system is a challenge because of the abundance of enzymes present in human body fluids. Enzymes called nucleases will digest DNA into nonfunctional fragments making them too small to hybridize effectively to the correct RNA and block the protein machinery.

Efforts to overcome the stability challenges led to the development of DNA structural backbone chemistries that block nuclease digestion so that DNA can remain in circulation long enough to reach the target cell. The most popular modification employed is called phosphorothioate in which an oxygen atom in the DNA is replaced with a sulfur atom. This switch alters the DNA's structure so that enzymes can no longer break down the DNA. However, DNA that contains sulfur has two major drawbacks. First, it has been shown to cause liver toxicity because, as pure DNA that contains sulfur is circulated through the body, it is rapidly cleared by and accumulates in the liver. Second, sulfur also induces significant toxicity in the form of life threatening bleeding and clotting complications.

While the development and use of phosphorothioate was a step forward in allowing for progress of *in vivo* studies, the amount of antisense drug product that can be delivered is severely limited. Consequently, doses at the level needed for true therapeutic success are not possible. Accordingly, stabilizing the DNA backbone through the use of phosphorothioate has prevented the successful use of antisense therapeutics to treat patients at a therapeutic level without causing significant amounts of toxicity. Alternative approaches have since been developed that reduce the number of sulfur groups in the antisense molecule; however, these methods still contain sulfur, and toxicity will always remain a concern. The P-ethoxy modification used in our DNAbilize® technology is completely sulfur free.

The second category of challenges to the development of successful antisense therapeutics is achieving efficient delivery and transfer of a DNA molecule across a lipid based cell membrane. Cell membranes have a negative charge on the surface. DNA is also negatively charged. When the pure DNA is delivered to the cell surface, the similar charges repel each other, and uptake of the DNA into the cell is very inefficient. Accordingly, the DNA containing antisense drug products will not be delivered in an amount that will have a therapeutic effect.

Efforts to overcome the efficient delivery and transfer challenges led to the exploration of lipid-based carriers for transfer of DNA containing antisense drug products through the lipid bilayer to mimic the lipid cell membrane. Encapsulating the DNA inside a neutral charged lipid bilayer facilitates the delivery and transfer of DNA into the cell to be fluid and gentle. Research initially focused on cationic lipids because they have an overall positive charge, which would be attracted to the negative charge of the cell membrane. It was thought that this would enhance uptake and delivery of DNA.

Research did, in fact, confirm that cationic liposomes are capable of transferring DNA inside of cells at a higher efficiency than with no delivery liposomes; however, it was found that cationic lipids have major drawbacks in therapeutics. These include absorption of serum proteins while the complexes are circulating in the blood. Absorption of charged serum proteins leads to lipid reorganization, aggregation or disassociation, resulting in poor efficiency of transfer of DNA into cells and non-specific toxicity to cell membranes. DNAbilize® overcomes this challenge as well by encapsulating the DNA in a neutral lipid-based liposome, which is a lipid membrane without surface charge. The lipid particles can circulate through the blood without interacting with charged serum proteins, reaching target cells to transfer intact DNA without toxic effects.

We believe the DNAbilize® technology is a first in class approach that overcomes the challenges associated with both DNA stabilization and lipid-based delivery. We believe that the combination of the protected DNA using P-ethoxy to modify the DNA structure with the neutral lipid membrane is the ideal approach for antisense DNA therapeutics. While many companies have focused research on either the DNA stabilization problem or the lipid delivery problem, we are not aware of any company that has developed improvements in both areas. DNAbilize® is truly a stand-alone platform because, based on our current research, it allows for high doses of drug products to be delivered throughout the entire body while minimizing toxicity. This allows our research and development efforts to focus on drug targets rather than on indications because the DNAbilize® system should not be limited in what types of indications it can treat. As such, we believe that DNAbilize® represents the first ever antisense therapeutic approach that can successfully treat hematological and systemic diseases of the blood and lymph.

Because of our unique ability to address unmet needs in hematological malignancies, our lead drug candidates focus in this area. Our lead drug candidate, prexigebersen, targets the protein Grb2, a bridging protein between activated and mutated cellular kinases and the proteins involved in cell proliferation, and in particular, Ras protein. When mutations occur that activate these kinases, the cell proliferates uncontrollably, via Grb2, and this results in disease. Inhibition of Grb2 interrupts this pathway and shuts off growth signals.

Prexigebersen is in a Phase 2 clinical trial for AML in combination with frontline therapy LDAC in elderly and induction therapy ineligible patients or patients who have decided to forego intensive induction therapy because of their age or fragile health. The multi-site trial is being conducted at leading cancer centers, among them are Weill Medical College of Cornell University, Baylor Scott &White Health, The University of Kansas, New Jersey Hematology Oncology Associates, West Virginia University/Mary Babb Randolph Cancer Center and MD Anderson Cancer Center (“MD Anderson”).

On April 3, 2018, we released the interim data from Stage 1 of the Phase 2 clinical trial for AML in combination with LDAC. The prexigebersen and LDAC combination therapy was well-tolerated and showed early anti-leukemic activity in nearly 50% of evaluable AML patients, including four patients with complete remission (“CR”) and four with stable disease. On August 27, 2018, we announced that we commenced Stage 2 of the Phase 2 clinical trial for AML and added a cohort of patients to be treated with a combination of prexigebersen and decitabine, another AML frontline therapy. On March 6, 2019, we announced updates to the interim analysis from Stage 1 of the Phase 2

clinical trial. We announced that the efficacy profile improved to where 11 (65%) of the 17 evaluable patients had a response, including five (29%) who achieved CR, including one complete remission with incomplete hematologic recovery ("CRi") and one morphologic leukemia free state, and six (35%) stable disease responses, including two patients who had greater than a 50% reduction in bone marrow blasts. The efficacy data from the 17 evaluable patients was very favorable compared to the reported CR, CRp (complete remission with incomplete platelet recovery) and CRi rates of 7 to 13% with LDAC treatment alone. Importantly, through investigation by the principal investigators, it was observed that 68% of patients were secondary AML patients, a difficult class to treat. On March 6, 2019, we also announced intended amendments to this Phase 2 clinical trial to, among other things, add prexigebersen in combination with decitabine for MDS and close prexigebersen in combination with LDAC.

In addition to the Phase 2 trial for AML, a Phase 1b/2a clinical trial, which is the safety portion of the Phase 2 clinical trial, of prexigebersen for the treatment of CML in accelerated and blast phase patients is open for enrollment. The trial is being conducted at MD Anderson as a potential salvage therapy for accelerated and blast phase CML patients. Two cohorts of three evaluable patients each will be enrolled to evaluate two doses (60 mg/ m^2 and 90 mg/ m^2) of prexigebersen in combination with the front-line treatment dasatinib.

Our second drug candidate, BP1002, targets the protein Bcl-2. Bcl-2 is an anti-apoptotic member of the Bcl-2 family of proteins that regulate cell death. Amplified expression of Bcl-2 protein is associated with numerous lymphomas. The chromosomal translocation t(14;18) is the defining genetic hallmark of follicular lymphoma. The t(14;18) moves the Bcl-2 gene from chromosome 18 into the heavy chain immunoglobin locus on chromosome 14, resulting in uncontrolled high level expression of Bcl-2 protein. Overexpression of Bcl-2 results in deregulated cell survival in affected cells. We are currently preparing an IND application for BP1002 in addition to completing additional IND enabling studies. We intend to initiate a Phase 1 clinical trial of BP1002 in patients with refractory/relapsed lymphoma and CLL once we receive approval from the FDA. The clinical trial would evaluate the safety of BP1002 in several dose escalating cohorts to determine a maximum tolerated dose and a recommended Phase 2 dose.

Our third drug candidate, BP1003, targets the Stat3 protein and is currently in preclinical development in a pancreatic patient-derived tumor model. Preclinical models have shown BP1003 to successfully penetrate pancreatic tumors and to significantly enhance the efficacy of standard frontline treatments. We intend to initiate IND enabling studies of BP1003 in 2019.

Strategy

Our strategy is to develop our lead candidates, prexigebersen, BP1002 and BP1003, for multiple indications where the pathways involving Grb2, Bcl-2 and Stat3, respectively, are utilized to promote cancer growth, survival, angiogenesis and tumor surveillance evasion. Using DNAbilize® technology, we plan to develop therapeutics to a wide range of diseases and disorders independently and in partnership with others. The key elements of our strategy include:

(1) **Develop prexigebersen for treatment of AML, MDS and CML in combination with frontline therapies.** The Phase 1 clinical trial demonstrated an excellent safety profile of prexigebersen in patients with relapsed/refractory AML, CML or MDS. Moving forward with AML, the area of highest need, we announced in November 2016, the commencement of the Phase 2 trial of prexigebersen in combination with LDAC in AML patients. Eligible patients include de novo elderly ineligible for induction therapy or patients who have decided to forego intensive induction therapy because of their age or fragile health. We released the initial interim data analysis of Stage 1 of the Phase 2 AML study in April 2018, and the updated data in March 2019. In August 2018, we announced the addition of a prexigebersen and decitabine combination cohort to the Phase 2 AML study. On March 6, 2019, we announced a revised clinical program intended for prexigebersen in AML. Part of this revised program includes the intended inclusion of high risk MDS patients in the prexigebersen and decitabine combination cohort and the closure of the prexigebersen and LDAC combination cohort in the ongoing Phase 2 AML study. In addition, preclinical efficacy studies are underway for triple combination prexigebersen, decitabine and Venclexta in AML. On December 29, 2017, we announced the initiation of the safety portion of the Phase 2a clinical trial for blast and accelerated phase CML patients with prexigebersen in combination with dasatinib.

(2) **Develop prexigebersen for treatment of solid tumors.** Preclinical studies, in collaboration with leaders in the field of ovarian and breast cancer at MD Anderson, have been conducted to assess the efficacy of prexigebersen in solid tumors. Research show that prexigebersen enhances the efficacy of frontline therapy in ovarian cancer models. The filing of an IND for a Phase 1 prexigebersen trial in solid tumors, such as ovarian and endometrial cancer, is expected in 2019.

(3) **Develop BP1002 for lymphoma and CLL**. We have completed initial IND enabling studies and filed these in a briefing package with the FDA. The FDA requested additional studies be prepared for submission of an IND to start a Phase 1 trial in refractory/relapsed lymphoma that will include multiple types of lymphoma, such as diffuse large B-cell lymphoma (“DLBCL”), follicular lymphoma (“FL”), mantle cell lymphoma (“MCL”), CLL, small lymphocytic lymphoma (“SLL”), peripheral T-cell lymphoma (“PTCL”), cutaneous T-cell lymphoma (“CTCL”), marginal zone lymphoma, Hodgkin lymphoma, and Waldenströms macroglobulinemia. It is expected that this will

be a multi-site, open-label, dose-escalating trial involving between 15-30 patients. The filing of the IND to open the Phase 1 trial is expected in 2019.

(4) **Develop BP1003 for pancreatic cancer and solid tumors**. Our third drug candidate, BP1003, targets the Stat3 protein and is currently in preclinical development for solid tumors, including pancreatic cancer. Previous preclinical models have shown BP1003 to successfully penetrate pancreatic tumors and to significantly enhance the efficacy of standard frontline treatments. Bio-Path intends to initiate IND enabling studies of BP1003 in 2019.

(5) **Expand DNAbilize® to evaluate targets beyond cancer.** We plan to apply the DNAbilize® delivery technology template to new protein targets that meet scientific, preclinical and commercial criteria and file new patents on these targets. We expect that these efforts will include collaboration with scientific key opinion leaders in the field of study and include developing drug candidates for diseases other than cancer. On July 19, 2017, we announced that the USPTO issued a notice of allowance for claims related to DNAbilize®, including its use in the treatment of cancers, autoimmune diseases and infectious diseases.

(6) **Establish DNAbilize® as the antisense drug delivery method of choice by forming partnerships with pharmaceutical and academic clinical research labs.** We plan to utilize our business and scientific expertise to identify potential partners and initiate a wide-ranging, proactive licensing program that will include co-development of specific liposomal antisense drug candidates, licensing the delivery template for outside development of one or more liposomal antisense drug candidates or an out-license of a partially developed drug for final development and marketing.

Overview of Drug Candidates and Delivery Technology

The historical perspective of cancer treatments has been the use of drugs that affect the entire body. Advances in the past decade have shifted to treating the tumor tissue itself. One of the main strategies in these developments has been targeted therapy, involving drugs that are targeted to block the expression of specific disease-causing proteins while having little or no effect on other healthy tissue. We believe that nucleic acid drug products, specifically antisense, are a promising field of targeted therapy. Development of antisense, however, has been limited by the lack of a suitable method to deliver antisense drugs to the diseased cells with high uptake into the cell without causing toxicity. Our currently licensed DNAbilize® neutral-lipid based liposome technology is designed to overcome these limitations. Studies conducted at MD Anderson have shown a 10-fold to 30-fold increase in tumor cell uptake with this technology compared to other delivery methods. In addition, to date, no adverse effects attributed to the study drug have been observed in our clinical trials for leukemia.

Antisense DNA therapeutics of the past have not adequately addressed the issues of toxicity and poor distribution and uptake. Without a lipid carrier, the majority of antisense DNA delivered intravenously is deposited in the liver and does not reach therapeutic levels in other organs in the body. Hence, antisense therapeutics have predominantly focused on diseases of the liver for which delivery of drugs is easy. Below is a table of antisense therapeutics we are aware of that are currently in clinical trials.

Table 1. Antisense or Anti-MiR drugs FDA Approved or in Clinical Trials*

Nucleic Acid Modification	Drug	Targeted Gene	Clinical Status	Indications
Backbone Modifications				
Phosphorothioate	Vitravene	Cytomegalovirus	Approved	CMV retinitis
P-ethoxy	Prexigebersen	Grb2	Phase 2	Leukemia
Sugar Modifications				
Morpholino	Eteplirsen	Dystrophin exon 51	Approved	Duchenne Myotonic dystrophy
Morpholino	AVI-7100	Influenza virus	Phase 1	Influenza
2’- methoxy-O-ethyl	Mipomersen	Apolipoprotein B	Approved	Familial hypercholesterolemia

Nusinersen	SMN1	Approved	Spinal muscular atrophy

Lipid System	**Natural Components**	**Potential toxicity**
SNALP	Cholesterol, Phosphatidylcholine	Cationic lipid, PEG
Lipidoid	Cholesterol	PEG
LPH	Cholesterol, hyaluronic acid	DOTAP, PEG
Neutral lipid particle	DOPC lipid	None

**This table represents examples of antisense drugs and lipid delivery systems. It is not meant to be exhaustive.*

Lipid delivery approaches using cationic lipids, which enhance the uptake of charged antisense DNA molecules into cells as compared to no lipid, still do not efficiently transfer antisense DNA into cells due to serum protein interactions and subsequent cell toxicity. The antisense field has attempted to work around these issues by either avoiding a delivery method completely, or by utilizing polyethylene glycol (PEG) as a carrier of DNA into cells. PEG showed promise in extending the time of circulation of antisense DNA *in vivo* and avoiding clearance by the liver. However, adverse effects have been demonstrated by PEG carriers, including hypersensitivity, activation of blood clotting, embolism and anaphylaxis. To date, the only known lipid delivery method that has not shown any adverse effects in clinical trials is the neutral lipid method utilized by DNAbilize®.

PREXIGEBERSEN

Prexigebersen is targeted at the protein Grb2. Antisense inhibition of Grb2 interrupts the signals between mutated and activated receptors that connect to a well-known cancer associated switch called Ras protein. Inhibition of Grb2 does not cause cell death and thus does not result in adverse events typically observed with receptor inhibitors or Ras pathway inhibitors. We believe that prexigebersen has the potential to be an ideal combination for any number of cancer therapeutics where the Ras pathway is aberrantly activated and patient fitness is a major concern.

We have completed our Phase 1 clinical trials for prexigebersen for indications of AML, CML, MDS and Acute Lymphoblastic Leukemia ("ALL"). We are currently prioritizing our efforts on AML, MDS and CML and have begun the Phase 2/Phase 2a clinical trials for these indications. In addition, preclinical efficacy studies are underway for triple combination prexigebersen, decitabine and Venclexta in AML. Priorities for additional indications, including solid tumors, are expected to be addressed in the future as the results of our clinical and preclinical work progress.

Indications for Acute Myeloid Leukemia (AML), Myelodysplastic Syndrome (MDS) and Chronic Myelogenous Leukemia (CML)

AML – Background and Common Treatments. AML is the rapid accumulation of immature myeloid cells in the blood, resulting in a drop of the other cell types such as red blood cells and platelets. The expansion of immature monocytes leaves the patient unable to fight infection. If AML is left untreated, it usually results in death within three months. AML incidence increases with age, with more than 50% of the cases in people age 60 or older. AML is the most common acute leukemia in adults, and the National Cancer Institute estimates that approximately 20,000 new cases occur each year (Figure 3). The cure rate is between 5 to 15% in older adults, and those who cannot receive the standard course of chemotherapy have an average survival rate of five to ten months. The frontline low-intensity therapies for elderly AML patients are LDAC, decitabine or azacytidine (the latter two drugs are DNA hypomethylating agents). In November of 2018, the FDA approved Venclexta (a Bcl-2 inhibitor) for the newly diagnosed AML patients aged 75 years and older or adults who cannot be treated with intensive induction chemotherapy. Venclexta is used in combination with LDAC, decitabine or azacytidine. Mutation in the Bcl-2 binding domain, which reduces Venclexta's ability to bind to Bcl-2, has been linked with Venclexta resistance in CLL patients. Such Venclexta resistance may also occur in AML patients. AML remains an area of high unmet need for both the relapsed and the de novo elderly population who are typically ineligible for induction therapy.

Figure 3. Basic Statistics for AML

MDS – Background and Common Treatments. MDS is a bone marrow disease, characterized by a reduced number of mature blood cells. MDS is diagnosed in about 15,000 people in the United States ("U.S.") yearly. MDS patients are stratified into different risk groups. Higher risk MDS patients have a survival of less than two years and, if untreated, can evolve into secondary AML. Secondary AML patients are often older and treated with DNA hypomethylating agents. Higher risk MDS and secondary AML patients who have progressed from DNA hypomethylating agents have very poor prognosis. Novel treatment strategies for these patients are needed.

CML – Background and Common Treatments. CML is characterized by expansion in the blood and bone marrow of mature myeloid cells and their precursors. It can show no symptoms and is often detected during a routine blood test. If left untreated, after several years it will progress to an accelerated phase and eventually blast crisis where it becomes an acute leukemia. With the introduction of drugs such as Gleevec, the life expectancy of patients treated in the chronic phase has been significantly improved, and only 1 to 1.5% of patients ever go into blast crisis. However, for those patients who do progress into blast crisis, there are currently few treatment options. Myeloid cells in blast crisis have accumulated genetic abnormalities that resist traditional treatment methods that kill leukemic cells. Patients in blast crisis have an average survival rate of seven to eleven months. New treatments for this critical population are necessary.

Figure 4. Basic Statistics for CML

Prexigebersen Development and Treatment for AML, MDS and CML. Our lead liposome delivered antisense drug candidate, prexigebersen, has been clinically tested in patients having AML, CML, MDS and ALL in a Phase 1 trial. During the Phase 1 trial, 80% of the evaluable patients had refractory/relapsed AML, having failed at least 6 prior therapies. In our study, 83% of patients showed decreased circulating blasts and anti-leukemic activity and eight patients stabilized for extended treatments.

Phase 1 Clinical Trials

The Phase 1 clinical trial was a dose-escalating study to determine the safety and tolerance of escalating doses of prexigebersen. The study determined an optimal biologically active dose for further development. The pharmacokinetics of prexigebersen in patients from the study was evaluated. In addition, patient blood samples from the trial were tested using a new assay developed by us to measure down-regulation of the target protein, the critical scientific data that demonstrated the delivery technology does in fact successfully deliver the antisense drug substance to the cell and across the cell membrane into the interior of the cell where expression of the target protein is blocked. The clinical trial was conducted at MD Anderson.

The original IND granted by the FDA in March 2010 allowed us to proceed with a Phase 1 clinical trial having five cohorts culminating in a maximum dose of 50 mg/m^2. However, in November 2012, we announced that since there had been no evidence of significant toxicity from treatment of patients with prexigebersen, we requested the FDA to allow higher dosing in patients. The principal investigator for the clinical trial, in consultation with our management team, advised us that with the absence of any real toxicity barriers, we should continue to evaluate higher doses of prexigebersen. The absence of significant toxicity provided a significant opportunity for us to test higher doses in

patients in order to find a dose that provides maximum potential benefit and duration of anti-leukemia effect. These actions were approved and a revised protocol was submitted allowing higher dosing. We announced in October 2014 that we completed Cohort 6, successfully treating three patients at a dose 90 mg/m^2. There has been no evidence of significant toxicity from treatment of patients with prexigebersen in our Phase 1 clinical trial.

An important outcome for the Phase 1 clinical trial is the ability to assess for the first time the performance of our delivery technology platform in human patients. We have developed two new assays to be able to provide scientific proof of concept of the delivery technology. The first involves a novel detection method for the drug substance in blood samples that will be used to assess the pharmacokinetics of the drug. The second involves a method to measure down-regulation of the target protein in a patient blood sample that was achieved. The latter measurement will provide critical proof that DNAbilize® neutral liposome delivery technology delivered the drug substance to the cell and was able to transport it across the cell membrane into the interior to block cellular production of the Grb2 protein.

In this regard, in August 2013 we announced that our DNAbilize® liposomal delivery technology achieved a major milestone in the development of antisense therapeutics based on a scientific assay confirming that treating patients with our drug candidate prexigebersen inhibits the Grb2 disease-causing target protein in patients with blood cancers (Figure 7). Inhibition of the disease-causing protein has the effect of down regulating the disease. This will allow for prexigebersen to be used potentially in combination with current frontline treatments. This discovery also points to the potential use of a liposomal antisense treatment as a standalone treatment to transform and manage a disease that has a disease-causing protein as a chronic disorder. This accomplishment is a potentially significant breakthrough for antisense therapeutics, whose development, to date, as a class of therapeutics has been severely limited by a lack of a systemic delivery mechanism that can safely distribute the drug throughout the body and deliver the antisense drug substance across the cell membrane into the interior of the cell. Further, we expect that scientific proof of principle for DNAbilize® may lead to licensing and business development opportunities, supporting our business model.

The principal investigator for the Phase 1 clinical trial is a leading expert in the treatment of CML, AML, MDS and ALL. Because the results of the first trial produced unexpected and clinically interesting results in some patients, the principal investigator prepared an abstract of the results of the first cohort that was accepted for presentation at the ASH annual meeting in December 2011. Results that demonstrated potential anti-leukemia benefits in treated patients were included in the presentation. Subsequently, in fall 2013 the principal investigator prepared an abstract of updated information on the results of the clinical trial through Cohort 5, which was accepted for presentation at the ASH annual meeting in December 2013. Highlights (which have been updated to include patients from Cohort 6) of the presentation prepared by the principal investigator for the meeting included:

Data from the Phase 1 Clinical Trial

- Among 20 evaluable patients, 15 demonstrated anti-leukemia activity with reduction in peripheral or bone marrow blasts from baseline.
- Five patients demonstrated transient improvement and/or stable disease, three of whom received a total of five cycles each.
- Two patients, in addition to achieving market blast percentage declines, also experienced transient improvements in leukemia cutis lesions.

Disease Stabilization in MDS and AML

- Two patients with MDS, a 53-year-old male and a 72-year-old female, both achieved disease stabilization and continued therapy for five cycles before disease progression.
- A 54-year-old HIV positive male with AML achieved stable disease and marked reduction in peripheral blasts, continuing therapy for five cycles before disease progression (Figure 5).

Figure 5. AML Patient with HIV Demonstrated Reduction of Peripheral Blasts and Sustained Improvement Over 5 Cycles of Treatment

End of C = end of the cycle of treatment

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Experience in CML-Blast Phase

- Patient with myeloid blast crisis of CML.
- Prior therapies consisted of: imatinib, dasatinib, nilotinib, DCC-2036, cytarabine + fludarabine + dasatinib + gemtuzumab, PHA-739358, clofarabine + dasatinib.
- Upon start of prexigebersen, patient showed a significant reduction in white blood cell (WBC) blasts from 81% to 5%, but due to leptomeningeal disease progression discontinued therapy before full cycle (Figure 6).

Figure 6. Prexigebersen Monotherapy Reversed Blast Phase Crisis in a Patient in the Phase 1 Clinical Trial for Prexigebersen

Inhibition of Target Grb2 Protein

- Grb2 levels were compared to baseline prior to treatment.
- By end of treatment, prexigebersen decreased Grb2 in 10 out of 12 samples (83%) tested (average reduction 50%).
- Phosphorylated ERK (pERK, extracellular signal related kinase), a protein downstream of the Ras protein, was decreased in 58% of samples.

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Figure 7. Grb2 Protein and Downstream pERK are

Downregulated in Prexigebersen Treated Patient's Cells

Grb2 levels decreased in 10 out of 12 patient samples by end of treatment (EOT)

pErk levels decreased in 7 of 12 patient samples by EOT

Subject	**Prexigebersen (mg/m^2)**	Cohort	Grb2 Decrease (EOT)	pERK Decrease (EOT)
22	20	3	57 %	0 %
23	20	3	28 %	45 %
24	20	3	47 %	35 %
25	40	4	54 %	91 %
26	40	4	0 %	0 %
27	40	4	34 %	27 %
28	60	5	30 %	54 %
29	60	5	65 %	0 %
30	60	5	43 %	47 %
31	90	6	0 %	0 %
32	90	6	91 %	63 %
34	90	6	40 %	0 %

The Phase 1 clinical trial is typically ended when a maximum tolerated dose ("MTD") is encountered. However, due to the lack of toxicity of the drug, a MTD was not observed. As a result, an optimal biological dose was determined and we completed Cohort 6 of our Phase 1 clinical trial. It is noted, however, that the lack of toxicity is a major advantage for the drug candidate prexigebersen since it allows higher levels of drug to be administered to the patient, increasing the potential therapeutic benefit.

In April 2015, we received orphan drug designation by the FDA for prexigebersen in AML. Orphan drug status provides Bio-Path with seven years of exclusivity after receiving formal marketing approval, as well as additional development incentives. The FDA grants this designation to certain drugs that target diseases affecting fewer than 200,000 people in the U.S. In October 2016, prexigebersen received orphan drug designation for AML in the European Union ("E.U.") from the European Medicines Agency ("EMA"). To receive orphan drug designation from the EMA, a therapy must be intended for the treatment of a life-threatening or chronically debilitating rare condition with a prevalence of less than five in 10,000 in the E.U. Orphan drug designation provides incentives designed to facilitate development, including fee reductions for protocol assistance, scientific advice and importantly, may provide up to ten years of market exclusivity in the E.U. following product approval.

Phase 2 Clinical Trials

On February 9, 2015, we announced that we began enrollment into the combination therapy Phase 1b clinical trial for prexigebersen in patients with AML. The combination therapy Phase 1b clinical trial consisted of two dosing cohorts of prexigebersen (60 mg/m^2 and 90 mg/m^2) to test the safety profile of treating AML patients with prexigebersen in combination with LDAC. Patients ineligible for intensive induction therapy are currently treated only with LDAC.

On October 9, 2015, we announced the completion of Cohort 7, the first dosing cohort of the Phase 1b clinical trial, consisting of a 60 mg/m^2 dose of prexigebersen in combination with LDAC. On March 3, 2016, we announced the completion of Cohort 8, the second dosing cohort of the Phase 1b clinical trial, consisting of a 90 mg/m^2 dose of prexigebersen in combination with LDAC. On June 6, 2016, we announced that data from Cohort 7 and Cohort 8 of the Phase 1b clinical trial combination therapy of prexigebersen and LDAC showed no dose limiting toxicities. Of the six evaluable patients from the Phase 1b clinical trial, four patients completed more than two cycles of treatment, three patients achieved CR and two patients had over 50% decrease in bone marrow blast counts (Figure 8). Pharmacokinetics of prexigebersen demonstrated a half-life at 60 mg/m^2 of 30 hours, significantly better than the 90 mg/m^2 dose. The final analysis of these data, along with the demonstrated reductions in bone marrow blasts, suggested that 60 mg/m^2 is the appropriate dose for use in the Phase 2 trial. Administratively, this required Bio-Path to substantially revise documents for the Phase 2 trial with the 60 mg/m^2 dose and resubmit for approvals with the FDA and site Institutional Review Boards, which delayed the commencement of the Phase 2 trial.

Figure 8. Five out of six patients in cohorts 7 and 8 receiving the combination prexigebersen + LDAC have greater than 50% decrease in bone marrow blasts

A summary of the clinical trial results for the Phase 1 monotherapy for indications of AML, CML, MDS and ALL, and Phase 1b combination therapy for prexigebersen for indications of AML is shown in Table 2 below. The first six cohorts, patients 001 to 034, were treated in the Phase 1 clinical trial using prexigebersen as a monotherapy. The seventh cohort, patients 035, 037 and 038, were treated in our Phase 1b clinical trial evaluating the combination therapy of 60 mg/m^2 prexigebersen. The eighth cohort, patients 039, 040 and 041, were treated with combination therapy of 90 mg/m^2.

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Table 2. Summary Cohorts 1-8 Prexigebersen Clinical Trial Phase 1 and 1B

Patients	Diagnosis	Peripheral or bone marrow blast %			Reason Discontinued	Cycles Completed
		Baseline	Nadir	Off-Tx		
1	CML	51	No	97	DLT	<1
6	AML	15	2	5	PD	5
7	MDS	8	4	6	PD	5
10	AML	23	10	10	PD	1
11	CML	7	No	50	PD	1
14	AML	48	5	21	PD	1
15	AML	54	31	72	PD	1
20	AML	76	5	63	PD	1
21	AML	71	43	74	PD	2
22	AML	1	0	1	PD	2
23	MDS	NE	NE	NE	PD	1
24	MDS	0	0	0	PD	5
25	AML	10	3	19	PD	2
26	AML	11	No	80	PD	1
27	AML	93	No	97	PD	1
28	AML	96	93	98	PD	1
29	AML	35	7	24	PD	1
30	AML	51	17	82	PD	1
31	AML	17	No	17	PD	1
32	AML	24	22	22	PD	2
34	AML	66	ND	ND	PD	1
35	AML	17	2	2	CRi	1
37	AML	25	33	ND	PD	1
38	AML	23	2	3	CR	5
39	AML	36	16	58	SD	3
40	AML	31	2	2	CR	3
41	AML	18	9	14	SD	3

Nadir: the lowest point, Off-TX: off treatment, No: no reduction in blasts, DLT: dose limiting toxicity, PD: progressive disease, NE: not enough sample to evaluate, ND: not done, CR: complete remission with incomplete hematologic recovery, CR: complete remission, SD: stable disease

With the completion of Cohort 8, the Phase 1b trial has been completed. Results from the Phase 1b clinical trial demonstrated it is safe to add prexigebersen, which appears to yield better response rates in this AML patient population. On November 2, 2016, we announced that the first patient in the efficacy portion of the Phase 2 trial was

dosed. The full trial design includes approximately 54 evaluable patients with an interim analysis to be performed after 19 patients are treated with the combination. The multi-site trial is being conducted at leading cancer centers, among them are Weill Medical College of Cornell University, Baylor Scott & White Health, The University of Kansas, New Jersey Hematology Oncology Associates, West Virginia University/Mary Babb Randolph Cancer Center, and MD Anderson. On August 27, 2018, we announced that we added a cohort of patients to be treated with a combination of prexigebersen and decitabine, another AML frontline therapy

To date, 33 patients have been pre-screened for the efficacy portion of the Phase 2 trial, 30 patients have been enrolled and 17 patients have been deemed evaluable. We released the initial interim data analysis of 17 patients in April 2018 and updated data in March 2019. On March 6, 2019, we announced that the updated data showed that 11 (65%) of the 17 evaluable patients had a response, including five (29%) who achieved CR, including one CR_i and one morphologic leukemia free state, and six (35%) stable disease responses, including two patients who had greater than a 50% reduction in bone marrow blasts. The efficacy data from the 17 evaluable patients was very favorable compared to the reported CR, CRp and CRi rates of 7 to 13% with LDAC treatment alone. Importantly, through investigation by the principal investigators, it was observed that 68% of patients were secondary AML patients, a difficult class to treat.

Results to date have shown prexigebersen, with its efficacy and excellent safety profile, to be an effective combination candidate with frontline therapy. We believe the recent approval of the frontline therapy Venclexta provides an opportunity for combining prexigebersen with the Venclexta and decitabine combination for the treatment of *de novo* AML patients. On March 6, 2019, we announced a revised clinical program intended for prexigebersen in AML, which is generally summarized below:

- Expand the existing prexigebersen and decitabine combination Phase 2 AML cohort to include untreated high risk MDS patients.
- Add a new cohort of prexigebersen and decitabine combination in refractory/relapsed patients (AML and high risk MDS).
- Close the prexigebersen and LDAC combination Phase 2 AML cohort.
- Determine the safety of the triple combination prexigebersen, decitabine and Venclexta in refractory/relapsed AML and high risk MDS patients.
- If we observe a successful safety assessment, we intend to initiate two AML registration-directed cohorts of the triple combination prexigebersen, decitabine and Venclexta in separate patient populations, including untreated patients (AML plus high risk MDS), and refractory/relapsed patients (AML plus high risk MDS).

In addition to the Phase 2 trial for AML, on December 29, 2017, we announced the initiation of our Phase 1b/2a clinical trial, which is the safety portion of the Phase 2 clinical trial, of prexigebersen for the treatment of CML in accelerated and blast phase patients. The trial is being conducted at MD Anderson as a potential salvage therapy for accelerated and blast phase CML patients. Two cohorts of three evaluable patients each will be enrolled to evaluate two doses (60 mg/m^2 and 90 mg/m^2) of prexigebersen in combination with the front-line treatment dasatinib.

Development of new therapeutics for AML, high risk MDS and CML in blast crisis can meet currently unmet needs for patients who have very few treatment options due to age, fitness or treatment-resistance of advanced genetically unstable cells. Elderly patients unfit to receive a stem cell transplant or induction therapy face a likelihood of relapse to a more resistant leukemia. Prexigebersen and DNAbilize® technology offer new hope for achieving remission for fragile populations. We believe that the combination of prexigebersen with frontline chemotherapy can provide a way to treat cancer without added toxicity so that the patient can remain under treatment long enough to reach complete remission.

Indications for Solid Tumors (e.g., Ovary, Breast, Colon, Thyroid, and Head and Neck Cancers)

Cancers of ovary, breast, colon, thyroid, and head and neck are solid tumors which utilize the same Grb2 signaling pathways as leukemias. It has been proposed that prexigebersen may have clinical efficacy in these indications due to the overlapping similarity of the cancer mechanisms.

Ovarian cancer is one of the most common type of gynecologic malignancies, with 50% of all cases occurring in women older than 65 years. It is the fifth most frequent cause of cancer death in women. In the U.S., 22,240 new cases and 14,070 deaths from ovarian cancer are expected in 2019. Around 70% of patients diagnosed with ovarian cancer will have a recurrence. Recurrent ovarian cancer is treatable but rarely curable. The average duration of survival after recurrence of ovarian cancer is less than 2 years. The 5-year survival rate for patients with recurrent ovarian cancer following standard salvage chemotherapy treatment is less than 10%. Given the poor outcomes of treatment for ovarian cancer, novel drug treatments are urgently needed.

Prexigebersen Development and Treatment for ovarian cancer. There have been reports demonstrating that Grb2 is overexpressed in ovarian tumors, and that Grb2 is essential to transducing various oncogenic signals in ovarian tumors. Thus, Grb2 may be a novel potential therapeutic target for ovarian cancer, and prexigebersen may provide clinical benefit against ovarian cancer. Preclinical experiments were conducted in collaboration with leaders in the field of ovarian cancer at MD Anderson. An abstract of the preclinical study was presented in the 2018 American Association for Cancer Research (AACR) Annual Meeting. Prexigebersen effectively penetrated ovarian tumors and decreased target Grb2 protein level in preclinical ovarian tumor models. Prexigebersen was demonstrated to reduce ovarian tumor burden both as a monotherapy and in combination with paclitaxel, a standard of care therapy for patients with advanced ovarian cancer. Bio-Path plans to file an IND for a Phase 1 clinical trial of prexigebersen and paclitaxel in patients diagnosed with recurrent ovarian or endometrial cancer in 2019. We believe that the observations that we learned from the prexigebersen clinical studies in leukemia will help us increase the speed of progress for prexigebersen in solid tumor clinical studies.

Indications for Triple Negative Breast Cancer (TNBC) and Inflammatory Breast Cancer (IBC)

TNBC and IBC – Background and Common Treatments. Approximately 15 to 20% of breast cancers fall into the category of triple-negative. TNBC tumors do not express estrogen receptors, progesterone receptors, and low human epidermal growth factor receptor 2 (HER2). These negative indicators mean that the growth of the cancer is not supported by the hormones estrogen and progesterone, or by the presence of HER2 receptors. Therefore, TNBC does not respond to hormonal therapy or therapies that target HER2 receptors. In addition, TNBC tumors are very aggressive. IBC often presents as TNBC and is a rare and very aggressive disease in which cancer cells block lymph vessels in the skin of the breast. This type of breast cancer is called “inflammatory” because the breast often looks swollen and red, or “inflamed.” IBC accounts for 2 to 5% of all breast cancers. IBC tumors are very aggressive and are frequently hormone receptor negative, which means hormone therapies may not be effective. The five-year survival rate for IBC is approximately 40% versus approximately 87% for all breast cancers combined, making IBC a priority area for development of new treatments. The current treatment regimen includes radiation, chemotherapy and surgery. A lack of targeted treatments for these types of breast cancer has led to development of new therapeutics currently in clinical trials. Because of the aggressiveness of these cancers, a systemic treatment is needed. Prexigebersen represents a systemic treatment that targets an important pathway for TNBC and IBC cell growth and has potential to be integral for the treatment of these diseases.

Prexigebersen Development and Treatment for TNBC and IBC. In July 2013, we announced that we were initiating preclinical testing of prexigebersen for TNBC and IBC. Our plan is to develop prexigebersen as a targeted therapy against TNBC and IBC. Our treatment goals are two-pronged: the first is to develop prexigebersen as a tumor reduction agent in combination with other approved drugs in preoperative settings for TNBC and IBC patients, and the second is to develop prexigebersen as a drug to treat and control or eliminate cancer metastasis in TNBC and IBC patients. Both of these treatment goals address high need situations for patients.

BP1002

BP1002, also known by its scientific name as Liposomal Bcl-2, is our second liposome delivered antisense drug candidate. BP1002 is intended to target the lymphoma, CLL and certain solid tumor markets. Clinical targets for BP1002 include lymphoma, breast cancer, colon cancer, prostate cancer and leukemia. We believe that BP1002 has the potential to treat 40 to 60% of solid tumors.

Bcl-2 is a protein that is involved in regulating apoptosis, or programmed cell death. Apoptosis is a physiologic mechanism of cell turnover by which cells actively commit suicide in response to aberrant external signals. Over-expression of Bcl-2 prevents the induction of apoptosis in response to cellular insults such as treatment with chemotherapeutic agents. Bcl-2 is over-expressed in more than 90% of FL due to a chromosomal rearrangement and is the key factor in the initiation of this malignancy. Bcl-2 is also overexpressed in a wide variety of solid tumors. For

example, Bcl-2 over-expression has been associated with the progression of prostate cancer from hormone dependence to hormone independence and may contribute to the relative drug resistant phenotype typically observed in hormone independent prostate cancer.

Non-Hodgkin's Lymphomas –Background and Common Treatments. In the U.S., approximately 74,200 new cases and 19,970 deaths from non-Hodgkin's lymphoma ("NHL") are expected in 2019. Approximately 40% of NHLs are indolent lymphomas such as FL and approximately 60% are the more aggressive lymphomas such as DLBCL. A consensus on front-line treatment for FL has not been established as many factors are taken into account in the treatment approach (e.g., age, stage of disease, cell surface markers). Rituximab is a treatment of choice for the majority of lymphomas and is typically used in combination with other chemotherapy agents or as a maintenance treatment.

BP1002 – Development and Treatment for FL, and other sub-types of lymphoma. On December 22, 2014, we announced that we initiated development of BP1002 as a treatment for FL and DLBCL. We are currently preparing an IND application for BP1002 in addition to completing additional IND enabling studies. We intend to initiate a Phase 1 clinical trial of BP1002 in refractory/relapsed lymphoma patients once we receive approval from the FDA. The clinical trial will evaluate the safety of BP1002 in several dose escalating cohorts to determine a maximum tolerated dose and/or a recommended Phase 2 dose. We anticipate that the Phase 1 trial will be open to refractory/relapsed patients with FL and other sub-types of NHL (including DLBCL, MCL, CLL, SLL, PTCL, CTCL, marginal zone lymphoma), Hodgkin lymphoma, and Waldenströms macroglobulinemia (Figure 9).

Figure 9. Non-Hodgkin's Lymphoma Types and Prevalence

BL = Burkitt's lymphoma; CLL = chronic lymphocytic leukemia; DLBCL = diffuse large B-cell lymphoma; FL = follicular lymphoma; MALT = mucosa-associated lymphoid tissue; MCL = mantle cell lymphoma; NK = natural killer; SLL = small lymphocytic lymphoma.

Source: http://www.medscape.org/viewarticle/725127

Treatments of varying efficacy exist for FL and DLBCL; however, due to the wide variety of subtypes of this disease, a frontline approach is lacking. Bcl-2 is over-expressed in 85% of FL patients due to a translocation between chromosomes 18 and 14, a hallmark of the disease. Therapies that directly and specifically block or inhibit protein synthesis of Bcl-2 could be transformative in this indication. Previous attempts at a Bcl-2 antisense by Genta Inc. and ProNAi failed to show an improvement in remission or overall survival rates. The Genta antisense was a phosphorothioate DNA with dose-limiting toxicity and it also did not have a lipid delivery mechanism to aid in prevention of clearance by the liver, reducing the levels of antisense reaching diseased cells. The ProNAi antisense was administered with an anionic, pH-tunable liposome. The drug was tolerable but its low response rate in DLBCL patients in a Phase 2 study prompted the company to discontinue further clinical development. We believe that BP1002 overcomes the failures of previous antisense attempts at inhibiting Bcl-2. With BP1002, more drug substance can reach the lymphoma cells so that the cancer cells can be treated with a safe and therapeutically relevant dose. The small molecule Bcl-2 inhibitor Venclexta was approved by the FDA in June 2018 for the treatment of patients with CLL and SLL who have received at least one prior therapy. However, treatment with Venclexta can lead to the development of drug resistance, resulting in disease recurrence. One of the proposed mechanisms of Venclexta resistance is an acquired mutation in Bcl-2, which reduces Venclexta's ability to bind and inhibit Bcl-2. Because BP1002 activity is based on blocking the Bcl-2 messenger RNA and BP1002 targets Bcl-2 at a site different from Venclexta, we expect BP1002 to overcome such Venclexta resistance mechanism and be an effective approach for patients who have relapsed from Venclexta. We believe BP1002 provides a new tool for cancer treatment for not just lymphomas, but also many cancers for which Bcl-2 expression is driving cell survival. The introduction of a new, non-toxic, and specific Bcl-2 inhibitor could be a major advance in cancer therapeutics.

BP1003

BP1003 is our third liposome delivered antisense drug candidate. BP1003 is a DNAbilize® RNAi nanoparticle containing antisense DNA targeting Stat3, whose constitutive activity is associated with a poorer survival outcome for cancer patients, including those of pancreatic adenocarcinoma (PDAC). We hypothesized that the natural lipid delivery vesicle would have unique characteristics that would allow for penetration of the fibrotic stroma to reach the PDAC cells. Our preclinical work demonstrated that BP1003 was successful in crossing the scar tissue matrix and delivering antisense drug into the tumor tissue. Subsequent studies evaluating the combination of BP1003 with gemcitabine, a frontline therapy for advanced PDAC patients, suggest that the regimen has synergistic anti-tumor effects. We intend to initiate IND enabling studies of BP1003 in 2019.

Stat3 expression has been associated with increased severity of disease and poor survival in numerous cancers including approximately 82 to 100% of pancreatic tumors, 80% of non-small cell lung cancers (NSCLC), 82% of prostate tumors, 77% of cervical cancers, 50% of breast cancers, 57% of colon cancers and 97% of Stage 3 and 4 ovarian cancers. We believe that a therapeutic that shuts down the Stat3 protein can have significant clinical impact for all solid tumors that express Stat3.

Our lead indication for BP1003 is pancreatic cancer due to the severity of this disease and the lack of effective, life-extending treatments. PDAC is a cancer of the exocrine cells of the pancreas. In the U.S. in 2019, approximately 57,000 people will be diagnosed with PDAC, and approximately 46,000 (80%) will die from the disease. Less than 9% of PDAC patients would survive beyond 5 years. It is projected that in the next 10 to 15 years, PDAC will become the second most lethal cancer behind lung cancer. This is due to rapid advancements that have been made in the treatment of other cancers, as well as the rise of type 2 diabetes, a risk factor for development of PDAC.

Because most people have advanced PDAC at the time of diagnosis, survival rates are very low. Typical survival for a metastatic or advanced patient is only 6 to 9 months from diagnosis. Treatment of this disease is hampered by the location of the pancreas, which is difficult to reach with conventional therapies and the fibrotic nature of the tumors, which protects them from penetration by chemotherapeutics. We believe a novel and unconventional therapeutic is needed to overcome these barriers to treatment.

While competition for therapeutics that target the Stat3 pathway exist, the competition for specific Stat3 inhibitors is very small. Most compounds under development target the pathway upstream of Stat3 or inhibit Stat1 and Stat5 in addition to Stat3 and thus induce serious toxic side effects. For example, Ionis Pharmaceuticals, Inc. has developed an antisense DNA-based Stat3 inhibitor called IONIS-STAT3-2.5Rx. It is being evaluated in clinical trials by AstraZeneca under the name AZD9150 for solid tumors, squamous carcinoma of the head and neck and DLBCL. However, due to the toxicity of the DNA chemistry, thrombocytopenia continues to limit the systemic delivery and efficacy of such compounds for the treatment of cancer. We believe BP1003 avoids these complications.

The competitive landscape for clinical trials treating advanced and metastatic pancreatic cancer patients in the U.S. is slim (Figure 10). Most candidates are fraught with serious side effects that can make completion of therapy a challenge for this fragile patient population. We believe that the excellent safety profile of the DNAbilize® chemistry, the novel lipid formula that allows for penetration of the tumor stroma, and the ability to target a single protein with precision, makes BP1003 an ideal candidate for combination with the frontline treatments to extend survival while maintaining quality of life for the patient.

Figure 10. U.S. Clinical Trials for Advance Metastatic PDAC Patients in Combination with Frontline Treatments

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DNAbilize®

DNAbilize® technology is available for out-licensing. We intend to apply our drug delivery technology template to new disease-causing protein targets as a means to develop new liposomal antisense drug candidates. A new product identification template was recently approved that defines a process of scientific, preclinical, commercial and intellectual property evaluation of potential new drug candidates for inclusion into our drug product development pipeline. A significant amount of capital is expected to be allocated to in-license promising protein targets that can be developed as new liposomal antisense drug candidates. As we expand, we will look at indications where a systemic delivery is needed and antisense can be used to slow, reverse or cure a disease, either alone or in combination with another drug. On July 19, 2017, we announced that the USPTO issued a notice of allowance for claims related to DNAbilize®, including its use in the treatment of cancers, autoimmune diseases and infectious diseases.

We are interested in pursuing a wide-ranging, proactive licensing program to include co-development of specific liposomal antisense drug candidates, sub-licensing our delivery template for outside development of liposomal antisense drug candidates or out-licensing a partially-developed drug candidate for final development and marketing.

Research and Development

Our research and development expense primarily consists of third-party clinical and preclinical development activities, salaries and benefits expense and stock-based compensation. As we advance and expand our pipeline of drug candidates, we anticipate our research and development expenses will continue to increase in conjunction with these activities. Research and development expenses incurred for the years ended December 31, 2018 and 2017, were $4.6 million and $5.5 million, respectively.

Manufacturing

We do not own or operate, and currently have no plans to establish, any manufacturing facilities. Accordingly, we have no ability to internally manufacture the drug candidates that we need to conduct our clinical trials. For the foreseeable future, we expect to continue to rely on third-party manufacturers and other third parties to produce, package and store sufficient quantities of our drug candidates and any future drug candidates for use in our clinical trials. We have entered into agreements with third-party manufacturers for the manufacture of our drug requirements, including agreements for the manufacture of prexigebersen for use in our Phase 2 clinical trials in AML and CML, a development agreement for BP1002 and an agreement for the manufacture of BP1002 for use in our planned Phase 1 clinical trial. However, we may face various risks and uncertainties in connection with our reliance on third-party manufacturers, as discussed in “Item 1A. Risk Factors” of this Annual Report on Form 10-K under the heading “Risks

Related to Manufacturing Our Drug Candidates." If the FDA or other regulatory agencies approve any of our drug candidates for commercial sale, we expect that we would continue to rely, at least initially, on third-party manufacturers to produce commercial quantities of such approved drug candidates. However, we may in the future elect to manufacture certain of our drug candidates in our own manufacturing facilities. If we do so, we will require substantial additional funds and need to recruit qualified personnel in order to build or lease and operate any manufacturing facilities.

Sales and Marketing

We currently do not have any commercial drug products or an organization for the sales and marketing of pharmaceutical products. In order to successfully commercialize any drug candidates that may be approved in the future by the FDA or comparable foreign regulatory authorities, we must build our sales and marketing capabilities or make arrangements with third parties to perform these services. For certain drug candidates in selected indications where we believe that an approved product could be commercialized by a specialty sales force that calls on a limited but focused group of physicians, we may commercialize these products ourselves. However, in therapeutic indications that require a large sales force selling to a large and diverse prescribing population, we may enter into arrangements with other companies for commercialization. If we are unable to establish adequate sales, marketing and distribution capabilities, whether independently or with third parties, we may not be able to generate product revenue and may not become profitable.

Intellectual Property

Patents, trademarks, trade secrets, technology, know-how and other proprietary rights are important to our business. Our success depends in large part on our ability to obtain and maintain patent protection both in the U.S. and in other countries for our drug candidates and on our ability to operate without infringing the proprietary rights of third parties. Our ability to protect our drug candidates from unauthorized or infringing use by third parties depends in substantial part on our ability to obtain and maintain valid and enforceable patents.

We rely on trade secrets to protect our technology, especially where we do not believe patent protection is appropriate or obtainable. However, trade secrets are difficult to protect. In order to protect our proprietary technology and processes, we also rely in part on confidentiality and intellectual property assignment agreements with our corporate partners, employees, consultants, outside scientific collaborators, sponsored researchers and other advisors. These agreements may not effectively prevent disclosure of confidential information nor result in the effective assignment to us of intellectual property, and may not provide an adequate remedy in the event of unauthorized disclosure of confidential information or other breaches of the agreements. In addition, others may independently discover our trade secrets and proprietary information, and in such case we could not assert any trade secret rights against such party. To the extent that we enter into out-license and in-license agreements in the future, our success will depend in part on the ability of our licensors to obtain, maintain and enforce patent protection for their intellectual property, in particular, any patents to which we secure exclusive rights.

We have expanded our intellectual property portfolio by filing patent applications that are applicable to our technology and business strategy. Our patent portfolio currently includes an issued patent (No. 9,744,187) in the U.S. that covers the manufacturing method, formulation and antisense composition for new targets in preclinical development, a patent pending for combinations of antisense drugs with frontline therapeutics, and four additional pending patents for composition and methods of use of specific drug targets. We announced on July 19, 2017 that the USPTO issued a notice of allowance for claims related to DNAbilize®, including its use in the treatment of cancers, autoimmune diseases and infectious diseases. There can be no assurances that patents related to our existing patent applications or applications we may file in the future will be issued or that any issued patents will provide meaningful protection for our drug candidates, which could materially and adversely affect our competitive business position, business prospects and financial condition.

In the U.S., individual patents extend for varying periods of time depending on the date of filing of the patent application or the date of patent issuance. Generally, patents issued in the U.S. are effective for 20 years from the earliest non-provisional filing date. In addition, a patent term can sometimes be extended to recapture a portion of the term effectively lost during the FDA’s regulatory review period; however, the restoration period cannot be longer than five years, and the total patent term cannot exceed 14 years following FDA approval.

Employees

We currently employ 8 full-time employees. We also have contractual relationships with additional professionals who perform certain medical officer, regulatory and drug development duties. We believe relations with such professionals and employees are good.

Competition

We are engaged in segments of the pharmaceutical and biotechnology industry that are highly competitive and characterized by rapid and significant technological change. Many large pharmaceutical and biotechnology companies, academic and research institutions, governmental agencies and other public and private research organizations are pursuing the development of novel drugs that target AML, MDS, CML, lymphoma, ovarian and breast cancer, solid tumors, and other cancers generally. We face, and expect to continue to face, intense and increasing competition as new products enter the market and advanced technologies become available. Our competitors may discover, develop or commercialize products or other novel technologies that are more effective, safer or less costly than our drug candidates. Our competitors may also obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for our drug candidates.

Many of our competitors have:

- significantly greater capital, technical and human resources than we have and may be better equipped to discover, develop, manufacture and commercialize drug candidates;

- more experience in drug discovery, development and commercialization, obtaining regulatory approvals and manufacturing and marketing pharmaceutical products;

- drug candidates that have been approved or are in late-stage clinical development; and/or

- collaboration arrangements in our target markets with leading companies and research institutions.

Mergers and acquisitions in the pharmaceutical and biotechnology industry may result in even more resources being concentrated among a smaller number of our competitors. Smaller or early stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel, establishing clinical trial sites and patent registration for clinical trials, and acquiring technologies complementary to, or necessary for, our drug candidates and programs.

Competitive products and technological developments may render our drug candidates noncompetitive or obsolete before we can recover the expenses of developing and commercializing our drug candidates. Furthermore, the development of new treatment methods and/or the widespread adoption or increased utilization of any vaccine for the diseases we are targeting could render our drug candidates noncompetitive, obsolete or uneconomical. If we successfully develop and obtain approval for any of our drug candidates, we will face competition based on the safety and effectiveness of our drug candidates, the timing of their entry into the market in relation to competitive products in development, the availability and cost of supply, marketing and sales capabilities, reimbursement coverage, price, patent position and other factors. If we successfully develop drug candidates but those drug candidates do not achieve and maintain market acceptance, our business will not be successful.

Government Regulation

Overview

Government authorities in the U.S., at the federal, state and local level, and other countries extensively regulate, among other things, the research, development, testing, manufacture, labeling, record keeping, packaging, promotion, storage, advertising, distribution, marketing and export and import of products such as those we are developing. The nature and extent to which such regulations will apply to us will vary depending on the nature of any drug candidates we develop. We anticipate that all of our drug candidates will require regulatory approval by governmental agencies prior to commercialization. This process and subsequent compliance with appropriate federal, state, local, and foreign statutes and regulations will require the expenditure of substantial time and financial resources.

U.S. Drug Development Process

In the U.S., drugs are subject to rigorous regulation by the FDA under the Federal Food, Drug and Cosmetic Act (the "FDCA"), and implementing regulations, as well as other federal and state statutes. Failure by us or our collaborators to comply with the applicable U.S. requirements at any time during the drug candidate development process, approval process or after approval, may subject us to administrative or judicial sanctions. These sanctions could include the FDA's refusal to approve pending applications, license suspension or revocation, withdrawal of an approval, a clinical hold, warning letters, product recalls, product seizures, total or partial suspension of production or distribution, injunctions, fines, civil penalties or criminal prosecution. Any agency or judicial enforcement action could have a material adverse effect on us.

The process required by the FDA before a new drug may be marketed in the U.S. generally involves the following:

- completion of preclinical laboratory tests, animal studies and formulation studies according to FDA's Good Laboratory Practice regulations;

- submission of an IND, which must become effective before human clinical trials may begin and which must include approval by an institutional review board at each clinical site before the trials are initiated;

- performance of adequate and well-controlled human clinical trials according to FDA's Good Clinical Practice ("GCP") regulations to establish the safety and efficacy of the proposed drug for its intended use;

- submission to, and acceptance by, the FDA of a new drug application (an "NDA");

- completion of an FDA inspection of the manufacturing facility or facilities at which the drug is produced to assess compliance with current Good Manufacturing Practice ("cGMP") regulations to assure that the facilities, methods and controls are adequate to preserve the drug's identity, strength, quality and purity; and

- FDA review and approval of the NDA.

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Pre-Approval Studies

Once a drug candidate is identified for development, it enters the preclinical testing stage. Preclinical tests include laboratory evaluations of drug candidate chemistry, toxicity and formulation, as well as animal studies. Prior to beginning human clinical trials, an IND sponsor must submit an IND to the FDA, which includes submitting the results of the preclinical tests, together with manufacturing information and analytical data. Some preclinical or nonclinical testing may continue even after the IND is submitted. The IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA, within the 30-day time period, raises concerns or questions about the conduct of the trial. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical trial can begin. Even after the 30-day time period, the FDA may impose a clinical hold on ongoing clinical trials. If the FDA imposes a clinical hold, clinical trials cannot commence or recommence without FDA authorization and then only under terms authorized by the FDA. The IND application process may be extremely costly and substantially delay the development of our drug candidates for certain indications. Moreover, positive results of preclinical tests will not necessarily indicate positive results in subsequent clinical trials in humans. The FDA may require additional animal testing after an initial IND application is approved and prior to Phase 3 trials.

Clinical trials involve the administration of the IND to volunteers or patients under the supervision of one or more qualified investigators in accordance with FDA's GCP regulations. Clinical trials must be conducted under protocols detailing the objectives of the trial and the safety and effectiveness criteria to be evaluated. Each protocol must be submitted to the FDA as part of the IND. Further, an institutional review board at each institution participating in the clinical trial must review and approve each protocol before any clinical trial commences at that institution. All research subjects must provide informed consent, and informed consent information must be submitted to the institutional review board for approval prior to initiation of the trial. Progress reports detailing the results of the clinical trials must be submitted at least annually to the FDA and more frequently if adverse events or other certain types of other changes occur.

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

- *Phase 1:* The drug candidate is initially introduced into human subjects or patients with the disease and tested for safety, dosage tolerance, absorption, metabolism, distribution and excretion. In the case of some drug candidates for severe or life-threatening diseases, the initial human testing is often conducted in patients.

- *Phase 2:* Involves studies in a limited patient population to identify possible adverse effects and safety risks, to preliminarily evaluate the efficacy of the drug candidate for specific targeted diseases and to determine dosage tolerance and optimal dosage.

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Phase 3: Clinical trials are undertaken to further evaluate dosage, clinical efficacy and safety in an expanded patient population, typically at geographically dispersed clinical study sites. These studies are intended to establish the overall risk-benefit ratio of the drug candidate and provide, if appropriate, an adequate basis for product labeling.

Phase 1, Phase 2 and Phase 3 testing may not be completed successfully within any specified period, if at all. The FDA or an institutional review board or the sponsor may suspend a clinical trial at any time on various grounds, including a finding that the research subjects or patients are being exposed to an unacceptable health risk.

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

Our business model relies on developing drug candidates through Phase 2a and either entering into out-license agreements with pharmaceutical licensee partners who will be responsible for post-Phase 2 clinical testing and working with the FDA on necessary regulatory submissions resulting in approval of new drug applications for commercialization, or internally developing a drug candidate through commercialization.

Approval Process

After successful completion of the required clinical trials, an NDA is generally submitted, which is required before marketing of the product may begin in the U.S. The NDA must include the results of drug development, preclinical studies and clinical studies, together with other detailed information, including information on the chemistry, manufacture and composition of the drug. The FDA has 60 days from its receipt of the NDA to review the application to ensure that it is sufficiently complete for substantive review before accepting it for filing and may request additional information rather than accept an NDA for filing. If additional information is requested, the NDA must be resubmitted. The resubmitted application is also subject to review before the FDA accepts it for filing. Once the submission is accepted for filing, the FDA begins an in-depth substantive review. The submission of an NDA is also subject to the payment of user fees, which may be waived under certain limited circumstances.

The FDA reviews an NDA that has been accepted for filing to determine, among other things, whether a product is safe and effective for its intended use. The approval process for an NDA is lengthy and the FDA may refuse to approve an NDA if the applicable regulatory criteria are not satisfied or may require additional clinical or other data and information. Even if such data and information is submitted, the FDA may ultimately decide that the NDA does not satisfy the criteria for approval. The FDA may also refer applications for drug candidates which present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and a recommendation as to whether the application should be approved. The FDA is not bound by the recommendation of an advisory committee. Before approving an NDA, the FDA will also inspect the facility or facilities where the product is manufactured to determine whether its manufacturing is cGMP-compliant to assure and preserve the product's identity, strength, quality, purity and stability.

There are various programs that are intended to expedite the development and review of drug candidates, and/or provide for approval on the basis of surrogate endpoints, including Fast Track, breakthrough therapy, priority review and accelerated approval. Even if a drug candidate qualifies for one or more of these programs, the FDA may later decide that the drug candidate no longer meets the conditions for qualification or that the time period for FDA review or approval will not be shortened. Generally, drug candidates that may be eligible for these programs are those for serious or life-threatening conditions, those with the potential to address unmet medical needs or those that offer meaningful benefits over existing treatments.

Fast Track is a process designed to facilitate the development, and expedite the review of drug candidates to treat serious diseases and fill an unmet medical need. Breakthrough therapy requires preliminary clinical evidence that demonstrates the drug candidate may have substantial improvement on at least one clinically significant endpoint over available therapy. A breakthrough therapy designation conveys all of the Fast Track program features, as well as more intensive FDA guidance on an efficient drug development program. Priority review is designed to give drug candidates that offer major advances in treatment or provide a treatment where no adequate therapy exists an initial review within six months as compared to a standard review time of 10 months. Although Fast Track, breakthrough therapy and priority review do not affect the standards for approval, the FDA will attempt to facilitate early and frequent meetings with a sponsor of a Fast Track designated drug candidate and expedite review of the application for a drug candidate designated for priority review. Accelerated approval provides an earlier approval of drugs to treat serious diseases and that fill an unmet medical need based on a surrogate endpoint, which is a laboratory measurement or physical sign used as an indirect or substitute measurement representing a clinically meaningful outcome. As a condition of approval, the FDA may require that a sponsor of a product receiving accelerated approval perform post-marketing clinical trials.

If the FDA evaluations of the application and the manufacturing facilities are favorable, the FDA may issue an approval letter or an "approvable" letter. An approvable letter will usually contain a number of conditions that must be met in order to secure final approval of the NDA and authorization of commercial marketing of the drug for certain indications. An approval letter authorizes commercial marketing of the drug with specific prescribing information for a specific indication. As a condition of NDA approval, the FDA may require post-approval testing, including Phase 4 trials, and surveillance to monitor the drug's safety or efficacy and may impose other conditions, including labeling or distribution restrictions which can materially impact the potential market and profitability of the drug. Once granted,

product approvals may be withdrawn if compliance with regulatory standards is not maintained or problems occur after the product reaches the market. The FDA may also refuse to approve the NDA or issue a “not approvable” letter outlining the deficiencies in the submission and often requiring additional testing or information.

To date, we have not submitted a marketing application for any drug candidate to the FDA or any foreign regulatory agency, and none of our drug candidates have been approved for commercialization in any country. We have limited experience in conducting and managing the clinical trials necessary to obtain regulatory approvals, including approval by the FDA. The time required to complete clinical trials and for the FDA’s review processes is uncertain and typically takes many years. Our analysis of data obtained from preclinical and clinical activities is subject to confirmation and interpretation by regulatory authorities, which could delay, limit or prevent regulatory approval. We may also encounter unanticipated delays or increased costs due to government regulation from future legislation or administrative action or changes in FDA policy during the period of product development, clinical trials, and FDA regulatory review.

Timing to Approval

We estimate that it generally takes 10 to 15 years or possibly longer to discover, develop and bring to market a new pharmaceutical product in the U.S. as outlined below:

Phase:	**Objective:**	**Estimated Duration:**
Discovery	Lead identification and target validation.	2 to 4 years
Preclinical	Initial toxicology for preliminary identification of risks for humans; gather early pharmacokinetic data.	1 to 2 years
Phase 1	Test for safety, dosage tolerance, absorption, metabolism, distribution and excretion.	1 to 2 years
Phase 2	Identify possible adverse effects and safety risks; preliminarily evaluate the efficacy of the drug candidate for specific targeted diseases; determine dosage tolerance and optimal dosage.	2 to 4 years
Phase 3	Further evaluate dosage, clinical efficacy and safety in an expanded patient population, typically at geographically dispersed clinical study sites; establish the overall risk-benefit ratio of the drug candidate and provide, if appropriate, an adequate basis for product labeling.	2 to 4 years
FDA approval	Approval by the FDA to sell and market the drug for the approved indication.	6 months to 2 years

A drug candidate may fail at any point during this process. Animal and other non-clinical studies typically are conducted during each phase of human clinical trials.

Our business model is primarily focused on the preclinical to Phase 2a interval. This greatly reduces the time frame for us from in-license of a new, preclinical stage drug candidate to be developed to out-licensing to a pharmaceutical partner.

Post-Approval Studies

Once an approval is granted, the FDA may withdraw the approval if compliance with regulatory standards is not maintained or if problems occur after the product reaches the market. 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 FDA review and approval. In addition, the FDA may require testing and surveillance programs to monitor the effect of approved products that have been commercialized, and the FDA has the power to prevent or limit further marketing of a product based on the results of these post-marketing programs.

Any drug products manufactured or distributed by us pursuant to FDA approvals are subject to continuing regulation by the FDA, including, among other things:

·record-keeping requirements;

·reporting of adverse experiences with the drug;

·providing the FDA with updated safety and efficacy information;

·drug sampling and distribution requirements;

·notifying the FDA and gaining its approval of specified manufacturing or labeling changes;

· complying with certain electronic records and signature requirements; and

·complying with FDA promotion and advertising requirements.

Drug manufacturers and their subcontractors are required to register their establishments with the FDA and some state agencies, and are subject to periodic unannounced inspections by the FDA and some state agencies for compliance with cGMP and other laws.

We rely, and expect to continue to rely, on third parties for the production of clinical quantities of our drug candidates. Future FDA and state inspections may identify compliance issues at the facilities of our contract manufacturers that may disrupt production or distribution, or require substantial resources to correct.

From time to time, legislation is drafted, introduced and passed in Congress that could significantly change the statutory provisions governing the approval, manufacturing and marketing of products regulated by the FDA. In addition, FDA regulations and guidance are often revised or reinterpreted by the agency in ways that may significantly affect our business and our drug candidates. It is impossible to predict whether legislative changes will be enacted, or FDA regulations, guidance or interpretations changed or what the impact of such changes, if any, may be.

Foreign Regulations

Whether or not we obtain FDA approval for a drug candidate, we must obtain the requisite approvals from regulatory authorities in non-U.S. countries prior to the commencement of clinical trials or marketing of our products in those countries. Certain countries outside of the U.S. have a process that requires the submission of a clinical trial application ("CTA"), much like an IND, prior to the commencement of human clinical trials. In the E.U., for example, a CTA must be submitted to the competent national health authority and to independent ethics committees in each country in which a company intends to conduct clinical trials. Once the CTA is approved in accordance with a country's requirements, clinical trial development may proceed in that country.

The requirements and process governing the conduct of clinical trials, product licensing, pricing and reimbursement vary from country to country, but typically takes several years and requires significant resources. In all cases, the clinical trials must be conducted in accordance with GCP and other applicable regulatory requirements.

To obtain regulatory approval of an investigational drug under E.U. regulatory systems, we must submit a marketing authorization application. This application is similar to the NDA in the U.S., with the exception of, among other things, country-specific document requirements. Drugs can be authorized in the E.U. by using (i) the centralized authorization procedure, (ii) the mutual recognition procedure, (iii) the decentralized procedure or (iv) national authorization procedures.

The EMA implemented the centralized procedure for the approval of human drugs to facilitate marketing authorizations that are valid throughout the E.U. This procedure results in a single marketing authorization granted by the European Commission that is valid across the E.U., as well as in Iceland, Liechtenstein and Norway. The centralized procedure is compulsory for certain human drugs including those that are: (i) derived from biotechnology processes, such as genetic engineering, or (ii) contain a new active substance indicated for the treatment of certain

diseases.

Reimbursement

Sales of pharmaceutical products depend in significant part on the availability of third-party reimbursement, which is time consuming and expensive. Reimbursement may not be available or sufficient to allow us to sell our future products, if any, on a competitive and profitable basis.

The passage of the Medicare Prescription Drug and Modernization Act of 2003 (the "MMA") imposed requirements for the distribution and pricing of prescription drugs for Medicare beneficiaries, which may affect the marketing of our future products, if any. The MMA also introduced a reimbursement methodology, part of which went into effect in 2004, and a prescription drug plan, which went into effect on January 1, 2006. 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 the MMA may result in a similar reduction in payments from non-governmental payors.

In addition, in some foreign countries, the proposed pricing for a drug must be approved before it may be lawfully marketed. The requirements governing drug pricing vary widely from country to country. For example, the E.U. provides options for its member states to restrict the range of medicinal products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. A member state may approve a specific price for the medicinal product or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the medicinal product on the market.

There have been and we expect that there will continue to be frequent federal and state proposals to impose governmental pricing controls or cost containment measures for prescription drugs. While we cannot predict whether such legislative or regulatory proposals will be adopted, the adoption of such proposals could have a material adverse effect on our business, financial condition and profitability. For example, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act of 2010, contains provisions that may reduce the profitability of drugs, including, for example, increased rebates for drugs sold to Medicaid programs, extension of Medicaid rebates to Medicaid managed care plans, mandatory discounts for certain Medicare Part D beneficiaries and annual fees based on pharmaceutical companies' share of sales to federal health care programs. Even if favorable coverage and reimbursement status is attained for one or more of our drug candidates for which we receive regulatory approval, less favorable coverage policies and reimbursement rates may be implemented in the future.

Other Regulations

Pursuant to the Drug Price Competition and Patent Term Restoration Act of 1984, known as the Hatch-Waxman Act, under certain conditions a sponsor may be granted marketing exclusivity for a period of five years following FDA approval. During this period, third parties would not be permitted to obtain FDA approval for a similar or identical drug through an Abbreviated NDA, which is the application form typically used by manufacturers seeking approval of a generic drug. The Hatch-Waxman Act also permits a patent extension term of up to five years as compensation for patent term lost during product development and the FDA regulatory review process. However, patent extension cannot extend the remaining term of a patent beyond a total of 14 years. 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, plus time of active FDA review between the submission date of an NDA and the approval of that application. Only one patent applicable to an approved drug is eligible for the extension and it must be applied for prior to expiration of the patent and within 60 days of the approval of the NDA.

Prexigebersen previously received orphan drug designations for the treatment of CML in the U.S. Orphan designation is available to drugs intended to treat, diagnose or prevent a rare disease or condition that affects fewer than 200,000 people in the U.S. at the time of application for orphan designation. Orphan drug designation must be requested before submitting an application for marketing authorization. Orphan designation qualifies the sponsor of the product for a tax credit and marketing incentives. The first sponsor to receive FDA marketing approval for a drug with an orphan designation is entitled to a seven-year exclusive marketing period in the U.S. for that product for that indication and, typically, a waiver of the prescription drug user fee for its marketing application. However, a drug that the FDA considers to be clinically superior to, or different from, the approved orphan drug, even though for the same indication, may also obtain approval in the U.S. during the seven-year exclusive marketing period. Orphan drug exclusive marketing rights may also 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.

In October 2016, prexigebersen also received orphan drug designation for AML in the E.U. from the EMA. To receive orphan drug designation from the EMA, a therapy must be intended for the treatment of a life-threatening or chronically debilitating rare condition with a prevalence of less than five in 10,000 in the E.U. Orphan drug designation provides incentives designed to facilitate development, including fee reductions for protocol assistance, scientific advice and importantly, may provide up to ten years of market exclusivity in the E.U. following product approval.

There is no guarantee that any of our other drug candidates will receive orphan drug designation or that, even if such drug candidate is granted such status, the drug candidate's clinical development and regulatory approval process will not be delayed or will be successful.

Pharmaceutical companies are also subject to various federal and state laws pertaining to health care "fraud and abuse," including anti-kickback laws and false claims laws. Anti-kickback laws make it illegal for any entity or person to solicit, offer, receive, or pay any remuneration in exchange for, or to induce, the referral of business, including the purchase or prescription of a particular drug. False claims laws prohibit anyone from knowingly and willingly presenting, or causing to be presented, for payment to third party payors, including Medicare and Medicaid, claims for reimbursed drugs or services that are false or fraudulent, claims for items or services not provided as claimed, or claims for medically unnecessary items or services.

Company History and Available Information

The Company was incorporated in May 2000 as a Utah corporation. In February 2008, Bio-Path Subsidiary completed a reverse merger with the Company, which at the time was traded over the counter and had no current operations. The prior name of Company was changed to Bio-Path Holdings, Inc. and the directors and officers of Bio-Path Subsidiary became the directors and officers of Bio-Path Holdings, Inc. On March 10, 2014, our common stock ceased trading on the OTCQX and commenced trading on the Nasdaq Capital Market under the ticker symbol "BPTH." Effective December 31, 2014, we changed our state of incorporation from Utah to Delaware through a statutory conversion pursuant to the Utah Revised Business Corporation Act and the Delaware General Corporation Law.

On February 8, 2018, we effected a reverse stock split of our outstanding shares of common stock at a ratio of 1-for-10, and our common stock began trading on the split-adjusted basis on the Nasdaq Capital Market at the commencement of trading on February 9, 2018. In addition, as described above, on January 17, 2019, we effected a reverse stock split of our outstanding shares of common stock at a ratio of 1-for-20, and our common stock began trading on the split-adjusted basis on the Nasdaq Capital Market at the commencement of trading on January 18, 2019. All common stock share and per share amounts in this Annual Report on Form 10-K have been adjusted to give effect to both the 1-for-10 reverse stock split and the 1-for-20 reverse stock split, retrospectively.

Our principal executive offices are located at 4710 Bellaire Boulevard, Suite 210, Bellaire, Texas 77401, and our telephone number is (832) 742-1357. Our Internet address is *www.biopathholdings.com*. We are not including the information contained in our website as part of, or incorporating it by reference into, this Annual Report on Form 10-K. We make available free of charge through our website our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and amendments to these reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act as soon as reasonably practicable after we electronically file such materials with, or furnish it to, the SEC. We also make available on our website our Corporate Governance Guidelines; the charters for our Audit Committee, Nominating/Corporate Governance Committee and Compensation Committee; our Employee Code of Business Conduct and Ethics, which applies to all of our employees, including our executive officers; and our Code of Business Conduct and Ethics for Members of the Board of Directors. All such information is also available in print and free of charge to any of our stockholders who request it. In addition, we intend to disclose on our website any amendments to, or waivers from, our codes of business conduct and ethics that are required to be publicly disclosed pursuant to rules of the SEC.

ITEM 1A. RISK FACTORS

Risks Related to Our Business

We are a clinical stage biotechnology company with no significant revenue. We have incurred significant operating losses since our inception, and we expect to incur losses for the foreseeable future and may never achieve profitability.

We have incurred significant operating losses since our inception. As of December 31, 2018, we had accumulated net losses of $47.7 million. To date, we have not generated any revenue from the sale of our drug candidates and we do not expect to generate any revenue from sales of our drug candidates for the foreseeable future. We expect to continue to incur significant operating losses and we anticipate that our losses may increase substantially as we expand our drug development programs and commercialization efforts.

To achieve profitability, we must successfully develop and obtain regulatory approval for one or more of our drug candidates and effectively commercialize any drug candidates we develop. Even if we succeed in developing and commercializing one or more of our drug candidates, we may not be able to generate sufficient revenue and we may never be able to achieve or sustain profitability.

We will continue to require substantial additional capital for the foreseeable future. If we are unable to raise additional capital when needed, we may be forced to delay, reduce or eliminate our drug development programs and commercialization efforts.

We expect to continue to incur significant operating expenses in connection with our ongoing activities, including conducting clinical trials, manufacturing and seeking regulatory approval of our drug candidates, prexigebersen, BP1002 and BP1003. In addition, if we obtain regulatory approval of one or more of our drug candidates, we expect to incur significant commercialization expenses related to product sales, marketing, manufacturing and distribution.

As of December 31, 2018, we had $1.0 million in cash on hand, compared to $6.0 million as of December 31, 2017. On January 17, 2019, we closed an underwritten public offering of 429,616 shares of our common stock for net proceeds of approximately $0.9 million. On January 23, 2019, we closed a registered direct offering of 648,233 shares of our common stock for net proceeds of approximately $1.5 million. On March 14, 2019, we closed a registered direct offering of 712,910 shares of our common stock for net proceeds of approximately $17.0 million. We believe that our available cash at December 31, 2018, together with the net proceeds received from these offerings, will be sufficient to meet obligations and fund operations for at least the next 12 months from the date of this Annual Report on Form 10-K. However, our ongoing future capital requirements will depend on numerous factors, including:

- the rate of progress, results and costs of completion of ongoing clinical trials of our drug candidates;
- the rate of progress, results and costs of completion of the ongoing preclinical trials of prexigebersen, BP1002 and BP1003;
- the size, scope, rate of progress, results and costs of completion of any potential future clinical trials and preclinical trials of our drug candidates that we may initiate;
- the costs to obtain adequate supply of the compounds necessary for our drug candidates;
- the costs of obtaining regulatory approval of our drug candidates;
- the scope, prioritization and number of drug development programs we pursue;
- the costs for preparing, filing, prosecuting, maintaining and enforcing our intellectual property rights and defending intellectual property-related claims;
- the extent to which we acquire or in-license other products and technologies and the costs to develop those products and technologies;
- the costs of future commercializing activities, including product sales, marketing, manufacturing and distribution, of any of our drug candidates or other products for which marketing approval has been obtained;
- our ability to establish strategic collaborations and licensing or other arrangements on terms favorable to us; and
- competing technological and market developments.

Any additional fundraising efforts may divert our management from their day to day activities, which may adversely affect our ability to develop and commercialize our drug candidates. Our ability to raise additional funds will depend, in part, on the success of our product development activities and other factors related to financial, economic and market conditions, many of which are beyond our control. There can be no assurance that we will be able to raise additional capital when needed or on terms that are favorable to us, if at all. If adequate funds are not available on a timely basis, we may be forced to:

- delay, reduce the scope of or eliminate one or more of our drug development programs;

- relinquish, license or otherwise dispose of rights to technologies, drug candidates or products that we would otherwise seek to develop or commercialize ourselves at an earlier stage or on terms that are less favorable than might otherwise be available; or

- liquidate and dissolve the Company.

If our operating plans change, we may require additional capital sooner than planned. Such additional financing may not be available when needed or on terms favorable to us. In addition, we may seek additional capital due to favorable market conditions or strategic considerations, even if we believe we have sufficient funds for our current and future operating plan.

The pharmaceutical and biotechnology industry is highly competitive. If we are unable to compete effectively, our drug candidates may be rendered noncompetitive or obsolete.

We are engaged in segments of the pharmaceutical and biotechnology industry that are highly competitive and characterized by rapid and significant technological change. Many large pharmaceutical and biotechnology companies, academic and research institutions, governmental agencies and other public and private research organizations are pursuing the development of novel drugs that target AML, CML, ALL, MDS, lymphoma, ovarian, breast cancer, solid tumors and other cancers generally. We face, and expect to continue to face, intense and increasing competition as new products enter the market and advanced technologies become available. Our competitors may discover, develop or commercialize products or other novel technologies that are more effective, safer or less costly than our drug candidates. Our competitors may also obtain FDA or other regulatory approval for their products more rapidly than we may obtain approval for our drug candidates.

Many of our competitors have:

- significantly greater capital, technical and human resources than we have and may be better equipped to discover, develop, manufacture and commercialize drug candidates;

- more experience in drug discovery, development and commercialization, obtaining regulatory approvals and manufacturing and marketing pharmaceutical products;

- drug candidates that have been approved or are in late-stage clinical development; and/or

- collaboration arrangements in our target markets with leading companies and research institutions.

Mergers and acquisitions in the pharmaceutical and biotechnology industry may result in even more resources being concentrated among a smaller number of our competitors. Smaller or early stage companies may also prove to be significant competitors, particularly through collaborative arrangements with large and established companies. These competitors also compete with us in recruiting and retaining qualified scientific and management personnel, establishing clinical trial sites and patent registration for clinical trials, and acquiring technologies complementary to, or necessary for, our drug candidates and programs.

Competitive products and technological developments may render our drug candidates noncompetitive or obsolete before we can recover the expenses of developing and commercializing our drug candidates. Furthermore, the development of new treatment methods and/or the widespread adoption or increased utilization of any vaccine for the

diseases we are targeting could render our drug candidates noncompetitive, obsolete or uneconomical. If we successfully develop and obtain approval for any of our drug candidates, we will face competition based on the safety and effectiveness of our drug candidates, the timing of their entry into the market in relation to competitive products in development, the availability and cost of supply, marketing and sales capabilities, reimbursement coverage, price, patent position and other factors. If we successfully develop drug candidates but those drug candidates do not achieve and maintain market acceptance, our business will not be successful.

Our plan to use collaboration arrangements to leverage our capabilities may not be successful.

As part of our business strategy, we may enter into collaborative arrangements for the development and commercialization of our drug candidates. For our collaboration efforts to be successful, we must identify partners whose competencies complement ours. We must also successfully enter into collaboration agreements with them on terms attractive to us and integrate and coordinate their resources and capabilities with our own. We may be unsuccessful in entering into collaboration agreements with acceptable partners or negotiating favorable terms in these agreements. In addition, we may face a disadvantage in seeking to enter into or negotiating collaborations with potential partners because other potential collaborators may have greater management and financial resources than we do.

If we do enter into collaborative arrangements, the success of these collaboration arrangements will depend heavily on the efforts and activities of our collaborators. Furthermore, we may face risks and uncertainties in connection with collaborative arrangements, including:

- inability to integrate the resources or capabilities of collaborators;
- collaborators may prove difficult to work with or less skilled than we originally expected;
- disputes may arise with respect to the ownership of rights to technology developed with collaborators;
- disagreements with collaborators could delay or terminate the research, development or commercialization of products or result in litigation or arbitration;
- difficulty enforcing our arrangements if one of our collaborators fails to perform;
- termination of our collaboration arrangements by collaborators, which could make it difficult for us to attract new collaborators or adversely affect the perception of us in the business or financial communities;
- collaborators may have considerable discretion in electing whether to pursue the development of any additional drug candidates and may pursue technologies or products either on their own or in collaboration with our competitors that are similar to or competitive with our technologies; and

·collaborators may change the focus of their development and commercialization efforts.

If we are unsuccessful in our collaborative efforts, our ability to develop and market drug candidates could be severely limited.

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

Our success depends on the availability and contributions of members of our senior management team, scientific team and other key personnel. The loss of services of any of these individuals could delay, reduce or prevent our drug development and other business objectives. Furthermore, recruiting and retaining qualified scientific personnel to perform drug development work will be critical to our success. We face intense competition for qualified individuals from numerous pharmaceutical and biotechnology companies, universities, governmental entities and other public and private research institutions. We may be unable to attract and retain these individuals, and our failure to do so could materially adversely affect our business and financial condition.

Our employees, agents, consultants, and commercial partners may engage in misconduct or other improper activities, including non-compliance with applicable regulatory standards and requirements.

We are exposed to the risk of fraud or other misconduct by our employees, principal investigators, consultants, advisors and commercial partners. Misconduct by these persons could include intentional failures to comply with the regulations of the FDA and non-U.S. regulators, comply with healthcare fraud and abuse laws and regulations in the U.S. and abroad, report financial information or data accurately or disclose unauthorized activities to us. In particular, sales, marketing and business arrangements in the healthcare industry are 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 and other business arrangements. Such misconduct could involve the improper use of information obtained in the course of clinical studies, which could result in regulatory sanctions and cause serious harm to our business, financial condition and reputation. We currently have codes of business conduct and ethics applicable to all of our employees, but it is not always possible to identify and deter employee misconduct, and our codes of business conduct and ethics and the other precautions we take to detect and prevent improper activities may not be effective in controlling unknown or unmanaged risks or losses, or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to comply with these laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could result in the imposition of significant fines or other sanctions, which could materially adversely affect our business and financial condition. Whether or not we are successful in defending against such actions or investigations, we could incur substantial costs, including legal fees, and divert the attention of management in defending ourselves against any of these claims or investigations.

We expect to expand our operations in the future and may face challenges in managing our growth, which may result in disruptions to our operations.

We expect to expand our operations over time. To successfully manage future growth, we may need to implement and improve our managerial, operational and financial resources, and may need to expand our facilities and recruit and train additional qualified personnel. Our expected growth may also require significant financial resources, which may not be available when needed or on terms favorable to us. Our senior management may be required to devote substantial attention to managing growth activities and may be unable to effectively manage the expansion of our operations due to our limited resources, which may result in disruptions to our business operations and could harm our business and financial condition.

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

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

Our business has a substantial risk of product liability claims. If we are unable to obtain or maintain appropriate levels of insurance, a product liability claim could adversely affect our business.

Our business exposes us to significant potential product liability risks that are inherent in the development, manufacturing and sales and marketing of human therapeutic products. Although we do not currently commercialize any products, claims could be made against us based on the use of our drug candidates in clinical trials. Product liability claims could delay or prevent completion of our clinical development programs**.** We currently have product liability insurance, but we may not be able to maintain such insurance on acceptable terms. However, even if we maintain or obtain other product liability insurance, our insurance may not provide adequate coverage against potential liabilities. As a result, we may be unable to obtain or maintain insurance coverage at a reasonable cost to protect against losses that could harm our business and financial condition. If any claims are brought against us, and we are not successful in defending ourselves, those claims could result in damage awards against us, which could materially adversely affect our business and financial condition. Whether or not we are successful in defending against such claims, we could incur substantial costs, including legal fees, and divert the attention of management in defending ourselves against any of these claims.

We are increasingly dependent on information technology systems to operate our business and a cyber-attack or other breach of our systems, or those of third parties on whom we may rely, could subject us to liability or interrupt the operation of our business.

We are increasingly dependent on information technology systems to operate our business. A breakdown, invasion, corruption, destruction or interruption of critical information technology systems by employees, others with authorized access to our systems or unauthorized persons could negatively impact operations. In the ordinary course of business, we collect, store and transmit confidential information and it is critical that we do so in a secure manner to maintain the confidentiality and integrity of such information. Additionally, we outsource certain elements of our information technology systems to third parties. As a result of this outsourcing, our third party vendors may or could have access to our confidential information making such systems vulnerable. Data breaches of our information technology systems, or those of our third party vendors, may pose a risk that sensitive data may be exposed to unauthorized persons or to the public. For example, the loss of clinical trial data from completed or ongoing clinical trials or preclinical studies could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data. While we believe that we have taken appropriate security measures to protect our data and information technology systems, and have been informed by our third party vendors that they have as well, there can be no assurance that our efforts will prevent breakdowns or breaches in our systems, or those of our third party vendors, that could materially adversely affect our business and financial condition.

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

Under Section 382 of the Internal Revenue Code of 1986, as amended (the "Code"), if a corporation experiences an "ownership change," generally defined as a greater than 50% change (by value) in its equity ownership over a three-year period, the corporation's ability to utilize its pre-change net operating loss carryforwards and other pre-change tax attributes (such as research tax credits) to offset its post- change taxable income or taxes may be limited. Our prior and potential future equity offerings and other changes in our stock ownership, some of which are outside of our control, may have resulted or could in the future result in an ownership change under Section 382 of the Code. If a limitation were to apply, utilization of a portion of our domestic net operating loss and tax credit carryforwards could be limited in future periods and a portion of the carryforwards could expire before being available to reduce future income tax liabilities.

On December 22, 2017, the U.S. government enacted legislation referred to as the Tax Cuts and Jobs Act (the "Tax Act"). Under the Tax Act, net operating losses generated prior to 2018 will continue to be governed by the net operating loss tax rules as they existed prior to the adoption of the new Tax Act, which means that generally they will expire 20 years after they were generated if not used prior thereto. Accordingly, our net operating losses could expire unused and be unavailable to offset future income tax liabilities, if any. Under the Tax Act, net operating losses incurred in 2018 and in future years may be carried forward indefinitely, but the deductibility of such net operating losses is limited to 80% of current year taxable income. We continue to examine the impact that this provision of the Tax Act, among other provisions, may have on our business.

Provisions of our charter documents or Delaware law could delay or prevent an acquisition of our company, even if the acquisition would be beneficial to our stockholders, and could make it more difficult to change management.

Provisions of our certificate of incorporation and bylaws may discourage, delay or prevent a merger, acquisition or other change in control that stockholders might otherwise consider favorable, including transactions in which stockholders might otherwise receive a premium for their shares. In addition, these provisions may frustrate or prevent any attempt by our stockholders to replace or remove our current management by making it more difficult to replace or remove our board of directors. These provisions include:

·limitations on our stockholders' ability to call special meetings of stockholders;

·an advance notice requirement for stockholder proposals and nominations for members of our Board;

·the authority of our Board to determine the number of director seats on our Board;

·the authority of our Board to fill vacancies occurring on the Board;

·the authority of our Board to issue preferred stock with such terms as our Board may determine.

In addition, because we are governed by Delaware law, we are subject to the provisions of Section 203 of the Delaware General Corporation Law, which prohibits a publicly held Delaware corporation from engaging in a business combination with an interested stockholder, generally a person who, together with its affiliates, owns or within the last three years has owned 15% of our voting stock, for a period of three years after the date of the transaction in which the person became an interested stockholder, unless the business combination is approved in a prescribed manner.

We face competition from entities that have developed or may develop therapeutic candidates for our target disease indications, including companies developing novel treatments and technology platforms based on modalities and technology that may be similar to ours. If these companies develop technologies, including delivery technologies, or therapeutic candidates more rapidly than we do, or their technologies are more effective, our ability to develop and successfully commercialize therapeutic candidates may be adversely affected.

While we believe that our DNAbilize® technology is the only delivery method of its type, the area of cancer treatment research is rapidly progressing, with many stakeholders, including for-profit and nonprofit institutions, conducting preclinical and clinical studies of various types of therapeutic products for the same or similar indications for use as our drug candidates. We expect that such work by others will continue, which may make it difficult for us to effectively recruit and enroll a satisfactory number of participants in clinical trials.

Our success will partially depend on our ability to develop therapeutics that are safer and more effective than competing therapeutics. Our commercial opportunity and success will be reduced or eliminated if competing therapeutics are safer, more effective, or less expensive than the therapeutics we develop, or if any are granted exclusive marketing approval by the FDA that precludes the marketing of our drug candidates for a period of time. If our lead drug candidates are approved for the indications we are currently pursuing, they will compete with a range of therapeutic treatments that are either in development or currently marketed. For example, the FDA has recently approved a number of drugs indicated for treatment of AML, some of which may have target patient populations similar to that of our drug candidates.

Many of our competitors may have significantly greater financial, technical, manufacturing, marketing, sales and supply resources or experience than we do. If we successfully obtain FDA approval for any drug candidate, we will face competition based on many different factors, including the safety and effectiveness of our products, the ease with which our products can be administered, the timing and scope of regulatory approvals (if we are able to obtain any) for these drug candidates, the availability and cost of manufacturing, marketing and sales capabilities, price, reimbursement coverage and patent position. Competing therapeutics could present superior treatment alternatives, including by being more effective, safer, less expensive or marketed and sold more effectively than any therapeutics we may develop. Competitive alternatives may make any drugs that we develop obsolete or noncompetitive before we recover the expense of developing and commercializing our drug candidates, if we are able to obtain regulatory approval to commercialize such drug candidates.

We may be subject, directly or indirectly, to certain U.S. federal and state healthcare laws and regulations, such as anti-kickback, false claims laws, physician payment transparency laws, or similar fraud and abuse laws, which could expose us to potential criminal sanctions, civil penalties, contractual damages, reputational harm and diminished profits and future earnings.

Healthcare providers, physicians and others will play a primary role in the recommendation, ordering and utilization of any products for which we obtain regulatory approval. If we obtain FDA approval for any of our products and begin commercializing those products in the U.S., our operations may be subject to various federal and state fraud and abuse laws, including, without limitation, the federal Anti-Kickback Statute, the federal False Claims Act, and physician payment transparency laws and regulations. These laws may impact, among other things, our potential sales, marketing and education programs and our relationships with physicians, patients, and other persons or entities in a position to refer, use, or recommend our future products. The laws that may affect our ability to operate could include, but are not limited to:

- the federal Anti-Kickback Statute, which prohibits, among other things, knowingly and willfully soliciting, receiving, offering or paying any remuneration (including any kickback, bribe, or rebate), directly or indirectly, overtly or covertly, in cash or in kind, to induce, or in return for, either the referral of an individual, or the purchase, lease, order or recommendation of any good, facility, item or service for which payment may be made, in whole or in part, under a federal healthcare program, such as the Medicare and Medicaid programs;

- federal civil and criminal false claims laws and civil monetary penalty laws, including the False Claims Act, which may be pursued through civil whistleblower or qui tam actions, impose criminal and civil penalties against individuals or entities for knowingly presenting, or causing to be presented, to the federal government, claims for payment or approval from Medicare, Medicaid or other third-party payors that are false or fraudulent or making a false statement to avoid, decrease or conceal an obligation to pay money to the federal government;

- federal criminal statutes under the Health Insurance Portability and Accountability Act of 1996, which prohibit knowingly and willfully executing, or attempting to execute, a scheme to defraud any healthcare benefit program or obtain, by means of false or fraudulent pretenses, representations, or promises, any of the money or property owned by, or under the custody or control of, any healthcare benefit program, 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 federal transparency requirements under The Patient Protection and Affordable Care Act and the Health Care and Education Reconciliation Act, enacted into law in the U.S. in March 2010 (known collectively as the "Affordable Care Act"), including the provision commonly referred to as the Physician Payments Sunshine Act, which requires manufacturers of drugs, biologics, devices and medical supplies for which payment is available under Medicare, Medicaid or the Children's Health Insurance Program to report annually to the Centers for Medicare and Medicaid Services information related to payments or other transfers of value made to physicians and teaching hospitals, as well as ownership and investment interests held by physicians and their immediate family members; and

- State law equivalents of each of the healthcare laws described above, some of which may be broader in scope and apply regardless of the type of payor, such as state anti-kickback statutes and false claims acts, and state pricing, marketing, and transparency statutes that require us to adopt compliance programs, report pricing information, or disclose payments or other transfers of value to physicians or other covered recipients.

Because of the breadth of these laws and the narrowness of the statutory exceptions and safe harbors available, it is possible that some of our business activities could be subject to challenge under one or more of such laws once our products are commercialized. In addition, healthcare reform legislation has strengthened these laws and additional laws or requirements may be implemented in the future. For example, the Affordable Care Act, among other things, amended the intent requirement of the federal Anti-Kickback and criminal healthcare fraud statutes. As a result of such amendment, a person or entity no longer needs to have actual knowledge of these statutes or specific intent to violate them in order to have committed a violation. Moreover, the Affordable Care Act provides that the government may assert that a claim including items or services resulting from a violation of the federal Anti-Kickback Statute constitutes a false or fraudulent claim for purposes of the False Claims Act.

Efforts to ensure that our business arrangements comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities will conclude that our existing or future 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. Any such actions instituted against us could have a significant adverse impact on our business, including the imposition of civil, criminal and administrative penalties, damages, disgorgement, monetary fines, possible exclusion from participation in Medicare, Medicaid and other federal healthcare programs, contractual damages, reputational harm, diminished profits and future earnings, and curtailment of our operations, any of which could adversely affect our ability to operate our business and our results of operations. Even if we are successful in defending against such actions, we may nonetheless be subject to substantial costs, reputational harm and adverse effects on our ability to operate our business.

If any of our employees, agents, or the physicians or other providers or entities with whom we expect to do business are found to have violated applicable laws, we may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs, or, if we are not subject to such actions, we may suffer reputational harm for conducting business with persons or entities found, or accused of being, in violation of such laws. Any such events could adversely affect our ability to operate our business and our results of operations.

Inadequate funding for the FDA, the SEC and other government agencies, or a work slowdown or stoppage at those agencies as part of a broader federal government shutdown, could hinder their ability to hire and retain key leadership and other personnel, prevent new products and services from being developed or commercialized in a timely manner, or otherwise prevent those agencies from performing normal business functions on which the operation of our business may rely, which could negatively impact our business.

The ability of the FDA to review and approve new products can be affected by a variety of factors, including government budget and funding levels, ability to hire and retain key personnel and accept the payment of user fees, and statutory, regulatory, and policy changes. Average review times at the agency have fluctuated in recent years as a result. In addition, government funding of the SEC and other government agencies on which our operations may rely, including those that fund research and development activities, is subject to the political process, which is inherently fluid and unpredictable.

Disruptions at the FDA and other agencies may also slow the time necessary for new drugs to be reviewed and/or approved by necessary government agencies, which could adversely affect our business. For example, over the last several years, including December 22, 2018 to January 25, 2019, the U.S. government has shut down several times and certain regulatory agencies, such as the FDA and the SEC, have had to furlough employees and stop critical activities. If a prolonged government shutdown or a series of shutdowns occurs, it could significantly affect the ability of the FDA to timely review and process our regulatory submissions, which could have a material adverse effect on our business. Further, future government shutdowns could impact our ability to gain access to the public markets and obtain necessary capital in order to properly capitalize and continue our operations

Risks Related to the Development of Our Drug Candidates

We must complete extensive clinical trials to demonstrate the safety and efficacy of our drug candidates. If we are unable to demonstrate the safety and efficacy of our drug candidates, we will not be successful.

To date, none of our drug candidates have been approved for sale in the U.S. or any foreign country. While antisense therapeutics have been in development for over 20 years, only two antisense drugs have been successfully developed to date. Further, development of liposomal antisense therapeutics, which comprise our drug therapeutics technology, has faced many challenges and generally remains unproven in the treatment of cancers. The success of our business depends primarily on our ability to develop and commercialize our drug candidates successfully. Our drug candidates must satisfy rigorous standards of safety and efficacy before they can be approved for sale. To satisfy these standards, we must engage in expensive and lengthy testing of our drug candidates.

On February 9, 2015, we announced that we began enrollment into the combination therapy Phase 1b clinical trial for prexigebersen in patients with AML. The combination therapy Phase 1b clinical trial consisted of two dosing cohorts of prexigebersen (60 mg/m^2 and 90 mg/m^2) to test the safety profile of treating AML patients with prexigebersen in combination with LDAC. Patients ineligible for intensive induction therapy are currently treated only with LDAC. We also announced the completion of the Phase 1b trial. Results from the Phase 1b clinical trial demonstrated it is safe to add prexigebersen, which appears to yield better response rates in this AML patient population. On October 9, 2015, we announced the completion of Cohort 7, the first dosing cohort of the Phase 1b clinical trial, and on March 3, 2016, we announced the completion of Cohort 8, the second dosing cohort of the Phase 1b clinical trial. On June 6, 2016, we announced data from the safety segment of the Phase 2 combination therapy of prexigebersen and LDAC showed no dose limiting toxicities. On November 2, 2016, we announced that the first patient in the efficacy portion of the Phase 2 trial for AML was dosed. We released the initial interim data analysis of Stage 1 of the Phase 2 AML study in April 2018, and the updated data in March 2019. In August 2018, we announced the addition of a prexigebersen and decitabine combination cohort to the Phase 2 AML study. On March 6, 2019, we announced a revised clinical program intended for prexigebersen in AML. Part of this revised program includes the intended inclusion of high risk MDS patients in the prexigebersen and decitabine combination cohort and the closure of the prexigebersen and LDAC combination cohort in the ongoing Phase 2 AML study. On December 29, 2017, we announced the initiation of our Phase 1b/2a clinical study of prexigebersen for the treatment of CML in accelerated blast phase patients. In addition, prexigebersen is in preclinical studies for solid tumors, including breast cancer and ovarian cancer.

We may not be able to obtain authority from the FDA or other equivalent foreign regulatory agencies to move on to further efficacy segments of the Phase 2 or Phase 3 clinical trials or commence and complete any other clinical trials for any of our drug candidates. Positive results in preclinical studies of a drug candidate may not be predictive of similar results in human clinical trials, and promising results from early clinical trials of a drug candidate may not be replicated in later clinical trials. A number of companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in late-stage clinical trials even after achieving promising results in early-stage development. Accordingly, the results from the preclinical trials or clinical trials for our drug candidates may not be

predictive of the results we may obtain in later stage trials. The failure of clinical trials to demonstrate safety and efficacy of one or more of our drug candidates will have a material adverse effect on our business and financial condition.

Delays in the commencement of clinical trials of our drug candidates could result in increased costs to us and delay our ability to generate revenues.

Our drug candidates will require continued extensive clinical trials prior to the submission of a regulatory application for commercial sales. Because of the nature of clinical trials, we do not know whether future planned clinical trials will begin on time, if at all. Delays in the commencement of clinical trials could significantly increase our drug development costs and delay any commercialization of our drug candidates. In addition, many of the factors that may cause, or lead to, a delay in the commencement of clinical trials may also ultimately lead to denial of regulatory approval of a drug candidate.

The commencement of clinical trials can be delayed for a variety of reasons, including delays in:

- demonstrating sufficient safety and efficacy in past clinical trials to obtain regulatory approval to commence a further clinical trial;
- convincing the FDA that we have selected valid endpoints for use in proposed clinical trials;
- reaching agreements on acceptable terms with prospective contract manufacturers for manufacturing sufficient quantities of our drug candidates; and
- obtaining institutional review board approval to conduct a clinical trial at a prospective site.

In addition, the commencement of clinical trials may be delayed due to insufficient patient enrollment, which is a function of many factors, including the size of the patient population, the nature of the protocol, the proximity of patients to clinical sites, the availability of effective treatments for the relevant disease and the eligibility criteria for the clinical trial.

Delays in the completion of, or the termination of, clinical trials of our drug candidates could result in increased costs to us, and could delay or prevent us from generating revenues.

Once a clinical trial has begun, it may be delayed, suspended or terminated by us or the FDA or other regulatory authorities due to a number of factors, including:

- regulators or institutional review boards may not authorize us to commence or conduct a clinical trial at a prospective trial site;
- our preclinical tests or clinical trials may produce negative or inconclusive results, and we may decide, or regulators may require us, to conduct additional preclinical testing or clinical trials or we may abandon projects that we expect may not be promising;
- we might have to suspend or terminate our clinical trials if the participating patients are being exposed to unacceptable health risks;
- regulators or institutional review boards may require that we hold, suspend or terminate clinical research for various reasons, including noncompliance with regulatory requirements;
- the cost of our clinical trials may be greater than we currently anticipate and we may lack adequate funding to continue the clinical trial;
- the timing of our clinical trials may be longer than we currently anticipate;
- our third-party contractors may fail to comply with regulatory requirements or meet their contractual obligations to us in a timely manner (including delays or inability to manufacture or obtain sufficient quantities of materials for use in clinical trials);
- inadequacy of or changes in our manufacturing process or compound formulation;
- slower than expected rates of patient recruitment and enrollment or lower than expected patient retention rates;
- the effects of our drug candidates may not be the desired effects or may include undesirable side effects or our drug candidates may have other unexpected characteristics;

- changes in applicable regulatory policies and regulations;

- delays in identifying and reaching agreement on acceptable terms with prospective clinical trial sites;

- uncertainty regarding proper dosing;

- failure of our clinical research organizations to comply with all regulatory and contractual requirements or otherwise fail to perform their services in a timely or acceptable manner;

- scheduling conflicts with participating clinicians and clinical institutions;

- failure to construct appropriate clinical trial protocols;

- insufficient data to support regulatory approval;

- inability or unwillingness of medical investigators to follow our clinical protocols; and

- the timing of discussions and meetings with the FDA or other regulatory authorities regarding the scope or design of our clinical trials.

Many of these factors that may lead to a delay, suspension or termination of clinical trials of our drug candidates may also ultimately lead to denial of regulatory approval of our drug candidates. If we experience delays in the completion of, or termination of, clinical trials of any drug candidates in the future, our business, financial condition and the commercial prospects for our drug candidates could be materially adversely affected, and our ability to generate product revenues could be delayed or eliminated.

If we are unable to obtain U.S. and/or foreign regulatory approval, we will be unable to commercialize our drug candidates.

Our drug candidates are subject to extensive governmental regulations relating to, among other things, research, testing, development, manufacturing, safety, efficacy, record keeping, labeling, marketing and distribution of drugs. Rigorous preclinical testing and clinical trials and an extensive regulatory approval process are required in the U.S. and in many foreign jurisdictions prior to the commercial sale of our drug candidates. Satisfaction of these and other regulatory requirements is costly, time consuming, uncertain and subject to unanticipated delays. It is possible that none of the drug candidates we are developing will obtain marketing approval. In connection with the clinical trials for our drug candidates, we face risks that:

·the drug candidate may not prove to be efficacious;

·the drug candidate may not prove to be safe;

·the drug candidate may not be readily co-administered or combined with other drugs or drug candidates;

·the results may not confirm the positive results from earlier preclinical studies or clinical trials;

·the results may not meet the level of statistical significance required by the FDA or other regulatory agencies; and

·the FDA or other regulatory agencies may require us to carry out additional studies.

We have limited experience in conducting and managing the clinical trials necessary to obtain regulatory approvals, including approval by the FDA. The time required to complete clinical trials and for the FDA and other countries' regulatory review processes is uncertain and typically takes many years. Our analysis of data obtained from preclinical and clinical trials is subject to confirmation and interpretation by regulatory authorities, which could delay, limit or prevent regulatory approval. We may also encounter unanticipated delays or increased costs due to government regulation from future legislation or administrative action or changes in FDA policy during the period of product

development, clinical trials, and FDA regulatory review.

Any regulatory approval to market a product may be subject to limitations on the indicated uses for which we may market the product and affect reimbursement by third-party payors. These limitations may limit the size of the market for the product. We may also become subject to numerous foreign regulatory requirements governing the conduct of clinical trials, manufacturing and marketing authorization, pricing and third-party reimbursement. The foreign regulatory approval process includes all of the risks associated with FDA approval described above as well as risks attributable to the satisfaction of foreign regulations. Approval by the FDA does not ensure approval by regulatory authorities outside the U.S. Foreign jurisdictions may have different approval procedures than those required by the FDA and may impose additional testing requirements for our drug candidates.

In addition to regulations in the U.S., we may be subject to a variety of regulations in other jurisdictions governing, among other things, clinical trials and any commercial sales and distribution of our products, if approved.

Whether or not we obtain FDA approval for a drug candidate, we must obtain the requisite approvals from regulatory authorities in non-U.S. countries prior to the commencement of clinical trials or marketing of our products in those countries. Certain countries outside of the U.S. have a process that requires the submission of a clinical trial application, much like an IND, prior to the commencement of human clinical trials. In the E.U., for example, a CTA must be submitted to the competent national health authority and to independent ethics committees in each country in which a company intends to conduct clinical trials. Once the CTA is approved in accordance with a country’s requirements, clinical trial development may proceed in that country.

The requirements and process governing the conduct of clinical trials, product licensing, pricing and reimbursement vary from country to country. In all cases, the clinical trials must be conducted in accordance with GCP and other applicable regulatory requirements.

To obtain regulatory approval of an investigational drug under E.U. regulatory systems, we must submit a marketing authorization application. This application is similar to the NDA in the U.S., with the exception of, among other things, country-specific document requirements. Drugs can be authorized in the E.U. by using (i) the centralized authorization procedure, (ii) the mutual recognition procedure, (iii) the decentralized procedure or (iv) national authorization procedures.

The EMA implemented the centralized procedure for the approval of human drugs to facilitate marketing authorizations that are valid throughout the E.U. This procedure results in a single marketing authorization granted by the European Commission that is valid across the E.U., as well as in Iceland, Liechtenstein and Norway. The centralized procedure is compulsory for certain human drugs including those that are: (i) derived from biotechnology processes, such as genetic engineering, or (ii) contain a new active substance indicated for the treatment of certain diseases.

Changes in existing laws and regulations affecting the healthcare industry could increase our costs and otherwise adversely affect our business.

Our research and development activities, preclinical studies and clinical trials, and the manufacturing, marketing and labeling of any products we may develop, are subject to extensive regulation by the FDA and other regulatory authorities in the U.S. and other countries. Changes in existing federal, state and foreign laws and agency regulations may be established that could prevent or delay regulatory approval of our drug candidates or materially increase our costs, including:

- changes in the FDA and foreign regulatory processes for new therapeutics that may delay or prevent the approval of any of our drug candidates;
- new laws, regulations, or judicial decisions related to healthcare availability or the payment for healthcare products and services, including prescription drugs, that would make it more difficult for us to market and sell products once they are approved by the FDA or foreign regulatory agencies;
- changes in FDA and foreign regulations that may require additional safety monitoring prior to or after the introduction of new products to market, which could materially increase our costs of doing business; and
- changes in FDA and foreign current cGMP that would make it more difficult for us to manufacture our drug candidates in accordance with cGMP.

Delays in obtaining or preventing our obtaining regulatory approval of our drug candidates could materially adversely affect our ability to commercialize any of our drug candidates and our ability to receive product revenues or to receive milestone payments or royalties from any product rights we might license to others.

We rely on third parties to conduct clinical trials for our drug candidates, and their failure to timely and properly perform their obligations may result in costs and delays that prevent us from obtaining regulatory approval or successfully commercializing our drug candidates.

We rely on independent contractors, including clinical research organizations, in certain areas that are particularly relevant to our research and drug development plans, such as for data management for the conduct of clinical trials. The competition for these relationships is intense, and we may not be able to maintain our relationships with them on acceptable terms. Independent contractors generally may terminate their engagements at any time, subject to notice. As a result, we can control their activities only within certain limits, and they will devote only a certain amount of their time conducting research on and trials of our drug candidates and assisting in developing them. If they do not successfully carry out their duties under their agreements with us, fail to inform us if these trials fail to comply with clinical trial protocols or fail to meet expected deadlines, our clinical trials may need to be extended, delayed or terminated. We may not be able to enter into replacement arrangements without undue delays or excessive expenditures. If there are delays in testing or regulatory approvals as a result of the failure to perform by our independent contractors or other outside parties, our drug candidate development costs will increase and we may not be able to attain regulatory approval for or successfully commercialize our drug candidates.

In addition, we have no control over the financial health of our independent contractors. Several of our independent contractors are in possession of valuable and sensitive information relating to the safety and efficacy of our drug candidates, and several others provide services to a significant percentage of the patients enrolled in our clinical trials in which such independent contractors participate. Should one or more of these independent contractors become insolvent, or otherwise are not able to continue to provide services to us, the clinical trial in which such contractor participates could become significantly delayed and we may be materially adversely affected as a result of the delays and additional expenses associated with such event.

We may not be able to obtain or maintain orphan drug exclusivity for our product candidates.

Prexigebersen has received orphan drug designations for the treatment of CML in the U.S. Orphan designation is available to drugs intended to treat, diagnose or prevent a rare disease or condition that affects fewer than 200,000 people in the U.S. at the time of application for orphan designation. Orphan drug designation must be requested before submitting an application for marketing authorization. Orphan designation qualifies the sponsor of the product for a tax credit and marketing incentives. The first sponsor to receive FDA marketing approval for a drug with an orphan designation is entitled to a seven-year exclusive marketing period in the U.S. for that product for that indication and, typically, a waiver of the prescription drug user fee for its marketing application. However, a drug that the FDA considers to be clinically superior to, or different from, the approved orphan drug, even though for the same indication, may also obtain approval in the U.S. during the seven-year exclusive marketing period. Orphan drug exclusive marketing rights may also 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.

In October 2016, prexigebersen also received orphan drug designation for AML in the E.U. from the EMA. To receive orphan drug designation from the EMA, a therapy must be intended for the treatment of a life-threatening or chronically debilitating rare condition with a prevalence of less than five in 10,000 in the E.U. Orphan drug designation provides incentives designed to facilitate development, including fee reductions for protocol assistance, scientific advice and importantly, may provide up to ten years of market exclusivity in the E.U. following product approval.

There is no guarantee that any of our other drug candidates will receive orphan drug designation or that, even if such drug candidate is granted such status, the drug candidate’s clinical development and regulatory approval process will not be delayed or will be successful.

Risks Related to Manufacturing Our Drug Candidates

We rely on third parties for manufacturing of our clinical drug supplies; our dependence on these manufacturers may impair the development of our drug candidates.

We have no ability to internally manufacture the drug candidates that we need to conduct our clinical trials. For the foreseeable future, we expect to continue to rely on third-party manufacturers and other third parties to produce, package and store sufficient quantities of our drug candidates and any future drug candidates for use in our clinical trials. We have entered into agreements with our third-party manufacturer for the manufacture of our drug requirements, including an agreement for the manufacture of prexigebersen for use in our Phase 2 clinical trial for

AML and CML and a development agreement for BP1002. To date, we have made steady progress with our current third-party manufacturers, overcoming challenges associated with scaling up manufacturing to develop their capabilities to supply us with our necessary quantities of drug supplies for our clinical trials. However, we may face various risks and uncertainties in connection with our reliance on third-party manufacturers, including:

- reliance on third-party manufactures for regulatory compliance and quality assurance;
- the possibility of breach of the manufacturing agreement by the third-party manufacturer because of factors beyond our control;
- the possibility of termination or nonrenewal of our manufacturing agreement by the third-party manufacturer at a time that is costly or inconvenient for us;
- the potential that third-party manufacturers will develop know-how owned by such third-party manufacturer in connection with the production of our drug candidates that is necessary for the manufacture of our drug candidates; and
- reliance on third-party manufacturers to assist us in preventing inadvertent disclosure or theft of our proprietary knowledge.

Our drug candidates are complicated and expensive to manufacture. If our third-party manufacturers fail to deliver our drug candidates for clinical use on a timely basis, with sufficient quality, and at commercially reasonable prices, we may be required to delay or suspend clinical trials or otherwise discontinue development of our drug candidates. While we may be able to identify replacement third-party manufacturers or develop our own manufacturing capabilities for these drug candidates, this process would likely cause a delay in the availability of our drug candidates and an increase in costs. In addition, third-party manufacturers may have a limited number of facilities in which our drug candidates can be manufactured, and any interruption of the operation of those facilities due to events such as equipment malfunction or failure or damage to the facility by natural disasters could result in the cancellation of shipments, loss of product in the manufacturing process or a shortfall in available drug candidates.

We may in the future elect to manufacture certain of our drug candidates in our own manufacturing facilities. If we do so, we will require substantial additional funds and need to recruit qualified personnel in order to build or lease and operate any manufacturing facilities.

There are underlying risks associated with the manufacture of our drug candidates, which have never been manufactured in large scale. Furthermore, we anticipate continued reliance on third-party manufacturers if we are successful in obtaining marketing approval from the FDA or other regulatory agencies for any of our drug candidates.

To date, our drug candidates have been manufactured in relatively small quantities for preclinical testing and clinical trials by third-party manufacturers, and have never been manufactured in large scale. Additionally, as in the development of any new compound, there are underlying risks associated with their manufacture. These risks include, but are not limited to, cost, process scale-up, process reproducibility, construction of a suitable process plant, timely availability of raw materials, as well as regulatory issues associated with the manufacture of an active pharmaceutical agent. Any of these risks may prevent us from successfully developing our drug candidates. Our failure, or the failure of our third-party manufacturers to achieve and maintain these high manufacturing standards, including the incidence of manufacturing errors and reliable product packaging for diverse environmental conditions, could result in patient injury or death, product recalls or withdrawals, delays or failures in product testing or delivery, cost overruns or other problems that could materially adversely affect our business and financial condition.

If the FDA or other regulatory agencies approve any of our drug candidates for commercial sale, we expect that we would continue to rely, at least initially, on third-party manufacturers to produce commercial quantities of such approved drug candidates. These manufacturers may not be able to successfully increase the manufacturing capacity for any of our approved drug candidates in a timely or economic manner, or at all. Significant scale-up of manufacturing may require additional validation studies, which the FDA or other regulatory authorities must review and approve. If our third-party manufacturers are unable to successfully increase the manufacturing capacity for a drug candidate, or we are unable to establish our own manufacturing capabilities, the commercial launch of any approved products may be delayed or there may be a shortage in supply.

Identification of previously unknown problems with respect to a drug candidate, manufacturer or facility may result in restrictions on the drug candidate, manufacturer or facility.

The FDA stringently applies regulatory standards for the manufacturing of our drug candidates. Identification of previously unknown problems with respect to a drug candidate, manufacturer or facility may result in restrictions on the drug candidate, manufacturer or facility, including warning letters, suspensions of regulatory approvals, operating restrictions, delays in obtaining new product approvals, withdrawal of the product from the market, product recalls, fines, injunctions and criminal prosecution. Any of the foregoing could have a material adverse effect on our business and financial condition.

We may experience delays in the development of our drug candidates if the third-party manufacturers of our drug candidates cannot meet FDA requirements relating to current Good Manufacturing Practices.

Our third-party manufacturers are required to produce our drug candidates under FDA cGMP in order to meet acceptable standards for our preclinical testing and clinical trials. If such standards change, the ability of third-party manufacturers to produce our drug candidates on the schedule we require for our preclinical tests and clinical trials may be affected. In addition, third-party manufacturers may not perform their obligations under their agreements with us or may discontinue their business before the time required by us to gain approval for or commercialize our drug candidates. Any difficulties or delays in the manufacturing and supply of our drug candidates could increase our costs or cause us to lose revenue or postpone or cancel clinical trials.

The FDA also requires that we demonstrate structural and functional comparability between the same drug candidate produced by different third-party manufacturers. Because we may use multiple sources to manufacture our drug candidates, we may need to conduct comparability studies to assess whether manufacturing changes have affected the safety, identity, purity or potency of any drug candidate compared to the drug candidate produced by another manufacturer. If we are unable to demonstrate comparability, the FDA could require us to conduct additional clinical trials, which would be expensive and significantly delay commercialization of our drug candidates.

Risks Related to Commercialization

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

We have no commercial products, and we do not currently have an organization for the sales and marketing of pharmaceutical products. In order to successfully commercialize any drug candidates that may be approved in the future by the FDA or comparable foreign regulatory authorities, we must build our sales and marketing capabilities or make arrangements with third parties to perform these services. For certain drug candidates in selected indications where we believe that an approved product could be commercialized by a specialty sales force that calls on a limited but focused group of physicians, we may commercialize these products ourselves. However, in therapeutic indications that require a large sales force selling to a large and diverse prescribing population, we may enter into arrangements with other companies for commercialization. If we are unable to establish adequate sales, marketing and distribution capabilities, whether independently or with third parties, we may not be able to generate product revenue and may not become profitable.

If our future drugs do not achieve market acceptance, we may be unable to generate significant revenue, if any.

Even if our drug candidates obtain regulatory approval, they may not gain market acceptance among physicians, health care payors, patients and the medical community. Factors that we believe could materially affect market acceptance of our drug candidates include:

- the timing of market introduction of competitive drugs;
- the demonstrated clinical safety and efficacy of our drug candidates compared to other drugs and other drug candidates;
- the suitability of our drug candidates to be co-administered or combined with other drugs or drug candidates;
- the durability of our drug candidates in their ability to prevent the emergence of drug-resistant viral mutants;
- the convenience and ease of administration of our drug candidates;

- the existence, prevalence and severity of adverse side effects;

- other potential advantages of alternative treatment methods;

- the effectiveness of marketing and distribution support;

- the cost-effectiveness of our drug candidates; and

- the availability of reimbursement from managed care plans, the government and other third-party payors.

If our approved drug candidates fail to achieve market acceptance, we would not be able to generate significant revenue. In addition, even if our approved drug candidates achieve market acceptance, we may not be able to maintain that market acceptance over time if:

- new products or technologies are introduced that are more favorably received than our products, are more cost effective or render our products obsolete;

- unforeseen complications arise with respect to the use of our products; or

- sufficient third-party insurance coverage or reimbursement does not remain available.

If third-party payors do not adequately reimburse patients for any of our drug candidates that are approved for marketing, they might not be purchased or used, and our revenues and profits will not develop or increase.

Our revenues and profits will depend significantly upon the availability of adequate reimbursement for the use of any approved drug candidates from governmental and other third-party payors, both in the U.S. and in foreign markets. Reimbursement by a third party may depend upon a number of factors, including the third-party payor's determination that use of an approved drug candidate is:

·a covered benefit under its health plan;

·safe, effective and medically necessary;

·appropriate for the specific patient;

·cost effective; and

·neither experimental nor investigational.

The regulations that govern marketing approvals, pricing and reimbursement for new therapeutic and diagnostic products vary widely from country to country. Some countries require approval of the sale price of a drug candidate before it can be marketed. In many countries, the pricing review period begins after marketing or product licensing approval is granted. In some foreign markets, prescription pharmaceutical pricing remains subject to continuing governmental control even after initial approval is granted. As a result, we might obtain regulatory approval for a drug candidate in a particular country, but then be subject to price regulations that delay our commercial launch of the approved drug and negatively impact the revenues we are able to generate from the sale of the approved drug in that country. Adverse pricing limitations may hinder our ability to recoup our investment in one or more drug candidates, even if our drug candidates obtain regulatory approval.

Obtaining reimbursement approval for an approved drug from each third-party and government payor is a time-consuming and costly process that could require us to provide supporting scientific, clinical and cost-effectiveness data for the use of any approved drug candidates to each payor. We may not be able to provide data sufficient to gain acceptance with respect to reimbursement. There also exists substantial uncertainty concerning third-party reimbursement for the use of any approved drug incorporating new technology, and even if determined eligible, coverage may be more limited than the purposes for which the drug is approved by the FDA. Moreover, eligibility for coverage does not imply that any approved drug will be reimbursed in all cases or at a rate that allows us to make a profit or even cover our costs. Interim payments for new products, if applicable, may also be insufficient to

cover our costs and may not be made permanent. Reimbursement rates may vary according to the use of the approved drugs and the clinical setting in which it is used, may be based on payments allowed for lower-cost products or combinations of products that are already reimbursed, may be incorporated into existing payments for other products or services, and may reflect budgetary constraints and/or imperfections in Medicare or Medicaid data used to calculate these rates. Net prices for products may be reduced by mandatory discounts or rebates required by government health care programs or by any future relaxation of laws that restrict imports of certain medical products from countries where they may be sold at lower prices than in the U.S.

In the U.S., at both the federal and state levels, the government regularly proposes legislation to reform health care and its cost, and such proposals have received increasing political attention. In 2010, Congress passed legislation to reform the U.S. health care system by expanding health insurance coverage, reducing health care costs and making other changes. While health care reform may increase the number of patients who have insurance coverage for the use of any approved drug, it may also include changes that adversely affect reimbursement for approved drugs. In addition, there has been, and we expect that there will continue to be, federal and state proposals to constrain expenditures for medical products and services, which may affect payments for any of our drug candidates that obtain approval. The Centers for Medicare and Medicaid Services frequently change product descriptors, coverage policies, product and service codes, payment methodologies and reimbursement values. Third-party payors often follow Medicare coverage policy and payment limitations in setting their own reimbursement rates and may have sufficient market power to demand significant price reductions. As a result of actions by these third-party payors, the health care industry is experiencing a trend toward containing or reducing costs through various means, including lowering reimbursement rates, limiting therapeutic class coverage and negotiating reduced payment schedules with service providers for drug products.

Our inability to promptly obtain coverage and profitable reimbursement rates from government-funded and private payors for any of our drug candidates that obtain approval could have a material adverse effect on our business and financial condition.

Risks Related to Intellectual Property

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

Our patent portfolio currently includes an issued patent (No. 9,744,187) in the U.S. that covers the manufacturing method, formulation and antisense composition for new targets in preclinical development, a patent pending for combinations of antisense drugs with frontline therapeutics, and four additional pending patents for composition and methods of use of specific drug targets. We announced on July 19, 2017 that the USPTO issued a notice of allowance for claims related to DNAbilize®, including its use in the treatment of cancers, autoimmune diseases and infectious diseases. Our success depends in large part on our ability to obtain and maintain patent protection both in the U.S. and in other countries for our drug candidates. Our ability to protect our drug candidates from unauthorized or infringing use by third parties depends in substantial part on our ability to obtain and maintain valid and enforceable patents. Due to evolving legal standards relating to the patentability, validity and enforceability of patents covering pharmaceutical inventions and the scope of claims made under these patents, our ability to maintain, obtain and enforce patents is uncertain and involves complex legal and factual questions. Accordingly, rights under any issued patents may not provide us with sufficient protection for our drug candidates or provide sufficient protection to afford us a commercial advantage against competitive products or processes. We cannot guarantee that any patents will issue from any pending or future patent applications owned by or licensed to us.

Even if patents have issued or will issue, we cannot guarantee that the claims of these patents are or will be valid or enforceable or will provide us with any significant protection against competitive products or otherwise be commercially valuable to us. Patent applications in the U.S. are maintained in confidence for up to 18 months after their filing. In some cases, however, patent applications remain confidential in the USPTO for the entire time prior to issuance as a U.S. patent. Similarly, publication of discoveries in the scientific or patent literature often lags behind actual discoveries. Consequently, we cannot be certain that we or our licensors were the first to invent, or the first to file patent applications on, our drug candidates. The costs of these proceedings could be substantial and it is possible that our efforts would be unsuccessful, resulting in a loss of our U.S. patent position. Furthermore, we may not have identified all U.S. and foreign patents or published applications that affect our business either by blocking our ability to commercialize our drugs or by covering similar technologies that affect our drug market.

The claims of the issued patents that are licensed to us, and the claims of any patents which may issue in the future and be owned by or licensed to us, may not confer on us significant commercial protection against competing products. Additionally, our patents may be challenged by third parties, resulting in the patent being deemed invalid, unenforceable or narrowed in scope, or the third party may circumvent any such issued patents. Our patents might not contain claims that are sufficiently broad to prevent others from utilizing our technologies. Consequently, our competitors may independently develop competing products that do not infringe our patents or other intellectual property. To the extent a competitor can develop similar products using a different molecule, our patents may not prevent others from directly competing with us.

The laws of some foreign jurisdictions do not protect intellectual property rights to the same extent as in the U.S. and many companies have encountered significant difficulties in protecting and defending such rights in foreign jurisdictions. If we encounter such difficulties in protecting or are otherwise precluded from effectively protecting our intellectual property rights in foreign jurisdictions, our business prospects could be substantially harmed.

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

The Leahy-Smith America Invents Act (the “America Invents Act”) was signed into law in September 2011, and many of the substantive changes became effective in March 2013. The America Invents Act reforms U.S. patent law in part by changing the standard for patent approval from a “first to invent” standard to a “first to file” standard and developing a post-grant review system. This legislation changes U.S. patent law in a way that may weaken our ability to obtain patent protection in the U.S. for those applications filed after March 2013.

If any third-party owners of intellectual property we may license in the future do not properly maintain or enforce the patents underlying such licenses, our competitive position and business prospects will be harmed.

We may enter into licenses for third-party intellectual property in the future. Our success will depend in part on the ability of our licensors to obtain, maintain and enforce patent protection for their intellectual property, in particular, those patents to which we have secured exclusive rights. If applicable, our licensors may not successfully prosecute the patent applications to which we are licensed. Even if patents issue in respect of any such patent applications, our licensors may fail to maintain these patents, may determine not to pursue litigation against other companies that are infringing these patents, or may pursue such litigation less aggressively than we would. In addition, our licensors may terminate their agreements with us in the event we breach the applicable license agreement and fail to cure the breach within a specified period of time. Without protection for the intellectual property we license, other companies might be able to offer substantially identical products for sale, which could materially adversely affect our competitive business position, business prospects and financial condition.

Because our research and development of drug candidates incorporates compounds and other information that is the intellectual property of third parties, we depend on continued access to such intellectual property to conduct and complete our preclinical and clinical research and commercialize the drug candidates that result from this research. We expect that future licenses would impose, numerous obligations on us. For example, under our existing and future license agreements, we may be required to pay (i) annual maintenance fees until a drug candidate is sold for the first time, (ii) running royalties on net sales of drug candidates, (iii) minimum annual royalties after a drug candidate is sold for the first time, and (iv) one-time payments upon the achievement of specified milestones. We may also be required to reimburse patent costs incurred by the licensor, or we may be obligated to pay additional royalties, at specified rates, based on net sales of our drug candidates that incorporate the licensed intellectual property rights. We may also be obligated under some of these agreements to pay a percentage of any future sublicensing revenues that we may receive. Future license agreements may also include payment obligations such as milestone payments or minimum expenditures for research and development. We expect that any future licenses would contain reporting, insurance and indemnification requirements.

Our patent portfolio currently includes an issued patent (No. 9,744,187) in the U.S. that covers the manufacturing method, formulation and antisense composition for new targets in preclinical development, a patent pending for combinations of antisense drugs with frontline therapeutics, and four additional pending patents for composition and methods of use of specific drug targets. We announced on July 19, 2017 that the USPTO issued a notice of allowance for claims related to DNAbilize®, including its use in the treatment of cancers, autoimmune diseases and infectious diseases. We are actively reviewing and preparing additional patent applications to expand our patent portfolio, but there can be no assurances that patents related to our existing patent applications or any applications we may file in the future will be issued or that any issued patents will provide meaningful protection for our drug candidates, which could materially adversely affect our competitive business position, business prospects and financial condition.

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

Our research, development and commercialization activities, including any drug candidates resulting from these activities, may infringe or be claimed to infringe patents or other proprietary rights owned by third parties and to which we do not hold licenses or other rights. There may be applications that have been filed but not published that, if issued, could be asserted against us. If a patent infringement suit were brought against us, we could be forced to stop or delay research, development or manufacturing of drug candidate that is the subject of the suit. Further, if we are found to have infringed a third- party patent, we could be obligated to pay royalties and/or other payments to the third party related to our drug candidates, which may be substantial, or we could be enjoined from selling our drug candidates that obtain approval.

There has been substantial litigation and other proceedings regarding patent and other intellectual property rights in the pharmaceutical and biotechnology industries. In addition to infringement claims against us, we may become a party to other patent litigation and other proceedings, including interference proceedings declared by the USPTO and opposition proceedings in the European Patent Office, regarding intellectual property rights with respect to our drug candidates and technology. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could have a material adverse effect on our business and financial condition.

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

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

· the patentability of our inventions relating to our drug candidates; and/or

· the enforceability, validity or scope of protection offered by our patents relating to our drug candidates.

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

· incur substantial monetary damages;

· encounter significant delays in bringing our drug candidates to market; and/or

· be precluded from participating in the manufacture, use or sale of our drug candidates or methods of treatment requiring licenses.

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

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

We rely on trade secrets to protect our technology, especially where we do not believe patent protection is appropriate or obtainable. However, trade secrets are difficult to protect. In order to protect our proprietary technology and processes, we also rely in part on confidentiality and intellectual property assignment agreements with our corporate partners, employees, consultants, outside scientific collaborators and sponsored researchers and other advisors. These agreements may not effectively prevent disclosure of confidential information nor result in the effective assignment to us of intellectual property, and may not provide an adequate remedy in the event of unauthorized disclosure of confidential information or other breaches of the agreements. In addition, others may independently discover our trade secrets and proprietary information, and in such case we could not assert any trade secret rights against such party.

Enforcing a claim that a party illegally obtained and is using our trade secrets is difficult, expensive and time-consuming, and the outcome is unpredictable. In addition, courts outside the U.S. may be less willing to protect trade secrets. Costly and time-consuming litigation could be necessary to seek to enforce and determine the scope of our proprietary rights, and failure to obtain or maintain trade secret protection could materially adversely affect our business and financial condition.

Risks Related to Our Securities

Raising additional capital may cause dilution to existing stockholders, restrict our operations or require us to relinquish rights. Additionally, sales of a substantial number of shares of our common stock or other securities in the public market could cause our stock price to fall.

We may seek the additional capital necessary to fund our operations through public or private equity offerings, collaboration agreements, debt financings or licensing arrangements. To the extent that we raise additional capital through the sale of equity or convertible debt securities, existing stockholders' ownership interests will be diluted and the terms may include liquidation or other preferences that adversely affect their rights as a stockholder. Debt financing, if available, may involve agreements that include covenants limiting or restricting our ability to take specific actions such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through collaboration or licensing arrangements with third parties, we may have to relinquish valuable rights to our technologies or drug candidates, or grant licenses on terms that are not favorable to us. In addition, sales of a substantial number of shares of our common stock or other securities 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.

The trading price of our common stock has been volatile and is likely to be volatile in the future.

The trading price of our common stock has been highly volatile. On March 10, 2014, our common stock ceased trading on the OTCQX and commenced trading on The Nasdaq Capital Market, and there is a limited history on which to gauge the volatility of our stock price on The Nasdaq Capital Market. From January 1, 2016 through December 31, 2018, our stock price has fluctuated from a low of $3.00 to a high of $638.00, after adjustment for the 1-for-20 reverse stock split that occurred effective as of 5:00 p.m. Eastern Time on January 17, 2019. The market price for our common stock will be affected by a number of factors, including:

- the denial or delay of regulatory approvals of our drug candidates or receipt of regulatory approval of competing products;
- our ability to accomplish clinical, regulatory and other drug development milestones;
- the ability of our drug candidates, if they receive regulatory approval, to achieve market success;
- the performance of third-party manufacturers and suppliers;
- developments with respect to patents and other intellectual property rights;
- sales of common stock or other securities by us or our stockholders in the future;
- additions or departures of key scientific or management personnel;
- disputes or other developments relating to proprietary rights, including patents, litigation matters and our ability to obtain patent protection for our drug candidates;
- trading volume of our common stock;
- investor perceptions about us and our industry;
- public reaction to our press releases, other public announcements and SEC and other filings;

- the failure of analysts to cover us, or changes in analysts' estimates or recommendations;

- the failure by us to meet analysts' projections or guidance;

- general market conditions and other factors unrelated to our operating performance or the operating performance of our competitors; and

- the other factors described elsewhere in this "Item 1A. Risk Factors" or the section titled "Risk Factors" contained in our other public filings.

The stock prices of many companies in the biotechnology industry have experienced wide fluctuations that have often been unrelated to the operating performance of these companies. Following periods of volatility in the market price of a company's securities, securities class action litigation often has been initiated against a company. If any class action litigation is initiated against us, we may incur substantial costs and our management's attention may be diverted from our operations, which could materially adversely affect our business and financial condition.

Our common stock is thinly traded and in the future may continue to be thinly traded, and our stockholders may be unable to sell at or near asking prices or at all if they need to sell their shares to raise money or otherwise desire to liquidate such shares.

To date, we have a low volume of daily trades in our common stock on The Nasdaq Capital Market. Our stockholders may be unable to sell their common stock at or near their asking prices or at all, which may result in substantial losses to our stockholders.

The market for our common stock may be characterized by significant price volatility when compared to seasoned issuers, and we expect that our share price will be more volatile than a seasoned issuer for the foreseeable future. As noted above, our common stock may be sporadically and/or thinly traded. As a consequence of this lack of liquidity, the trading of relatively small quantities of shares by our stockholders may disproportionately influence the price of those shares in either direction. The liquidity of the shares of our common stock may be further affected adversely by the 1-for-20 reverse stock split that we implemented effective as of 5:00 p.m. Eastern Time on January 17, 2019, due to the reduced number of shares that are outstanding.

Our certificate of incorporation grants our Board of Directors the power to designate and issue additional shares of common and/or preferred stock.

Our authorized capital consists of 200,000,000 shares of common stock and 10,000,000 shares of preferred stock. Our preferred stock may be designated into series pursuant to authority granted by our certificate of incorporation, and on approval from our Board of Directors (the "Board"). The Board, without any action by our stockholders, may designate and issue shares in such classes or series as the Board deems appropriate and establish the rights, preferences and privileges of such shares, including dividends, liquidation and voting rights. The rights of holders of other classes or series of stock that may be issued could be superior to the rights of holders of our common shares. The designation and issuance of shares of capital stock having preferential rights could adversely affect other rights appurtenant to shares of our common stock.

We do not anticipate paying cash dividends, and accordingly stockholders must rely on stock appreciation for any return on their investment in us.

We anticipate that we will retain our earnings, if any, for future growth and therefore do not anticipate paying cash dividends in the future. As a result, only appreciation of the price of our common stock will provide a return to stockholders.

Our management is required to devote substantial time and incur additional expense to comply with public company regulations.

As a public reporting company, we are subject to the Sarbanes-Oxley Act of 2002, as well as to the information and reporting requirements of the SEC and other federal securities laws. We are also subject to the rules of The Nasdaq Stock Market. As a result, we incur significant legal, accounting, and other expenses that we would not incur as a private company, including costs associated with our public company reporting requirements and corporate governance requirements. Compliance with these public company obligations places significant additional demands

on our limited number of finance and accounting staff and on our financial, accounting and information systems.

We have identified a material weakness in our internal control over financial reporting that, if not properly remediated, could result in us being unable to provide required financial information in a timely and reliable manner, which may cause investors to lose confidence in our reported financial information and may lead to a decline in our stock price.

Our management has identified a material weakness in our internal control over financial reporting as of December 31, 2018 relating to the design of our controls to prevent a misstatement resulting from the information and communication between our clinical and finance personnel as it relates to an input for our clinical trial expense accrual. A material weakness is a deficiency, or combination of deficiencies, in internal controls over financial reporting that results in a reasonable possibility that a material misstatement of our annual or interim financial statements will not be prevented or detected on a timely basis. For further discussion of our internal control over financial reporting, a description of the identified material weakness and a summary of the remediation efforts we are implementing, see “Item 9A. Controls and Procedures.”

If we are not able to remediate the material weakness in a timely manner, or if additional material weaknesses in our internal control over financial reporting are discovered or occur in the future, we may be unable to provide required financial information in a timely and reliable manner, which may cause investors to lose confidence in our reported financial information and may lead to a decline in our stock price.

Our common stock may be delisted from The Nasdaq Capital Market which could negatively impact the price of our common stock and our ability to access the capital markets.

The listing standards of The Nasdaq Capital Market provide that a company, in order to qualify for continued listing, must maintain a minimum stock price of $1.00 and satisfy standards relative to minimum stockholders’ equity, minimum market value of publicly held shares and various additional requirements. If we fail to comply with all listing standards applicable to issuers listed on The Nasdaq Capital Market, our common stock may be delisted. If our common stock is delisted, it could reduce the price of our common stock and the levels of liquidity available to our stockholders. In addition, the delisting of our common stock could materially adversely affect our access to the capital markets and any limitation on liquidity or reduction in the price of our common stock could materially adversely affect our ability to raise capital. Delisting from The Nasdaq Capital Market could also result in other negative consequences, including the potential loss of confidence by suppliers, customers and employees, the loss of institutional investor interest and fewer business development opportunities.

In the past, we have received a notice of non-compliance from the Listing Qualifications Department of The Nasdaq Stock Market LLC with respect to the $1.00 minimum closing bid price requirement. Although we regained compliance with the minimum closing bid price requirement after implementing a 1-for-20 reserve stock split effective as of 5:00 p.m. Eastern Time on January 17, 2019, there can be no assurance that we will be able to meet the

minimum closing bid price requirement or other listing requirements in the future.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

We currently lease approximately 3,000 square feet of office space for general and administrative purposes in Bellaire, Texas, which is part of the Houston metropolitan area, under a lease agreement that expires on July 31, 2019.

In April 2016, we entered into a lease agreement for approximately 2,100 square feet of lab space located in Bellaire, Texas for research and development purposes. The term of the lease began on May 1, 2016 and was scheduled to terminate on April 30, 2019. In December 2018, we entered into an amendment to the lease agreement to extend the term of the lease to April 30, 2022.

We do not own or lease any other real property that is materially important to our business. We believe that our current facilities are adequate for our current needs and that additional space will be available when and as needed.

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

Our common stock is listed on The Nasdaq Capital Market under the symbol "BPTH."

Holders

As of March 15, 2019, there were 2,507,239 shares of our common stock outstanding and approximately 231 stockholders of record.

Dividends

We have not paid any cash dividends since our inception and do not anticipate or contemplate paying dividends in the foreseeable future.

Unregistered Sales of Equity Securities and Use of Proceeds

None.

Purchases of Equity Securities by the Issuer and Affiliated Purchasers

None.

ITEM 6. SELECTED CONSOLIDATED FINANCIAL DATA

Not applicable.

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

In addition to historical information, this Annual Report on Form 10-K contains forward-looking statements that involve significant risks and uncertainties, which may cause our actual results to differ materially from plans and results discussed in forward-looking statements. We encourage you to review the risks and uncertainties, discussed in "Item 1A. Risk Factors" and "Cautionary Note Regarding Forward-Looking Statements," included elsewhere in this Annual Report on Form 10-K. The risks and uncertainties can cause actual results to differ significantly from those forecasted in forward-looking statements or implied in historical results and trends.

The following discussion of our financial condition and results of operations should be read in conjunction with our financial statements and related notes included elsewhere in this Annual Report on Form 10-K.

Overview

We are a clinical and preclinical stage oncology focused RNAi nanoparticle drug development company utilizing a novel technology that achieves systemic delivery for target specific protein inhibition for any gene product that is over-expressed in disease. Our drug delivery and antisense technology, called DNAbilize®, is a platform that uses P-ethoxy, which is a DNA backbone modification that is intended to protect the DNA from destruction by the body's enzymes when circulating *in vivo,* incorporated inside of a neutral charged lipid bilayer. We believe this combination allows for high efficiency loading of antisense DNA into non-toxic, cell-membrane-like structures for delivery of the antisense drug substance into cells. *In vivo,* the DNAbilize® delivered antisense drug substances are systemically distributed throughout the body to allow for reduction or elimination of proteins in blood diseases and solid tumors. DNAbilize® is a registered trademark of the Company.

Using DNAbilize® as a platform for drug development and manufacturing, we currently have three antisense drug candidates in development to treat at least five different cancer disease indications. Our lead drug candidate, prexigebersen (pronounced prex" i je ber' sen), is in the efficacy portion of a Phase 2 clinical trial for AML in combination with LDAC and in combination with decitabine. On March 6, 2019, we announced intended amendments to this Phase 2 clinical trial to, among other things, add prexigebersen in combination with decitabine for MDS and close prexigebersen in combination with LDAC. In addition, preclinical efficacy studies are underway for triple combination prexigebersen, decitabine and Venclexta in AML. Prexigebersen is also being studied in the safety portion of a Phase 2a clinical trial for CML in combination with dasatinib. Prexigebersen was shown to enhance chemotherapy efficacy in preclinical solid tumor models, and we intend to file an IND application for prexigebersen in solid tumors in 2019.

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Our second drug candidate, BP1002, targets the protein Bcl-2, which is responsible for driving cell survival in up to 60% of all cancers. We are currently preparing an IND application for BP1002 in addition to completing additional IND enabling studies. We intend to initiate a Phase 1 clinical trial of BP1002 in refractory/relapsed lymphoma and CLL patients once we receive approval from FDA.

Our third drug candidate, BP1003, targets the Stat3 protein and is currently in preclinical development in a pancreatic patient derived tumor model. Preclinical models have shown BP1003 to successfully penetrate pancreatic tumors and to significantly enhance the efficacy of standard frontline treatments. Our lead indication for BP1003 is pancreatic cancer due to the severity of this disease and the lack of effective, life-extending treatments. We intend to initiate IND enabling studies of BP1003 in 2019.

Our DNAbilize® technology-based products are available for out-licensing or partnering. We intend to apply our drug delivery technology template to new disease-causing protein targets as a means to develop new nanoparticle antisense RNAi drug candidates. We have a new product identification template in place to define a process of scientific, preclinical, commercial and intellectual property evaluation of potential new drug candidates for inclusion into our drug product development pipeline. As we expand, we will look at indications where a systemic delivery is needed and antisense RNAi nanoparticles can be used to slow, reverse or cure a disease, either alone or in combination with another drug. On July 19, 2017, we announced that the USPTO issued a notice of allowance for claims related to DNAbilize®, including its use in the treatment of cancers, autoimmune diseases and infectious diseases.

We have certain intellectual property as the basis for our current drug products in clinical development, prexigebersen, BP1002 and BP1003. We are developing RNAi antisense nanoparticle drug candidates based on our own patented technology to treat cancer and autoimmune disorders where targeting a single protein may be advantageous and result in reduced patient adverse effects as compared to small molecule inhibitors with off-target and non-specific effects. We have composition of matter and method of use intellectual property for the design and manufacture of antisense RNAi nanoparticle drug products.

On January 14, 2019, we entered into an underwriting agreement with H.C. Wainwright & Co., LLC relating to an underwritten public offering of 429,616 shares of our common stock for gross proceeds of approximately $1.1 million under our shelf registration statement on Form S-3 (File No. 333-215205), which became effective on January 9, 2017 (the “2019 Underwritten Offering”). The offering price to the public in the 2019 Underwritten Offering was $2.60 per share, and H.C. Wainwright & Co., LLC agreed to purchase the shares in the 2019 Underwritten Offering from the Company pursuant to the underwriting agreement at a price of $2.418 per share. Additionally, we issued warrants to purchase up to 25,777 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as underwriter in connection with the 2019 Underwritten Offering. The 2019 Underwritten Offering closed on January 17, 2019. The net proceeds to the Company from the 2019 Underwritten Offering, after deducting the underwriting discounts and commissions and expenses and the Company’s estimated offering expenses, and excluding the proceeds, if any, from the exercise of the underwriter warrants, were

approximately $0.9 million.

On January 18, 2019, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell, in a registered direct offering, an aggregate of 648,233 shares of our common stock for gross proceeds of approximately $1.7 million under our effective shelf registration statement on Form S-3 (File No. 333-215205), which became effective on January 9, 2017 (the "January 2019 Registered Direct Offering"). In a concurrent private placement, we also agreed pursuant to the securities purchase agreement to issue to such investors Series A warrants to purchase up to 324,117 shares of our common stock (the "January 2019 Private Placement"). Additionally, we issued warrants to purchase up to 38,894 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as a placement agent in connection with the January 2019 Registered Direct Offering and the January 2019 Private Placement. The January 2019 Registered Direct Offering and the January 2019 Private Placement closed on January 23, 2019. The net proceeds to the Company from the offerings, after deducting the placement agent's fees and expenses, our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offerings, were approximately $1.5 million.

On March 12, 2019, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell, in a registered direct offering, an aggregate of 712,910 shares of our common stock for gross proceeds of approximately $18.5 million under our effective shelf registration statement on Form S-3 (File No. 333-215205), which became effective on January 9, 2017 (the "March 2019 Registered Direct Offering"). Additionally, we issued warrants to purchase up to 42,775 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as a placement agent in connection with the March 2019 Registered Direct Offering. The March 2019 Registered Direct Offering closed on March 14, 2019. The net proceeds to us from the offerings, after deducting the placement agent's fees and expenses, our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offerings, were approximately $17.0 million.

As of December 31, 2018, we had an accumulated deficit of $47.7 million. Our net loss was $8.6 million and $7.0 million for the years ended December 31, 2018 and 2017, respectively. We expect to continue to incur significant operating losses and we anticipate that our losses may increase substantially as we expand our drug development programs and commercialization efforts. To achieve profitability, we must enter into license or development agreements with third parties, or successfully develop and obtain regulatory approval for one or more of our drug candidates and effectively commercialize any drug candidates we develop. In addition, if we obtain regulatory approval of one or more of our drug candidates, we expect to incur significant commercialization expenses related to product sales, marketing, manufacturing and distribution. Even if we succeed in developing and commercializing one or more of our drug candidates, we may not be able to generate sufficient revenue and we may never be able to achieve or sustain profitability. We expect to finance our foreseeable cash requirements through cash on hand, cash from operations, debt financings and public or private equity offerings. We may seek to access the public or private equity markets whenever conditions are favorable; however, there can be no assurance that we will be able to raise additional capital when needed or on terms that are favorable to us, if at all. Additionally, we may seek collaborations and license arrangements for our drug candidates. We currently have no lines of credit or other arranged access to debt financing.

Financial Operations Overview

Revenue

We have not generated significant revenues to date. Our ability to generate revenues from our drug candidates, which we do not expect will occur for many years, if ever, will depend heavily on the successful development and eventual commercialization of our drug candidates.

In the future, we may generate revenue from a combination of product sales, third-party grants, service agreements, strategic alliances and licensing arrangements. We expect that any revenue we generate will fluctuate due to the timing and amount of services performed, milestones achieved, license fees earned and payments received upon the eventual sales of our drug candidates, in the event any are successfully commercialized. If we fail to complete the development of any of our drug candidates or obtain regulatory approval for them, our ability to generate future revenue will be adversely affected.

Research and development expenses

Research and development expenses consist of costs associated with our research activities, including the development of our drug candidates. Our research and development expenses consist of:

- expenses related to research and development personnel, including salaries and benefits, travel and stock-based compensation;

- external research and development expenses incurred under arrangements with third parties, such as contract research organizations, clinical investigative sites, laboratories, manufacturing organizations and consultants;

- license fees; and

- costs of materials used during research and development activities.

Costs and expenses that can be clearly identified as research and development are charged to expense as incurred in accordance with generally accepted accounting policies ("GAAP"). Advance payments, including nonrefundable amounts, for goods or services that will be used or rendered for future research and development activities are deferred and capitalized. Such amounts will be recognized as an expense as the related goods are delivered or the related services are performed. If the goods will not be delivered, or services will not be rendered, then the capitalized advance payment is charged to expense.

We expect research and development expenses associated with the completion of the associated clinical trials to be substantial and to increase over time. The successful development of our drug candidates is highly uncertain. At this time, we cannot reasonably estimate or know the nature, timing and estimated costs of the efforts that will be necessary to complete development of our drug candidates or the period, if any, in which material net cash inflows from our drug candidates may commence. This is due to the numerous risks and uncertainties associated with developing drugs, including the uncertainty of:

- the rate of progress, results and costs of completion of ongoing clinical trials of our drug candidates;

- the size, scope, rate of progress, results and costs of completion of any potential future clinical trials and preclinical trials of our drug candidates that we may initiate;

- competing technological and market developments;

- the performance of third-party manufacturers and suppliers;

- the ability of our drug candidates, if they receive regulatory approval, to achieve market success; and

- disputes or other developments relating to proprietary rights, including patents, litigation matters and our ability to obtain patent protection for our drug candidates.

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

General and administrative expenses

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

Results of Operations

Comparisons of the Year Ended December 31, 2018 to the Year Ended December 31, 2017

Revenue. We had no revenue for the year ended December 31, 2018. We had $37,000 revenue in the year ended December 31, 2017. The decrease in revenue represents the completion in 2017 of a fixed fee service agreement with a preclinical stage biotechnology company in connection with a development project involving our DNAbilize® technology. Payments received prior to the Company’s performance of work are recorded as deferred revenue and recognized as revenue once the work is performed.

Research and Development Expenses. Our research and development expense was $4.6 million for the year ended December 31, 2018, a decrease of $0.9 million compared to the year ended December 31, 2017. The decrease in

research and development expense was primarily due to decreased salaries and benefits expense. The following table sets forth our research and development expenses (in thousands):

	Year ended December 31,	
	2018	2017
Research and development expense	$4,522	$5,162
Non-cash stock-based compensation expense	81	318
Total research and development expense	$4,603	$5,480

General and Administrative Expenses. Our general and administrative expense was $3.4 million for the year ended December 31, 2018, a decrease of $0.1 million compared to the year ended December 31, 2017. The decrease in general and administrative expense was primarily due to decreased professional and consulting fees. The following table sets forth our general and administrative expenses (in thousands):

	Year ended December 31,	
	2018	2017
General and administrative expense	$2,906	$3,048
Non-cash stock-based compensation expense	473	475
Total general and administrative expense	$3,379	$3,523

Impairment of Technology License. We recorded an impairment of our technology license of $0.6 million for the year ended December 31, 2018. There were no technology license impairments for the year ended December 31, 2017.

Net Operating Loss. Our net loss from operations was $8.6 million for the year ended December 31, 2018, a decrease of $0.4 million compared to the year ended December 31, 2017.

Change in Fair Value of Warrant Liability. There was no outstanding warrant liability in 2018. The change in fair value of the warrant liability for the year ended December 31, 2017 resulted in non-cash income of $2.4 million.

Loss on Extinguishment of Warrant Liability. There was no outstanding warrant liability in 2018. The loss on extinguishment of the warrant liability for the year ended December 31, 2017 resulted in a non-cash loss of $0.4 million.

Net Loss. Our net loss for the year ended December 31, 2018 was $8.6 million, an increase of $1.6 million compared to the year ended December 31, 2017.

Deemed Dividend Related to Warrant Conversion. The Company did not have a deemed dividend for the year ended December 31, 2018. The deemed dividend related to the warrant conversion was $1.0 million for the year ended December 31, 2017.

Net Loss Attributable to Common Stockholders. Our net loss attributable to common stockholders for the year ended December 31, 2018 was $8.6 million, an increase of $0.5 million compared to the year ended December 31, 2017.

Net Loss per Share. Net loss per share, both basic and diluted, was $14.38 per share for the year ended December 31, 2018, compared to $15.99 per share for the year ended December 31, 2017. Net loss per share is calculated using the weighted average number of shares of common stock outstanding during the applicable periods and excludes stock options and warrants because they are antidilutive.

Liquidity and Capital Resources

Overview

We have not generated significant revenues to date. Since our inception, we have funded our operations primarily through public and private offerings of our capital stock and other securities. We expect to finance our foreseeable cash requirements through cash on hand, cash from operations, debt financings and public or private equity offerings. We may seek to access the public or private equity markets whenever conditions are favorable; however, there can be no assurance that we will be able to raise additional capital when needed or on terms that are favorable to us, if at all. Additionally, we may seek collaborations and license arrangements for our drug candidates. We currently have no lines of credit or other arranged access to debt financing.

We had a cash balance of $1.0 million at December 31, 2018, a decrease of $5.0 million compared to December 31, 2017. We believe that our available cash, together with the net proceeds received from the 2019 Underwritten Offering of $0.9 million, the January 2019 Registered Direct Offering of $1.5 million and the March 2019 Registered Direct Offering of $17.0 million, will be sufficient to meet obligations and fund our liquidity and capital expenditure requirements for at least the next 12 months from the date of this Annual Report on Form 10-K.

Cash Flows

For the Year Ended December 31, 2018

Operating Activities. Net cash used in operating activities for the year ended December 31, 2018 was $6.1 million. Net cash used in operating activities consisted primarily of the net loss for the period of $8.6 million partially offset by impairment of the technology license of $0.6 million, non-cash stock-based compensation expense of $0.6 million, an increase in current assets of $0.5 million, technology license amortization and depreciation expenses of $0.4 million and a decrease in current liabilities of $0.3 million.

Investing Activities. Net cash used in investing activities for the year ended December 31, 2018 consisted of capital expenditures totaling $17,000, which were primarily related to research and development equipment purchases.

Financing Activities. Net cash provided by financing activities for the year ended December 31, 2018 was $1.2 million from the 2018 Registered Direct Offering and 2018 Private Placement, both as described below.

For the Year Ended December 31, 2017

Operating Activities. Net cash used in operating activities for the year ended December 31, 2017 was $8.0 million. Net cash used in operating activities consisted primarily of the net loss for the period of $7.0 million and an increase in current assets of $0.2 million. Our net cash used in operating activities is partially offset by non-cash stock-based compensation expense of $0.8 million and technology license amortization and depreciation expenses of $0.4 million. The change in fair value of the warranty liability of $2.4 million partially offset by loss on extinguishment of the warranty liability of $0.4 million, did not have an impact on net cash used in operating activities during the period.

Investing Activities. Net cash used in investing activities for the year ended December 31, 2017 consisted of capital expenditures totaling $0.5 million which were primarily related to equipment purchases for our new research and development laboratory.

Financing Activities. Net cash provided by financing activities for the year ended December 31, 2017 was $5.1 million. Net cash provided by financing activities consisted of $3.6 million from the 2017 Registered Direct Offering and $1.5 million from the warrant exercises, both as described below.

2017 Shelf Registration Statement

On December 20, 2016, we filed a shelf registration on Form S-3 with the SEC, which was declared effective by the SEC on January 9, 2017 (File No. 333-215205) (the "2017 Shelf Registration Statement"), at which time the offering of unsold securities under a previous shelf registration statement on Form S-3 filed with the SEC, which was declared effective by the SEC on January 13, 2014 (File No. 333-192102) (the "2014 Shelf Registration Statement"), was deemed terminated pursuant to Rule 415(a)(6) under the Securities Act. The 2017 Shelf Registration Statement was filed to register the offering, issuance and sale of (i) up to $125.0 million of our common stock, preferred stock, warrants to purchase common stock or preferred stock or any combination thereof, either individually or in units, including offers and sales of our common stock under the Controlled Equity Offering^{SM} Sales Agreement (the "Sales Agreement") with Cantor Fitzgerald & Co. ("Cantor Fitzgerald") described below and (ii) up to 27,209 shares of our common stock pursuant to the exercise of warrants that were issued in a registered direct offering in 2014 and a registered direct offering in 2016. The foregoing does not constitute an offer to sell or the solicitation of an offer to buy securities, and shall not constitute an offer, solicitation or sale in any jurisdiction in which such offer, solicitation or sale would be unlawful prior to registration or qualification under the securities laws of that jurisdiction.

"At the Market" Offering

On June 24, 2015, we entered into the Sales Agreement with Cantor Fitzgerald, as sales agent, pursuant to which we may offer and sell, from time to time, through Cantor Fitzgerald, shares of our common stock. Sales of shares of common stock under the Sales Agreement will be made pursuant to the 2017 Shelf Registration Statement and a related prospectus filed with the SEC on January 10, 2017, for an aggregate offering price of up to $25.0 million. Under the Sales Agreement, Cantor Fitzgerald may sell shares by any method deemed to be an “at the market” offering as defined in Rule 415 under the Securities Act. We will pay Cantor Fitzgerald a commission of 3.4% of the aggregate gross proceeds from each sale of shares under the Sales Agreement and have agreed to provide Cantor Fitzgerald with customary indemnification and contribution rights. We have also agreed to reimburse Cantor Fitzgerald for certain specified expenses. The Sales Agreement may be terminated by either Cantor Fitzgerald or the Company upon ten days’ notice. We are subject to certain restrictions on our ability to offer and sell shares of our common stock under the Sales Agreement. To date, we have not offered or sold any shares of common stock under the Sales Agreement

Warrant Exercises

On May 21, 2017, the Company entered into Warrant Exercise Agreements (the “Exercise Agreements”) with certain holders (the “Exercising Holders”) of warrants to purchase shares of common stock that we issued in June 2016 (the “2016 Warrants”) and warrants to purchase shares of common stock that we issued in January 2014 (the “2014 Warrants,” and together with the 2016 Warrants, the “Original Warrants”). The Exercising Holders owned, in the aggregate, Original Warrants exercisable for 22,059 shares of our common stock. Pursuant to the Exercise Agreements, the Exercising Holders and the Company agreed that the Exercising Holders would exercise their Original Warrants with respect to 21,500 shares of our common stock underlying such Original Warrants for a reduced exercise price equal to $76.00 per share (the “Reduced Exercise Price”). The Exercising Holders also subsequently exercised their Original Warrants for the remaining 559 shares of our common stock underlying such Original Warrants for the Reduced Exercise Price. In connection with the execution of the Exercise Agreements, we issued to each Exercising Holder a new warrant (each, a “New Warrant”) to purchase shares of our common stock equal to the number of shares of our common stock received by such Exercising Holder upon exercise of such Exercising Holder’s Original Warrants. The terms of the New Warrants are substantially similar to the terms of the Original Warrants, except that the New Warrants (i) became exercisable immediately upon issuance for a period of five years from the closing date of the Exercise Agreements; (ii) have an exercise price equal to $120.00 per share and (iii) included revised language providing that the holders’ right to require the Company to purchase the outstanding New Warrants upon the occurrence of certain fundamental transactions will not apply if the fundamental transaction is a result of a transaction that has not been approved by the Board and that in the event the Company does not have an effective registration statement registering the issuance of the underlying shares of our common stock to the holders, there is no circumstance that would require the Company to net cash settle the outstanding New Warrants. The net proceeds to the Company from the exercise of the New Warrants by the Exercising Holders, after deducting financial advisory fees and expenses and our offering expenses, were approximately $1.5 million.

2017 Registered Direct Offering

On November 3, 2017, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell an aggregate of 66,667 shares of our common stock and warrants to purchase up to 33,334 shares of our common stock for gross proceeds of approximately $4.0 million under the 2017 Shelf Registration Statement (the "2017 Registered Direct Offering"). We also issued warrants to purchase up to 800 shares of common stock in a private placement to Roth Capital Partners, LLC as compensation for its services as a placement agent in connection with the 2017 Registered Direct Offering. The 2017 Registered Direct Offering closed on November 6, 2017. The net proceeds to the Company from the 2017 Registered Direct Offering, after deducting the placement agent's fees and expenses and our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offering, were approximately $3.6 million.

2018 Registered Direct Offering and 2018 Private Placement

On September 20, 2018, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell, in a registered direct offering, an aggregate of 98,454 shares of our common stock and pre-funded warrants to purchase up to 14,624 shares of our common stock for gross proceeds of approximately $1.5 million under the 2017 Shelf Registration Statement (the "2018 Registered Direct Offering"). In a concurrent private placement, we also agreed pursuant to the securities purchase agreement to issue to such investors Series A warrants to purchase up to 113,077 shares of our common stock (the "2018 Private Placement"). Additionally, we issued warrants to purchase up to 6,785 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as a placement agent in connection with the 2018 Registered Direct Offering and the 2018 Private Placement. The 2018 Registered Direct Offering and the 2018 Private Placement closed on September 25, 2018. The net proceeds to the Company from the offerings, after deducting the placement agent's fees and expenses, our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offerings, were approximately $1.2 million.

2019 Underwritten Offering

On January 14, 2019, we entered into an underwriting agreement with H.C. Wainwright & Co., LLC relating to an underwritten public offering of 429,616 shares of our common stock for gross proceeds of approximately $1.1 million under the 2017 Shelf Registration Statement. The offering price to the public in the 2019 Underwritten Offering was $2.60 per share, and H.C. Wainwright & Co., LLC agreed to purchase the shares in the 2019 Underwritten Offering from the Company pursuant to the underwriting agreement at a price of $2.418 per share. Additionally, we issued warrants to purchase up to 25,777 shares of our common stock in a private placement to the H.C. Wainwright & Co., LLC as compensation for its services as underwriter in connection with the 2019 Underwritten Offering. The 2019 Underwritten Offering closed on January 17, 2019. The net proceeds to the Company from the 2019 Underwritten

Offering, after deducting the underwriting discounts and commissions and expenses and the Company's estimated offering expenses, and excluding the proceeds, if any, from the exercise of the underwriter warrants, were approximately $0.9 million.

January 2019 Registered Direct Offering and January 2019 Private Placement

On January 18, 2019, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell, in a registered direct offering, an aggregate of 648,233 shares of our common stock for gross proceeds of approximately $1.7 million under the 2017 Shelf Registration Statement. In a concurrent private placement, we also agreed pursuant to the securities purchase agreement to issue to such investors Series A warrants to purchase up to 324,117 shares of our common stock. Additionally, we issued warrants to purchase up to 38,894 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as a placement agent in connection with the 2019 Registered Direct Offering and the January 2019 Private Placement. The January 2019 Registered Direct Offering and the January 2019 Private Placement closed on January 23, 2019. The net proceeds to the Company from the offerings, after deducting the placement agent's fees and expenses, our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offerings, were approximately $1.5 million.

March 2019 Registered Direct Offering

On March 12, 2019, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell, in a registered direct offering, an aggregate of 712,910 shares of our common stock for gross proceeds of approximately $18.5 million under the 2017 Shelf Registration Statement. Additionally, we issued warrants to purchase up to 42,775 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as a placement agent in connection with the March 2019 Registered Direct Offering. The March 2019 Registered Direct Offering closed on March 14, 2019. The net proceeds to us from the offerings, after deducting the placement agent's fees and expenses, our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offerings, were approximately $17.0 million.

Future Capital Requirements

We expect to continue to incur significant operating expenses in connection with our ongoing activities, including conducting clinical trials, manufacturing and seeking regulatory approval of our drug candidates, prexigebersen, BP1002 and BP1003. Accordingly, we will continue to require substantial additional capital to fund our projected operating requirements. Such additional capital may not be available when needed or on terms favorable to us. In addition, we may seek additional capital due to favorable market conditions or strategic considerations, even if we believe we have sufficient funds for our current and future operating plan. There can be no assurance that we will be able to continue to raise additional capital through the sale of our securities in the future. Our future capital requirements may change and will depend on numerous factors, which are discussed in detail in "Item 1A. Risk Factors" of this Annual Report on Form 10-K.

Off-Balance Sheet Arrangements

As of December 31, 2018, we did not have any material off-balance sheet arrangements.

Critical Accounting Policies

Our management's discussion and analysis of our financial condition and results of operations are based on our financial statements, which have been prepared in conformity with GAAP in the U.S. The preparation of such financial statements has required our management to make assumptions, estimates and judgments that affect the amounts reported in the financial statements, including the notes thereto, and related disclosures of commitments and contingencies, if any. We consider our critical accounting policies to be those that require the more significant judgments and estimates in the preparation of financial statements, including the following:

Principles of Consolidation — The consolidated financial statements include the accounts of Bio-Path Holdings, Inc., and its wholly-owned subsidiary Bio-Path, Inc. All intercompany accounts and transactions have been eliminated in consolidation.

Concentration of Credit Risk — Financial instruments that potentially subject us to a significant concentration of credit risk consist of cash. The Company maintains its cash balances with one major commercial bank, JPMorgan Chase Bank. The balances are insured by the Federal Deposit Insurance Corporation (the "FDIC") up to $250,000. As a result, as of December 31, 2018, $0.8 million of our cash balances was not covered by the FDIC. As of December 31, 2017,

we had approximately $6.0 million in cash on-hand, of which approximately $5.7 million was not covered by the FDIC. To date, the Company has not incurred any losses on its cash balances.

Long Lived Assets — Our long-lived assets consist of furniture, fixtures and equipment, and a technology license. Long lived assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Recoverability of the asset is measured by a comparison of the asset's carrying amount to the estimated undiscounted future cash flows expected to be generated by the asset. If the carrying amount of an asset exceeds its estimated undiscounted future cash flows, an impairment charge is recognized by the amount by which the carrying amount of the asset exceeds the fair value of the asset.

Intangible Assets/Impairment of Long-Lived Assets — Long-lived assets are reviewed for events of changes in circumstances which indicate that their carrying value may not be recoverable. The license agreement with MD Anderson was mutually terminated on December 18, 2018, and the Company fully impaired the license as of December 31, 2018. The Company did not have any impairments in 2017. As of December 31, 2017, other assets totaled $0.8 million, comprised of $2.5 million in value acquiring our technology license and our intellectual property, less accumulated amortization of $1.7 million.

Research and Development Costs — Costs and expenses that can be clearly identified as research and development are charged to expense as incurred. Advance payments, including nonrefundable amounts, for goods or services that will be used or rendered for future research and development activities are deferred and capitalized. Such amounts will be recognized as an expense as the related goods are delivered or the related services are performed. If the goods will not be delivered, or services will not be rendered, then the capitalized advance payment is charged to expense.

The Company estimates its clinical trial expense accrual each period based on a cost per patient calculation which is derived from estimated start-up costs, clinical trial costs based on the number of patients and length of the study and clinical study report costs. These services are performed by the Company's third-party clinical research organizations, laboratories and clinical investigative sites. The expense accrual is recorded in research and development expense each period. Amounts that have been prepaid in advance of work performed are recorded in other current assets.

For the year ended December 31, 2018, we had $4.6 million of costs classified as research and development expense. For the year ended December 31, 2017, we had $5.5 million of costs classified as research and development expense.

Stock-Based Compensation — The Company has accounted for stock-based compensation under the provisions of GAAP. The provisions require us to record an expense associated with the fair value of stock-based compensation. We currently use the Black-Scholes option valuation model to calculate stock based compensation at the date of grant. Option pricing models require the input of highly subjective assumptions, including the expected price volatility. Changes in these assumptions can materially affect the fair value estimate.

Recent Accounting Pronouncements — From time to time, new accounting pronouncements are issued by the Financial Accounting Standards Board ("FASB") that are adopted by the Company as of the specified effective date. If not discussed, management believes that the impact of recently issued standards, which are not yet effective, will not have a material impact on the Company's consolidated financial statements upon adoption.

In May 2014, the FASB issued Accounting Standards Update ("ASU") No. 2014-09, *Revenue from Contracts with Customers.* The new standard provides comprehensive guidance for recognizing revenue as goods or services are delivered to the customer in an amount that is expected to be earned from those same goods or services. The Company adopted the standard on January 1, 2018 using the modified retrospective method of adoption and determined that it did not have a material effect on our consolidated financial statements as the Company currently does not have significant contracts with customers.

In February 2016, the FASB issued ASU No. 2016-02, *Leases*. The new standard establishes a right-of-use ("ROU") model that requires a lessee to record a ROU asset and a lease liability on the balance sheet for all leases with terms longer than 12 months. Leases will be classified as either finance or operating, with classification affecting the pattern of expense recognition in the income statement. The new standard is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. A modified retrospective transition approach is required for lessees for capital and operating leases existing at, or entered into after, the beginning of the earliest comparative period presented in the financial statements, with certain practical expedients available. Management has evaluated the adoption of the new standard and determined that its ROU asset and lease liability will not have a material impact on the Company's consolidated financial statements. The FASB also issued ASU No. 2018-11, *Lease-Targeted Improvements (Topic 842).* The update allows companies to use the effective date of the new lease

standard as the date of initial application on transition and not apply the new lease standard in the comparative prior periods included in their financial statements in the year of adoption. The update also gives entities the option not to separate non-lease components from the associated lease components when certain criteria are met. Management notes the implementation of this update will not have a significant impact on the Company's consolidated financial statements.

In May 2017, the FASB issued ASU No. 2017-09, *Compensation-Stock Compensation: Scope of Modification Accounting*. The new standard requires an entity to apply modification accounting provisions if the value, vesting conditions or classification of the award changes. The new guidance must be applied on a prospective basis and is effective for fiscal years beginning after December 15, 2017, including interim periods within those fiscal years, with early adoption permitted. The Company adopted the standard on January 1, 2018 on a prospective basis and determined that it did not have a significant impact on our consolidated financial statements

In July 2017, the FASB issued ASU No. 2017-11*, Earnings Per Share (Topic 260); Distinguishing Liabilities from Equity (Topic 480); Derivatives and Hedging (Topic 815): (Part I) Accounting for Certain Financial Instruments with Down Round Features, (Part II) Replacement of the Indefinite Deferral for Mandatorily Redeemable Financial Instruments of Certain Nonpublic Entities and Certain Mandatorily Redeemable Noncontrolling Interests with a Scope Exception.* Part I of the new standard applies to entities that issue financial instruments such as warrants, convertible debt or convertible preferred stock that contain down round features. The ASU allows companies to exclude a down round feature when determining whether a financial instrument (or embedded conversion feature) is considered indexed to the entity's own stock. As a result, financial instruments (or embedded conversion features) with down round features may no longer be required to be classified as liabilities. A company will recognize the value of a down round feature only when it is triggered and the strike price has been adjusted downward. Part II of the new standard replaces the indefinite deferrals for certain mandatorily redeemable noncontrolling interests and mandatorily redeemable financial instruments of nonpublic entities. ASU 2017-11 is effective for annual reporting periods beginning after December 15, 2018, including interim periods within those fiscal years, with early adoption permitted. Management early adopted the new standard during fiscal year 2017 and notes the adoption did not have a significant impact on the Company's consolidated financial statements.

In June 2018, the FASB issued ASU No. 2018-07, *Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting.* The new standard simplifies the accounting for share-based payments to nonemployees by aligning it with the accounting for share-based payments to employees. Equity-classified share-based payments issued to nonemployees will be measured on the grant date instead of being remeasured through the performance completion date as required under the current guidance. The new standard is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years, with early adoption permitted. The Company early adopted this standard effective June 30, 2018 and notes the adoption did not have a significant impact on the Company's consolidated financial statements.

In August 2018, the FASB issued ASU No. 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement*. The new standard eliminates certain disclosure requirements for fair value measurements for all entities, requires public entities to disclose certain new information and modifies some disclosure requirements. This standard is effective for fiscal years beginning after December 15, 2019, with early adoption permitted. Management is currently evaluating the impact of future adoption of the new standard on the Company's consolidated financial statements.

In August 2018, the SEC adopted the final rule under SEC Release No. 33-10532, *Disclosure Update and Simplification*, amending certain disclosure requirements that were redundant, duplicative, overlapping, outdated or superseded. In addition, the amendments expanded the disclosure requirements on the analysis of stockholders' equity for interim financial statements. Under the amendments, an analysis of changes in each caption of stockholders' equity presented in the balance sheet must be provided in a note or separate statement. The analysis should present a reconciliation of the beginning balance to the ending balance of each period for which a statement of comprehensive income is required to be filed. The Company anticipates its first presentation of changes in shareholders' equity will be included in its Form 10-Q for the first quarter of fiscal year 2019.

In November 2018, the FASB issued ASU No. 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction Between Topic 808 and Topic 606.* The new standard provides guidance on how to assess whether certain transactions between collaborative arrangement participants should be accounted for within the revenue recognition standard. The update also provides more comparability in the presentation of revenue for certain transactions between collaborative arrangement participants. The new standard is effective for fiscal years beginning after December 15, 2019, including interim periods within those fiscal years with early adoption permitted. The Company early adopted this standard effective December 31, 2018 and notes that it did not a significant impact on our consolidated financial statements as the Company currently does not have significant collaborative agreements in place.

Management has reviewed all other recently issued pronouncements and has determined they will have no material impact on the Company’s consolidated financial statements.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Not applicable.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

Our consolidated financial statements, together with the report of our independent registered public accounting firm, are set forth beginning on page F-1 of this Annual Report on Form 10-K. In the calendar year 2008, our fiscal year end was changed from June 30th to December 31st.

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

None.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

It is management's responsibility to establish and maintain adequate disclosure controls and procedures, as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act. Disclosure controls and procedures are controls and other procedures of a company that are designed to ensure that information required to be disclosed by the company in the reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed by a company in the reports that it files or submits under the Exchange Act is accumulated and communicated to management, including the company's principal executive and principal financial officers, as appropriate, to allow timely decisions regarding required disclosure.

Our management, including our Chief Executive Officer (who is also our Chief Financial Officer), has reviewed and evaluated the effectiveness of our disclosure controls and procedures, as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, as of the end of the period covered by this Annual Report on Form 10-K. Following this review and evaluation, due to the material weakness in our internal control over financial reporting discussed below, our management determined that as of the end of the period covered by this Annual Report on Form 10-K, our disclosure controls and procedures were not effective as it relates to an input in our clinical trial expense accrual to ensure that information required to be disclosed by us in reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in SEC rules and forms, and is accumulated and communicated to management, including our Chief Executive Officer and our Chief Financial Officer, 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. Internal control over financial reporting, as defined in Rule 13a-15(f) under the Exchange Act, is a process designed by, or under the supervision of, our principal executive officer and our principal financial officer, and effected by our Board, management, and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with GAAP and includes those policies and procedures that:

- Pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and disposition of our assets;

- Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with GAAP, and that our receipts and expenditures are being made only in accordance with authorizations of our management and directors; and

- Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on our financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate. All internal control systems, no matter how well designed, have inherent limitations. Therefore, even those systems determined to be effective can provide only reasonable assurance with respect to financial statement preparation and presentation. The scope of management's assessment of the effectiveness of internal control over financial reporting includes our consolidated subsidiary.

Management's assessment of the effectiveness of our internal controls is based principally on our financial reporting as of December 31, 2018. In making our assessment of internal control over financial reporting, management used the criteria set forth in *Internal Control - Integrated Framework (*2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission. Our management, with the participation of our Chief Executive Officer (who is also our Chief Financial Officer), has evaluated the effectiveness of our internal control over financial reporting as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act, as of December 31, 2018. Based on this evaluation, management believes that, as of December 31, 2018, our internal control over financial reporting was not effective due to a material weakness in our internal control over financial reporting relating to the design of our controls to prevent a misstatement resulting from the information and communication between our clinical and finance personnel as it relates to an input for our clinical trial expense accrual.

Our management is committed to the planning and implementation of remediation efforts to address the material weakness in our internal control over financial reporting described above. These remediation efforts are in process and include improving communication between our clinical and finance personnel in addition to using a report to substantiate the input used in our clinical trial expense accrual. These remediation efforts are intended both to address the identified material weakness and to enhance our overall financial control environment. When fully implemented and operational, our management believes that these measures will appropriately remediate the material weakness and

strengthen our internal control over financial reporting.

Changes in Internal Control over Financial Reporting

Other than the material weakness noted above, there were no changes in our internal control over financial reporting that occurred during the fourth fiscal quarter of 2018 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting. As identified above under "Management's Report on Internal Control over Financial Reporting," a material weakness was identified in our internal control over financial reporting as of December 31, 2018. Our plans for remediating such material weakness, which would constitute changes in our internal control over financial reporting prospectively, are also enumerated above.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Identification of Directors and Executive Officers

Our current directors and officers are set forth below:

Name	Age	Position - Committee
Peter H. Nielsen	70	Chief Executive Officer; President; Chief Financial Officer; Treasurer; Chairman of the Board; Director
Heath W. Cleaver, CPA	45	Director – Audit Committee (Chair); Compensation Committee; Nominating/Corporate Governance Committee (Chair)
Mark P. Colonnese	63	Director – Audit Committee; Compensation Committee (Chair); Nominating/Corporate Governance Committee

Douglas P. Morris	63	Director; Director of Investor Relations; Secretary
Paul D. Aubert	49	Director – Audit Committee

Our current directors will serve until the next annual meeting of stockholders or until their successors are elected or appointed and qualified.

Background Information

Peter H. Nielsen. Mr. Nielsen co-founded Bio-Path and has served as Bio-Path's President, Chief Executive Officer, Chief Financial Officer/Treasurer and Chairman of the Board since 2008. At the time of Bio-Path's establishment in 2007, Mr. Nielsen licensed technology and targets from The University of Texas, MD Anderson Cancer Center and coordinated preclinical development, optimization and manufacturing of Bio-Path's lead drug candidate, prexigebersen. Since that time, Mr. Nielsen has led the clinical advancement of prexigebersen into Phase 2 studies, the introduction of additional pipeline candidates and the Company's public market debut. Prior to co-founding Bio-Path, Mr. Nielsen worked with several other companies, leading turnarounds and developing and executing on strategies for growth. Mr. Nielsen previously served as a director of Synthecon, Inc., a company developing 3D cell culture technology. Before entering the biotechnology sector, Mr. Nielsen was a lieutenant in the U.S. Naval Nuclear Power program where he was director of the physics department and was employed at Ford Motor Company in product development. Mr. Nielsen has a broad background in senior management and has significant negotiating experience. He holds engineering, mathematics and M.B.A. finance degrees from the University of California at Berkeley.

Heath W. Cleaver, CPA. Mr. Cleaver has served as a director of Bio-Path since 2014. Since July 2017, Mr. Cleaver has served as the Chief Financial Officer of Compressor Engineering Corporation, a privately-held independent manufacturer of engine and compressor replacement parts. Mr. Cleaver was previously a consultant providing turn-around management and capital raising services to companies in the oil and gas service sector from 2016 to 2017. From 2015 to 2016, Mr. Cleaver served as the Chief Financial Officer of Global Fabrication Services, Inc. In 2014, Mr. Cleaver served as Chief Financial Officer at Tarka Resources, Inc. From 2011 until 2014, Mr. Cleaver served as Chief Financial Officer of Porto Energy Corp. From 2010 until 2011, Mr. Cleaver served as Chief Accounting Officer of Porto Energy Corp. Mr. Cleaver served as Corporate Controller and then as Vice President and Chief Accounting Officer for BPZ Energy from 2006 to 2010. Beginning in 1997 through 2004, Mr. Cleaver served in various accounting roles, including Financial Controller, at Horizon Offshore Contractors, Inc. Mr. Cleaver is a Certified Public Accountant in the state of Texas and holds a Bachelor's Degree in Business Administration - Accounting from Texas A&M University.

Mark P. Colonnese. Mr. Colonnese has served as a director of Bio-Path since 2017. Since September 2018, Mr. Colonnese has served as the Chief Financial Officer of Covanos, Inc., a private biotechnology company focused on cardiovascular diagnostics. From 2015 to February 2018, Mr. Colonnese served as Executive Vice President & Chief Financial Officer of Aviragen Therapeutics, Inc., a Nasdaq-listed biotechnology company focused on the discovery and development of direct-acting antivirals to treat infections that have limited therapeutic options and affect a significant number of patients globally. Mr. Colonnese previously served as Chief Financial Officer of Stealth Biotherapeutics Inc. from 2014 to 2015 and as Executive Vice President & Chief Financial Officer of Transgenomic, Inc. from 2012 to 2014. From 1999 to 2012, Mr. Colonnese served in various roles at Salutria Pharmaceuticals, LLC and its predecessor company, AtheroGenics, Inc., including as Executive Vice President; Commercial Operations and Chief Financial Officer, and Senior Vice President, Finance and Administration. Mr. Colonnese holds a B.S. magna cum laude in Accounting from Ithaca College and an M.B.A. from Fairleigh Dickinson University.

Paul D. Aubert. Mr. Aubert was appointed to the Board on February 1, 2018. Mr. Aubert is currently Senior Vice President & General Counsel of Anthem Vault, Inc., a gold retail and vaulting business, and also serves as Senior Vice President & General Counsel of AnthemGold, Inc. and Hercules SEZC, positions he has held since March 2018. From June 2014 to March 2018, he practiced law in a solo law practice and also served as part-time General Counsel to his current employers. From February 2012 through May 2014, Mr. Aubert served as General Counsel of Pernix Therapeutics Holdings, Inc., a Nasdaq-listed specialty pharmaceutical company. Before that, he was a Shareholder in the Corporate and Securities practice group at Winstead PC, a national law firm headquartered in Dallas, Texas, from 2007 to 2012. Mr. Aubert also served as an attorney in the Corporate and Securities practice groups of several national and international law firms prior to joining Winstead in 2004, including at Andrews Kurth LLP from 1999 to 2004, Weil, Gotshal & Manges LLP from 1998 to 1999 and Jones Walker LLP from 1996 to 1998. Mr. Aubert holds a Juris Doctor and an M.B.A. from Tulane University in New Orleans, Louisiana and a B.A. in History from Louisiana State University - Baton Rouge.

Douglas P. Morris. Mr. Morris is a co-founder of Bio-Path and has served as a director of Bio-Path since 2007 and served as an officer from 2007 to June 2014. Mr. Morris also currently serves as the Director of Investment Relations and the Secretary of Bio-Path. Mr. Morris previously served as a co-founder, Managing Member, and Secretary of nCAP Holdings, LLC (nCAP), a privately held technology based company from September 2013 to January 2016. Between 1993 and 2010, Mr. Morris was an officer and director of Celtic Investment, Inc., a financial services company. Mr. Morris has owned and operated Hyacinth Resources, LLC (“Hyacinth”), a business-consulting firm since 1990 and is also a Managing Member of Sycamore Ventures, LLC, a privately held consulting firm. Mr. Morris has a B.A. from Brigham Young University, and attended the University of Southern California Master’s program in public administration.

Board of Directors

Our operations are managed under the broad supervision of the Board, which has ultimate responsibility for the establishment and implementation of our general operating philosophy, objectives, goals and policies. Our Board is

currently comprised of three independent directors and two non-independent directors. The Board has determined that current directors Heath W. Cleaver, Mark P. Colonnese and Paul D. Aubert are “independent” as independence is defined under the listing standards for The Nasdaq Stock Market. The Board based these determinations primarily on a review of the responses our directors provided to questions regarding employment and compensation history, affiliations and family and other relationships.

Codes of Ethics

We have adopted the Employee Code of Business Conduct and Ethics, which applies to all of our employees, including our executive officers, and the Code of Business Conduct and Ethics for Members of the Board, which applies to members of the Board.

Board Committees

The Board has a standing audit committee (the "Audit Committee"), compensation committee (the "Compensation Committee") and nominating/corporate governance committee (the "Nominating/Corporate Governance Committee"), each of which is governed by a charter. The Board may also establish other committees from time to time as necessary to facilitate the management of the business and affairs of the Company. In addition to the three standing committees, we also have a Scientific Advisory Board that serves an advisory role to management and the Board. The information below summarizes the functions of each of the committees and the Scientific Advisory Board.

Audit Committee

The Audit Committee has been structured to comply with the requirements of Section 3(a)(58)(A) of the Exchange Act. The Board has determined that the Audit Committee members have the appropriate level of financial understanding and industry specific knowledge to be able to perform the duties of the position and are financially literate and have the requisite financial sophistication as required by the applicable listing standards of The Nasdaq Stock Market.

The Audit Committee, as permitted by, and in accordance with, its charter, is responsible to periodically assess the adequacy of procedures for the public disclosure of financial information and review on behalf of the Board, and report to the Board, the results of its review and its recommendation regarding all material matters of a financial reporting and audit nature, including, but not limited to, the following main subject areas:

- financial statement, including management's discussion and analysis thereof;
- financial information in any annual information form, proxy statement, prospectus or other offering document, material change report, or business acquisition report;
- press releases regarding annual and interim financial results or containing earnings guidance;
- internal controls;
- audits and reviews our financial statements; and

filings with securities regulators containing financial information, including our Annual Reports on Form 10-K and Quarterly Reports on Form 10-Q.

The Audit Committee appoints and sets the compensation for the independent registered public accounting firm annually and reviews and evaluates such external auditor. This external auditor reports directly to the Audit Committee. The Audit Committee establishes our hiring policies regarding current and former partners and employees of the external auditor. In addition, the Audit Committee pre-approves all audit and non-audit services undertaken by the external auditor.

The Audit Committee has direct responsibility for overseeing the work of the external auditor engaged for the purpose of preparing or issuing an auditor’s report or performing other audit, review or attest services, including the resolution of disagreements between the external auditor and management.

The Audit Committee is comprised of Messrs. Cleaver, Colonnese and Aubert. Mr. Cleaver currently serves as the chair of the Audit Committee. The Board has determined that Mr. Cleaver qualifies as an “audit committee financial expert” under the Exchange Act and that each member of the Audit Committee is an independent director. The Audit Committee meets at least once per fiscal quarter to fulfill its responsibilities under its charter and in connection with the review of the Company’s quarterly and annual financial statements.

Compensation Committee

The Compensation Committee’s role is to assist the Board in fulfilling its responsibilities relating to all forms of compensation of the Company's executive officers, administering the Company's incentive compensation plan and other benefits plans, including a deferred compensation plan, if applicable, and producing any required report on executive compensation for use in the Company's proxy statement or other public disclosure. The Compensation Committee operates under a written charter adopted by the Board. The Compensation Committee periodically assesses compensation of our executive officers in relation to companies of comparable size, industry and complexity, taking the performance of the Company and such other companies into consideration. All decisions with respect to the compensation of our Chief Executive Officer are determined and approved either solely by the Compensation Committee or together with other independent directors, as directed by the Board. All decisions with respect to non-CEO executive compensation, and incentive-compensation and equity based plans are first approved by the Compensation Committee and then submitted, together with the Compensation Committee’s recommendation, to the members of the Board for final approval. In addition, the Compensation Committee will, as appropriate, review and approve public or regulatory disclosure respecting compensation, including required disclosures regarding executive compensation under Item 402 of Regulation S-K, and the basis on which performance is measured. The Compensation Committee has the authority to retain and compensate any outside adviser as it determines necessary to permit it to carry out its duties. The Compensation Committee has not to date engaged the services of any executive compensation consultant. The Compensation Committee may not form or delegate authority to subcommittees without the prior approval of the Board.

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The Compensation Committee is comprised of Messrs. Cleaver and Colonnese, both of whom are independent under the rules of The Nasdaq Stock Market. The Compensation Committee meets as necessary. Mr. Colonnese is the chair of the Compensation Committee.

Nominating/Corporate Governance Committee

The Nominating/Corporate Governance Committee's charter provides that the responsibilities of such committee include:

- evaluating, identifying and recommending nominees to the Board;
- considering written recommendations from our stockholders for nominees to the Board;
- recommending directors to serve as committee members and chairs;
- reviewing and developing corporate governance guidelines, policies and procedures for the Board;
- reviewing disclosure by the Company of matters within the Nominating/Corporate Governance Committee's mandate; and
- reviewing and evaluating the Nominating/Corporate Governance Committee's charter and efficacy.

The Nominating/Corporate Governance Committee is responsible for, among other things, identifying and recommending potential candidates for nomination to the Board. The Nominating/Corporate Governance Committee receives advice from the Board and will consider written recommendations from the stockholders of the Company respecting individuals best suited to serve as directors, and, when necessary, develops its own list of appropriate candidates for directorships. For a description of the procedures to be followed by stockholders of the Company in submitting recommendations to be considered by the Nominating/Corporate Governance Committee, see the discussion set forth below under the heading titled, "Stockholder Nominations for Directors."

The Nominating/Corporate Governance Committee is comprised of Messrs. Cleaver and Colonnese, both of whom are independent under the rules of The Nasdaq Stock Market. The Nominating/Corporate Governance Committee meets at least annually, and otherwise as necessary. Mr. Cleaver is the chair of the Nominating/Corporate Governance

Committee.

Scientific Advisory Board

The Scientific Advisory Board assists management and the Board on an advisory basis with respect to the research, development, clinical, regulatory and commercial plans and activities relating to research, manufacture, use and/or sale of our drug candidates and products. The Scientific Advisory Board meets on an *ad hoc* basis and may attend meetings of the Board at the Board's request. The current members of the Scientific Advisory Board are Jorge Cortes, M.D, who serves as chairman, D. Craig Hooper, Ph.D., Anas Younes, M.D., and Jason Fleming, M.D.

Availability of Committee Charters and Other Information

The charters for our Audit Committee, Compensation Committee, and Nominating/Corporate Governance Committee, as well as our Corporate Governance Guidelines, Employee Code of Business Conduct and Ethics and Code of Business Conduct and Ethics for Members of the Board, are available under the section titled "Corporate Governance" on the Investors page of the Company's website, *www.biopathholdings.com*. We intend to disclose any changes to or waivers from the Employee Code of Business Conduct and Ethics that would otherwise be required to be disclosed under Item 5.05 of Form 8-K on our website. The information on our website is not, and shall not be deemed to be, a part of this Annual Report on Form 10-K or incorporated into any other filings we make with the SEC.

We also make available on our website, free of charge, access to our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and any amendments to those reports, as well as other documents that we file with or furnish to the SEC pursuant to Sections 13(a) or 15(d) of the Exchange Act, as soon as reasonably practicable after such documents are filed with, or furnished to, the SEC.

Nomination Process

It is our Board's responsibility to nominate members for election to the Board and to fill vacancies on the Board that may occur between annual meetings of stockholders. The Nominating/Corporate Governance Committee assists the Board by identifying and reviewing potential candidates for Board membership consistent with criteria approved by the Board. The Nominating/Corporate Governance Committee also annually recommends qualified candidates (which may include existing directors) for approval by the Board of a slate of nominees to be proposed for election to the Board at the annual meeting of stockholders.

In the event of a vacancy on the Board between annual meetings of our stockholders, the Board may request that the Nominating/Corporate Governance Committee identify, review and recommend qualified candidates for Board membership for Board consideration to fill such vacancies, if the Board determines that such vacancies will be filled. Our First Amended and Restated Bylaws (the "Bylaws") allow for up to fifteen directors. The Board is permitted by the Bylaws to change the number of directors by a resolution adopted by the Board.

When formulating its recommendations for potential Board nominees, the Nominating/Corporate Governance Committee seeks and considers advice and recommendations from management, other members of the Board and may seek or consider advice and recommendations from consultants, outside counsel, accountants or other advisors as the Nominating/Corporate Governance committee or the Board may deem appropriate.

Board membership criteria are determined by the Board, with input from the Nominating/Corporate Governance Committee. The Board is responsible for periodically determining the appropriate skills, perspectives, experiences and characteristics required of Board candidates, taking into account our needs and current make-up of the Board. This assessment should include appropriate knowledge, experience, and skills in areas deemed critical to understanding the Company and our business; personal characteristics, such as integrity and judgment; and the candidate's commitments to the boards of other companies. Each Board member is expected to ensure that other existing and planned future commitments do not materially interfere with the member's service as a director and that he or she devotes the time necessary to discharge his or her duties as a director.

Stockholder Nominations for Directors

The Nominating/Corporate Governance Committee will consider candidates for director nominees that are recommended by our stockholders in the same manner as Board recommended nominees, in accordance with the procedures set forth in our Bylaws. Any such nominations should be submitted to the Nominating/Corporate Governance Committee c/o Secretary, Bio-Path Holdings, Inc., 4710 Bellaire Boulevard, Suite 210, Bellaire, Texas 77401 before the deadline set forth in the Bylaws and should be accompanied by the following information:

- appropriate biographical information, a statement as to the qualifications of the nominee and any other information relating to such nominee that is required to be disclosed pursuant to Regulation 14A under the Exchange Act (including such person's written consent to being named in the proxy statement as a nominee and to serving as a director if elected); and

- the Proposing Stockholder Information (as defined in the Bylaws).

Involvement in Certain Legal Proceedings

There have been no events under any bankruptcy act, no criminal proceedings and any judgments or injunctions material to the evaluation of the ability and integrity of any director or executive officer during the last ten years.

Section 16(a) Beneficial Ownership Reporting Compliance

Section 16(a) of the Exchange Act requires our directors and officers, and persons who own more than 10% of our common stock, to file initial reports of ownership and reports of changes in ownership (Forms 3, 4, and 5) of common stock with the SEC. Officers, directors and greater than 10% stockholders are required by SEC regulation to furnish us with copies of all such forms that they file.

To our knowledge, based solely on our review of the copies of such reports received by us and on written representations by certain reporting persons that no reports on Form 5 were required, we believe that during the fiscal year ended December 31, 2018, all Section 16(a) filing requirements applicable to our officers, directors and 10% stockholders were complied with in a timely manner.

ITEM 11. EXECUTIVE COMPENSATION

The Compensation Committee oversees our compensation programs for executives and all employees. The Compensation Committee understands that for the Company and its stockholders to achieve long-term success, the compensation programs need to attract, retain, develop and motivate a strong leadership team. As a result, our executive compensation programs are designed to pay for performance, enable talent attraction, retain top talent and closely align the interests of our executives with those of our stockholders. All decisions with respect to the compensation of our Chief Executive Officer are determined and approved either solely by the Compensation Committee or together with other independent directors, as directed by the Board. All decisions with respect to non-CEO executive compensation, incentive-compensation and equity based plans are first approved by the Compensation Committee and then submitted, together with the Compensation Committee's recommendation, to the members of the Board for final approval.

This section provides important information on our executive compensation programs for our named executive officers ("NEOs"). In fiscal year ended December 2018, our only NEO was Peter H. Nielsen, Chairman of the Board, Chief Executive Officer; Chief Financial Officer and President.

Summary Compensation Table

The following table sets forth information with respect to the compensation of our sole NEO for the fiscal years ended December 31, 2018 and 2017.

Name and Principal Position	Year	Salary ($)	Bonus ($)	Option Awards ($)(1)	All Other Compensation ($)	Total ($)
Peter H. Nielsen, CEO, CFO, President, Chairman, Director	2018	$490,000	$-	$181,711	$ 216 (2)	$671,927
	2017	$475,000	$118,750	-	$ 208 (2)	$593,958

(1)

The amounts reported in this column reflect the aggregate grant date fair value of equity awards granted during the year computed in accordance with FASB ASC Topic 718. See Note 11 to our consolidated financial statements included in this Annual Report on Form 10-K for assumptions made by us in such valuation.

(2) The amounts reported represent life insurance premiums paid by the Company for Mr. Nielsen.

Outstanding Equity Awards at December 31, 2018

The following table sets forth certain information with respect to outstanding stock option awards of our sole NEO for the fiscal year ended December 31, 2018.

Name	Number of Securities Underlying Unexercised Options Exercisable (#)	Number of Securities Underlying Unexercised Options Unexercisable (#)	Equity Incentive Plan Awards: Number of Securities Underlying Unexercised Unearned Options (#)	Option Exercise Price ($)	Option Expiration Date
Mr. Nielsen (1)	7,500	-	-	$ 92.00	Aug 2023
Mr. Nielsen (2)	1,841	920	-	$ 550.00	April 2026
Mr. Nielsen (3)	-	6,500	-	$ 36.80	April 2028

(1) All of these options granted are fully vested.

(2) This option vests over a four-year period from the date of grant, April 5, 2016, with one-fourth (1/4) of the shares vesting on the first anniversary of such grant, and the remaining shares vesting thereafter in equal monthly increments equal to one-forty-eighth (1/48) of the shares over the next three years, based on continuing service to the Company.

(3) Such options vest over a four-year period from the date of grant, April 11, 2018, with one-fourth (1/4) of the shares vesting on the first anniversary of each such grant and the remaining shares vesting thereafter in equal monthly increments equal to one-forty-eighth (1/48) of the shares over the next three years, based on continuing service to the Company.

DIRECTOR COMPENSATION

The following table presents summary information for the year ended December 31, 2018 regarding the compensation of the members of our Board.

Name	Fees Earned or Paid in Cash	Option Awards	All Other Compensation	Total
Heath W. Cleaver	$31,500 (1)	$25,226 (2)	$ 63 (3)	$56,789
Mark P. Colonnese	$31,500 (1)	$25,226 (2)	$ 1,313 (3)	$58,039
Paul D. Aubert	22,000 (1)	$26,023 (2)	$ - (3)	$48,023
Douglas P. Morris (4)	$-	$25,226 (5)	$ 65,532 (6)	$90,758

(1) These amounts reflect cash fees paid to or earned by our non-employee directors for attending Board or committee meetings during the year ended December 31, 2018.

(2) During 2018, our non-employee directors who were eligible earned or received an annual grant of an option to purchase 1,000 shares of our common stock which was the only grant received by such directors during 2018, with the exception of Mr. Aubert, who received an annual grant of an option to purchase 875 shares of our common stock and also received a grant of an option to purchase 125 shares of our common stock upon his appointment to the Board on February 1, 2018. The amounts in this column reflect the aggregate grant date fair value of equity awards granted during the year computed in accordance with FASB ASC Topic 718. See Note 11 to our consolidated financial statements included elsewhere in this Annual Report on Form 10-K for assumptions made by us in such valuation.

(3) The amounts reported represent amounts earned for Board services performed beyond the normal scope of their Board or committee responsibilities.

(4) Mr. Morris was hired by the Company in 2016 as the Company’s Director of Investor Relations. Accordingly, Mr. Morris is not considered a non-employee director and does not receive compensation for his services as a member of the Board.

(5) Option awards granted to Mr. Morris reflect compensation received by Mr. Morris in his capacity as the Company’s Director of Investor Relations.

(6) This amount reflects compensation received by Mr. Morris in his capacity as the Company’s Director of Investor Relations, which includes base salary and certain other benefits.

The following table reflects the aggregate number of outstanding options (including unexercisable options) held by our directors as of December 31, 2018:

Director	Number of shares underlying outstanding options
Heath W. Cleaver	1,500
Mark P. Colonnese	1,125
Paul D. Aubert	1,000
Douglas P. Morris (1)	4,639

(1) Mr. Morris's outstanding options include 3,264 options earned while serving as an executive officer of the Company. Mr. Morris ceased serving in his officer capacities in June 2014. However, Mr. Morris was hired by the Company in 2016 as the Company's Director of Investor Relations. Accordingly, Mr. Morris is not considered a non-employee director.

Narrative to Director Compensation Table

In 2018, our non-employee directors received cash and equity compensation in accordance with our non-employee director compensation structure. Directors who are also employed by the Company do not receive compensation for services as a director. We amended our compensation structure for all non-employee directors on April 17, 2018. During 2018, our compensation structure for all non-employee directors was as follows:

Cash Compensation Program

Non-employee directors receive as compensation the following amounts: (i) an annual cash retainer in the amount of $5,000; (ii) $3,000 for each required meeting of the Board attended in person; (iii) $1,500 for each meeting of the Board conducted by telephonic or other electronic communications of duration of 15 minutes or longer; and (iv) $500 for each meeting of the Board of duration less than 15 minutes conducted by telephonic or other electronic communications. Board members must attend meetings in person or by telephonic or other electronic communications to receive the applicable cash compensation.

Each non-employee director of the Board who is a member of a Board committee also receives as compensation the following amounts: (i) $2,000 for each committee meeting attended in person; (ii) $1,500 for each committee meeting conducted by telephonic or other electronic communications of duration of 15 minutes or longer; and (iii) $500 for each committee meeting of duration less than 15 minutes conducted by telephonic or other electronic communications. Committee members must attend meetings in person or by telephonic or other electronic communications to receive the applicable compensation.

In addition to the foregoing cash compensation for Board and committee members, non-employee directors of the Board who spend significant time performing Board or committee service beyond the normal scope of their Board or committee responsibilities may receive up to $2,500 per diem at the discretion of the Chief Executive Officer of the Company.

Equity Compensation Program

Each non-employee director of the Board also receives as compensation an annual stock option grant (a "Grant") of 1,000 shares of our common stock (the "Option Shares"). The exercise price of the Option Shares is determined by the Board and the Option Shares vest over a four-year period from the date of the Grant, with one-fourth (1/4) of the Option Shares vesting on the first anniversary of each such Grant, and the remaining Option Shares vesting thereafter in equal monthly increments equal to one-forty-eighth (1/48) of the Option Shares over the next three years, based on continuing service to the Company.

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

The following table sets forth information regarding shares of our common stock beneficially owned at March 15, 2019 by: (i) our sole NEO and each director; (ii) all executive officers and directors as a group; and (iii) each person known by us to beneficially own 5% or more of the outstanding shares of our common stock. The information in this table is based solely on statements in filings with the SEC or other reliable information.

Name of Beneficial Owner	Amount and Nature of Beneficial Ownership	Percent of Class
Peter H. Nielsen (1) (2)	37,211	1.48 %
Douglas P. Morris (1) (3)	11,972	*
Heath W. Cleaver (1) (4)	662	*
Mark P. Colonnese (1) (5)	308	*
Paul D. Aubert (1) (6)	258	*
All officers and directors as a group (7)	50,411	2.00 %
Empery Asset Management, LP (8) 1 Rockefeller Plaza, Suite 1205 New York, New York 10020	163,000	6.50 %
Sabby Management, LLC (9) 10 Mountainview Road, Suite 205 Upper Saddle River, New Jersey 07458	237,637	9.48 %

*Less than 1%

(1) These are our NEOs and directors.

(2) Includes 25,823 shares owned of record and 11,388 shares issuable upon the exercise of options that are exercisable within 60 days.

(3) Includes 8,050 shares held by Hyacinth Resources, LLC and 121 shares held by Sycamore Ventures, LLC. Mr. Morris disclaims beneficial ownership of the shares held by Sycamore Ventures, LLC except to the extent of his pecuniary interest therein. Also includes 3,801 shares issuable upon the exercise of options that are exercisable within 60 days.

(4) All 662 shares are issuable upon the exercise of options that are exercisable within 60 days.

(5) All 308 shares are issuable upon the exercise of options that are exercisable within 60 days.

(6) All 258 shares are issuable upon the exercise of options that are exercisable within 60 days.

(7) Includes 33,994 shares owned of record and 16,417 shares issuable upon the exercise of options currently exercisable or will be exercisable within 60 days.

(8) Based on a Schedule 13G filed with the SEC on January 24, 2019, Empery Asset Management, LP, Ryan M. Lane and Martin D. Hoe have shared voting and dispositive power with respect to these shares. Empery Asset Management, LP serves as investment manager of the funds holding such shares. Each of Ryan M. Lane and Martin D. Hoe is a managing member of Empery AM GP, LLC, the general partner of Empery Asset

Management, LP.

(9) Based on a Schedule 13G filed with the SEC on March 14, 2019, Sabby Management, LLC and Hal Mintz have shared voting and dispositive power with respect to these shares. Sabby Healthcare Master Fund, Ltd. and Sabby Volatility Master Fund, Ltd. beneficially own 59,409 and 178,228 shares, respectively. The address of Sabby Healthcare Master Fund, Ltd. and Sabby Volatility Warrant Master Fund, Ltd. is 89 Nexus Way, Camana Bay, Grand Cayman KY1-9007, Cayman Islands. Sabby Management, LLC serves as the investment manager of Sabby Healthcare Master Fund, Ltd. and Sabby Volatility Warrant Master Fund, Ltd. Hal Mintz serves as the manager of Sabby Management, LLC.

Equity Compensation Plan Information

There are no equity compensation plans that have not been approved by our stockholders. The following table contains information about our equity compensation plans in effect as of December 31, 2018 (in thousands, except per share amount).

Plan Category	Number of shares of common stock to be issued upon exercise of outstanding options, warrants and rights (1)	Weighted-average exercise price of outstanding options, warrants and rights	Number of shares of common stock remaining available for future issuance under equity compensation plans (2)
Equity compensation plans approved by stockholders	37	$ 112.60	40
Equity compensation plans not approved by stockholders	—	—	—

(1) 17 of the shares shown in this column as securities to be issued upon exercise of outstanding options, warrants and rights were subject to outstanding stock option awards as of December 31, 2018 that were granted under the First Amended Bio-Path Holdings, Inc. 2007 Stock Incentive Plan, as amended (the "2007 Stock Incentive Plan"). 20 of the shares shown in this column as securities to be issued upon exercise of outstanding options, warrants and rights were subject to outstanding stock option awards as of December 31, 2018 that were granted under the Bio-Path Holdings, Inc. 2017 Stock Incentive Plan (the "2017 Stock Incentive Plan").

(2) The shares shown in this column as remaining available for future issuance as of December 31, 2018 are all under the 2017 Stock Incentive Plan. The 2007 Stock Incentive Plan expired in January 2018.

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

Related Party Transactions

It is our policy that we will not enter into any transactions required to be disclosed under Item 404 of Regulation S-K promulgated by the SEC unless the Audit Committee first reviews and approves the transactions. The Audit Committee is required to review on an ongoing basis, and pre-approve all related party transactions before they are

entered into, including those transactions that are required to be disclosed under Item 404 of Regulation S-K. Related party transactions involving a director must also be approved by the disinterested members of the Audit Committee. It is the responsibility of our employees and directors to disclose any significant financial interest in a transaction between the Company and a third party, including an indirect interest. All related party transactions shall be disclosed in our filings with the SEC as required under SEC rules.

In addition, pursuant to our codes of ethics, all employees, officers and directors of ours and our subsidiaries are prohibited from engaging in any relationship or financial interest that is an actual or potential conflict of interest with us without approval. Employees and officers are required to provide written disclosure to their supervisors as soon as they have any knowledge of a transaction or proposed transaction with an outside individual, business or other organization that would create a conflict of interest or the appearance of one. Directors are required to disclose such information to the Board or as otherwise required by law.

For our last two fiscal years, there has not been nor is there currently proposed any transaction or series of similar transactions to which we were or are to be a party in which the amount involved exceeds the lesser of $120,000 or 1% of the average of our total assets at the end of our last two fiscal years, and in which any of our directors, executive officers, persons who we know hold more than 5% of our common stock, or any member of the immediate family of any of the foregoing persons had or will have a direct or indirect material interest other than: (i) compensation agreements and other arrangements, which are described elsewhere in this Annual Report on Form 10-K and (ii) the transactions described in the following paragraph.

We have entered into indemnity agreements with certain of our officers and directors which provide, among other things, that we will indemnify such officer or director, under the circumstances and to the extent provided for therein, for expenses, damages, judgments, fines and settlements he or she may be required to pay in actions or proceedings which he or she is or may be made a party by reason of his or her position as a director, officer or other agent of the Company, and otherwise to the fullest extent permitted under applicable law, our Certificate of Incorporation and our Bylaws.

Director Independence

The following members of the Board have been identified as independent under the standards of The Nasdaq Stock Market: Heath W. Cleaver, Mark P. Colonnese and Paul D. Aubert. Presently, there are no directors on any of our committees who are not independent under the standards of The Nasdaq Stock Market.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

For the fiscal years ended December 31, 2018 and December 31, 2017, BDO USA, LLP ("BDO"), as our independent registered public accounting firm during such time, billed the approximate fees set forth in the table below. The Board has considered the services provided by BDO and has concluded that such services are compatible with the independence of BDO as our principal accountants during such periods.

The table below sets forth the aggregate fees billed to the Company by BDO for services rendered in the fiscal years ended December 31, 2018 and December 31, 2017 (in thousands).

	December 31, 2018	**December 31, 2017**
Audit fees (1)	$ 230	$ 232
Audit-related fees (2)	—	—
Tax fees (3)	—	4
All other fees (4)	—	—
Total	$ 230	$ 236

(1) Audit fees consist of fees billed for professional services rendered for the audit of our consolidated financial statements, reviews of the interim condensed consolidated financial statements included in quarterly filings, services associated with equity offerings, including with respect to registration statements filed by the Company, and services that are normally provided by BDO in connection with statutory and regulatory filings or engagements, including consents, except those not required by statute or regulation.

(2) Audit-related fees consist of fees billed by BDO for assurance and related services. These fees include services provided in conjunction with due diligence services and employee benefit plan audits.

(3)

Tax fees consist of fees billed for professional services rendered by BDO for state and federal tax compliance and advice, and tax planning.

(4) All other fees consist of fees billed by BDO for professional services other than those relating to audit fees, audit-related fees and tax fees.

Pre-Approval Policies and Procedures

The Audit Committee has not adopted any blanket pre-approval policies and procedures. Instead, the Audit Committee will pre-approve the provision of all audit or non-audit services.

PART IV

ITEM 15. EXHIBITS AND FINANCIAL STATEMENT SCHEDULES

1. *Financial Statements*. The financial statements and information required by "Item 8. Financial Statements and Supplementary Data" of this Annual Report on Form 10-K appear on pages F-1 through F-18 of this report. The Index to Consolidated Financial Statements appears on page F-1.

2. *Financial Statement Schedules*. All schedules are omitted because they are not applicable or the required information is shown in the financial statements or the notes thereto.

3. *Exhibits.*

Exhibit Number	Exhibit
2.1	Agreement and Plan of Merger and Reorganization dated September 27, 2007, by and among the Company, Biopath Acquisition Corp., a Utah corporation and wholly owned subsidiary of the registrant, and Bio-Path, Inc., a Utah corporation (incorporated by reference to Exhibit 2.1 to the Company's Current Report on Form 8-K filed on September 27, 2007).
3.1	Certificate of Incorporation (incorporated by reference to Exhibit 3.3 to the Company's Current Report on Form 8-K filed on January 6, 2015).
3.2	Certificate of Amendment to the Certificate of Incorporation of Bio-Path Holdings, Inc. (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed on February 9, 2018).
3.3	First Amended and Restated Bylaws (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed on June 7, 2017).
3.4	Certificate of Amendment to the Certificate of Incorporation of Bio-Path Holdings, Inc. (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed on January 16, 2019).
4.1	Form of Common Stock Certificate (incorporated by reference to Exhibit 4.1 to the Company's Annual Report on Form 10-K filed on March 16, 2015).
4.2	Warrant Agreement, dated April 25, 2008, by and between the Company and Randeep Suneja, M.D. (incorporated by reference to Exhibit 4.2 to the Company's Annual Report on Form 10-K filed on March 31, 2014).
4.3	Form of Warrant issued to Maxim Group LLC, Sabby Healthcare Volatility Master Fund, Ltd. and Sabby Volatility Warrant Master Fund, Ltd. (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K on January 21, 2014).
4.4	Form of Warrant issued to certain investors (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed on June 29, 2016).
4.5	Form of Warrant issued to H.C. Wainwright & Co., LLC and certain of its designees (incorporated by reference to Exhibit 4.5 to the Company's Quarterly Report on Form 10-Q filed on August 9, 2016).
4.6	Form of New Warrant (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed on May 22, 2017).
4.7	Form of Warrant Amendment (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed on June 19, 2017).
4.8	Form of Warrant issued to certain investors (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed on November 6, 2017).
4.9	Form of Warrant issued to Roth Capital Partners, LLC (incorporated by reference to Exhibit 4.9 to the Company's Annual Report on Form 10-K filed on April 2, 2018).

4.10	Form of Pre-Funded Warrant (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed on September 21, 2018).
4.11	Form of Series A Warrant issued to certain investors (incorporated by reference to Exhibit 4.2 to the Company's Current Report on Form 8-K filed on September 21, 2018).
4.12	Form of Warrant issued to H.C. Wainwright & Co., LLC and certain of its designees (incorporated by reference to Exhibit 4.3 to the Company's Quarterly Report on Form 10-Q filed on November 14, 2018).
4.13	Form of Underwriter Warrant issued to H.C. Wainwright & Co., LLC and certain of its designees (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed on January 16, 2019).
4.14	Form of Series A Warrant issued to certain investors (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed on January 22, 2019).
4.15*	Form of Warrant issued to H.C. Wainwright & Co., LLC and certain of its designees.
4.16	Form of Warrant issued to H.C. Wainwright & Co., LLC and certain of its designees (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed on March 13, 2019).

10.1+	Employment Agreement – Peter H. Nielsen (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on February 19, 2008).
10.2+	Amended 2007 Stock Incentive Plan (incorporated by reference to Exhibit 4.1 to the Company's Registration Statement on Form S-8 filed on December 10, 2008).
10.3+	First Amendment to First Amended 2007 Stock Incentive Plan (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed on August 14, 2013).
10.4	Patent and Technology License Agreement, dated as of November 2, 2007, by and between the Company and the Board of Regents of The University of Texas System on behalf of The University of Texas M.D. Anderson Cancer Center (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed on May 15, 2013).
10.5	Amendment No. 1 to the Patent and Technology Agreement, dated as of May 11, 2009, by and between the Company and the Board of Regents of the University of Texas System on behalf of The University of Texas M.D. Anderson Cancer Center (incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q filed on May 15, 2013).
10.6	Form of Securities Purchase Agreement by and between the Company, Sabby Healthcare Volatility Master Fund, Ltd. and Sabby Volatility Warrant Master Fund, Ltd. (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on January 21, 2014).
10.7	Form of Waiver, Consent and Amendment to that certain Securities Purchase Agreement by and between Sabby Healthcare Volatility Master Fund, Ltd. and Sabby Volatility Warrant Master Fund, Ltd. (incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K on January 21, 2014).
10.8+	First Amendment to Employment Agreement, dated March 26, 2014 – Peter H. Nielsen (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on March 26, 2014).
10.9	Lease Agreement dated April 16, 2014 by and between the Company and Pin Oak North Parcel TT, LLC (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on April 18, 2014).
10.10	Form of Indemnification Agreement (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on April 16, 2015).
10.11	Controlled Equity OfferingSM Sales Agreement, dated June 24, 2015, by and between the Company and Cantor Fitzgerald & Co. (incorporated by reference to Exhibit 1.1 to the Company's Current Report on Form 8-K filed on June 25, 2015).
10.12	Form of Securities Purchase Agreement by and between the Company and certain investors (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on June 29, 2016).
10.13	Form of Warrant Exercise Agreement (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on May 22, 2017).

10.14	Form of Securities Purchase Agreement by and between the Company and certain investors (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on November 6, 2017).
10.15	Form of Leak-Out Agreement by and between the Company and certain investors (incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed on November 6, 2017).

10.16+	Bio-Path Holdings, Inc. 2017 Stock Incentive Plan (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on December 27, 2017).
10.17	Form of Incentive Stock Option Award Agreement under 2017 Stock Incentive Plan (incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed on December 27, 2017).
10.18	Form of Non-Qualified Stock Option Award Agreement under 2017 Stock Incentive Plan (incorporated by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K filed on December 27, 2017).
10.19	Form of Restricted Share Unit Award Agreement (Time-Vested) under 2017 Stock Incentive Plan (incorporated by reference to Exhibit 10.4 to the Company's Current Report on Form 8-K filed on December 27, 2017).
10.20	Form of Restricted Share Unit Award Agreement (Performance-Based) under 2017 Stock Incentive Plan (incorporated by reference to Exhibit 10.5 to the Company's Current Report on Form 8-K filed on December 27, 2017).
10.21	Form of Restricted Share Award Agreement under 2017 Stock Incentive Plan (incorporated by reference to Exhibit 10.6 to the Company's Current Report on Form 8-K filed on December 27, 2017).
10.22	Form of Stock Appreciation Right Award Agreement under 2017 Stock Incentive Plan (incorporated by reference to Exhibit 10.7 to the Company's Current Report on Form 8-K filed on December 27, 2017).
10.23	Form of Securities Purchase Agreement (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on September 21, 2018).
10.24	Form of Securities Purchase Agreement (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on January 22, 2019).
10.25	Form of Securities Purchase Agreement (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K filed on March 13, 2019).
21.1	Subsidiaries of Bio-Path Holdings, Inc. (incorporated by reference to Exhibit 21.1 to the Company's Annual Report on Form 10-K filed on April 2, 2018).
23.1*	Consent of BDO USA, LLP.
31*	Certification of Principal Executive Officer/Principal Financial Officer pursuant to Exchange Act Rules 13a-14 and 15d-14, as adopted pursuant to Section 302 Sarbanes Oxley Act of 2002.
32**	Certification of Principal Executive Officer/Principal Financial Officer pursuant to Section 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes Oxley Act of 2002.
101.INS*	XBRL Instance Document
101.SCH*	XBRL Taxonomy Extension Schema Document

101.CAL* XBRL Taxonomy Extension Calculation Linkbase Document

101.DEF* XBRL Taxonomy Extension Definition Linkbase Document

101.LAB* XBRL Taxonomy Extension Label Linkbase Document

101.PRE* XBRL Taxonomy Extension Presentation Linkbase Document

* Filed herewith.

** Furnished herewith.

+ Management contract or compensatory plan.

ITEM 16. FORM 10-K SUMMARY

None.

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.

BIO-PATH HOLDINGS, INC.

Dated: March 19, 2019 By: /s/ Peter H. Nielsen
Peter H. Nielsen
President
Chief Executive Officer
Chief Financial Officer
Principal Accounting Officer

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

Date	**Title**	**Signature**
March 19, 2019	President/Chief Executive Officer/ Chief Financial Officer/ Principal Accounting Officer/Director	/s/ Peter H. Nielsen Peter H. Nielsen
March 19, 2019	Director	/s/ Heath W. Cleaver Heath W. Cleaver
March 19, 2019	Director	/s/ Mark P. Colonnese Mark P. Colonnese
March 19, 2019	Director	/s/ Paul D. Aubert Paul D. Aubert
March 19, 2019	Director	/s/ Douglas P. Morris Douglas P. Morris

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Report of Independent Registered Public Accounting Firm

Shareholders and Board of Directors

Bio-Path Holdings, Inc.

Bellaire, Texas

Opinion on the Consolidated Financial Statements

We have audited the accompanying consolidated balance sheets of Bio-Path Holdings, Inc. (the "Company") and subsidiary as of December 31, 2018 and 2017, the related consolidated statements of operations, shareholders' equity, and cash flows for the years then ended, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company and subsidiary at December 31, 2018 and 2017, and the results of their operations and their cash flows for the years then ended**,** in conformity with accounting principles generally accepted in the United States of America.

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 ("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/ BDO USA, LLP

We have served as the Company's auditor since 2016.

Salt Lake City, Utah

March 19, 2019

BIO-PATH HOLDINGS, INC.

CONSOLIDATED BALANCE SHEETS

(In thousands, except par value)

	As of December 31, 2018	As of December 31, 2017
Assets		
Current assets		
Cash	$ 1,004	$ 5,965
Prepaid drug product for testing	332	1,117
Other current assets	593	353
Total current assets	1,929	7,435
Fixed assets		
Furniture, fixtures & equipment	998	984
Less accumulated depreciation	(592)	(330)
	406	654
Other assets		
Technology license	-	2,500
Less accumulated amortization	-	(1,731)
	-	769
Total Assets	$ 2,335	$ 8,858
Liabilities & Shareholders' Equity		
Current liabilities		
Accounts payable	$ 813	$ 52
Accrued expenses	304	739
Total current liabilities	1,117	791
Total Liabilities	1,117	791

Shareholders' equity		
Preferred stock, $.001 par value; 10,000 shares authorized; no shares issued and outstanding	-	-
Common stock, $.001 par value; 200,000 shares authorized; 680 and 567 shares issued and outstanding, respectively	1	1
Additional paid in capital	48,957	47,223
Accumulated deficit	(47,740)	(39,157)
Total shareholders' equity	1,218	8,067
Total Liabilities & Shareholders' Equity	$ 2,335	$ 8,858

SEE ACCOMPANYING NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

BIO-PATH HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS

(In thousands, except per share amounts)

	Year Ended December 31,	
	2018	2017
Revenue	$ -	$ 37
Operating expenses		
Research and development	4,603	5,480
General and administrative	3,379	3,523
Impairment of technology license	608	-
Total operating expenses	8,590	9,003
Net operating loss	(8,590)	(8,966)
Other income (loss)		
Change in fair value of warrant liability	-	2,374
Loss on extinguishment of warrant liability	-	(440)
Interest income	7	9
Total other income	7	1,943
Net loss	$ (8,583)	$ (7,023)
Deemed dividend related to warrant conversion	-	(1,038)
Net loss attributable to common stockholders	$ (8,583)	$ (8,061)
Net loss per share, basic and diluted	$ (14.38)	$ (15.99)
Basic and diluted weighted average number of common shares outstanding	597	504

SEE ACCOMPANYING NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

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BIO-PATH HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)

	Year Ended December 31,	
	2018	2017
Cash flow from operating activities		
Net loss	$ (8,583)	$ (7,023)
Adjustments to reconcile net loss to net cash used in operating activities		
Amortization	161	160
Depreciation	265	251
Stock-based compensation	554	793
Impairment of technology license	608	-
Change in fair value of warrant liability	-	(2,374)
Loss on extinguishment of warrant liability	-	440
(Increase) decrease in assets		
Prepaid drug product for testing	785	(741)
Other current assets	(240)	549
Increase (decrease) in liabilities		
Accounts payable and accrued expenses	326	(12)
Net cash used in operating activities	(6,124)	(7,957)
Cash flow from investing activities		
Purchases of furniture, fixtures & equipment	(17)	(538)
Net cash used in investing activities	(17)	(538)
Cash flow from financing activities		
Net proceeds from sale of common stock	1,180	3,567
Net proceeds from exercise of warrants	-	1,518
Net cash provided by financing activities	1,180	5,085
Net decrease in cash	(4,961)	(3,410)

Cash, beginning of period	5,965	9,375
Cash, end of period	$ 1,004	$ 5,965
Supplemental disclosure of non-cash activities		
Non-cash financing activities		
Warrants transferred to equity upon modification	$ -	$ 797
Conversion of warrant liability to equity	$ -	$ 175

SEE ACCOMPANYING NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

BIO-PATH HOLDINGS, INC.

CONSOLIDATED STATEMENTS OF SHAREHOLDERS' EQUITY

(in thousands)

Description	Common Stock Shares	Amount	Additional Paid in Capital	Accumulated Deficit	Total
Balance at December 31, 2016	478	$ -	$ 40,374	$ (32,134)	$ 8,240
Issuance of common stock, net of fees	67	1	3,566		3,567
Exercise of warrants	22	-	1,518		1,518
Warrants transferred to equity upon modification			797		797
Conversion of warrant liability to equity			175		175
Stock-based compensation			793		793
Deemed dividend related to warrant modification			(1,038)		(1,038)
Modification of warrant exercise price			1,038		1,038
Net loss				(7,023)	(7,023)
Balance at December 31, 2017	567	1	47,223	(39,157)	8,067
Issuance of common stock, net of fees	113	-	1,180		1,180
Stock-based compensation			554		554
Net loss				(8,583)	(8,583)
Balance at December 31, 2018	680	$ 1	$ 48,957	$ (47,740)	$ 1,218

SEE ACCOMPANYING NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

Bio-Path Holdings, Inc.

Notes to Consolidated Financial Statements

December 31, 2018

Unless the context requires otherwise, references in these Notes to the Consolidated Financial Statements to "we," "our," "us," "the Company" and "Bio-Path" refer to Bio-Path Holdings, Inc. and its subsidiary. Bio-Path Holdings, Inc.'s wholly-owned subsidiary, Bio-Path, Inc., is sometimes referred to herein as "Bio-Path Subsidiary."

1. Organization and Business

The Company is a clinical and preclinical stage oncology focused RNAi nanoparticle drug development company utilizing a novel technology that achieves systemic delivery for target specific protein inhibition for any gene product that is over-expressed in disease. Our drug delivery and antisense technology, called DNAbilize®, is a platform that uses P-ethoxy, which is a deoxyribonucleic acid (DNA) backbone modification that is intended to protect the DNA from destruction by the body's enzymes when circulating *in vivo,* incorporated inside of a neutral charged lipid bilayer. We believe this combination allows for high efficiency loading of antisense DNA into non-toxic, cell-membrane-like structures for delivery of the antisense drug substance into cells. *In vivo,* the DNAbilize® delivered antisense drug substances are systemically distributed throughout the body to allow for reduction or elimination of proteins in blood diseases and solid tumors. DNAbilize® is a registered trademark of the Company. Using DNAbilize® as a platform for drug development and manufacturing, we currently have three antisense drug candidates in development to treat at least five different cancer disease indications.

Bio-Path Subsidiary was founded in May 2007 as a Utah corporation. In February 2008, Bio-Path Subsidiary completed a reverse merger with the Company, which at the time was traded over the counter and had no current operations. The prior name of Company was changed to Bio-Path Holdings, Inc. and the directors and officers of Bio-Path Subsidiary became the directors and officers of Bio-Path Holdings, Inc. The Company's operations to date have been limited to organizing and staffing the Company, acquiring, developing and securing its technology and undertaking product development for a limited number of product candidates.

In June 2015, the Company established an “at the market” (“ATM”) program through which it may offer and sell up to $25.0 million of its common stock from time to time, at Bio-Path’s discretion, through an investment banking firm, acting as sales agent. Sales of Bio-Path common stock under the ATM program will be made directly on or through The Nasdaq Capital Market, among other methods. The ATM program may be terminated by either the investment banking firm or the Company upon ten days’ notice. We are subject to certain restrictions on our ability to offer and sell shares of our common stock under the ATM program. To date, the Company has not offered or sold any shares of its common stock under the ATM program.

In June 2016, the Company entered into a securities purchase agreement with certain healthcare focused institutional investors pursuant to which the Company agreed to sell an aggregate of 29,412 shares of the Company’s common stock and warrants (the “2016 Registered Warrants”) to purchase up to 14,706 shares of the Company’s common stock for gross proceeds of approximately $10.0 million (the “2016 Registered Direct Offering”). The 2016 Registered Direct Offering closed on July 5, 2016. The Company also issued warrants (the “2016 Placement Warrants,” and together with the 2016 Registered Warrants, the “2016 Warrants”) to purchase up to 1,250 shares of the Company’s common stock in a private placement to H.C. Wainwright & Co., LLC and its designees as compensation for its services as a placement agent in connection with the 2016 Registered Director Offering.

In May 2017, the Company entered into Warrant Exercise Agreements (the “Exercise Agreements”) with certain holders (the “Exercising Holders”) of the 2016 Registered Warrants and warrants to purchase shares of common stock that we issued in January 2014 (the “2014 Warrants,” and together with the 2016 Warrants, the “Original Warrants”). The Exercising Holders owned, in the aggregate, Original Warrants exercisable for 22,059 shares of our common stock. Pursuant to the Exercise Agreements, the Exercising Holders and the Company agreed that the Exercising Holders would exercise their Original Warrants with respect to 21,500 shares of our common stock underlying such Original Warrants for a reduced exercise price equal to $76.00 per share (the “Reduced Exercise Price”). The Exercising Holders also subsequently exercised their Original Warrants for the remaining 559 shares of our common stock underlying such Original Warrants for the Reduced Exercise Price. In connection with the execution of the Exercise Agreements, we issued to each Exercising Holder a new warrant (each, a “New Warrant”) to purchase shares of our common stock equal to the number of shares of our common stock received by such Exercising Holder upon exercise of such Exercising Holder’s Original Warrants. The terms of the New Warrants are substantially similar to the terms of the Original Warrants, except that the New Warrants (i) became exercisable immediately upon issuance for a period of five years from the closing date of the Exercise Agreements; (ii) have an exercise price equal to $120.00 per share and (iii) included revised language substantially similar to the language in the Warrant Amendments described below regarding fundamental transactions and net cash settlement. As noted below, this modified language results in the New Warrants qualifying for equity treatment on the Company’s Consolidated Balance Sheet. The net proceeds to the Company from the exercise of the New Warrants by the Exercising Holders, after deducting financial advisory fees and expenses and our offering expenses, were approximately $1.5 million.

In June 2017, the Company entered into amendments (the “Warrant Amendments”) with holders (the “Holders”) of the remaining 2016 Warrants, which amended the terms of their 2016 Warrants exercisable for 6,398 shares of our common stock. The Warrant Amendments provide that (i) the Holders’ right to require the Company to purchase the outstanding warrants upon the occurrence of certain fundamental transactions will not apply if the fundamental

transaction is a result of a transaction that has not been approved by the Board of Directors and (ii) in the event the Company does not have an effective registration statement registering the issuance of the underlying shares of our common stock to the Holders, there is no circumstance that would require the Company to net cash settle the outstanding warrants. As such, the changes made in the Warrant Amendments allow for equity treatment of the remaining 2016 Warrants. As a result of the Exercise Agreements and the Warrant Amendments, the Company's Warrant Liability was extinguished, allowing the New Warrants and the remaining 2016 Warrants, as amended, to be treated as equity for all filings beginning with the quarter ended June 30, 2017.

The Exercise Agreements for the 2014 Warrants resulted in the holders receiving $1.0 million in incremental value over the value of the warrants at the exchange date. This incremental value was recorded as a deemed dividend in additional paid-in capital due to the absence of retained earnings and increased the net loss available to common stockholders on the Consolidated Statements of Operations. The Exercise Agreements for the 2016 Registered Warrants resulted in warrants with a fair value of $0.4 million being extinguished and resulted in the recognition of a loss on extinguishment of warrants of $0.4 million. Additionally, the Warrant Amendments resulted in the reclassification of the remaining 2016 Warrants with a fair value of $0.2 million from liability presentation to equity treatment on the Consolidated Balance Sheet.

In November 2017, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell an aggregate of 66,667 shares of our common stock and warrants to purchase up to 33,334 shares of our common stock for gross proceeds of approximately $4.0 million under our effective shelf registration statement on Form S-3 (File No. 333-2152051) (the "2017 Shelf Registration Statement"), which became effective on January 9, 2017 (the "2017 Registered Direct Offering"). We also issued warrants to purchase up to 800 shares of common stock in a private placement to Roth Capital Partners, LLC as compensation for its services as a placement agent in connection with the 2017 Registered Direct Offering. The 2017 Registered Direct Offering closed on November 6, 2017. The net proceeds to the Company from the 2017 Registered Direct Offering, after deducting the placement agent's fees and expenses and our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offering, were approximately $3.6 million.

On September 20, 2018, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell an aggregate of 98,454 shares of our common stock and pre-funded warrants to purchase up to 14,624 shares of our common stock for gross proceeds of approximately $1.5 million under the 2017 Shelf Registration Statement (the "2018 Registered Direct Offering"). In a concurrent private placement, we also agreed pursuant to the securities purchase agreement to issue to such investors Series A warrants to purchase up to 113,077 shares of our common stock (the "2018 Private Placement"). Additionally, we issued warrants to purchase up to 6,785 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as a placement agent in connection with the 2018 Registered Direct Offering and the 2018 Private Placement. The 2018 Registered Direct Offering and the 2018 Private Placement closed on September 25, 2018. The net proceeds to the Company from the offerings, after deducting the placement agent's fees and expenses, our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offerings, were approximately $1.2 million.

On January 14, 2019, we entered into an underwriting agreement with H.C. Wainwright & Co., LLC relating to an underwritten public offering of 429,616 shares of our common stock for gross proceeds of approximately $1.1 million under the 2017 Shelf Registration Statement (the "2019 Underwritten Offering"). The offering price to the public in the 2019 Underwritten Offering was $2.60 per share, and H.C. Wainwright & Co., LLC agreed to purchase the shares in the 2019 Underwritten Offering from the Company pursuant to the underwriting agreement at a price of $2.418 per share. Additionally, we issued warrants to purchase up to 25,777 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as underwriter in connection with the 2019 Underwritten Offering. The 2019 Underwritten Offering closed on January 17, 2019. The net proceeds to the Company from the 2019 Underwritten Offering, after deducting the underwriting discounts and commissions and expenses and the Company's estimated offering expenses, and excluding the proceeds, if any, from the exercise of the underwriter warrants, were approximately $0.9 million.

On January 17, 2019, we effected a reverse stock split of our outstanding shares of common stock at a ratio of 1-for-20, and our common stock began trading on the split-adjusted basis on the Nasdaq Capital Market at the commencement of trading on January 18, 2019. All common stock share and per share amounts in our consolidated financial statements have been adjusted to give effect to the 1-for-20 reverse stock split.

On January 18, 2019, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell, in a registered direct offering, an aggregate of 648,233 shares of our common stock for gross proceeds of approximately $1.7 million under the 2017 Shelf Registration Statement (the "January 2019 Registered Direct Offering"). In a concurrent private placement, we also agreed pursuant to the securities purchase agreement to issue to such investors Series A warrants to purchase up to 324,117 shares of our common stock (the "January 2019 Private Placement"). Additionally, we issued warrants to purchase up to 38,894 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as a placement agent in connection with the 2019 Registered Direct Offering and the 2019 Private Placement. The 2019 Registered Direct Offering and the 2019 Private Placement closed on January 23, 2019. The net proceeds to the Company from the offerings, after deducting the placement agent's fees and expenses, our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offerings, were approximately $1.5 million.

On March 12, 2019, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell, in a registered direct offering, an aggregate of 712,910 shares of our common stock for gross proceeds of approximately $18.5 million under the 2017 Shelf Registration Statement (the "March 2019 Registered Direct Offering"). Additionally, we issued warrants to purchase up to 42,775 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as a placement agent in connection with the March 2019 Registered Direct Offering. The March 2019 Registered Direct Offering closed on March 14, 2019. The net proceeds to us from the offerings, after deducting the placement agent's fees and expenses, our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offerings, were approximately $17.0 million.

As the Company has not begun its planned principal operations of commercializing a product candidate, the Company's activities are subject to significant risks and uncertainties, including the potential requirement to secure additional funding, the outcome of the Company's clinical trials, and failing to operationalize the Company's current drug candidates before another company develops similar products.

2. Summary of Significant Accounting Policies

Principles of Consolidation — The consolidated financial statements include the accounts of Bio-Path Holdings, Inc., and its wholly-owned subsidiary Bio-Path, Inc. All intercompany accounts and transactions have been eliminated in consolidation.

Revenue Recognition — We have not generated significant revenues to date. During 2016, the Company entered into a fixed fee service agreement with a preclinical stage biotechnology company in connection with a development project involving our DNAbilize® technology, pursuant to which we agreed to perform certain evaluation services in exchange for $50,000. As of December 31, 2017, the Company completed its obligations and recorded $50,000 in revenue under the agreement.

Cash and Cash Equivalents — The Company considers all highly liquid investments with a maturity of three months or less when purchased to be cash equivalents.

Concentration of Credit Risk — Financial instruments that potentially subject us to a significant concentration of credit risk consist of cash. The Company maintains its cash balances with one major commercial bank, JPMorgan Chase Bank. The balances are insured by the Federal Deposit Insurance Corporation (the "FDIC") up to $250,000. As a result, as of December 31, 2018, approximately $0.8 million of our cash balances was not covered by the FDIC. As of December 31, 2017, we had approximately $6.0 million in cash on-hand, of which approximately $5.7 million was not covered by the FDIC. To date, the Company has not incurred any losses on its cash balances.

Furniture, fixtures and equipment — Furniture, fixtures and equipment are stated at cost and depreciated using the straight-line method over the estimated useful lives of the assets. Depreciation expense was $0.3 million for both the years ended December 31, 2018 and 2017, respectively.

The estimated useful lives are as follows:

Computers and equipment – 3 years

Furniture and fixtures – 7 years

Scientific equipment –7 years

Leasehold improvements – Lesser of useful life or lease term

Major additions and improvements are capitalized, while costs for minor replacements, maintenance, and repairs that do not increase the useful life of an asset are expensed as incurred.

Long Lived Assets — Our long-lived assets consist of furniture, fixtures and equipment, leasehold improvements and a technology license. Long lived assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Recoverability of the asset is measured by a comparison of the asset's carrying amount to the estimated undiscounted future cash flows expected to be generated by the asset. If the carrying amount of an asset exceeds its estimated undiscounted future cash flows, an impairment charge is recognized by the amount by which the carrying amount of the asset exceeds the fair value of the asset.

Intangible Assets/Impairment of Long-Lived Assets — Long-lived assets are reviewed for events of changes in circumstances which indicate that their carrying value may not be recoverable. The license agreement was mutually terminated on December 18, 2018, and the Company fully impaired the license as of December 31, 2018. The Company did not have any impairments in 2017. As of December 31, 2017, other assets totaled $0.8 million,

comprised of $2.5 million in value acquiring our technology license and our intellectual property, less accumulated amortization of $1.7 million.

Research and Development Costs — Costs and expenses that can be clearly identified as research and development are charged to expense. Advance payments, including nonrefundable amounts, for goods or services that will be used or rendered for future research and development activities are deferred and capitalized. Such amounts will be recognized as an expense as the related goods are delivered or the related services are performed. If the goods will not be delivered, or services will not be rendered, then the capitalized advance payment is charged to expense.

The Company estimates its clinical trial expense accrual each period based on a cost per patient calculation which is derived from estimated start-up costs, clinical trial costs based on the number of patients and length of the study and clinical study report costs. These services are performed by the Company's third-party clinical research organizations, laboratories and clinical investigative sites. The expense accrual is recorded in research and development expense each period. Amounts that have been prepaid in advance of work performed are recorded in other current assets.

For the years ended December 31, 2018 and 2017, we had $4.6 million and $5.5 million of costs classified as research and development expense, respectively.

Stock-Based Compensation — The Company has accounted for stock-based compensation under the provisions of generally accepted accounting principles ("GAAP"). The provisions require us to record an expense associated with the fair value of stock-based compensation. We currently use the Black-Scholes option valuation model to calculate stock-based compensation at the date of grant. Option pricing models require the input of highly subjective assumptions, including the expected price volatility. Changes in these assumptions can materially affect the fair value estimate.

Net Loss Per Share — Basic net loss per common share is computed by dividing net loss attributable to common stockholders for the period by the weighted average number of common shares outstanding during the period. Although there were warrants and stock options outstanding during 2018 and 2017, no potential common shares shall be included in the computation of any diluted per-share amount when a loss exists, as it would be anti-dilutive. Consequently, diluted net loss per share as presented in the financial statements is equal to basic net loss per share for the years 2018 and 2017. The calculation of diluted earnings per share for 2018 did not include 15,286 shares and 183,714 shares issuable pursuant to the exercise of vested common stock options and outstanding warrants, respectively, as of December 31, 2018 as the effect would be anti-dilutive. The calculation of diluted earnings per share for 2017 did not include 28,102 shares and 63,889 shares issuable pursuant to the exercise of vested common stock options and outstanding warrants, respectively, as of December 31, 2017 as the effect would be anti-dilutive.

Use of Estimates — The preparation of consolidated financial statements in conformity with accounting principles generally accepted in the United States (“U.S.”) requires management to make estimates and assumptions that affect the amounts reported in the Company’s consolidated financial statements and accompanying notes. On an ongoing basis, the Company evaluates its estimates and judgments, which are based on historical and anticipated results and trends as well as on various other assumptions that the Company believes to be reasonable under the circumstances. By their nature, estimates are subject to an inherent degree of uncertainty and, as such, actual results may differ from the Company’s estimates. These estimates include accrued clinical trial costs, stock-based compensation expense, valuation of warrants and valuation of deferred tax assets.

Income Taxes — Deferred income tax assets and liabilities are determined based upon differences between the financial reporting and tax bases of assets and liabilities and are measured using the enacted tax rates and laws that will be in effect when the differences are expected to reverse.

Liquidity — Since its inception, the Company has devoted substantially all of its efforts to product development, raising capital and building infrastructure, and has not generated significant revenues from its planned principal operations. The Company does not anticipate generating significant revenues for the foreseeable future. The Company’s activities are subject to significant risks and uncertainties.

The Company has experienced significant losses since its inception, including net losses of $8.6 million and $7.0 million for the years ended December 31, 2018 and 2017, respectively. As of December 31, 2018, the Company had an accumulated deficit of $47.7 million and $1.0 million in cash and cash equivalents. The Company has no debt commitments. Substantially all of the Company’s net losses have resulted from costs incurred in connection with its research and development activities and its general and administrative expenses to support operations. The Company’s net losses may fluctuate significantly from quarter to quarter and year to year. We believe that our available cash, together with the net proceeds received from the 2019 Underwritten Offering of $0.9 million, the January 2019 Registered Direct Offering of $1.5 million and the March 2019 Registered Direct Offering of $17.0 million, will be sufficient to meet obligations and fund our liquidity and capital expenditure requirements for at least the next 12 months from the issuance of these financial statements.

The Company expects to continue to incur net losses for the foreseeable future in connection with its ongoing activities, including conducting clinical trials, manufacturing development and seeking regulatory approval of its drug candidates, prexigebersen, BP1002 and BP1003. Accordingly, the Company will continue to require substantial additional capital to fund its projected operating requirements. Such additional capital may not be available when needed or on terms favorable to the Company. In addition, the Company may seek additional capital due to favorable market conditions or strategic considerations, even if it believes it has sufficient funds for our current and future operating plan. There can be no assurance that the Company will be able to continue to raise additional capital through the sale of securities in the future. If the Company is not able to secure adequate additional funding, the Company may be forced to make reductions in spending, extend payment terms with suppliers, and/or suspend or curtail planned programs. Any of these actions could materially harm the Company's business, results of operations, financial condition and future prospects.

Recent Accounting Pronouncements — From time to time, new accounting pronouncements are issued by the Financial Accounting Standards Board ("FASB") that are adopted by the Company as of the specified effective date. If not discussed, management believes that the impact of recently issued standards, which are not yet effective, will not have a material impact on the Company's consolidated financial statements upon adoption.

In May 2014, FASB issued Accounting Standards Update ("ASU") No. 2014-09, *Revenue from Contracts with Customers.* The new standard provides comprehensive guidance for recognizing revenue as goods or services are delivered to the customer in an amount that is expected to be earned from those same goods or services. The Company adopted the standard on January 1, 2018 using the modified retrospective method of adoption and determined that it did not have a material effect on our consolidated financial statements as the Company currently does not have significant contracts with customers.

In February 2016, the FASB issued ASU No. 2016-02, *Leases*. The new standard establishes a right-of-use ("ROU") model that requires a lessee to record a ROU asset and a lease liability on the balance sheet for all leases with terms longer than 12 months. Leases will be classified as either finance or operating, with classification affecting the pattern of expense recognition in the income statement. The new standard is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. A modified retrospective transition approach is required for lessees for capital and operating leases existing at, or entered into after, the beginning of the earliest comparative period presented in the financial statements, with certain practical expedients available. The Company expects the right of use ("ROU") asset will be the present value of the remaining lease payments as noted in Note 13 - Commitments and Contingencies. Management has evaluated the adoption of the new standard and determined that its ROU asset and lease liability will not have a material impact on the Company's consolidated financial statements. The FASB also issued ASU No. 2018-11, *Lease-Targeted Improvements (Topic 842).* The update allows companies to use the effective date of the new lease standard as the date of initial application on transition and not apply the new lease standard in the comparative prior periods included in their financial statements in the year of adoption. The update also gives entities the option not to separate non-lease components from the associated lease components when certain criteria are met.

In May 2017, the FASB issued ASU No. 2017-09, *Compensation-Stock Compensation: Scope of Modification Accounting*. The new standard requires an entity to apply modification accounting provisions if the value, vesting conditions or classification of the award changes. The new guidance must be applied on a prospective basis and is effective for fiscal years beginning after December 15, 2017, including interim periods within those fiscal years, with early adoption permitted. The Company adopted the standard on January 1, 2018 on a prospective basis and determined that it did not have a significant impact on our consolidated financial statements

In July 2017, the FASB issued ASU No. 2017-11*, Earnings Per Share (Topic 260); Distinguishing Liabilities from Equity (Topic 480); Derivatives and Hedging (Topic 815): (Part I) Accounting for Certain Financial Instruments with Down Round Features, (Part II) Replacement of the Indefinite Deferral for Mandatorily Redeemable Financial Instruments of Certain Nonpublic Entities and Certain Mandatorily Redeemable Noncontrolling Interests with a Scope Exception.* Part I of the new standard applies to entities that issue financial instruments such as warrants, convertible debt or convertible preferred stock that contain down round features. The ASU allows companies to exclude a down round feature when determining whether a financial instrument (or embedded conversion feature) is considered indexed to the entity's own stock. As a result, financial instruments (or embedded conversion features) with down round features may no longer be required to be classified as liabilities. A company will recognize the value of a down round feature only when it is triggered and the strike price has been adjusted downward. Part II of the new standard replaces the indefinite deferrals for certain mandatorily redeemable noncontrolling interests and mandatorily redeemable financial instruments of nonpublic entities. ASU 2017-11 is effective for annual reporting periods beginning after December 15, 2018, including interim periods within those fiscal years, with early adoption permitted. Management early adopted the new standard during fiscal year 2017 and notes the adoption did not have a significant impact on the Company's consolidated financial statements.

In June 2018, the FASB issued ASU No. 2018-07, *Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting.* The new standard simplifies the accounting for share-based payments to

nonemployees by aligning it with the accounting for share-based payments to employees. Equity-classified share-based payments issued to nonemployees will be measured on the grant date instead of being remeasured through the performance completion date as required under the current guidance. The new standard is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years, with early adoption permitted. The Company early adopted this standard effective June 30, 2018 and notes the adoption did not have a significant impact on the Company's consolidated financial statements.

In August 2018, the FASB issued ASU No. 2018-13, *Fair Value Measurement (Topic 820): Disclosure Framework - Changes to the Disclosure Requirements for Fair Value Measurement*. The new standard eliminates certain disclosure requirements for fair value measurements for all entities, requires public entities to disclose certain new information and modifies some disclosure requirements. This standard is effective for fiscal years beginning after December 15, 2019, with early adoption permitted. Management is currently evaluating the impact of future adoption of the new standard on the Company's consolidated financial statements.

In August 2018, the SEC adopted the final rule under SEC Release No. 33-10532, *Disclosure Update and Simplification*, amending certain disclosure requirements that were redundant, duplicative, overlapping, outdated or superseded. In addition, the amendments expanded the disclosure requirements on the analysis of stockholders' equity for interim financial statements. Under the amendments, an analysis of changes in each caption of stockholders' equity presented in the balance sheet must be provided in a note or separate statement. The analysis should present a reconciliation of the beginning balance to the ending balance of each period for which a statement of comprehensive income is required to be filed. The Company anticipates its first presentation of changes in shareholders' equity will be included in its Form 10-Q for the first quarter of fiscal year 2019.

In November 2018, the FASB issued ASU No. 2018-18, *Collaborative Arrangements (Topic 808): Clarifying the Interaction Between Topic 808 and Topic 606.* The new standard provides guidance on how to assess whether certain transactions between collaborative arrangement participants should be accounted for within the revenue recognition standard. The update also provides more comparability in the presentation of revenue for certain transactions between collaborative arrangement participants. The new standard is effective for fiscal years beginning after December 15, 2019, including interim periods within those fiscal years with early adoption permitted. The Company early adopted this standard effective December 31, 2018 and notes that it did not a significant impact on our consolidated financial statements as the Company currently does not have significant collaborative agreements in place.

Management has reviewed all other recently issued pronouncements and has determined they will have no material impact on the Company’s consolidated financial statements.

3. Prepaid Drug Product for Testing

Advance payments, including nonrefundable amounts, for goods or services that will be used or rendered for future clinical development activities are deferred and capitalized. Such amounts will be recognized as an expense as the related goods are delivered or the related services are performed. The Company made payments to its contract drug manufacturing and raw material suppliers totaling $1.1 million in late 2016 and all of 2017 pursuant to drug supply contracts for the manufacture and delivery of prexigebersen for testing in two Phase 2 clinical trials and Bcl-2 for testing in a Phase 1 clinical trial. This amount was carried on the Balance Sheet as of December 31, 2017 at cost as Prepaid Drug Product for Testing. The Company recognized certain expenses and incurred additional installment costs during 2018, with advanced payments totaling $0.3 million, which are carried on the Balance Sheet as of December 31, 2018 as Prepaid Drug Product for Testing (See Note 13).

4. Other Current Assets

As of December 31, 2018, Other Current Assets included prepaid expenses of $0.6 million, comprised primarily of prepayments made for our clinical trial for prexigebersen in AML of $0.4 million, prepaid insurance of $0.1 million

and other prepaid expenses of $0.1 million. As of December 31, 2017, Other Current Assets included prepaid expenses of $0.4 million, comprised primarily of prepayments made to the Company's clinical research organization for our clinical trial for prexigebersen in CML of $0.2 million, prepaid insurance of $0.1 million and other prepaid expenses of $0.1 million

5. Property and Equipment

The following table summarizes property and equipment as of December 31, 2018 and 2017:

	Estimated Useful Lives	December 31,	
		2018	2017
	(in years)	(in thousands)	
Leasehold improvements	2 to 3	$432	$432
Computers and office equipment	3	60	63
Furniture and fixtures	7	46	46
Scientific equipment	7	460	443
Total		998	984
Less: Accumulated depreciation		(592)	(330)
Net property and equipment		$406	$654

6. Accounts Payable

As of December 31, 2018, Current Liabilities included accounts payable of $0.8 million, comprised primarily of amounts owed to the Company's clinical research organizations for our clinical trials for prexigebersen in AML and CML of $0.3 million, preclinical expenses of $0.2 million, an annual license maintenance fee of $0.1 million, manufacturing costs of $0.1 million and other payables of $0.1 million. As of December 31, 2017, Current Liabilities included accounts payable of $0.1 million.

7. Accrued Expense

As of December 31, 2018, Current Liabilities included accrued expenses of $0.3 million, comprised primarily of accrued preclinical expenses of $0.1 million, employee vacation and bonus expenses of $0.1 million and legal and professional fees of $0.1 million. As of December 31, 2017, Current Liabilities included accrued expenses of $0.7 million, comprised primarily of accrued clinical and preclinical expenses of $0.4 million, employee vacation and bonus expenses of $0.1 million, an annual license maintenance fee of $0.1 million and other accrued expenses of $0.1 million.

8. Warrant Liability

In connection with the 2016 Registered Direct Offering, the Company issued warrants to purchase up to 14,706 shares of the Company's common stock at $460.00 per share to certain healthcare focused institutional investors, as well as warrants to purchase up to 1,250 shares of the Company's common stock at $492.00 per share to H.C. Wainwright & Co., LLC and its designees as compensation for its services as the placement agent. When issued, the 2016 Warrants contained a provision for net cash settlement in the event of certain fundamental transactions involving the Company (defined in the 2016 Warrants to include, among other things, the Company's approval and consummation of a merger with another entity, the Company's approval and consummation of the sale of all or substantially all of the Company's assets or the occurrence of certain other change of control transactions). Due to this provision and in accordance with ASC 480-10 (Distinguishing Liabilities from Equity), the 2016 Warrants were classified as a liability and recorded at fair value as calculated using the Binomial Lattice Model.

As discussed in Note 1, certain of the 2016 Warrants were extinguished in 2017 as a result of the Exercise Agreements and resulted in recognition of a loss on extinguishment of warrants of $0.4 million. Additionally, warrants with a fair value of $0.2 million were reclassified to equity as a result of the Warrant Amendments. For the years ended December 31, 2018 and 2017, the net change in fair value of the 2016 Warrants of none and $2.4 million respectively, are shown as other income on the Company's Consolidated Statements of Operations.

9. Fair Value Measurements

In accordance with ASC 820 (Fair Value Measurements and Disclosures), the Company uses various inputs to measure the 2016 Warrants on a recurring basis to determine the fair value of the liability. ASC 820 also establishes a hierarchy categorizing inputs into three levels used to measure and disclose fair value. The hierarchy gives the highest priority to quoted prices available in active markets and the lowest priority to unobservable inputs. An explanation of each level in the hierarchy is described below:

Level 1 – Unadjusted quoted prices in active markets for identical instruments that are accessible by the Company on the measurement date

Level 2 – Quoted prices in markets that are not active or inputs which are either directly or indirectly observable

Level 3 – Unobservable inputs for the instrument requiring the development of assumptions by the Company

The Company's Warranty Liability was extinguished as of June 30, 2017 (See Note 1).

The following table summarizes changes to the fair value of the Level 3 2016 Warrants for the year ended December 31, 2017:

	Fair Value of Warrant Liability (in thousands)
Balance at December 31, 2016	$ 2,906
Change in fair value	(2,374)
Extinguished	(357)
Reclassified to equity	(175)
Balance at December 31, 2017	$ -

The Company utilized the Binomial Lattice Model for estimating the fair value of the 2016 Warrants using the following assumptions on the reclassification dates of June 13, 2017 and May 21, 2017 and as of December 31, 2016:

	As of June 13, 2017		As of May 21, 2017		As of December 31, 2016	
Risk-free interest rate	1.51	%	1.78	%	1.93	%
Expected volatility	88	%	89	%	98	%
Expected term in years	4.6		4.6		5.0	
Dividend yield	-	%	-	%	-	%

10. Stockholders' Equity

Issuances of Common Stock – On November 3, 2017, the Company entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell an aggregate of 66,667 shares of our common stock and warrants to purchase up to 33,334 shares of our common stock for gross proceeds of approximately $4.0 million under the 2017 Registration Statement. We also issued warrants to purchase up to 800 shares of common stock in a private placement to Roth Capital Partners, LLC as compensation for its services as a placement agent in connection with the 2017 Registered Direct Offering. The 2017 Registered Direct Offering closed on November 6, 2017. The net proceeds to the Company from the 2017 Registered Direct Offering, after deducting the placement agent's fees and expenses and our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offering, were approximately $3.6 million.

On September 20, 2018, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell, in a registered direct offering, an aggregate of 98,454 shares of our common stock and pre-funded warrants to purchase up to 14,624 shares of our common stock for gross proceeds of approximately $1.5 million under the 2017 Shelf Registration Statement (the "2018 Registered Direct Offering"). In a concurrent private placement, we also agreed pursuant to the securities purchase agreement to issue to such investors Series A warrants to purchase up to 113,077 shares of our common stock (the "2018 Private Placement"). Additionally, we issued warrants to purchase up to 6,785 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as a placement agent in connection with the 2018 Registered Direct Offering and the 2018 Private Placement. The 2018 Registered Direct Offering and the 2018 Private Placement closed on September 25, 2018. The net proceeds to the Company from the offerings, after deducting the placement agent's fees and expenses, our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offerings, were approximately $1.2 million.

Warrant Exercises – On May 21, 2017, the Company entered into the Exercise Agreements with the Exercising Holders of the Original Warrants to purchase up to 12,500 shares of common stock that we issued in January 2014. The Exercising Holders owned, in the aggregate, Original Warrants exercisable for 22,059 shares of our common

stock. Pursuant to the Exercise Agreements, the Exercising Holders and the Company agreed that the Exercising Holders would exercise their Original Warrants with respect to 21,500 shares of our common stock underlying such Original Warrants for a reduced exercise price equal to $76.00 per share. The Exercising Holders also subsequently exercised their Original Warrants for the remaining 559 shares of our common stock underlying such Original Warrants for the Reduced Exercise Price. In connection with the execution of the Exercise Agreements, we issued to each Exercising Holder a New Warrant to purchase shares of our common stock equal to the number of shares of our common stock received by such Exercising Holder upon exercise of such Exercising Holder's Original Warrants. The terms of the New Warrants are substantially similar to the terms of the Original Warrants, except that the New Warrants (i) became exercisable immediately upon issuance for a period of five years from the closing date of the Exercise Agreements; (ii) have an exercise price equal to $120.00 per share and (iii) included revised language substantially similar to the language in the Warrant Amendments described above regarding fundamental transactions and net cash settlement. The net proceeds to the Company from the exercise of the New Warrants by the Exercising Holders, after deducting financial advisory fees and expenses and our offering expenses, were approximately $1.5 million.

Stockholders' Equity totaled $0.7 million as of December 31, 2018 compared to $8.1 million as of December 31, 2017. There were 680,115 shares of common stock issued and outstanding as of December 31, 2018. There were no preferred shares outstanding as of December 31, 2018.

11. Stock-Based Compensation Plan

The 2017 Plan – On December 21, 2017, the Company's stockholders approved the Bio-Path Holdings, Inc. 2017 Stock Incentive Plan (the "2017 Plan"), which replaced the First Amended 2007 Stock Incentive Plan, as amended (the "2007 Plan," and together with the 2017 Plan, the "Plans"). The 2007 Plan expired by its terms in January 2018, however, no awards were made under the 2007 Plan upon approval of the 2017 Plan. The 2017 Plan provides for the grant of Incentive Stock Options, Non-Qualified Stock Options, Restricted Shares, Restricted Share Units, Stock Appreciation Rights, Performance-Based Awards and other stock-based awards, or any combination of the foregoing to the Company's employees, non-employee directors and consultants. As of December 31, 2018, the total number of shares reserved and available for grant and issuance pursuant to the 2017 Plan is 60,000 shares, subject to the terms of the 2017 Plan. Under the 2017 Plan, the exercise price of awards is determined by the Board of Directors or the compensation committee of the Board of Directors, and for options intended to qualify as qualified Incentive Stock Options, may not be less than the fair market value as determined by the closing stock price at the date of the grant. Each option and award under the 2017 Plan shall vest and expire as determined by the Board of Directors or the compensation committee. Options expire no later than ten years from the date of grant. All grants provide for accelerated vesting if there is a change of control, as defined in the 2017 Plan.

Stock option awards granted for the years 2018 and 2017 were estimated to have a weighted average fair value per share of $26.55 and $120.00, respectively. The fair value calculation is based on stock options granted during the year using the Black-Scholes option-pricing model on the date of grant. In addition, for all stock options granted, exercise price was determined based on the fair market value as determined by the closing stock price at the date of the grant. For stock options granted during 2018 and 2017 the following weighted average assumptions were used in determining fair value:

	2018	2017
Risk-free interest rate	2.70%	2.06%
Expected volatility	90 %	99 %
Expected term in years	6.1	6.1
Dividend yield	- %	- %

The Company determines the expected term of its stock option awards using the simplified method based on the weighted average of the length of the vesting period and the term of the exercise period. Expected volatility is determined by the volatility of the Company's historical stock price over the expected term of the grant. The risk-free interest rate for the expected term of each option granted is based on the U.S. Treasury yield curve in effect at the time of grant.

Option activity under the Plans for the year ended December 31, 2018, was as follows (in thousands, except as noted):

	Options	Weighted-Average Exercise Price (per share)	Weighted Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value
Year Ended December 31, 2018				
Outstanding at December 31, 2017	32	$ 232.00	4.0	$ -
Granted	20	34.60	9.3	
Forfeited	-	-		
Expired	(15)	267.20		
Outstanding at December 31, 2018	37	$ 112.60	7.5	$ -
Vested and expected to vest December 31, 2018	31	$ 124.60	7.2	$ -
Exercisable at December 31, 2018	15	$ 181.00	5.1	$ -

The aggregate intrinsic value represents the total pretax intrinsic value (the difference between the Company’s closing stock price on December 31, 2018 and the exercise price, multiplied by the number of in-the-money options) that would have been received by the option holders had all option holders exercised their options on December 31, 2018. This amount changes based on the fair market value of the Company’s stock.

Option activity under the Plans for the year ended December 31, 2017, was as follows (in thousands, except as noted):

	Options	Weighted-Average Exercise Price (per share)	Weighted Average Remaining Contractual Term (in years)	Aggregate Intrinsic Value
Year Ended December 31, 2017				
Outstanding at December 31, 2016	35	$ 266.00	5.2	$ 2,241
Granted	3	150.00	9.3	
Forfeited	(4)	330.00		
Expired	(2)	426.00		
Outstanding at December 31, 2017	32	$ 232.00	4.0	$ -
Vested and expected to vest December 31, 2017	31	$ 230.00	3.8	$ -
Exercisable at December 31, 2017	28	$ 214.00	3.3	$ -

The aggregate intrinsic value represents the total pretax intrinsic value (the difference between the Company's closing stock price on December 31, 2017 and the exercise price, multiplied by the number of in-the-money options) that would have been received by the option holders had all option holders exercised their options on December 31, 2017. This amount changes based on the fair market value of the Company's stock.

Stock-Based Compensation Expense – Total stock-based compensation expense for the year ended 2018 was $0.6 million which consisted of research and development expense of $0.1 million and general and administrative expense of $0.5 million. As of December 31, 2018, future stock-based compensation expense for all outstanding unvested options was $0.8 million, which is expected to be recognized over a weighted-average vesting period of 2.0 years. Total stock-based compensation expense for the year ended 2017 was $0.8 million which consisted of research and development expense of $0.3 million and general and administrative expense of $0.5 million.

12. Warrants

A summary of warrants outstanding and exercisable as of December 31, 2018 (in thousands, except as noted):

Warrants Outstanding			Warrants Exercisable	
	Weighted Average Remaining	Weighted Average		Weighted Average

Year Issued	Number Outstanding	Contractual Life (in years)	Exercise Price (per share)	Number Exercisable	Exercise Price (per share)
2014	1	0.1	$ 948.00	1	$ 948.00
2016	6	3.0	466.26	6	466.26
2017 (Note 10)	56	3.7	55.63	56	55.63
2018 (Note 10)	120	5.2	19.20	-	-
	183	4.6	$ 52.24	63	$ 114.28

13. Commitments and Contingencies

Operating Lease – In April 2014, the Company entered into a five-year lease agreement for administrative office space located in Bellaire, Texas. The term of the lease began on August 1, 2014 and terminates on July 31, 2019. The remaining lease payments due under this lease as of December 31, 2018 are $0.1 million.

In April 2016, the Company entered into a three-year lease agreement for lab space located in Bellaire, Texas. The term of lease began on May 1, 2016 and terminates on April 30, 2019 and requires Bio-Path to pay $2,500 per month over the term of the lease. In December 2018, we entered into an amendment to the agreement with the term of the extension beginning on May 1, 2019 and terminating on April 30, 2022 and will require Bio-Path to pay $2,575 per month over the term. The remaining lease payments due under the original lease and the lease extension as of December 31, 2018 are $0.1 million.

A summary of future payments under operating leases as of December 31, 2018:

For the Year Ending December 31, (in thousands)	
2019	$ 82
2020	31
2021	31
2022	10
Total	$ 154

Drug Supplier Project Plan – The amounts paid for manufacture of the Company's Grb2 drug substance, prexigebersen, Bcl-2 drug substance and BP1002 drug product that have not been expensed total $0.3 million and are carried on the balance sheet as of December 31, 2018 as Prepaid Drug Product for Testing (See Note 3). Total commitments for the Company's drug supplier project plan are $1.6 million as of December 31, 2018, comprised of $1.0 million to the manufacturer of prexigebersen and BP1002, $0.5 million for manufacture of our Grb2 and Bcl-2 drug substance and $0.1 million for manufacturing development. We expect to incur $1.0 million of these commitments over the next 12 months.

14. Benefit Plan

The Company initiated a contribution savings plan under Section 401(k) of the Internal Revenue Code in 2016. Under the plan, all eligible employees may contribute up to the statutory allowable amount governed by the Internal Revenue Service for any calendar year. We make matching contributions equal to 100% of the first 3% and 50% of the next 2% of each employee's base salary up to the allowable amount which is fully vested on the date the matching contributions are made. For the years ended December 31, 2018 and 2017, matching contributions totaled $35,000 and $47,000, respectively.

15. Income Taxes

At December 31, 2018, the Company had a net operating loss carryforward for federal income tax purposes of $43.8 million, $35.8 million of which begins to expire in varying amounts in tax year 2026. $8.0 million of net operating losses, incurred after December 31, 2017, carryforward indefinitely. During the years ended December 31, 2018 and 2017, the Company raised additional equity capital. IRC Section 382 imposes certain limitations on the use of a net operating losses to offset future taxable income when an ownership change has occurred. The Company has yet to determine whether an ownership change occurred in 2018 or 2017. If an ownership change is determined to have occurred, additional limitations on the Company's net operating losses incurred prior to the ownership change may

apply. The Company has a research and development tax credit carryforward of $1.8 million for federal income tax purposes that begins to expire in varying amounts in tax year 2028.

In assessing the ability to realize its deferred tax assets, management considers whether it is more likely than not that some portion or all of the deferred tax assets will not be realized. The ultimate realization of deferred tax assets is dependent upon the generation of future taxable income during the periods in which those temporary differences become deductible. Management considers evidence such as the reversal of deferred tax liabilities, projected future results of operations, and tax planning strategies in making this assessment. Based upon the level of historical taxable income, significant book losses during the current and prior periods, and projections for future results of operations over the periods in which the deferred tax assets are deductible, among other factors, management continues to conclude that the Company does not meet the “more likely than not” requirement of ASC 740 in order to recognize deferred tax assets. As such, a valuation allowance has been recorded to offset the Company’s net deferred tax assets at December 31, 2018. The Company recorded an increase in the valuation allowance of $1.8 million for the year ended December 31, 2018.

On December 22, 2017, the U.S. enacted the Tax Cuts and Jobs Act (the “2017 Tax Act”). The 2017 Tax Act significantly changes corporate income tax laws in the U.S. including reducing the corporate income tax rate from a maximum of 35% to a flat rate of 21%, effective January 1, 2018. As a result of the reduction in the corporate income tax rate under the 2017 Tax Act, an adjustment was recorded in 2017 to the deferred tax asset of $4.9 million.

Due to the uncertainty surrounding the realization of the benefits of its deferred assets, including NOL carryforwards, the Company has provided a 100% valuation allowance on its deferred tax assets at December 31, 2018 and 2017. The valuation balances were $11.4 million and $9.5 million at December 31, 2018 and 2017, respectively.

The components of the Company's deferred tax asset are as follows:

	December 31,	
	2018	2017
	(in thousands)	
Deferred tax assets – non-current		
Accrued bonuses	$12	$-
Accrued vacation	15	17
Net operating loss (NOL) carryover	9,191	7,516
Technology license amortization	-	36
Research & development tax credits	1,780	1,542
Share based expense	310	387
Other	5	5
Fixed asset depreciation	50	15
Total deferred tax asset	11,363	9,518
Less: valuation allowance	(11,363)	(9,518)
Net deferred tax asset	-	-
Deferred tax liability- non-current	-	-
Net deferred tax asset	$-	$-

Reconciliation between income taxes at the statutory tax rate (21% to 34%) and the actual income tax provision for continuing operations follows:

	December 31,		
	2018	2017	2016
	(in thousands)		
Loss before income taxes	$(8,583)	$(7,023)	$(6,750)
Tax (benefit) at statutory tax rate	(1,802)	(2,388)	(2,295)
Effects of:			
Exclusion of incentive stock option expense	47	86	117
R&D tax credits	(238)	(283)	(252)
Increase (decrease) in valuation allowance	1,845	(1,447)	3,001
FMV of warrants	-	(658)	(582)
Prior year adjustments	-	5	6
Carryforward adjustment	2	(252)	5
Stock option forfeitures	146	-	-
Rate change on net deferred tax asset	-	4,937	-
Provision for income taxes	$-	$-	$-

As of December 31, 2018, the Company had no unrecognized income tax benefits. The Company's policy for classifying interest and penalties associated with unrecognized income tax benefits is to include such items as tax expense. No interest or penalties have been recorded as of the year ended December 31, 2018, and no interest or penalties have been accrued as of December 31, 2018 and 2017.

The Company's open years for Internal Revenue Service (IRS) examination purposes due to normal statute of limitation are 2015, 2016 and 2017. However, since the Company has operating loss carryforwards, the IRS has the ability to make adjustments to items that originate in a year otherwise barred by the statute of limitations under Section 6501 of the Internal Revenue Code of 1986, as amended (the "code"), in order to redetermine tax for an open year to which those items are carried. Therefore, in a year in which a net operating loss deduction was claimed, the IRS may examine the year in which the net operating loss was generated and adjust it accordingly for purposes of assessing additional tax in the year the net operating loss was claimed. The Company is not currently under examination by the IRS or any other taxing authorities.

16. Subsequent Events

On January 14, 2019, the Company entered into an underwriting agreement with H.C. Wainwright & Co., LLC relating to an underwritten public offering of 429,616 shares of our common stock for gross proceeds of approximately $1.1 million under the 2017 Shelf Registration Statement. The offering price to the public in the 2019 Underwritten Offering was $2.60 per share, and H.C. Wainwright & Co., LLC agreed to purchase the shares in the 2019 Underwritten Offering from the Company pursuant to the underwriting agreement at a price of $2.418 per share. Additionally, we issued warrants to purchase up to 25,777 shares of our common stock in a private placement to the H.C. Wainwright & Co., LLC as compensation for its services as underwriter in connection with the 2019 Underwritten Offering. The 2019 Underwritten Offering closed on January 17, 2019. The net proceeds to the Company from the 2019 Underwritten Offering, after deducting the underwriting discounts and commissions and expenses and the Company's estimated offering expenses, and excluding the proceeds, if any, from the exercise of the underwriter warrants, were approximately $0.9 million.

On January 17, 2019, the Company effected a reverse stock split of our outstanding shares of common stock at a ratio of 1-for-20, and our common stock began trading on the split-adjusted basis on The Nasdaq Capital Market at the commencement of trading on January 18, 2019 (See Note 1).

On January 18, 2019, the Company entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell, in a registered direct offering, an aggregate of 648,233 shares of our common stock for gross proceeds of approximately $1.7 million under the 2017 Shelf Registration Statement. In a concurrent private placement, we also agreed pursuant to the securities purchase agreement to issue to such investors Series A warrants to purchase up to 324,117 shares of our common stock. Additionally, we issued warrants to purchase up to 38,894 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as a placement agent in connection with the January 2019 Registered Direct Offering and the January 2019 Private Placement. The January 2019 Registered Direct Offering and the January 2019 Private Placement closed on January 23, 2019. The net proceeds to the Company from the offerings, after deducting the placement agent’s fees and expenses, our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offerings, were approximately $1.5 million.

On March 12, 2019, we entered into a securities purchase agreement with certain investors pursuant to which we agreed to sell, in a registered direct offering, an aggregate of 712,910 shares of our common stock for gross proceeds of approximately $18.5 million under our effective shelf registration statement on Form S-3 (File No. 333-215205), which became effective on January 9, 2017. Additionally, we issued warrants to purchase up to 42,775 shares of our common stock in a private placement to H.C. Wainwright & Co., LLC as compensation for its services as a placement agent in connection with the March 2019 Registered Direct Offering. The March 2019 Registered Direct Offering closed on March 14, 2019. The net proceeds to us from the offerings, after deducting the placement agent’s fees and expenses, our offering expenses, and excluding the proceeds, if any, from the exercise of the warrants issued in the offerings, were approximately $17.0 million.