Biostage, Inc.
Form 10-K
March 17, 2017

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

x **Annual report pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934**

For the fiscal year ended December 31, 2016

or

¨ **Transition report pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934**

For the transition period from to

Commission File Number 001-35853

BIOSTAGE, INC.

(Exact Name of Registrant as Specified in Its Charter)

Delaware	**45-5210462**
(State or other jurisdiction of Incorporation or organization)	(I.R.S. Employer Identification No.)

84 October Hill Road, Suite 11, Holliston, Massachusetts 01746

(Address of Principal Executive Offices, including zip code)

(774)233-7300

(Registrant's telephone number, including area code)

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

Title of each class	**Name of each exchange on which registered**
Common Stock, $0.01 par value	**The NASDAQ Capital Market**
Preferred Stock Purchase Rights	

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 and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). YES x NO ¨

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

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

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

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

The aggregate market value of the voting and non-voting common equity held by non-affiliates of the registrant, computed by reference to the price at which the common equity was last sold, or the average bid and asked price of such common equity, as of June 30, 2016 was approximately $18,965,643. Shares of the registrant’s common stock held by each officer and director and each person known to the registrant to own 10% or more of the outstanding voting power of the registrant have been excluded in that such persons may be deemed affiliates. This determination of affiliate status is not a determination for other purposes.

At March 14, 2017, there were 37,116,570 shares of the registrant’s common stock issued and outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the Company’s definitive Proxy Statement in connection with the 2017 Annual Meeting of Stockholders (the “Proxy Statement”), to be filed within 120 days after the end of the Registrant’s fiscal year, are incorporated by reference into Part III of this Form 10-K. Except with respect to information specifically incorporated by reference in this Form 10-K, the Proxy Statement is not deemed to be filed as part hereof.

BIOSTAGE, INC.

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For the Year Ended December 31, 2016

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This Annual Report on Form 10-K contains statements that are not statements of historical fact and are forward-looking statements within the meaning of Section 27A of the Securities Act of 1933 and Section 21E of the Securities Exchange Act of 1934 (the "Exchange Act"), each as amended. The forward-looking statements are principally, but not exclusively, contained in "Item 1: Business" and "Item 7: Management's Discussion and Analysis of Financial Condition and Results of Operations." These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. Forward-looking statements include, but are not limited to, statements about management's confidence or expectations and our plans, objectives, expectations and intentions that are not historical facts. In some cases, you can identify forward-looking statements by terms such as "may," "will," "should," "could," "would," "seek," "expect," "plans," "aim," "anticipates," "believes," "estimates," "projects," "predicts," "intends," "think," "continue," "potential," "is likely," "permit," "objectives," "optimistic," "new," "goal," "target," "strategy" and similar expressions intended to identify forward-looking statements. These statements reflect our current views with respect to future events and are based on assumptions and subject to risks and uncertainties. Given these uncertainties, you should not place undue reliance on these forward-looking statements. We discuss many of these risks in detail under the heading "Item 1A. Risk Factors" beginning on page 18 of this Annual Report on Form 10-K. You should carefully review all of these factors, as well as other risks described in our public filings, and you should be aware that there may be other factors, including factors of which we are not currently aware, that could cause these differences. Also, these forward-looking statements represent our estimates and assumptions only as of the date of this report. We may not update these forward-looking statements, even though our situation may change in the future, unless we have obligations under the federal securities laws to update and disclose material developments related to previously disclosed information. Biostage, Inc. is referred to herein as "we," "our," "us," and "the Company."

PART I

Item 1. *Business.*

BUSINESS

We are a biotechnology company developing bioengineered organ implants based on our novel Cellframe™ technology. Our Cellframe technology is comprised of a biocompatible scaffold seeded with the patient's own stem cells. Our platform technology is being developed to treat life-threatening conditions of the esophagus, bronchus and trachea. By focusing on these underserved patients, we hope to dramatically improve the treatment paradigm for these patients. Our unique Cellframe technology combines the clinically proven principles of tissue engineering, cell biology and material science.

We believe that our Cellframe technology may provide surgeons a new paradigm to address life-threatening conditions of the esophagus, bronchus, and trachea due to cancer, infection, trauma or congenital abnormalities. Our novel technology harnesses the body's response and modulates it toward the healing process to restore the continuity and integrity of the organ. We are pursuing the Cellspan ™ esophageal implant as our first product candidate to address esophageal atresia and esophageal cancer, and we are also developing our technology's applications to address conditions of the bronchus and trachea.

In collaboration with world-class institutions, such as Mayo Clinic and Connecticut Children's Medical Center, we are expecting to transition from a pre-clinical company to a clinical company in 2017. We plan to file an Investigational New Drug application, (IND) with the U.S. Food and Drug Administration (FDA) for our Cellspan esophageal implant in the third quarter of 2017 and expect to begin first in human clinical trials in the fourth quarter of 2017.

Our Cellframe technology platform: how it works

Our Cellframe process begins with the collection of an adipose (fat) tissue biopsy from the patient followed by the use of standard tissue culture techniques to isolate and expand the patient's own (autologous) mesenchymal (multipotent) stem cells, or MSC. The cells are seeded onto a biocompatible, synthetic scaffold, produced to mimic the dimensions of the organ to be regenerated, and incubated in a proprietary organ bioreactor. The scaffold is electrospun from polyurethane (PU) to form a non-woven, hollow tube. The specific microstructures of the Cellspan implants are designed to allow the cultured cells to attach to and cover the scaffold fibers.

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We have conducted large-animal studies to investigate the use of the Cellspan implants for the reconstitution of the continuity and integrity of tubular shape organs, such as the esophagus and the large airways, following a full circumferential resection of a clinically relevant segment, just as would occur in a clinical setting. We announced favorable preliminary preclinical results of large-animal studies for the esophagus, bronchus and trachea in November 2015. Based on the results of those studies, we chose the esophagus to be the initial focus for our organ regeneration technology.

Illustration of intersection of Cellspan esophageal implant and native

esophagus at time of implant and proposed mechanism of action

In May 2016, we reported an update of results from additional, confirmatory pre-clinical large-animal studies. We disclosed that the studies had demonstrated in a predictive large-animal model the ability of our Cellspan organ implant to successfully stimulate the regeneration of a section of esophagus that had been surgically removed. Cellspan esophageal implants, consisting of a proprietary biocompatible synthetic scaffold seeded with the recipient animal's own stem cells, were surgically implanted in place of the esophagus section that had been removed. After the surgical full circumferential resection of a portion of the thoracic esophagus, the Cellspan implant stimulated the reconstitution of full esophageal structural integrity and continuity.

Illustration of esophageal reconstitution over Cellspan esophageal

implant following time of implant and proposed mechanism of action

Study animals were returned to a solid diet three weeks after the implantation surgery. The scaffold portions of the Cellspan implants, which are intended to be in place only temporarily, were retrieved approximately three weeks post-surgery via the animal's mouth in a non-surgical endoscopic procedure. Within 2.5 to 3 months, a complete inner epithelium layer and other specialized esophagus tissue layers were regenerated. As of March 1, 2017, two animals in the study have not been sacrificed and are alive at eleven months and one year, respectively. These animals have demonstrated significant weight gain, appear healthy and free of any significant side effects and are receiving no specialized care.

Platform technology in life-threatening orphan indications

In November 2016, we were granted Orphan Drug Designation for our Cellspan esophageal implant by the FDA to restore the structure and function of the esophagus subsequent to esophageal damage due to cancer, injury or congenital abnormalities. Orphan drug designation provides a seven-year marketing exclusivity period against competition in the U.S. from the date of a product's approval for marketing. This exclusivity would be in addition to any exclusivity we may obtain from our patents. Additionally, orphan designation provides certain incentives, including tax credits and a waiver of the Biologics License Application fee. We also plan to apply for orphan drug designation for our Cellspan esophageal implant in Europe. Orphan drug designation in Europe provides market exclusivity in Europe for ten years from the date of the product's approval for marketing.

We are now advancing the development of our Cellframe technology, specifically a Cellspan esophageal implant, in large-animal studies with collaborators. As we believe that our recent studies provided sufficient confirmatory proof of concept data, we have initiated the Good Laboratory Practice (GLP) studies to demonstrate that our technology, personnel, systems and practices are sufficient for advancing into human clinical trials. In order to seek approval for the initiation of clinical trials for Biostage Cellspan esophageal implants in humans, GLP studies to support the safety of the Cellspan esophageal implant are required to submit an Investigational New Drug (IND) application with the FDA.

Our goal is to submit an IND filing in the third quarter of 2017.

Our product candidates are currently in development and have not yet received regulatory approval for sale anywhere in the world.

Changing the surgical treatment of Esophageal Cancer

Illustration of esophageal cancer site	*Illustration of potential human application of Cellspan esophageal implant at site of esophageal cancer (depicting implant prior to esophageal tissue reconstitution over implant)*

According to the World Health Organization's International Agency for Research on Cancer, there are approximately 450,000 new cases of esophageal cancer worldwide each year. A portion of all patients diagnosed with esophageal cancer are treated via a surgical procedure known as an esophagectomy. The current standard of care for an esophagectomy requires a complex surgical procedure that involves moving the patient's stomach or a portion of their colon into the chest to replace the portion of esophagus resected by the removal of the tumor. These current procedures have high rates of complications, and can lead to a severely diminished quality of life and require costly ongoing care. Our Cellspan esophageal implants aim to provide a simpler surgical procedure, with reduced complications, that may result in a better quality of life after the operation and reduce the overall cost of these patients to the healthcare system.

Congenital Abnormalities - Esophageal Atresia: a much needed focus on children

Each year, several thousand children worldwide are born with a congenital abnormality known as esophageal atresia, a condition where the baby is born with an esophagus that does not extend completely from the mouth to the stomach. When a long segment of the esophagus is lacking, the current standard of care is a series of surgical procedures where surgical sutures are applied to both ends of the esophagus in an attempt to stretch them and pull them together so they can be connected at a later date. This process can take weeks and the procedure is plagued by serious complications and may carry high rates of failure. Such approach also requires, in time, at least two separate surgical interventions. Other options include the use of the child’s stomach or intestine that would be pulled up into the chest to allow a connection to the mouth. We are working to develop a Cellspan esophageal implant solution to address newborns’ esophageal atresia, that could potentially be life-saving or organ-sparing, or both.

Our Mission and Our Strategy

Our mission is to be the leading developer and supplier of bioengineered organ implants for restoring organ function for patients with life-threatening conditions of the esophagus, the bronchus and the trachea. Our business strategy to accomplish this mission includes:

Targeting life-threatening medical conditions. We are focused on creating products to help physicians treat life-threatening conditions like esophageal cancer, central lung cancer and damage to the trachea caused by cancer, trauma or infection. We are also developing products for the treatment of congenital abnormalities of the esophagus and the airways. We are not targeting less severe conditions that have reasonable existing treatment options. Solutions for life-threatening medical conditions present a favorable therapeutic index, or risk/benefit relationship, by providing the opportunity of a significant medical benefit for patients who have poor or no treatment alternatives. We believe that product candidates targeting life-threatening medical conditions may be eligible for review and approval by regulatory authorities under established expedited review programs, which may result in savings of time in the regulatory approval process. Also, we believe that products targeting life-threatening medical conditions may be more likely to receive favorable reimbursement compared with treatments for less critical medical conditions.

Developing products that have a relatively short time to market. Since the number of patients diagnosed with esophageal cancer in the U.S. each year is relatively small, we expect the number of patients that we would likely need to enroll in a clinical trial will also be relatively small. A small number of patients implies a relatively fast enrollment time and a less expensive clinical development program. Therefore, we expect to be able to conduct a clinical trial in a relatively short period of time compared to clinical trials in indications with larger patient populations. We intend to work closely with regulatory agencies and clinical experts to design and size the clinical studies appropriately based on the specific conditions our products are intended to treat.

Using our Cellframe technology as a platform to address multiple organs. We believe that pre-clinical data we have produced to date may suggest that our Cellframe technology is a novel and innovative approach to restoring organ function that may provide an ability to develop products that would address life-threatening conditions impacting organs like the esophagus, bronchus and trachea, and perhaps lower portions of the gastrointestinal (GI) tract. We believe that our Cellframe technology may allow physicians to treat certain life-threatening conditions in ways not currently possible, and in some combination, to save patients' lives, avoid or reduce complications experienced in the current standard of care, and improve the patients' quality of life, while at the same time reducing the overall cost of patient care to the healthcare system.

Supplying the finished organ implant to the surgeon. Our technology includes our proprietary organ bioreactor, as well as our proprietary biocompatible scaffold that is seeded with the patient's own cells. We believe there is considerable value in supplying the final cell-seeded scaffold implant to the surgeon so that the hospital and surgeon may focus solely on performing the implantation.

Collaborating with leading medical and research institutions. We have and will continue to collaborate with leading medical and research institutions. We have a co-development initiative with Mayo Clinic for regenerative medicine organ implant products for the esophagus and airways, and we are currently conducting large-animal studies with Mayo Clinic to develop our Cellframe technology. We are also collaborating with Connecticut Children's Medical Center on a co-development project to research regenerative medicine-based solutions to esophageal atresia. We believe the use of our product candidates by leading surgeons and institutions will increase the likelihood that other surgeons and institutions will use our products.

Our Technology

Our Cellframe technology is comprised of our proprietary bioengineered organ scaffold seeded with the patient's own stem cells in our proprietary organ bioreactor prior to implantation. We believe that our Cellframe technology combines a highly-engineered, biocompatible scaffold and a robust population of cells that, by tapping into the stem cell niche of the surrounding native tissue after implantation, may potentially enable a tubular organ to remodel or regenerate tissue to close the gap created by a surgical resection of a portion of that organ. This unique combination of technologies, developed through our extensive testing performed during the last two years, may potentially provide solutions to life-threatening conditions for patients with unmet medical needs.

We believe that our new technology is unique, in that its mode of action appears to be different from other tissue engineering organ scaffold products developed previously, of which we are aware. Prior to our development of the Cellframe technology, our approach attempted to implant an organ scaffold that would be incorporated into the patient's body by the surrounding native tissue growing into the scaffold. To our knowledge, all previous research and development efforts by other investigators were based on that same concept. Our Cellframe technology appears to work very differently. We believe that the unique combination of our highly-engineered organ scaffold with a population of the patient's own mesenchymal stem cells enables an organ to develop new native tissue around our scaffold, but not into it, so the scaffold acts as a type of frame or staging for the new tissue. As a result, our scaffold is not incorporated into the body. Instead, it is retrieved from the body via an endoscopic or bronchoscopic procedure, not surgically, after sufficient tissue remodeling and regeneration has occurred to restore the organ's integrity and function.

A Cellframe technology-based organ implant includes two key components: a biocompatible synthetic scaffold and the patient's own stem cells.

Biocompatible Scaffold Component

Our proprietary biocompatible scaffold component of the Cellspan esophageal implant is constructed primarily of polyurethane (PU; a plastic polymer). This material was chosen based on extensive testing of various materials. The scaffold is made using a manufacturing process known as electrospinning. The combination of the electrospinning process, which provides control over the desired microstructure of the scaffold fabric, with the PU results in a scaffold that we believe has favorable biocompatibility characteristics.

The Patient's Cells

Based on current pre-clinical development efforts, the cells we seed onto the scaffold are obtained from the patient's adipose tissue (abdominal fat). This fat tissue is obtained from a standard biopsy before the implant surgery. Mesenchymal stem cells are extracted and isolated from the adipose tissue biopsy. The isolated cells are then expanded, or grown, for a short period prior to surgery in order to derive a sufficient cell population to be seeded on the scaffold. The cells are then seeded on the scaffold in our proprietary organ bioreactor and incubated there before the implant surgery.

We believe the Cellspan esophageal implant has the potential to provide a major advance over the current therapeutic options for treating esophageal cancer, damage from infection or trauma and congenital abnormalities. We believe our Cellframe technology has the potential to overcome the major challenges in restoring organ function for a damaged esophagus. With our Cellspan esophageal implant we are developing a surgical procedure that has the objective of reconstituting the continuity of the patient's esophagus without having to relocate another organ in its place. In addition, by reducing or eliminating complications that occur in the current standard of care, we expect to reduce the costs of addressing and treating those additional complications. Because these substantial costs can be reduced or even eliminated with our technology, we believe our products, if successfully developed, can help save lives, improve the quality of life for patients and reduce overall healthcare costs.

Further, human embryonic stem cells are not part of any of our implant product candidates. This eliminates both the medical risks and ethical controversy associated with regenerative medicine approaches that use human embryonic stem cells.

Unmet Patient Needs and Cellspan Implant Solutions

Esophageal Cancer

There are approximately 456,000 new diagnoses of esophageal cancer globally each year, according to the World Health Organization's International Agency for Research on Cancer. According to the American Cancer Society, there are approximately 17,000 new diagnoses of esophageal cancer in the U.S. each year, and there are more than 15,000 deaths from esophageal cancer each year. Esophageal cancer is very deadly - the five-year survival rate for people with esophageal cancer is 18% in the U.S. Approximately 5,000 esophagectomy surgeries occur in the U.S. annually to treat esophageal cancer, and approximately 10,000 esophagectomies occur in Europe annually. We believe that our Cellspan esophageal implant, if approved, has the potential to provide a major advance over the current esophagectomy procedures for addressing esophageal cancer, which have high complication and morbidity rates.

The current standard of care for the esophagectomy requires either (A) a gastric pull-up, where the stomach is cut and sutured into a tubular shape, then pulled up through the diaphragm to replace a portion of the esophagus resected by the removal of the cancerous tumor; or (B) a colon interposition, where a portion of the colon is resected and used to replace the portion of the esophagus resected by the removal of the cancerous tumor. Esophagectomies have 90-day mortality rates of up to 19%. Serious complications, such as leakage at the anastomoses, which can lead to infections and sepsis, and pulmonary complications, such as impaired pulmonary function or pneumonia, occur in up to 30% of esophagectomy cases. Other complications from esophagectomies, such as a narrowing of the esophagus post-surgery, gastroesophageal reflux and dumping syndrome (repetitive nausea, dizziness and vomiting) can also pose significant quality of life issues for patients.

We believe that the Cellspan esophageal implant has the potential to provide physicians a new, simpler procedure to restore organ function while significantly reducing complication and morbidity rates compared with the current standard of care, and without creating significant quality of life issues for patients.

Esophageal Atresia

Esophageal Atresia (EA) is a rare congenital abnormality in which a baby is born without part of the esophagus. About 1 in 4,000 babies in the U.S. is born with EA. In some cases, the two sections can be connected surgically. However, in cases where the gap is too great for a simple surgical reconnection, the current standard of care is a gastric pull-up, a colon interposition, or a procedure known as the Foker process. In the Foker process, traction devices are surgically attached to the two ends of the esophagus. Traction is then applied, usually for several weeks during which time the baby remains in an Intensive Care Unit, to stimulate the ends of the esophagus to grow and narrow the gap. If the Foker process is successful in narrowing the gap sufficiently, a second surgery is necessary to connect the two ends of the esophagus. In addition to the Foker process being complex, it is also a very expensive procedure, because the baby will normally be several months in hospital for the process.

We believe that a pediatric Cellspan esophageal implant may provide pediatric surgeons with a better procedure to treat EA that would result in a connected esophagus with higher success rates, lower complications and lower overall costs to the healthcare system.

Central Lung Cancer

Lung cancer is the most common form of cancer and the most common cause of death from cancer worldwide. There are more than 450,000 new lung cancer diagnoses annually in the U.S. and Europe. In approximately 25% of all lung cancer cases, the cancerous tumor resides only in a bronchus and not in the lobes of the lungs, and is known as central lung cancer. Approximately 33,000 central lung cancer cases diagnosed in the U.S. and Europe are Stage I and II and are considered eligible for surgical resection, often with adjuvant chemotherapy and radiation. Approximately 5,000 of those patients are treated via pneumonectomy, a surgical procedure involving the resection of the cancer tumor, the whole bronchus below the tumor and the entire lung to which it is connected. It is a complex surgery and, due to the removal of a lung, results in a 50% reduction in the patient's respiratory capacity. The procedure has reported rates of post-surgical (in hospital) mortality of 8% to 15%. Complication rates associated with pneumonectomy are reported as high as 50%, and include post-operative pneumonia, supraventricular arrhythmias and anastomotic leakage, placing patients at significant mortality risk post-discharge.

We believe that a Cellspan bronchial implant, once developed and approved for marketing, has the potential to provide physicians a treatment alternative superior to the sleeve pneumonectomy to address central lung cancer, a simpler procedure to restore organ function of the bronchus without sacrificing one of the patient's lungs, resulting in fewer post-surgery complications, improved mortality rates and improved quality of life for the patient.

Life-threatening conditions of the Trachea

There are approximately 8,000 patients per year in the U.S. and Europe who suffer from a condition of the trachea that put the patient at high risk of death. These conditions can be due to tracheal trauma, tracheal stenosis or trachea cancer. There are approximately 40,000 tracheal trauma patients diagnosed each year in the U.S. Of those, approximately 1,000 are severe enough to need surgical resection procedures. Tracheal stenosis is a rare complication from tracheostomies, but may have a devastating impact on respiratory function for patients. Approximately 2,000 patients are diagnosed with stenosis from tracheostomy in the U.S. each year. Trachea cancer is a very rare but extremely deadly cancer. Trachea cancer patients in the U.S. have a median survival of 10 months from diagnosis and a 5-year survival of only 27%. There were approximately 200 cases of primary trachea cancer diagnosed in the U.S. in 2013. Based on these facts, we estimate that there are approximately 8,000 patients in the U.S. and Europe with conditions of the trachea that put them at high risk of death, but for whom there is currently no clinically effective tracheal implant or replacement method currently available.

We believe that a Cellspan tracheal implant may potentially provide physicians a treatment to re-establish the structural integrity and function of a damaged or diseased trachea to address life-threatening conditions due tracheal trauma, stenosis or cancer.

Our History

We were incorporated under the laws of the State of Delaware on May 3, 2012 by Harvard Bioscience, Inc. ("Harvard Bioscience") to provide a means for separating its regenerative medicine business from its other businesses. Harvard Bioscience decided to separate its regenerative medicine business into our company, a separate corporate entity (the "Separation"), and it spun off its interest in our business to its stockholders in November 2013. Since the Separation we have been a separately-traded public company and Harvard Bioscience has not been a stockholder of our common stock or controlled our operations. Following the Separation, we continued to innovate our bioreactors based on our physiology expertise, we developed our materials science capabilities and we investigated and developed a synthetic tracheal scaffold. In April 2014, Saverio LaFrancesca, M.D., joined our company as Chief Medical Officer. By that time we had built and staffed cell biology laboratories at our Holliston facility, to give ourselves the ability to perform and control our scientific investigation and developments internally. At that point, we began the second phase of our company's development.

In mid-2014, under Dr. LaFrancesca's leadership, we increased the pace of our scientifically-based internal analysis and development of our first-generation tracheal implant product, the HART-Trachea. From large-animal studies conducted thereafter we found that the product elicited an unfavorable inflammatory response after implantation, which required additional development and testing. These requirements extended our expectations regarding our regulatory milestones and we announced the additional testing and extended milestone expectations in January 2015. During 2015 we isolated and tested all major variables of the organ scaffold and the cell source and protocols, examining the effects of alternatives against the then-existing product approach. Through extensive *in vitro* preclinical studies, and small-animal and large-animal studies, we made dramatic improvements, and discovered that the mechanism of action of this new approach was very different from our hypothesis regarding that of the first-generation product. We call this new implant approach our Cellframe technology. Our Cellframe technology uses a different scaffold material and microstructure, a different source and concentration of the patient's cells and several other changes from our earlier trachea initiative. We believe that our Cellframe technology, although built on learnings from our earlier-generation product initiative, represents a new technology platform resulting from our rigorous science and development. We see the development of our Cellframe technology platform as the beginning of a new, third phase in our company's progression.

We discontinued development of our earlier initiative in 2014; that first-generation product approach was significantly different from our new Cellframe technology and Cellspan product candidates currently in development. We have focused our development efforts on our Cellframe technology and Cellspan product candidates, which we have and will continue to develop internally, and with our collaborators, via a rigorous scientific development process. As a result, we believe that prior statements by others regarding the patients whose surgeries utilized our HART bioreactor or HART-Trachea scaffold, or such products, are not pertinent to our Cellframe technology or Cellspan products, or their respective future development.

Clinical Trials

In order to market our product candidates, we will need to successfully complete clinical trials. The initial indication for which we intend to seek FDA approval will be to restore the function of the esophagus subsequent to esophageal damage or stenosis due to cancer, injury or infection.

Because esophageal cancer affects only approximately 17,000 patients per year in the U.S. we anticipate that our clinical trials will involve relatively few patients. Therefore, once commenced, we expect to be able to conduct a clinical trial in a relatively short period of time compared to clinical trials in indications with larger patient populations. We intend to work closely with regulatory agencies and clinical experts to design and size the clinical studies appropriately based on the specific conditions our products are intended to treat. We also intend to request expedited review from the FDA for the Cellspan esophageal implant product. Receipt of expedited review would reduce the overall time through the regulatory approval process.

We intend to pursue regulatory approval for the Cellspan esophageal implant in the U.S., Canada and Europe initially. Following clinical trials in other foreign markets, we expect to pursue regulatory approval for the Cellspan esophageal implant in those foreign markets, as well.

Research and Development

Our primary research and development activities are focused in three areas: materials science, cell biology and engineering. In materials science, we focus on designing and testing biocompatible organ scaffolds, testing the structural integrity and the cellularization capacities of the scaffolds. In cell biology, we focus on developing and testing isolation and expansion protocols, cell characterization and fate studies, investigating the effects of various cell types and concentrations, evaluating the biocompatibility of scaffolds, experimenting with different cell seeding methodologies, and developing protocols for implantation experiments. Our engineering group supports the materials science and cell biology groups across an array of their activities, i.e. designing, engineering and making our proprietary organ bioreactors. All three of our R&D groups combine to plan and execute the in vitro studies. A fundamental part of our R&D effort in developing the Cellframe technology has been dedicated to the discovery and development of small and large animal model studies. The large-animal model employs the use of Yucatan mini-pigs. Our Cellspan scaffolds were implanted in the cervical portion as well as the thoracic portion of the esophagus and the airways in studies to date. As of December 31, 2016, we employed 14 full-time scientists and engineers and we also hire other consultants and part-time employees from time to time.

In addition to our in-house engineering and scientific development team, we collaborate with leaders in the field of regenerative medicine who are performing the fundamental research and surgeries in this field to develop and test new products that will advance and improve the procedures being performed. As these procedures become more common, we will work with our collaborators to further enhance our products to make them more efficient and easier to use by surgeons. In the U.S., our principal collaborations have been with Mayo Clinic and Connecticut Children's Medical Center. Collaboration typically involves us developing new technologies specifically to address issues these researchers and clinicians face. In certain instances, we have entered into agreements that govern the ownership of the technologies developed in connection with these collaborations.

We incurred approximately $4.8 million and $7.6 million of research and development expenses in 2015 and 2016, respectively. As we have not yet applied for or received regulatory approval to market any clinical products and sales of our research bioreactor products have not been significant in relation to our operating costs, no significant amount of these research and development costs have been passed on to our customers.

Manufacturing

For our scaffolds we use a process called electrospinning to create the fabric part of the scaffold. Electrospinning is a well-known fabrication process. It is useful for cell culture applications as it can create extremely thin fibers (much thinner than a human hair) that can make a fabric with pores approximately the same size as a cell. The electrospinning process parameters can be tuned to create a structure that is very similar to the natural structure of the collagen fibers in human extracellular matrix. Our Cellspan scaffolds are made from polyurethane, an inert polymer that is not bioresorbable. However, we also perform studies on the use of scaffolds made from bioresorbable materials. While we do not manufacture the cells, as they will come from the patient’s adipose tissue, for regulatory purposes we are responsible for the quality control of the cells and the seeding of the cells onto the scaffold in the bioreactor. For this we have, in collaboration with our partners, developed standard operating procedures for the seeding of cells on the scaffold. For U.S. clinical trials we anticipate that the seeding will be performed in an automated version of our bioreactor at a pre-qualified third-party contract manufacturer using current Good Manufacturing Procedures (cGMP) using our proprietary protocol and under the supervision of our staff.

For our scaffolds, our primary materials are medical-grade plastic resins and solvents used to liquefy the resins in our manufacturing process. These materials are readily available from a variety of suppliers and do not currently represent a large proportion of our total costs. For our bioreactors, we perform final assembly and testing of components that we buy from third parties like machine shops, parts distributors, molding facilities and printed circuit board manufacturers. These operations are performed primarily at our Holliston, MA headquarters.

Sales and Marketing

We expect that most surgeries using the Cellspan esophageal implant product will be performed at a relatively small number of major hospitals in the U.S., Canada and European countries that will establish themselves as specialized centers of excellence. We believe that a relatively small number of centers of excellence in each country would be able to treat a very large percentage of that country’s patients annually, given the expected number of patients to be treated each year. So, we expect our markets to be served by a concentrated number of treatment centers. Further, our three Cellspan product candidates are for the esophagus, the bronchi and the trachea, three organs all treated by thoracic surgeons. Therefore, all three products, once approved, would be marketed primarily to physicians practicing in a single surgical specialty, so we expect that the total number of physicians using our products will be a much smaller population than if our products were to be used by physicians in multiple areas of surgical specialties. Due to our expectation of a population of physicians in one surgical specialty being the primary users of our products in a concentrated number of centers of excellence in each national market, we expect to be able to support our markets with a fairly small field sales force.

We expect to price the product commensurate with the medical value created for the patient and the costs avoided with the use of our product. We further expect to be paid by the hospital that buys the product from us. Finally, we expect that the hospital would seek reimbursement from payers for the entire transplant procedure, including the use of our products.

Harvard Bioscience is the exclusive distributor for the research versions of our organ bioreactors. Harvard Bioscience can only sell those products to the research markets in accordance with the terms of our distribution agreement. We retain all rights to manufacture and sell all our products for clinical use.

Intellectual Property and Related Agreements

We actively seek to protect our products and proprietary information by means of U.S. and foreign patents, trademarks and contractual arrangements. Our success will depend in part on our ability to obtain and enforce patents on our products, processes and technologies to preserve our trade secrets and other proprietary information and to avoid infringing on the patents or proprietary rights of others.

We have rights in the patent and the patent applications listed below. The patent or patents that may issue based on the patent applications are scheduled to expire as provided below:

Patent/Technology	Jurisdiction	Expiration
Patent application covering aspects of synthetic scaffolds and organ and tissue transplantation	U.S.	2032
Patent application relating to methods and compositions for producing elastic scaffolds for use in tissue engineering	U.S.	2033
Patent application relating to support configurations for tubular tissue scaffolds, and airway scaffold configurations	U.S., Europe	2033
Patent application relating to methods and compositions for promoting the structural integrity of scaffolds for tissue engineering	U.S.	2033
Issued Patent covering methods for analyzing engineered tissues	U.S.	2033
Patent application covering aspects of clinical scale bioreactors and tissue engineering	U.S., Europe	2030
Issued Patent covering aspects of liquid distribution in a rotating bioreactor	Germany	2031
Issued Patent covering aspects of liquid distribution in a rotating bioreactor	Germany	2021
Patent application covering aspects of liquid distribution in a rotating bioreactor	U.S.	2032
Patent application relating to bioreactors with supports to facilitate culturing organs	U.S.	2034
Patent application relating to bioreactor adaptors for tubular tissue scaffolds	U.S.	2034
Patent applications relating to engineered hybrid organs	U.S.	2034
Patent applications relating to infrared-based methods for evaluating tissue health including methods for evaluating burns	U.S.	2033
Patent applications relating to methods and compositions for esophageal repair	U.S.	2036

We also rely on unpatented proprietary technologies in the development and commercialization of our products. We also depend upon the skills, knowledge and experience of our scientific and technical personnel, as well as those of our advisors, consultants and other contractors. To help protect our proprietary know-how that may not be patentable, and our inventions for which patents may be difficult to enforce, we rely on trade secret protection and confidentiality agreements to protect our interests. To this end, we require employees, consultants and advisors to enter into agreements that prohibit the disclosure of confidential information and, where applicable, require disclosure and assignment to us of the ideas, developments, discoveries and inventions that arise from their activities for us. Additionally, these confidentiality agreements require that our employees, consultants and advisors do not bring to us, or use without proper authorization, any third party's proprietary technology.

Exclusive License Agreement and Sponsored Research Agreement - InBreath Bioreactor

We had an exclusive license agreement with Sara Mantero and Maria Adelaide Asnaghi to intellectual property rights relating to our earlier generation InBreath Bioreactor. Under this agreement, we had worldwide rights to intellectual property (including patents, data, and know-how) relating to the hollow organ bioreactor, related techniques, and improvements thereof. We had exclusive worldwide rights to make, use and sell the hollow organ bioreactor, and the right to grant sublicenses and distribution rights. Under this agreement, we were obligated to pay the licensor royalties at various percentage rates in the low to mid-single digits pertaining to any applicable bioreactors we sell. This agreement terminated on August 6, 2016.

We have entered into a sponsored research agreement with Sara Mantero, Maria Adelaide Asnaghi, and the Department of Bioengineering of the Politecnico Di Milano, or PDM. Under the terms of this agreement, PDM is required to use its facilities and best efforts to conduct a research program relating to the development of bioreactors, clinical applications, and automated seeding processes. We are required to provide engineering support to PDM with respect to bioreactor designs. Intellectual property developed by PDM or its employees, including Dr. Mantero or Ms. Asnaghi, under this sponsored research agreement will be owned by Dr. Mantero or Ms. Asnaghi and covered by our exclusive license agreement described above. In addition, we have an option to an exclusive license for intellectual property relating to new technology that may not be covered by the exclusive license agreement. We will own any inventions and discoveries that we solely develop in connection with the research program and any inventions and discoveries that are jointly developed in connection with the research program will be owned jointly by the parties. On February 28, 2017, we provided 90 days' prior written notice to terminate the sponsored research agreement.

Sublicense Agreement with Harvard Bioscience

We have entered into a sublicense agreement with Harvard Bioscience pursuant to which Harvard Bioscience has granted us a perpetual, worldwide, royalty-free, exclusive, except as to Harvard Bioscience and its subsidiaries, license to use the mark "Harvard Apparatus" in the name Harvard Apparatus Regenerative Technology. The mark "Harvard Apparatus" is used under a license agreement between Harvard Bioscience and Harvard University, and we have agreed to be bound by such license agreement in accordance with our sublicense agreement. We currently have no affiliation with Harvard University.

Separation Agreements with Harvard Bioscience

On November 1, 2013, to effect the Separation, Harvard Bioscience distributed all of the shares of our common stock to the Harvard Bioscience stockholders (the "Distribution"). Prior to the Distribution Harvard Bioscience contributed the assets of its regenerative medicine business, and approximately $15 million in cash, to our company to fund our operations following the Distribution.

In connection with the Separation and immediately prior to the Distribution, we entered into a Separation and Distribution Agreement, Intellectual Property Matters Agreement, Product Distribution Agreement, Tax Sharing Agreement, Transition Services Agreement, and Sublicense Agreement with Harvard Bioscience to effect the Separation and Distribution and provide a framework for our relationship with Harvard Bioscience after the Separation. These agreements govern the current relationships among us and Harvard Bioscience and provided for the allocation among us and Harvard Bioscience of Harvard Bioscience's assets, liabilities and obligations (including employee benefits and tax-related assets and liabilities) attributable to periods prior to the Separation.

Government Regulation

Any product that we may develop based on our Cellframe technology, and any other clinical products that we may develop, will be subject to considerable regulation by governments. We were in the past informed by the FDA that our previous-generation tracheal product candidate would be regulated under the Biologics License Application, or BLA, pathway in the U.S. and we were informed by the European Medicines Agency (EMA) that the previous generation tracheal product would be regulated under the Advanced Therapy Medicinal Products(ATMP), pathway in the EU. On October 18, 2016, we also received written confirmation from FDA's Center for Biologics Evaluation and Research(CBER), that FDA intends to regulate our Cellspan esophageal implant as a combination product under the primary jurisdiction of CBER. We further understand that CBER may choose to consult or collaborate with the FDA's Center for Devices and Radiological Health (CDRH), with respect to the characteristics of the synthetic scaffold component of our product based on CBER's determination of need for such assistance. Although our Cellframe technology differs in design and performance from the first generation product candidate, we expect that Cellframe-based products will be regulated by the FDA and EMA under the same pathways as the first generation tracheal product candidate. This expectation is based on the fact that the Cellframe technology is centered on the delivery of the patient's own cells seeded on an implanted synthetic scaffold in order to restore organ function and our belief that the cells provide the primary mode of action. Of course, it is possible that some of our current and future products may use alternative regulatory pathways.

Combination Product/Biologic

Government Regulation Combination Products/Biologics

We believe that products derived from our Cellframe technology may be defined as combination products consisting of two or more regulated components, a biologic and a medical device. In the U.S., a combination product usually is assigned by the FDA to one of the agency's centers, such as CBER, or CDRH, with the chosen center to take the lead in pre-marketing review and approval of the combination product. Other FDA centers also may review the product in regard to matters that are within their expertise. The FDA selects the lead center based on an assessment of the combination product's "primary mode of action." Some products also may require approval or clearance from more than one FDA center.

To determine which FDA center or centers will review a combination product submission, companies may submit a Request for Designation to the FDA. Those requests may be handled formally or informally. In some cases, jurisdiction may be determined informally based on FDA experience with similar products. However, informal jurisdictional determinations are not binding on the FDA. Companies also may submit a formal Request for Designation to the FDA Office of Combination Products. The Office of Combination Products will review the request and make its jurisdictional determination within 60 days of receiving a Request for Designation. We believe that regenerative medicine products containing cells will be reviewed by CBER, possibly with CBER's consultation with CDRH.

Domestic Regulation of Our Products and Business

The testing, manufacturing, and potential labeling, advertising, promotion, distribution, import and marketing of our products are subject to extensive regulation by governmental authorities in the U.S. and in other countries. In the U.S., the FDA, under the Public Health Service Act, the Federal Food, Drug and Cosmetic Act, and its implementing regulations, regulates biologics and medical device products.

The labeling, advertising, promotion, marketing and distribution of biopharmaceuticals, or biologics and medical devices also must be in compliance with the FDA and U.S. Federal Trade Commission (FTC), requirements which include, among others, standards and regulations for off-label promotion, industry sponsored scientific and educational activities, promotional activities involving the internet, and direct-to-consumer advertising. The FDA and FTC have very broad enforcement authority, and failure to abide by these regulations can result in penalties, including the issuance of a warning letter directing us to correct deviations from regulatory standards and enforcement actions that can include seizures, injunctions and criminal prosecution. Recently, promotional activities for FDA-regulated products of other companies have been the subject of enforcement action brought under healthcare reimbursement laws and consumer protection statutes. In addition, under the federal Lanham Act and similar state laws, competitors and others can initiate litigation relating to advertising claims. Further, we are required to meet regulatory requirements in countries outside the U.S., which can change rapidly with relatively short notice.

The FDA has broad post-market and regulatory enforcement powers. Manufacturers of biologics and medical devices are subject to unannounced inspections by the FDA to determine compliance with applicable regulations, and these inspections may include the manufacturing facilities of some of our subcontractors. Failure by manufacturers or their suppliers to comply with applicable regulatory requirements can result in enforcement action by the FDA or other regulatory authorities. Potential FDA enforcement actions include:

- untitled letters, warning letters, fines, injunctions, consent decrees and civil penalties;
- unanticipated expenditures to address or defend such actions;
- customer notifications for repair, replacement, refunds;
- recall, detention or seizure of our products;
- operating restrictions or partial suspension or total shutdown of production;
- operating restrictions;
- refusal to grant export approval for our products; or
- criminal prosecution.

In addition, other government authorities influence the success of our business, including the availability of adequate reimbursement from third party payers, including government programs such as Medicare and Medicaid. Medicare and Medicaid reimbursement policies can also influence corresponding policies of private insurers and managed care providers, which can further affect our business.

Biologics Regulation

Biological products must satisfy the requirements of the Public Health Services Act and the Food, Drug and Cosmetics Act and their implementing regulations. In order for a biologic product to be legally marketed in the U.S., the product must have a BLA approved by the FDA.

The BLA Approval Process

The steps for obtaining FDA approval of a BLA to market a biopharmaceutical, or biologic product in the U.S. include:

- completion of pre-clinical laboratory tests, animal studies and formulation studies under the FDA's GLP regulations;
- submission to the FDA of an IND application, for human clinical testing, which must become effective before human clinical trials may begin and which must include Institutional Review Board (IRB), approval at each clinical site before the trials may be initiated;
- performance of adequate and well-controlled clinical trials in accordance with Good Clinical Practices (GCP), to establish the safety and efficacy of the product for each indication;
- submission to the FDA of a BLA, which contains detailed information about the chemistry, manufacturing and controls for the product, extensive pre-clinical information, reports of the outcomes of the clinical trials, and proposed labeling and packaging for the product;
- the FDA's acceptance of the BLA for filing;
- satisfactory review of the contents of the BLA by the FDA, including the satisfactory resolution of any questions raised during the review or by the advisory committee, if applicable;
- satisfactory completion of an FDA inspection of the manufacturing facility or facilities at which the product is produced to assess compliance with cGMP regulations, to assure that the facilities, methods and controls are adequate to ensure the product's identity, strength, quality and purity; and

• FDA approval of the BLA.

Pre-clinical studies include laboratory evaluations of product toxicity, as well as animal studies.

An IND will automatically become effective 30 days after receipt by the FDA, unless before that time the FDA raises concerns or questions about issues such as the conduct of the trials as outlined in the IND. In that case, the IND sponsor and the FDA must resolve any outstanding FDA concerns or questions before clinical trials can proceed.

Clinical trials are subject to extensive monitoring, recordkeeping and reporting requirements. Clinical trials must be conducted under the oversight of an IRB for the relevant clinical trial sites and must comply with FDA regulations, including but not limited to those relating to GCP. Adverse events must be reported and investigated in a timely manner. To conduct a clinical trial, a company is also required to obtain the patients' informed consent in form and substance that complies with both FDA requirements and state and federal privacy and human subject protection regulations. The sponsor, the FDA or the IRB could suspend a clinical trial at any time for various reasons, including a belief that the risks to trial subjects outweigh the anticipated benefits. A protocol for each clinical trial and any subsequent protocol amendments must be submitted to the FDA as part of the IND. In addition, an IRB at each site at which the trial is conducted must approve the protocol and any amendments. If foreign clinical trials are intended to be considered by the FDA for approval of a product in the U.S. then those foreign clinical trials performed under an IND must meet the same requirements that apply to U.S. studies. The FDA will accept a foreign clinical trial not conducted under an IND only if the trial is well-designed, well-conducted, performed by qualified investigators in accordance with international principles for GCP, or with the laws and regulations of the country in which the research was conducted, whichever provides greater protection of the human subjects. The FDA, however, has substantial discretion in deciding whether to accept data from foreign non-IND clinical trials.

Clinical trials involving biopharmaceutical products are typically conducted in three sequential phases. The phases may overlap or be combined. A fourth, or post-approval, phase may include additional clinical trials. These phases are described generally below. We note, however, that the exact number of study subjects required for each specific intended use, and our intent to combine or "telescope" various study phases together, are both areas where we will actively seek FDA feedback to streamline the clinical evaluation process. Briefly, the phases of clinical development generally include the following:

- Phase I. Phase I clinical trials involve the initial introduction of the product into human subjects to determine the adverse effects associated with increasing doses. Such Phase I studies frequently are highly abbreviated or combined with Phase II studies (as outlined below), when the product involves the patient's own cells.

- Phase II. Phase II clinical trials usually involve studies in a limited patient population to evaluate the efficacy of the product for specific, targeted indications, to determine dosage tolerance and optimal dosage, and to identify possible adverse effects and safety risks. Products that contain the patient's own cells frequently are studied for initial safety and effectiveness determinations in combined or "telescoped" Phase I/II clinical studies.

- Phase III. If the product is found to be potentially effective and to have an acceptable safety profile in Phase II (or sometimes Phase I) trials, the clinical trial program will be expanded to further demonstrate clinical efficacy, optimal dosage and safety within an expanded patient population at geographically dispersed clinical trial sites. As noted, the exact number of subjects needed, the duration of clinical follow-up, and the endpoints by which safety and efficacy are demonstrated are based on the condition being treated.

- Post-Approval (Phase IV). Post-approval clinical trials may be required of or agreed to by a sponsor as a condition of, or subsequent to marketing approval. Further, if the FDA becomes aware of new safety information about an approved product, it is authorized to require post approval trials of the biological product. These trials are used to gain additional experience from the treatment of patients in the intended therapeutic indication and to document a clinical benefit in the case of biologics approved under accelerated approval regulations. If the FDA approves a product while a company has ongoing clinical trials that were not necessary for approval, a company may be able to use the data from these clinical trials to meet all or part of any Phase IV clinical trial requirement. These clinical trials are often referred to as Phase III/IV post approval clinical trials. Failure to promptly conduct Phase IV clinical trials could result in withdrawal of approval for products approved under accelerated approval regulations.

Clinical testing may not be completed successfully within any specified time period, if at all. The FDA closely monitors the progress of each of the three phases of clinical trials that are conducted under an IND and may, at its discretion, reevaluate, alter, suspend, or terminate the testing based upon the data accumulated to that point and the FDA's assessment of the risk/benefit ratio to the patient. The FDA or the sponsor may suspend or terminate clinical trials at any time for various reasons, including a finding that the subjects or patients are being exposed to an unacceptable health risk. The FDA can also request that additional pre-clinical studies or clinical trials be conducted as a condition to product approval. Additionally, new government requirements may be established that could delay or prevent regulatory approval of our products under development. Furthermore, IRBs have the authority to suspend clinical trials in their respective institutions at any time for a variety of reasons, including safety issues.

Certain information about clinical trials, including a description of the trial, participation criteria, location of trial sites, and contact information, is required to be sent to the National Institute of Health, or NIH for inclusion in a publicly-assessable database. Sponsors also are subject to certain state laws imposing requirements to make publicly available certain information on clinical trial results. In addition, the FDA Amendments Act of 2007 directs the FDA to issue regulations that will require sponsors to submit to the NIH the results of certain controlled clinical trials, other than Phase I studies.

Assuming successful completion of the required clinical testing, the results of the pre-clinical studies and of the clinical trials, together with other detailed information, including information on the chemistry, manufacture and composition of the product, are submitted to the FDA in the form of a BLA requesting approval to market the product for one or more indications. In most cases, the BLA must be accompanied by a substantial user fee. The FDA will initially review the BLA for completeness before it accepts the BLA for filing. There can be no assurance that the submission will be accepted for filing or that the FDA may not issue a refusal-to-file, or RTF. If a RTF is issued, there is opportunity for dialogue between the sponsor and the FDA in an effort to resolve all concerns. If the BLA submission is accepted for filing, the FDA will begin an in-depth review of the BLA to determine, among other things, whether a product is safe and effective for its intended use and whether the product is being manufactured in accordance with cGMP to assure and preserve the product's identity, strength, quality and purity.

Companies also may seek Fast Track or Breakthrough Therapy designation for their products. Fast Track or Breakthrough Therapy products are those that are intended for the treatment of a serious or life-threatening condition and that demonstrate the potential to address unmet medical needs for such a condition. If awarded, the Fast Track or Breakthrough Therapy designation applies to the product only for the indication for which the designation was received.

If the FDA determines after review of preliminary clinical data submitted by the sponsor that a Fast Track or Breakthrough Therapy product may be effective, it may begin review of portions of a BLA before the sponsor submits the complete BLA (rolling review), thereby accelerating the date on which review of a portion of the BLA can begin. There can be no assurance that any of our products will be granted Fast Track or Breakthrough Therapy designation. And even if they are designated as Fast Track or Breakthrough Therapy products, we cannot assure you that our products will be reviewed or approved more expeditiously for their Fast Track or Breakthrough Therapy indications than would otherwise have been the case or will be approved promptly, or at all. Furthermore, the FDA can revoke Fast Track or Breakthrough Therapy designation at any time.

In addition, products studied for their safety and effectiveness in treating serious or life-threatening illnesses and that provide meaningful therapeutic benefit over existing treatments may receive Accelerated Approval and may be approved on the basis of adequate and well-controlled clinical trials establishing that the product has an effect on a surrogate endpoint that is reasonably likely to predict clinical benefit or on the basis of an effect on a clinical endpoint other than survival or irreversible morbidity. As a condition of approval, the FDA may require that a sponsor of a product receiving Accelerated Approval perform adequate and well-controlled post-approval clinical trials to verify and further define the product’s clinical benefit and safety profile. There can be no assurance that any of our products will receive Accelerated Approval. Even if Accelerated Approval is granted, the FDA may withdraw such approval if the sponsor fails to conduct the required post-approval clinical trials, or if the post-approval clinical trials fail to confirm the early benefits seen during the accelerated approval process.

Fast Track or Breakthrough Therapy designation and Accelerated Approval should be distinguished from Priority Review designation although products awarded Fast Track or Breakthrough Therapy designation may also be eligible for Priority Review designation. Products regulated by the CBER may receive Priority Review designation if they provide significant improvement in the safety or effectiveness of the treatment, diagnosis, or prevention of a serious or life-threatening disease. The agency has agreed to the performance goal of reviewing products awarded Priority Review designation within six months, whereas products under standard review receive a ten-month target. The review process, however, can be significantly extended by FDA requests for additional information or clarification regarding information already provided in the submission. Priority Review designation is requested at the time the BLA is submitted, and the FDA makes a decision as part of the agency’s review of the application for filing. We intend to seek Priority Review designation for the Cellspan esophageal implant as a biologic through the BLA process. We cannot guarantee that the FDA will grant the designation and cannot predict if awarded, what impact, if any, it will have on the review time for approval of our product.

If granted, Fast Track or Breakthrough Therapy designation, Accelerated Approval and Priority Review designation may expedite the approval process, but they do not change the standards for approval.

Before approving a BLA, the FDA will generally inspect the facility or the facilities at which the finished product and its components are manufactured to ensure compliance with cGMP.

Separate approval is required for each proposed indication. If we want to expand the use of an approved product, we will have to design additional clinical trials, submit the trial designs to the FDA for review and complete those trials successfully.

The testing and approval process requires substantial time, effort and financial resources, and each may take several years to complete. Data obtained from clinical activities are not always conclusive, which could delay, limit or prevent regulatory approval. The FDA may not grant approval on a timely basis, or at all. We may encounter difficulties or unanticipated costs in our efforts to secure necessary governmental approvals, which could delay or preclude us from marketing our products. The FDA may limit the indications for use or place other conditions, such as post-approval studies, on any approvals that could restrict the commercial application of the products. After approval, some types of changes to the approved product, such as adding new indications, manufacturing changes and additional labeling claims, are subject to further testing requirements and FDA review and approval.

Post-Approval Requirements

After regulatory approval of a product is obtained, companies are required to comply with a number of post-approval requirements relating to manufacturing, labeling, packaging, adverse event reporting, storage, advertising, promotion, distribution and recordkeeping. For example, as a condition of approval of a BLA, the FDA may require post-approval testing and surveillance to monitor the product's safety or efficacy. In addition, holders of an approved BLA are required to keep extensive records, to report certain adverse reactions and production deviations and problems to the FDA, to provide updated safety and efficacy information and to comply with requirements concerning advertising and promotional labeling for their products. If we fail to comply with the regulatory requirements of the FDA and other applicable U.S. and foreign regulatory authorities, or previously unknown problems with any approved commercial products, manufacturers or manufacturing processes are discovered, we could be subject to administrative or judicially imposed sanctions or other setbacks. Accordingly, manufacturers must continue to expend time, money and effort in the area of production and quality control to maintain compliance with cGMP and other aspects of regulatory compliance.

Specifically, our products could be subject to voluntary recall if we or the FDA determine, for any reason, that our products pose a risk of injury or are otherwise defective. Moreover, the FDA can order a mandatory recall if there is a reasonable probability that our device would cause serious adverse health consequences or death. In addition, the FDA could suspend the marketing of or withdraw a previously approved product from the market upon receipt of newly discovered information regarding the product's safety or effectiveness.

Orphan Drug Designations

The Orphan Drug Act provides incentives to manufacturers to develop and market drugs and biologics for rare diseases and conditions affecting fewer than 200,000 persons in the U.S. at the time of application for orphan drug designation, or more than 200,000 individuals in the U.S. and for which there is no reasonable expectation that the cost of developing and making a drug or biological product available in the U.S. for this type of disease or condition will be recovered from sales of the product. Orphan Product designation must be requested before submitting a New Drug Application (NDA), Biologics License Application (BLA). After the FDA grants orphan product designation, the identity of the therapeutic agent and its potential orphan use are disclosed publicly by the FDA. In September 2014 the FDA granted orphan designation to our HART-Trachea product in the U.S. In November 2016, we were granted Orphan Drug Designation for our Cellspan esophageal implant by the FDA to restore the structure and function of the esophagus subsequent to esophageal damage due to cancer, injury or congenital abnormalities. Orphan product designation does not convey any advantage in or shorten the duration of the regulatory review and approval process. The first developer to receive FDA marketing approval for an orphan biologic is entitled to a seven year exclusive marketing period in the U.S. for that product as well as a waiver of the BLA user fee. The exclusivity prevents FDA approval of another application for the same product for the same indication for a period of seven years, except in limited circumstances where there is a change in formulation in the original product and the second product has been proven to be clinically superior to the first.

International

We plan to seek required regulatory approvals and comply with extensive regulations governing product safety, quality, manufacturing and reimbursement processes in order to market our products in other major foreign markets. The regulation of our products in the EU and in other foreign markets varies significantly from one jurisdiction to another. The classification of the particular products and related approval or CE marking procedures can involve additional product testing and additional administrative review periods. The time required to obtain these foreign approvals or to CE mark our products may be longer or shorter than that required in the U.S., and requirements for approval may differ from the FDA requirements. Regulatory approval in one country does not ensure regulatory approval in another, but a failure or delay in obtaining regulatory approval in one country may negatively impact the regulatory process in others.

The marketing authorization of products containing viable human tissues or cells in the EU is governed by Regulation 1394/2007/EC on advanced therapy medicinal products, read in combination with Directive 2001/83/EC of the European parliament and of the Council, commonly known as the Community code on medicinal products. Regulation 1394/2007/EC lays down specific rules concerning the authorization, supervision and pharmacovigilance of medicinal products, cell therapy medicinal products and tissue engineered products. Manufacturers of advanced therapy medicinal products must demonstrate the quality, safety and efficacy of their products to the European Medicines Agency which is required to provide an opinion regarding the application for marketing authorization. The European Commission grants or refuses marketing authorization in light of the opinion delivered by the European Medicines

Agency. Regulation 1394/2007/EC also applies to combination products which consist of medical devices and advanced therapy medicinal products. In light of Regulation 1394/2007/EC, a medical device which forms part of a combined advanced therapy medicinal product must meet the Essential Requirements laid down in Annex I to Directive 93/42/EEC. The manufacturer of the combination product must include evidence of such compliance in its marketing authorization application. The application for a marketing authorization for a combined advanced therapy medicinal product must also, where available, include the results of the assessment of the medical device part by a notified body in accordance with Directive 93/42/EEC.

Legislation similar to the Orphan Drug Act has been enacted in other jurisdictions, including the EU. The orphan legislation in the EU is available for therapies addressing conditions that affect five or fewer out of 10,000 persons. The marketing exclusivity period is for ten years, although that period can be reduced to six years if, at the end of the fifth year, available evidence establishes that the product is sufficiently profitable not to justify maintenance of market exclusivity.

Employees

At December 31, 2016, we had 28 employees working in our business, of whom 27 were full-time and one was part-time. At that date, all of our employees were based in the U.S. None of our employees are unionized. In general, we consider our relations with our employees to be good.

Competition

We are not aware of any companies whose products are directly competitive with our cell-seeded biocompatible synthetic scaffold system. However, in our key markets we may in the future compete with multiple pharmaceutical, biotechnology, and medical device, including, among others, Aldagen, Asterias Biotherapeutics, Athersys, BioTime, Caladrius Biosciences, Celgene, Cytori Therapeutics, E. I. du Pont de Nemours and Company, InVivo Therapeutics, Mesoblast, Miramatrix Medical, Nanofiber Solutions, Neuralstem, Organovo, Osiris Therapeutics, Pluristem, Smiths Medical, Tissue Genesis, Inc., Tissue Growth Technologies, United Therapeutics, Vericel Corporation and W.L. Gore and Associates. In addition, there are many academic and clinical centers that are developing regenerative technologies that may one day become competitors with us.

Many of our potential competitors have substantially greater financial, technological, research and development, marketing, and personnel resources than we do. We cannot forecast if or when these or other companies may develop competitive products.

We expect that other products will compete with products and potential products based on efficacy, safety, cost, and intellectual property positions. While we believe that these will be the primary competitive factors, other factors include, in certain instances, obtaining marketing exclusivity under the Orphan Drug Act, availability of supply, manufacturing, marketing and sales expertise and capability, and reimbursement coverage.

Executive Officers of the Registrant

The following table shows information about our executive officers as of December 31, 2016.

Name	Age	Position(s)
James McGorry	60	Chief Executive Officer and Member of the Board of Directors
Thomas McNaughton	56	Chief Financial Officer
Saverio LaFrancesca, M.D.	55	President and Chief Medical Officer

James McGorry - Chief Executive Officer and Director

Mr. McGorry has served as our President and Chief Executive Officer (CEO) since July 6, 2015. He has served as a Member of our Board of Directors since February 2013. Mr. McGorry has more than 30 years of experience as a life science business leader in biologics, personalized medicine and medical devices, including multiple product launches. Prior to becoming President and CEO at Biostage, Mr. McGorry most recently served as Executive Vice President and General Manager, Translational Oncology Solutions for Champions Oncology and previously was Executive Vice President of Commercial Operations at Accellent. During a 12-year tenure at Genzyme, he held leadership positions across several therapeutic areas, including Bio Surgery, Cardiac Surgery, Oncology and Transplant. Mr. McGorry also was President of Clineffect Systems, an electronic medical records company. He began his life sciences career with Baxter Healthcare Corporation, where he spent 11 years in positions of increasing responsibility. Mr. McGorry also served as an officer in the United States Army for six years, including commanding a special operations Green Beret SCUBA detachment. Mr. McGorry has an MBA with a concentration in healthcare from Duke University, Fuqua School of Business, and a B.S. in engineering from the United States Military Academy at West Point where he was the president of his class. We believe Mr. McGorry’s qualifications to sit on our Board of Directors include his extensive executive leadership positions at several biotechnology and healthcare companies over the past 25 years.

Thomas McNaughton - Chief Financial Officer

Mr. McNaughton has served as our Chief Financial Officer since May 3, 2012. Mr. McNaughton joined Harvard Bioscience as its Chief Financial Officer in November 2008, and served in that role until the spin-off of our company from Harvard Bioscience on November 1, 2013. During 2008 and prior to joining Harvard Bioscience, Mr. McNaughton was a consultant providing services primarily to an angel-investing group and a silicon manufacturing start-up. From 2005 to 2007, he served as Vice President of Finance and Chief Financial Officer for Tivoli Audio, LLC, a venture capital-backed global manufacturer of premium audio systems. From 1990 to 2005, Mr. McNaughton served in various managerial positions in the areas of financial reporting, treasury, investor relations, and acquisitions within Cabot Corporation, a global manufacturer of fine particulate products, and served from 2002 to 2005 as Finance Director, Chief Financial Officer of Cabot Supermetals, a $350 million Cabot division that provided high purity tantalum and niobium products to the electronics and semiconductor industries. Mr. McNaughton practiced from 1982 to 1990 as a Certified Public Accountant in the audit services group of Deloitte & Touche, LLP. He holds a B.S. in accounting and finance with distinction from Babson College.

Saverio LaFrancesca, M.D.- President and Chief Medical Officer

Dr. LaFrancesca has served as our Chief Medical Officer since April 14, 2014 and President since March 15, 2017. Dr. LaFrancesca has a unique combination of experience that features more than 25 years of academic clinical surgical practice and innovative research, with a foundation in the cardiovascular, thoracic transplantation, cardiac assist device and regenerative medicine fields. He joined our company from the Department of Cardiovascular Surgery and Transplantation at the DeBakey Heart and Vascular Center at the Houston Methodist Hospital, where he developed the current surgical and perfusion techniques for thoracic organ procurement and preservation and where he was also the Director of the Exvivo lung perfusion laboratory. Previously Dr. LaFrancesca was an attending surgeon at the Department of Cardiopulmonary Transplantation at the Texas Heart Institute in Houston, Texas. He also previously held an appointment as Associate Professor of Surgery at the “Sapienza” University of Rome in Rome, Italy. Dr. LaFrancesca received his M.D. in medicine and surgery in 1985 at the University of Palermo. He did his Residency in Cardiovascular Surgery in the Department of Cardiovascular Surgery at the “Sapienza” University of Rome. He then completed his postdoctoral training with fellowships at the Texas Heart Institute under the supervision of pioneer heart surgeon Dr. Denton Cooley. He was also a Clinical/ Research fellow at McGill University in Montréal, Québec, Canada and at the Baylor College of Medicine in Houston. He holds UNOS certifications as heart transplant surgeon and lung transplant surgeon. He is also certified as surgeon for the use of the HeartMate and the Jarvik 2000 left ventricular assist devices.

Available Information and Website

Our website address is *www.biostage.com*. Our Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and exhibits and amendments to those reports filed or furnished with the Securities and Exchange Commission pursuant to Section 13(a) of the Exchange Act are available for review on our website and the Securities and Exchange Commission’s (“SEC”) website at www.sec.gov. Any such materials that we file with, or furnish to, the SEC in the future will be available on our website as soon as reasonably practicable after they are electronically filed with, or furnished to, the SEC. The information on our website is not incorporated by reference into this Annual Report on Form 10-K.

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Item 1A. *Risk Factors.*

The following factors should be reviewed carefully, in conjunction with the other information contained in this Annual Report on Form 10-K. As previously discussed, our actual results could differ materially from our forward-looking statements. Our business faces a variety of risks. We describe below what we believe are currently the material risks and uncertainties we face, but they are not the only risks and uncertainties we face. Additional risks and uncertainties of which we are unaware, or that we currently believe are not material, may also become important factors that adversely affect our business. In addition, past financial performance may not be a reliable indicator of future performance and historical trends should not be used to anticipate results or trends in future periods. If any of the following risks and uncertainties develops into actual events, these events could have a material adverse effect on our business, financial condition or results of operations. In such case, the trading price of our common stock could decline, and you may lose all or part of your investment in our securities. The risk factors generally have been separated into three groups: (i) risks relating to our business, (ii) risks relating to the Separation and (iii) risks relating to our common stock. These risk factors should be read in conjunction with the other information in this Annual Report on Form 10-K.

Risks Relating To Our Business

Risks Associated with Clinical Trials and Pre-Clinical Development

The results of our clinical trials or pre-clinical development efforts may not support our product claims or may result in the discovery of adverse side effects.

Even if our pre-clinical development efforts or clinical trials are completed as planned, we cannot be certain that their results will support our product claims or that the FDA, foreign regulatory authorities or notified bodies will agree with our conclusions regarding them. Although we have obtained some positive results from the use of our scaffolds and bioreactors for trachea transplants performed to date, we also discovered that our first generation trachea product design encountered certain body response issues that we have sought to resolve with our ongoing development of our Cellframe implant design. We cannot be certain that our Cellframe implant design or any future modifications or improvements with respect thereto will support our claims, and any such developments may result in the discovery of further adverse side effects. We also may not see positive results when our products undergo clinical testing in humans in the future. Success in pre-clinical studies and early clinical trials does not ensure that later clinical trials will be successful, and we cannot be sure that the later trials will replicate the results of prior trials and pre-clinical studies. Our pre-clinical development efforts and any clinical trial process may fail to demonstrate that our products are safe and effective for the proposed indicated uses, which could cause us to abandon a product and may delay development of others. Also, patients receiving surgeries using our products under compassionate use or in clinical trials may experience significant adverse events following the surgeries, including serious health complications or death, which may or may not be related to materials provided by us. Our current Cellframe technology has never been used in humans. We provided a previous generation trachea implant that was used in human patients under compassionate use. To date, we believe that at least four of the six patients who received that first generation implant have died. While we believe that none of them have died because of a failure of the first generation implant, these and any other such adverse events have and may cause or contribute to the delay or termination of our clinical trials or pre-clinical development efforts. Any delay or termination of our pre-clinical development efforts or clinical trials will delay the filing of our product submissions and, ultimately, our ability to commercialize our products and generate revenues. It is also possible that patients enrolled in clinical trials will experience adverse side effects that are not currently part of the product's profile.

Clinical trials necessary to support a biological product license or other marketing authorization for our products will be expensive and will require the enrollment of sufficient patients to adequately demonstrate safety and efficacy for the product's target populations. Suitable patients may be difficult to identify and recruit. Delays or failures in our clinical trials will prevent us from commercializing any products and will adversely affect our business, operating results and prospects.

In the U.S., initiating and completing clinical trials necessary to support Biological License Applications (BLAs), will be time consuming, expensive and the outcome uncertain. Moreover, the FDA may not agree that clinical trial results support an application for the indications sought in the application for the product. In other jurisdictions such as the EU, the conduct of extensive and expensive clinical trials may also be required in order to demonstrate the quality, safety and efficacy of our products, depending on each specific product, the claims being studied, and the target condition or disease. The outcome of these clinical trials, which can be expensive and are heavily regulated, will also be uncertain. Moreover, the results of early clinical trials are not necessarily predictive of future results, and any product we advance into clinical trials following initial positive results in early clinical trials may not have favorable results in later clinical trials.

Conducting successful clinical trials will require the enrollment of a sufficient number of patients to support each trial's claims, and suitable patients may be difficult to identify and recruit. Patient enrollment in clinical trials and completion of patient participation and follow-up depends on many factors, including the size of the patient population, the nature of the trial protocol, the attractiveness of, or the discomfort and risks associated with, the treatments received by enrolled subjects, the availability of appropriate clinical trial investigators, support staff, and proximity of patients to clinical sites and ability to comply with the eligibility and exclusion criteria for participation in the clinical trial and patient compliance. For example, patients may be discouraged from enrolling in our clinical trials if the trial protocol requires them to undergo extensive post-treatment procedures or follow-up to assess the safety and effectiveness of our products, or if they determine that the treatments received under the trial protocols are not attractive or involve unacceptable risks or discomfort. Also, patients may not participate in our clinical trials if they choose to participate in contemporaneous clinical trials of competitive products. In addition, patients participating in clinical trials may die before completion of the trial or suffer adverse medical events unrelated to investigational products.

Development of sufficient and appropriate clinical protocols to demonstrate safety and efficacy are required and we may not adequately develop such protocols to support clearance and approval. Further, the FDA and foreign regulatory authorities may require us to submit data on a greater number of patients than we originally anticipated and/or for a longer follow-up period or change the data collection requirements or data analysis applicable to our clinical trials. Delays in patient enrollment or failure of patients to continue to participate in a clinical trial may cause an increase in costs and delays in the approval and attempted commercialization of our products or result in the failure of the clinical trial. In addition, despite considerable time and expense invested in our clinical trials, the FDA and foreign regulatory authorities may not consider our data adequate to demonstrate safety and efficacy. Although FDA regulations allow submission of data from clinical trials outside the U.S., there can be no assurance that such data will be accepted or that the FDA will not apply closer scrutiny to such data. Increased costs and delays necessary to generate appropriate data, or failures in clinical trials could adversely affect our business, operating results and prospects. In the U.S., clinical studies for our products will be reviewed through the Investigational New Drug, or IND, pathway for biologics or combination products.

If the third parties on which we rely to conduct our clinical trials and to assist us with pre-clinical development do not perform as contractually-required or expected, we may not be able to obtain regulatory approval for or commercialize our products.

We do not have the ability to independently conduct our pre-clinical and clinical trials for our products and we must rely on third parties, such as contract research organizations, medical institutions, clinical investigators and contract laboratories to conduct, or assist us in conducting, such trials, including data collection and analysis. We do not have direct control over such third parties' personnel or operations. If these third parties do not successfully carry out their contractual duties or regulatory obligations or meet expected deadlines, if these third parties need to be replaced, or if the quality or accuracy of the data they obtain is compromised due to the failure to adhere to our clinical protocols or any regulatory requirements, or for other reasons, our pre-clinical development activities or clinical trials may be extended, delayed, suspended or terminated, and we may not be able to seek or obtain regulatory approval for, or successfully commercialize, our products on a timely basis, if at all. Our business, operating results and prospects may also be adversely affected. Furthermore, any third-party clinical trial investigators pertaining to our products may be delayed in conducting our clinical trials for reasons outside of their control.

Risks Associated with Regulatory Approvals

If we fail to obtain, or experience significant delays in obtaining, regulatory approvals in the U.S. and the EU for our products, including those for the esophagus and airways, or are unable to maintain such clearances or approvals for our products, our ability to commercially distribute and market these products would be adversely impacted.

We currently do not have regulatory approval to market any of our implant products, including those for the esophagus and airways (trachea and bronchus). Our products are subject to rigorous regulation by the FDA, and numerous other federal and state governmental authorities in the U.S., as well as foreign governmental authorities. In the U.S., the FDA permits commercial distribution of new medical products only after approval of a Premarket Approval (PMA), NDA or BLA, unless the product is specifically exempt from those requirements. A PMA, NDA or BLA must be supported by extensive data, including, but not limited to, technical, pre-clinical, clinical trial, manufacturing and labeling data, to demonstrate to the FDA's satisfaction the safety and efficacy of the product for its intended use. There are similar approval processes in the EU and other foreign jurisdictions. Our failure to receive or obtain such clearances or approvals on a timely basis or at all would have an adverse effect on our results of operations.

The first bioengineered trachea implant approved in the U.S. using our first-generation trachea implant was approved under the IND pathway through CBER for a compassionate use. Such initial U.S. surgery was led by Professor Paolo Macchiarini, M.D., a surgeon pioneering tracheal replacement techniques. Dr. Macchiarini was not employed or affiliated with our company, and we did no pay him any compensation or consulting fees. In June 2014, shortly after our Chief Medical Officer joined our company, we ceased support of any human surgeries with Dr. Macchiarini. Since the time we withdrew from involvement with Dr. Macchiarini, allegations that Dr. Macchiarini had failed to obtain informed consent and accurately report patient conditions, among other things, for surgeries performed at the Karolinska Institutet in Stockholm, Sweden, were made public.

The Karolinska Institutet investigated the allegations and concluded that while in some instances Dr. Macchiarini did act without due care, his actions did not qualify as scientific misconduct. Subsequent to this investigation, further negative publicity and claims continued to be released questioning the conduct of Dr. Macchiarini, the Karolinska Institutet, the Krasnodar Regional Hospital in Krasnodar, Russia as well as our company relating to surgeries performed by Dr. Macchiarini and other surgeons at such facilities. In February 2015, the Karolinska Institutet announced that it would conduct an additional investigation into the allegations made about Dr. Macchiarini and the Karolinska Institutet's response and actions in the earlier investigation. In March 2015, the Karolinska Institutet announced that it was terminating Dr. Macchiarini's employment, and in December 2016 the Karolinska Institutet found Dr. Macchiarini, along with three co-authors, guilty of scientific misconduct. These allegations, the results of the investigation and any further actions that may be taken in connection with these matters, have and may continue to harm the perception of our products or company and make it difficult to recruit patients for any clinical trials.

The FDA has informed us that our first generation trachea product and our Cellspan esophageal implant would be viewed by the FDA as a combination product comprised of a biologic (cells) and a medical device component. Nevertheless, we cannot be certain how the FDA will regulate our products. The FDA may require us to obtain marketing clearance and approval from multiple FDA centers. The review of combination products is often more complex and more time consuming than the review of products under the jurisdiction of only one center within the FDA.

While the FDA has informed us that our first generation trachea product and our Cellspan esophageal implant would be regulated by the FDA as a combination product, we cannot be certain that any of our other products would also be regulated by the FDA as a combination product. For a combination product, the Office of Combination Products, or OCP, within FDA can determine which center or centers within the FDA will review the product and under what legal authority the product will be reviewed. Generally, the center within the FDA that has the primary role in regulating a combination product is determined based on the primary mode of action of the product. Generally, if the primary mode of action is as a device CDRH takes the lead. Alternatively, if the primary mode of action is cellular, then the Center for Biologics Evaluation and Research takes the lead. On August 29, 2013, we received written confirmation from FDA's Office of Combination Products that FDA intends to regulate our first generation trachea product as a combination product under the primary jurisdiction of CBER. On October 18, 2016, we also received written confirmation from FDA's Center for Biologics Evaluation and Research, or CBER, that FDA intends to regulate our Cellspan esophageal implant as a combination product under the primary jurisdiction of CBER. We further understand that CBER may choose to consult or collaborate with CDRH with respect to the characteristics of the synthetic scaffold component of our product based on CBER's determination of need for such assistance.

The process of obtaining FDA marketing approval is lengthy, expensive, and uncertain, and we cannot be certain that our products, including products pertaining to the esophagus, airways, or otherwise, will be cleared or approved in a timely fashion, or at all. In addition, the review of combination products is often more complex and can be more time consuming than the review of a product under the jurisdiction of only one center within the FDA.

We cannot be certain that the FDA will not elect to have our combination products reviewed and regulated by only one FDA center and/or different legal authority, in which case the path to regulatory approval would be different and could be more lengthy and costly.

If the FDA does not approve or clear our products in a timely fashion, or at all, our business and financial condition will be adversely affected.

In the EU, our esophagus product will likely be regulated as a combined advanced therapy medicinal product and our other products, including for the trachea or bronchus, may also be viewed as advanced therapy medicinal products, which could delay approvals and clearances and increase costs of obtaining such approvals and clearances.

On May 28, 2014, we received notice from the European Medicines Agency (EMA) that our first generation trachea product would be regulated as a combined advanced therapy medicinal product. While we have not had any formal interaction with the EMA with respect to our Cellframe implant technology, including pertaining to the esophagus, we believe that such implant technology would likely be regulated as a combined advanced therapy medicinal product. In the event of such classification, it would be necessary to seek a marketing authorization for these products granted by the European Commission before being marketed in the EU.

Other products we may develop, including any products pertaining to the airways or otherwise, may similarly be regulated as advanced therapy medicinal products or combined advanced therapy medicinal products. The regulatory procedures leading to marketing approval of our products vary among jurisdictions and can involve substantial additional testing. Compliance with the FDA requirements does not ensure clearance or approval in other jurisdictions, and the ability to legally market our products in any one foreign country does not ensure clearance, or approval by regulatory authorities in other foreign jurisdictions. The foreign regulatory process leading to the marketing of the products may include all of the risks associated with obtaining FDA approval in addition to other risks. In addition, the time required to comply with foreign regulations and market products may differ from that required to obtain FDA approval, and we may not obtain foreign approval or clearance on a timely basis, if at all.

The United Kingdom’s vote to leave the European Union will have uncertain effects and could adversely affect us.

On June 23, 2016, eligible members of the electorate in the United Kingdom decided by referendum to leave the European Union, commonly referred to as "Brexit". The effects of Brexit will depend on any agreements the U.K. makes to retain access to E.U. markets either during a transitional period or more permanently. Since a significant proportion of the regulatory framework in the United Kingdom is derived from European Union directives and regulations, the referendum could materially change the regulatory regime applicable to the approval of any product candidates in the United Kingdom. In addition, since the EMA is located in the U.K., the implications for the regulatory review process in the European Union has not been clarified and could result in relocation of the EMA or a disruption in the EMA review process.

Further, Brexit could adversely affect European and worldwide economic or market conditions and could contribute to instability in global financial markets. Brexit is likely to lead to legal uncertainty and potentially divergent national laws and regulations as the U.K. determines which E.U. laws to replace or replicate. Any of these effects of Brexit, and others we cannot anticipate, could adversely affect our business and financial condition.

Risk Associated with Product Marketing

Even if our products are cleared or approved by regulatory authorities, if we or our suppliers fail to comply with ongoing FDA or other foreign regulatory authority requirements, or if we experience unanticipated problems with our products, these products could be subject to restrictions or withdrawal from the market.

Any product for which we obtain clearance or approval in the U.S. or the EU, and the manufacturing processes, reporting requirements, post-approval clinical data and promotional activities for such product, will be subject to continued regulatory review, oversight and periodic inspections by the FDA and other domestic and foreign regulatory authorities or notified bodies. In particular, we and our suppliers are required to comply with the FDA’s Quality System Regulations, or QSR, and Good Manufacturing Practices, or GMPs, for our medical products, and International Standards Organization, or ISO, regulations for the manufacture of our products and other regulations which cover the methods and documentation of the design, testing, production, control, quality assurance, labeling, packaging, storage and shipping of any product for which we obtain clearance or approval. Manufacturing may also be subject to controls by the FDA for parts of the system or combination products that the FDA may find are controlled by the biologics regulations. Equivalent regulatory obligations apply in foreign jurisdictions. Regulatory authorities, such as the FDA, the competent authorities of the EU Member States, the European Medicines Agency and notified bodies, enforce the QSR, GMP and other applicable regulations in the U.S. and in foreign jurisdictions through periodic inspections. The failure by us or one of our suppliers to comply with applicable statutes and regulations administered by the FDA and other regulatory authorities or notified bodies in the U.S. or in foreign jurisdictions, or the failure to timely and adequately respond to any adverse inspectional observations or product safety issues, could result in, among other things, any of the following enforcement actions:

- untitled letters, warning letters, fines, injunctions, consent decrees and civil penalties;
- unanticipated expenditures to address or defend such actions;
- customer notifications for repair, replacement, refunds;
- recall, detention or seizure of our products;
- operating restrictions or partial suspension or total shutdown of production;
- withdrawing BLA or NDA approvals that have already been granted;
- withdrawal of the marketing authorization granted by the European Commission or delay in obtaining such marketing authorization;
- withdrawal of the CE Certificates of Conformity granted by the notified body or delay in obtaining these certificates;
- refusal to grant export approval for our products; and
- criminal prosecution.

Post-market enforcement actions can generate adverse commercial consequences.

Even if regulatory approval of a product is granted, such clearance or approval may be subject to limitations on the intended uses for which the product may be marketed and reduce our potential to successfully commercialize the product and generate revenue from the product. If the FDA or a foreign regulatory authority determines that our promotional materials, labeling, training or other marketing or educational activities constitute promotion of an unapproved use, it could request that we cease or modify our training or promotional materials or subject us to regulatory enforcement actions. It is also possible that other federal, state or foreign enforcement authorities might take action if they consider our training or other promotional materials to constitute promotion of an unapproved use, which could result in significant fines or penalties under other statutory authorities, such as laws prohibiting false claims for reimbursement. In addition, we may be required to conduct costly post-market testing and surveillance to monitor the safety or effectiveness of our products, and we must comply with medical products reporting requirements, including the reporting of adverse events and malfunctions related to our products. Later discovery of previously unknown problems with our products, including unanticipated adverse events or adverse events of unanticipated severity or frequency, manufacturing problems, or failure to comply with regulatory requirements such as QSR, may result in changes to labeling, restrictions on such products or manufacturing processes, withdrawal of the products from the market, voluntary or mandatory recalls, a requirement to repair, replace or refund the cost of any medical device we manufacture or distribute, fines, suspension of regulatory approvals, product seizures, injunctions or the imposition of civil or criminal penalties which would adversely affect our business, operating results and prospects.

Extensive governmental regulations that affect our business are subject to change, and we could be subject to penalties and could be precluded from marketing our products and technologies if we fail to comply with new regulations and requirements.

As a manufacturer and marketer of biotechnology products, we are subject to extensive regulation that is subject to change. In March 2010, President Obama signed into law a legislative overhaul of the U.S. healthcare system, known as the Patient Protection and Affordable Care Act of 2010, as amended by the Healthcare and Education Affordability Reconciliation Act of 2010, or the PPACA, which may have far-reaching consequences for most healthcare companies, including biotechnology companies. The PPACA could substantially change the structure of the health insurance system and the methodology for reimbursing medical services, laboratory tests, drugs and devices. These structural changes, as well as those relating to proposals that may be made in the future to change the health care system, could entail modifications to the existing system of private payers and government programs, as well as implementation of measures to limit or eliminate payments for some medical procedures and treatments or subject the pricing of medical products to government control. Government and other third-party payers increasingly attempt to contain health care costs by limiting both coverage and the level of payments of newly approved health care products. In some cases, they may also refuse to provide any coverage of uses of approved products for disease indications other than those for which the regulatory authorities have granted marketing approval. Governments may adopt future legislative proposals and federal, state, foreign or private payers for healthcare goods and services may take action to limit their payments for goods and services. In addition, it is possible that changes in administration and policy, including the potential repeal of all or parts of the PPACA, resulting from the recent U.S. presidential election could result in additional proposals and/or changes to health care system legislation.

Any of these regulatory changes and events could limit our ability to form collaborations and our ability to commercialize our products, and if we fail to comply with any such new or modified regulations and requirements it could adversely affect our business, operating results and prospects.

If we fail to complete the required IRS forms for exemptions, make timely semi-monthly payments of collected excise taxes, or submit quarterly reports as required by the Medical Device Excise Tax, we may be subject to penalties, such as Section 6656 penalties for any failure to make timely deposits.

Section 4191 of the Internal Revenue Code, enacted by Section 1405 of the Health Care and Education Reconciliation Act of 2010, Public Law 111-152 (124 Stat. 1029 (2010)), in conjunction with the Patient Protection and Affordable Care Act, Public Law 111-148 (124 Stat. 119 (2010)), imposed as of January 1, 2013, an excise tax on the sale of certain medical devices. The excise tax imposed by Section 4191 is 2.3% of the price for which a taxable medical device is sold within the U.S.

While the provision for a medical device excise tax has been suspended for 2016 and 2017, there is no guarantee that the moratorium will be approved for subsequent years. The excise tax will apply to future sales of any company medical device listed with the FDA under Section 510(j) of the Federal Food, Drug, and Cosmetic Act and 21 C.F.R. Part 807, unless the device falls within an exemption from the tax, such as the exemption governing direct retail sale of devices to consumers or for foreign sales of these devices. We will need to assess to what extent this excise tax may impact the sales price and distribution agreements under which any of our products are sold in the U.S. We also expect general and administrative expense to increase due to the medical device excise tax. We will need to submit IRS forms applicable to relevant exemptions, make semi-monthly payments of any collected excise taxes, and make timely (quarterly) reports to the IRS regarding the excise tax. To the extent we do not comply with the requirements of the Medical Device Excise Tax we may be subject to penalties.

Financial and Operating Risks

Our audited financial statements for the year ended December 31, 2016 contain a going concern qualification. Our financial status creates doubt whether we will continue as a going concern. We will need additional funds in the near future and our operations will be adversely affected if we are unable to obtain needed funding.

In their audit report dated March 16, 2017 included in this Form 10-K, our independent registered public accounting firm included a “going concern” qualification as to our ability to continue as a going concern. We believe that if we do not raise additional capital from outside sources in the very near future, we may be forced to curtail or cease our operations. We believe that our existing cash resources will be sufficient to fund our planned operations through the third quarter of 2017. Our cash requirements and cash resources will vary significantly depending upon the timing, financial and other resources that will be required to complete ongoing development and pre-clinical and clinical testing of our products as well as regulatory efforts and collaborative arrangements necessary for our products that are currently under development. In addition to development and other costs, we expect to incur capital expenditures from time to time. These capital expenditures will be influenced by our regulatory compliance efforts, our success, if any, at developing collaborative arrangements with strategic partners, our needs for additional facilities and capital equipment and the growth, if any, of our business in general. We will require additional funding by the third quarter of 2017 to continue our anticipated operations and support our capital needs. We may seek to raise necessary funds through a combination of public or private equity offerings, debt financings, other financing mechanisms, strategic collaborations and licensing arrangements. We may not be able to obtain additional financing on terms favorable to us, if at all. In addition, general market conditions may make it difficult for us to seek financing from the capital markets.

Any additional equity financings could result in significant dilution to our stockholders and possible restrictions on subsequent financings. Debt financing, if available, could result in agreements that include covenants limiting or restricting our ability to take certain actions, such as incurring additional debt, making capital expenditures or paying dividends. Other financing mechanisms may involve selling intellectual property rights, payment of royalties or participation in our revenue or cash flow. In addition, in order to raise additional funds through strategic collaborations or licensing arrangements, we may be required to relinquish certain rights to some or all of our technologies or products. If we cannot raise funds or engage strategic partners on acceptable terms when needed, we may not be able to continue our research and development activities, develop or enhance our products, take advantage of future opportunities, grow our business or respond to competitive pressures or unanticipated requirements.

We have generated insignificant revenue to date and have an accumulated deficit. We anticipate that we will incur losses for the foreseeable future. We may never achieve or sustain profitability.

We have generated insignificant revenues to date and we have generated no revenues from sales of any clinical products, and as of December 31, 2016, we had an accumulated deficit of approximately $36.3 million. We expect to continue to experience losses in the foreseeable future due to our limited anticipated revenues and significant anticipated expenses. We do not anticipate that we will achieve meaningful revenues for the foreseeable future. In addition, we expect that we will continue to incur significant operating expenses as we continue to focus on additional research and development, preclinical testing, clinical testing and regulatory review and/or approvals of our products and technologies. As a result, we cannot predict when, if ever, we might achieve profitability and cannot be certain that we will be able to sustain profitability, if achieved.

Our products are in an early stage of development. If we are unable to develop or market any of our products, our financial condition will be negatively affected, and we may have to curtail or cease our operations.

We are in the early stage of product development. One must evaluate us in light of the uncertainties and complexities affecting an early stage biotechnology company. Our products require additional research and development, preclinical testing, clinical testing and regulatory review and/or approvals or clearances before marketing. In addition, we may not succeed in developing new products as an alternative to our existing portfolio of products. If we fail to successfully develop and commercialize our products, including our esophageal or airway products, our financial condition may be negatively affected, and we may have to curtail or cease our operations.

We have a limited operating history and it is difficult to predict our future growth and operating results.

We have a limited operating history and limited operations and assets. Accordingly, one should consider our prospects in light of the costs, uncertainties, delays and difficulties encountered by companies in the early stage of development. As such, our development timelines have been and may continue to be subject to delay that could negatively affect our cash flow and our ability to develop or bring products to market, if at all. Our estimates of patient population are based on published data and analysis of external databases by third parties and are subject to uncertainty and possible future revision as they often require inference or extrapolations from one country to another or one patient condition to another.

Our prospects must be considered in light of inherent risks, expenses and difficulties encountered by all early stage companies, particularly companies in new and evolving markets, such as bioengineered organ implants, and regenerative medicine. These risks include, but are not limited to, unforeseen capital requirements, delays in obtaining regulatory approvals, failure to gain market acceptance and competition from foreseen and unforeseen sources.

If we fail to retain key personnel, we may not be able to compete effectively, which would have an adverse effect on our operations.

Our success is highly dependent on the continued services of key management, technical and scientific personnel and collaborators. Our management and other employees may voluntarily terminate their employment at any time upon short notice. The loss of the services of any member of our senior management team, including our Chief Executive Officer, James McGorry, our Chief Financial Officer, Thomas McNaughton, our President and Chief Medical Officer, Dr. Saverio La Francesca, our Vice President of Regulatory Affairs, Laura Mondano, and our other key scientific, technical and management personnel, may significantly delay or prevent the achievement of product development and other business objectives.

If our collaborators do not devote sufficient time and resources to successfully carry out their duties or meet expected deadlines, we may not be able to advance our products in a timely manner or at all.

We are currently collaborating with multiple academic researchers and clinicians at a variety of research and clinical institutions. Our success depends in part on the performance of our collaborators. Some collaborators may not be successful in their research and clinical trials or may not perform their obligations in a timely fashion or in a manner satisfactory to us. Typically, we have limited ability to control the amount of resources or time our collaborators may devote to our programs or potential products that may be developed in collaboration with us. Our collaborators frequently depend on outside sources of funding to conduct or complete research and development, such as grants or other awards. In addition, our academic collaborators may depend on graduate students, medical students, or research assistants to conduct certain work, and such individuals may not be fully trained or experienced in certain areas, or they may elect to discontinue their participation in a particular research program, creating an inability to complete ongoing research in a timely and efficient manner. As a result of these uncertainties, we are unable to control the precise timing and execution of any experiments that may be conducted.

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Although we have formal co-development collaboration agreements with Mayo Clinic and Connecticut Children's Medical Center, we do not have formal agreements in place with other collaborators, and most of our collaborators retain the ability to pursue other research, product development or commercial opportunities that may be directly competitive with our programs. If any of our collaborators elect to prioritize or pursue other programs in lieu of ours, we may not be able to advance product development programs in an efficient or effective manner, if at all. If a collaborator is pursuing a competitive program and encounters unexpected financial or capability limitations, they may be motivated to reduce the priority placed on our programs or delay certain activities related to our programs. Any of these developments could harm or slow our product and technology development efforts.

Public perception of ethical and social issues surrounding the use of cell technology may limit or discourage the use of our technologies, which may reduce the demand for our products and technologies and reduce our revenues.

Our success will depend in part upon our collaborators' ability to develop therapeutic approaches incorporating, or discovered through, the use of cells. If either bioengineered organ implant technology is perceived negatively by the public for social, ethical, medical or other reasons, governmental authorities in the U.S. and other countries may call for prohibition of, or limits on, cell-based technologies and other approaches to bioengineering and tissue engineering. Although the surgeons using our products have not, to date, used the more controversial stem cells derived from human embryos or fetuses in the human transplant surgeries using our products, claims that human-derived stem cell technologies are ineffective or unethical may influence public attitudes. The subject of cell and stem cell technologies in general has at times received negative publicity and aroused public debate in the U.S. and some other countries. Ethical and other concerns about such cells could materially harm the market acceptance of our products.

Our products will subject us to liability exposure.

We face an inherent risk of product liability claims, especially with respect to our products that will be used within the human body, including the scaffolds we manufacture. Product liability coverage is expensive and sometimes difficult to obtain. We may not be able to obtain or maintain insurance at a reasonable cost. We may be subject to claims for liabilities for unsuccessful outcomes of surgeries involving our products, which may include claims relating to patient death. We may also be subject to claims for liabilities relating to patients that suffer serious complications or death during or following transplants involving our products, including the patients who had surgeries utilizing our first generation scaffold product or our bioreactor technology, or patients that may have surgeries utilizing any of our products in the future. Our current product liability coverage is $15 million per occurrence and in the aggregate. We will need to increase our insurance coverage if and when we begin commercializing any of our products. There can be no assurance that existing insurance coverage will extend to other products in the future. Any product liability insurance coverage may not be sufficient to satisfy all liabilities resulting from product liability claims. A successful claim may prevent us from obtaining adequate product liability insurance in the future on commercially desirable items, if at all. If claims against us substantially exceed our coverage, then our business could be adversely impacted. Regardless of whether we are ultimately successful in any product liability litigation, such litigation could consume substantial amounts of our financial and managerial resources and could result in, among others:

- significant awards against us;
- substantial litigation costs;
- injury to our reputation and the reputation of our products;
- withdrawal of clinical trial participants; and
- adverse regulatory action.

Any of these results would substantially harm our business.

If restrictions on reimbursements or other conditions imposed by payers limit our customers' actual or potential financial returns on our products, our customers may not purchase our products or may reduce their purchases.

Our customers' willingness to use our products will depend in part on the extent to which coverage for these products is available from government payers, private health insurers and other third-party payers. These payers are increasingly challenging the price of medical products and services. Significant uncertainty exists as to the reimbursement status of newly approved treatments and products in the fields of biotechnology and regenerative medicine, and coverage and adequate payments may not be available for these treatments and products. In addition, third-party payers may require additional clinical trial data to establish or continue reimbursement coverage. These clinical trials, if required, could take years to complete and could be expensive. There can be no assurance that the payers will agree to continue reimbursement or provide additional coverage based upon these clinical trials. Failure to obtain adequate reimbursement would result in reduced sales of our products.

We depend upon a single-source supplier for the hardware used for our organ bioreactor control and acquisition system. The loss of this supplier, or future single-source suppliers we may rely on, or their failure to provide us with an adequate supply of their products or services on a timely basis, could adversely affect our business.

We currently have a single supplier for certain components that we use for our organ bioreactor control and acquisition systems as well as materials used in scaffolds. We may also rely on other single-source suppliers for critical components of our products in the future. If we were unable to acquire hardware or other products or services from applicable single-source suppliers, we could experience a delay in developing and manufacturing our products.

We use and generate hazardous materials in our business and must comply with environmental laws and regulations, which can be expensive.

Our research, development and manufacturing involve the controlled use of hazardous chemicals, and we may incur significant costs as a result of the need to comply with numerous laws and regulations. For example, certain volatile organic laboratory chemicals we use, such as fluorinated hydrocarbons, must be disposed of as hazardous waste. We are subject to laws and regulations enforced by the FDA, foreign health authorities and other regulatory requirements, including the Occupational Safety and Health Act, the Environmental Protection Act, the Toxic Substances Control Act, the Resource Conservation and Recovery Act, and other current and potential federal, state, local and foreign laws and regulations governing the use, manufacture, storage, handling and disposal of our products, materials used to develop and manufacture our products, and resulting waste products. Although we believe that our safety procedures for handling and disposing of such materials comply with the standards prescribed by state and federal regulations, the risk of accidental contamination or injury from these materials cannot be completely eliminated. In the event of such an accident, our operations could be interrupted. Further, we could be held liable for any damages that result and any such liability could exceed our resources.

Our products are novel and will require market acceptance.

Even if we receive regulatory approvals for the commercial use of our products, their commercial success will depend upon acceptance by physicians, patients, third party payers such as health insurance companies and other members of the medical community. Market acceptance of our products is also dependent upon our ability to provide acceptable evidence and the perception of the positive characteristics of our products relative to existing or future treatment methods, including their safety, efficacy and/or other positive advantages. If our products fail to gain market acceptance, we may be unable to earn sufficient revenue to continue our business. Market acceptance of, and demand for, any product that we may develop and commercialize will depend on many factors, both within and outside of our control. If our products receive only limited market acceptance, our business, financial condition and results of operations would be materially and adversely affected.

Our long-term growth depends on our ability to develop products for other organs.

Our growth strategy includes expanding the use of our products in treatments pertaining to organs other than the esophagus and airways, such as the lungs, GI tract, among others. These other organs are more complex than the esophagus and airways. There is no assurance that we will be able to successfully apply our technologies to these other more complex organs, which might limit our expected growth.

Our success will depend partly on our ability to operate without infringing on, or misappropriating, the intellectual property or confidentiality rights of others.

We may be sued for infringing on the intellectual property or confidentiality rights of others, including the patent rights, trademarks and trade names and confidential information of third parties. We have received correspondence from legal counsel to Nanofiber Solutions, Inc., or NFS, claiming that in developing our scaffold product and related intellectual property, we may have committed misappropriation, unauthorized use and disclosure of confidential information, and possible infringement of intellectual property rights of NFS. We have received correspondence from legal counsel to UCL Business PLC, or UCLB, challenging the validity of the assignment of certain patent applications that have been assigned to us by Dr. Macchiarini. We have also received correspondence from an academic researcher implying that one of our research bioreactor products may violate an issued patent. We do not believe that our current products violate this patent. To the extent that any of such claims are valid, if we had utilized, or were to utilize, such patent applications or patents without an agreement from the owner thereof, it could result in infringement of the intellectual property rights of the respective owner. Intellectual property and related litigation is costly and the outcome is uncertain. If we do not prevail in any such intellectual property or related litigation, in addition to any damages we might have to pay, we could be required to stop the infringing activity, or obtain a license to or design around the intellectual property or confidential information in question. If we are unable to obtain a required license on acceptable terms, or are unable to design around any third party patent, we may be unable to sell some of our products and services, which could result in reduced revenue.

We may be involved in lawsuits to protect or enforce our patents that would be expensive and time consuming.

In order to protect or enforce our patent rights, we may initiate patent litigation against third parties. We may also become subject to interference proceedings conducted in the patent and trademark offices of various countries to determine the priority of inventions. The defense and prosecution, if necessary, of intellectual property suits, interference proceedings and related legal and administrative proceedings would be costly, and may divert our technical and management personnel from their normal responsibilities. We may not prevail in any of these suits should they occur. An adverse determination of any litigation or defense proceedings could put our patents at risk of being invalidated or interpreted narrowly and could put our patent applications at risk of being rejected and patents not being issued.

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. For example, 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 in the litigation. Securities analysts or investors may perceive these announcements to be negative, which could cause the market price of our stock to decline.

If we are unable to effectively protect our intellectual property, third parties may use our technology, which would impair our ability to compete in our markets.

Our continued success will depend significantly on our ability to obtain and maintain meaningful patent protection for certain of our products throughout the world. Patent law relating to the scope of claims in the biotechnology, regenerative medicine, and medical device fields in which we operate is still evolving. The degree of future protection for our proprietary rights is uncertain. We may rely on patents to protect a significant part of our intellectual property and to enhance our competitive position. However, our presently pending or future patent applications may not be accepted and patents might not be issued, and any patent previously issued to us may be challenged, invalidated, held unenforceable or circumvented. Furthermore, the claims in patents which have been issued or which may be issued to us in the future may not be sufficiently broad to prevent third parties from producing competing products similar to our products. We may also operate in countries where we do not have patent rights and in those countries we would not have patent protection. We also rely on trademarks and trade names in our business. The laws of various foreign countries in which we compete may not protect our intellectual property to the same extent as do the laws of the U.S. If we fail to obtain adequate patent protection for our proprietary technology, our ability to be commercially competitive could be materially impaired. It is also possible that our intellectual property may be stolen via cyber-attacks or similar methods.

In addition to patent protection, we also rely on protection of trade secrets, know-how and confidential and proprietary information. To maintain the confidentiality of trade-secrets and proprietary information, we generally seek to enter into confidentiality agreements with our employees, consultants and strategic partners upon the commencement of a relationship. However, we may not be able to obtain these agreements in all circumstances in part due to local regulations. In the event of unauthorized use or disclosure of this information, these agreements, even if obtained, may not provide meaningful protection for our trade-secrets or other confidential information. In addition, adequate remedies may not exist in the event of unauthorized use or disclosure of this information. The loss or exposure of our trade secrets and other proprietary information would impair our competitive advantages and could have a material adverse effect on our operating results, financial condition and future growth prospects.

Our competitors and potential competitors may have greater resources than we have and may develop products and technologies that are more effective or commercially attractive than our products and technologies or may develop competing relationships with our key collaborators.

We expect to compete with multiple pharmaceutical, biotechnology, medical device and scientific research product companies. Companies working in competing areas include, among others, Aldagen, Asterias Biotherapeutics, Athersys, BioTime, Caladrius Biosciences, Celgene, Cytori Therapeutics, E. I. du Pont de Nemours and Company, InVivo Therapeutics, Mesoblast, Miramatrix Medical, Nanofiber Solutions, Neuralstem, Organovo, Osiris Therapeutics, Pluristem Therapeutics, Smiths Medical, Tissue Genesis, Inc., Tissue Growth Technologies, United Therapeutics, Vericel Corporation, and W.L. Gore and Associates. In addition, there are many academic and clinical centers that are developing bioengineered or regenerative organ technologies that may one day become competitors for us. Many of our competitors and potential competitors have substantially greater financial, technological, research and development, marketing, and personnel resources than we do. We cannot, with any accuracy, forecast when or if these companies are likely to bring bioengineered organ or regenerative medicine products to market for indications that we are also pursuing. Many of these potential competitors may be further along in the process of product development and also operate large, company-funded research and development programs.

We expect that other products will compete with our current and future products based on efficacy, safety, cost, and intellectual property positions. While we believe that these will be the primary competitive factors, other factors include obtaining marketing exclusivity under certain regulations, availability of supply, manufacturing, marketing and sales expertise and capability, and reimbursement coverage. Our competitors may develop or market products that are more effective or commercially attractive than our current or future products and may also develop competing relationships with our key collaborators. In addition, we may face competition from new entrants into the field. We may not have the financial resources, technical expertise or marketing, distribution or support capabilities to compete successfully in the future. The effects of any such actions of our competitors may have a material adverse effect on our business, operating results and financial condition.

If we do not successfully manage our growth, our business goals may not be achieved.

To manage growth, we will be required to continue to improve existing, and implement additional, operational and financial systems, procedures and controls, and hire, train and manage additional employees. Our current and planned personnel, systems, procedures and controls may not be adequate to support our anticipated growth and we may not be able to hire, train, retain, motivate and manage required personnel. Competition for qualified personnel in the biotechnology and regenerative medicine area is intense, and we operate in several geographic locations where labor markets are particularly competitive, including Boston, Massachusetts, where demand for personnel with these skills is extremely high and is likely to remain high. As a result, competition for qualified personnel is intense and the process of hiring suitably qualified personnel is often lengthy and expensive, and may become more expensive in the future. If we are unable to hire and retain a sufficient number of qualified employees or otherwise manage our growth effectively, our ability to conduct and expand our business could be seriously reduced.

We are exposed to a variety of risks relating to our international sales and operations, including fluctuations in exchange rates, local economic conditions and delays in collection of accounts receivable.

We intend to generate significant revenues outside the U.S. in multiple foreign currencies including Euros, British pounds, and in U.S. dollar-denominated transactions conducted with customers who generate revenue in currencies other than the U.S. dollar. For those foreign customers who purchase our products in U.S. dollars, currency fluctuations between the U.S. dollar and the currencies in which those customers do business may have a negative impact on the demand for our products in foreign countries where the U.S. dollar has increased in value compared to the local currency.

Since we have vendors and customers outside the U.S. and we may generate revenues and incur operating expenses in multiple foreign currencies, we will experience currency exchange risk with respect to any foreign currency-denominated revenues and expenses. We cannot predict the consolidated effects of exchange rate fluctuations upon our future operating results because of the number of currencies involved, the variability of currency exposure and the potential volatility of currency exchange rates. Our international activities subject us to laws regarding sanctioned countries, entities and persons, customs, import-export, laws regarding transactions in foreign countries, the U.S. Foreign Corrupt Practices Act and local anti-bribery and other laws regarding interactions with healthcare professionals. Among other things, these laws restrict, and in some cases prohibit, U.S. companies from directly or indirectly selling goods, technology or services to people or entities in certain countries. In addition, these laws require that we exercise care in structuring our sales and marketing practices in foreign countries.

Local economic conditions, legal, regulatory or political considerations, disruptions from strikes, the effectiveness of our sales representatives and distributors, local competition and changes in local medical practice could also affect our sales to foreign markets. Relationships with customers and effective terms of sale frequently vary by country, often with longer-term receivables than are typical in the U.S.

Risks Related To Our Separation From Harvard Bioscience

If the Separation and related distribution of all of the shares of our common stock by Harvard Bioscience, together with certain related transactions, does not qualify as a transaction that is generally tax-free for U.S. federal income tax purposes, Harvard Bioscience could be subject to significant tax liability and, in certain circumstances, we could be required to indemnify Harvard Bioscience for material taxes pursuant to indemnification obligations under the tax sharing agreement.

Harvard Bioscience has informed us that on June 28, 2013 it received a Supplemental Ruling to the Private Letter Ruling dated March 22, 2013 from the IRS to the effect that, among other things, the Separation and related distribution of all of the shares of our common stock by Harvard Bioscience, or the Distribution, will qualify as a transaction that is tax-free for U.S. federal income tax purposes under Section 355 and 368(a)(1)(D) of the Internal Revenue Code continuing in effect. The private letter and supplemental rulings and the tax opinion that Harvard Bioscience received from Burns & Levinson LLP, special counsel to Harvard Bioscience, rely on certain representations, assumptions and undertakings, including those relating to the past and future conduct of our business, and neither the private letter and supplemental rulings nor the opinion would be valid if such representations, assumptions and undertakings were incorrect. Moreover, the private letter and supplemental rulings do not address all the issues that are relevant to determining whether the Distribution will qualify for tax-free treatment. Notwithstanding the private letter and supplemental rulings and opinion, the IRS could determine the Distribution should be treated as a taxable transaction for U.S. federal income tax purposes if, among other reasons, it determines any of the representations, assumptions or undertakings that were included in the request for the private letter and supplemental rulings are false or have been violated or if it disagrees with the conclusions in the opinion that are not covered by the IRS ruling.

If the Distribution fails to qualify for tax-free treatment, in general, Harvard Bioscience would be subject to tax as if it had sold our common stock in a taxable sale for its fair market value, and Harvard Bioscience stockholders who receive shares of our common stock in the Distribution would be subject to tax as if they had received a taxable Distribution equal to the fair market value of such shares.

Under the tax sharing agreement between Harvard Bioscience and us, we would generally be required to indemnify Harvard Bioscience against any tax resulting from the Distribution to the extent that such tax resulted from (i) an acquisition of all or a portion of our stock or assets, whether by merger or otherwise, (ii) other actions or failures to act by us, or (iii) any of our representations or undertakings being incorrect or violated. Our indemnification obligations to Harvard Bioscience and its subsidiaries, officers and directors are not limited by any maximum amount. If we are required to indemnify Harvard Bioscience or such other persons under the circumstances set forth in the tax sharing agreement, we may be subject to substantial liabilities.

We may have received better terms from unaffiliated third parties than the terms we received in our agreements with Harvard Bioscience.

The agreements related to the Separation, including the separation and distribution agreement, tax sharing agreement, transition services agreement and the other agreements, were negotiated in the context of the Separation while we were still part of Harvard Bioscience and, accordingly, may not reflect terms that would have resulted from arm's-length negotiations among unaffiliated third parties. The terms of the agreements we negotiated in the context of the Separation related to, among other things, allocation of assets, liabilities, rights, indemnifications and other obligations among Harvard Bioscience and us. We may have received better terms from third parties because third parties may have competed with each other to win our business. One of the members of our Board of Directors is also a member of the Harvard Bioscience Board of Directors.

The ownership by one of our executive officers and one of our directors of shares of common stock, options, or other equity awards of Harvard Bioscience, as well as the continued role of our director with Harvard Bioscience may create, or may create the appearance of, conflicts of interest.

The ownership by one of our executive officers and one of our directors of shares of common stock, options, or other equity awards of Harvard Bioscience may create, or may create the appearance of, conflicts of interest. Because of their current or former positions with Harvard Bioscience, one of our executive officers, and one of our directors, own shares of Harvard Bioscience common stock, options to purchase shares of Harvard Bioscience common stock or other equity awards. The individual holdings of common stock, options to purchase common stock of Harvard Bioscience or our company or other equity awards, may be significant for some of these persons compared to such persons' total assets. Ownership by our directors and officers of common stock or options to purchase common stock of Harvard Bioscience, or any other equity awards, creates, or, may create the appearance of, conflicts of interest when these directors and officers are faced with decisions that could have different implications for Harvard Bioscience than the decisions have for us. In addition, one of our directors, John F. Kennedy, is a member of the Board of Directors of Harvard Bioscience. The continued service at both companies creates, or, may create the appearance of, conflicts of interest when Mr. Kennedy is faced with decisions that could have different implications for Harvard Bioscience than the decisions have for us.

Third parties may seek to hold us responsible for liabilities of Harvard Bioscience that we did not assume in our agreements.

In connection with the Separation, Harvard Bioscience has generally agreed to retain all liabilities that did not historically arise from our business. Third parties may seek to hold us responsible for Harvard Bioscience's retained liabilities. Under our agreements with Harvard Bioscience, Harvard Bioscience has agreed to indemnify us for claims and losses relating to these retained liabilities. However, if those liabilities are significant and we are ultimately liable for them, we cannot assure you that we will be able to recover the full amount of our losses from Harvard Bioscience.

Any disputes that arise between us and Harvard Bioscience with respect to our past and ongoing relationships could harm our business operations.

Disputes may arise between Harvard Bioscience and us in a number of areas relating to our past and ongoing relationships, including:

- intellectual property, technology and business matters, including failure to make required technology transfers and failure to comply with non-compete provisions applicable to Harvard Bioscience and us;
- labor, tax, employee benefit, indemnification and other matters arising from the Separation;
- distribution and supply obligations;
- employee retention and recruiting;
- business combinations involving us;
- sales or distributions by Harvard Bioscience of all or any portion of its ownership interest in us; and
- business opportunities that may be attractive to both Harvard Bioscience and us.

We may not be able to resolve any potential conflicts, and even if we do, the resolution may be less favorable than if we were dealing with a different party.

Risks Relating To Our Common Stock

Substantial sales of common stock have and may continue to occur, or may be anticipated, which have and could continue to cause our stock price to decline.

We expect that we will seek to raise additional capital from time to time in the future, which may involve the issuance of additional shares of common stock, or securities convertible into common stock. Since our February 2015 public offering, the holders of the shares of Series B Convertible Preferred Stock issued in that offering have converted all such shares and have sold substantially all of the common stock they received upon such conversion. We believe that the effect of these conversions and sales contributed, at that time, to a decline in the price of our common stock. On February 10, 2017, we completed a public offering of 20,000,000 shares of common stock and the issuance of warrants to purchase 20,000,000 shares of common stock. Additionally, we issued to the placement agent warrants to purchase 1,000,000 shares of common stock to the placement agent for the offering. The purchasers of the shares of common stock and warrants to purchase shares of common stock from that offering may sell significant quantities of our common stock in the market, which may cause a decline in the price of our common stock. Further, we cannot predict the effect, if any, that any additional market sales of common stock, or anticipation of such sales, or the availability of those shares of common stock for sale will have on the market price of our common stock. Any future sales of significant amounts of our common stock, or the perception in the market that this will occur, may result in a decline in the price of our common stock.

A trading market that will provide you with adequate liquidity may not develop for our common stock.

The current public market for our common stock has limited trading volume and liquidity. We cannot predict the extent to which investor interest in our company will lead to the development of a more active trading market in our common stock, or how liquid that market might be.

Our revenues, operating results and cash flows may fluctuate in future periods and we may fail to meet investor expectations, which may cause the price of our common stock to decline.

Variations in our quarterly and year-end operating results are difficult to predict and may fluctuate significantly from period to period. If our revenues or operating results fall below the expectations of investors or securities analysts, the price of our common stock could decline substantially. In addition to the other factors discussed under these "Risk Factors," specific factors that may cause fluctuations in our operating results include:

- demand and pricing for our products;
- government or private healthcare reimbursement policies;
- adverse events or publicity related to our products, our research or investigations, or our collaborators or other partners;
- physician and patient acceptance of any of our current or future products;
- manufacturing stoppages or delays;
- introduction of competing products or technologies;
- our operating expenses which fluctuate due to growth of our business; and
- timing and size of any new product or technology acquisitions we may complete.

The market price of our shares may fluctuate widely.

The market price of our common stock may fluctuate widely, depending upon many factors, some of which may be beyond our control, including:

- the success and costs of preclinical and clinical testing and obtaining regulatory approvals or clearances for our products;
- the success or failure of surgeries and procedures involving the use our products;
- a shift in our investor base;
- our quarterly or annual results of operations, or those of other companies in our industry;
- actual or anticipated fluctuations in our operating results due to factors related to our business;

- changes in accounting standards, policies, guidance, interpretations or principles;

- announcements by us or our competitors of significant acquisitions, dispositions or intellectual property developments or issuances;
- the failure to maintain our NASDAQ listing or failure of securities analysts to cover our common stock;
- changes in earnings estimates by securities analysts or our ability to meet those estimates;
- the operating and stock price performance of other comparable companies; our issuance of equity, debt or other financing instruments;
- overall market fluctuations; and
- general macroeconomic conditions.

Stock markets in general have experienced volatility that has often been unrelated to the operating performance of a particular company. These broad market fluctuations may adversely affect the trading price of our common stock.

Your percentage ownership will be diluted in the future.

Your percentage ownership will be diluted in the future because of equity awards that we expect will be granted to our directors, officers and employees, as well as shares of common stock, or securities convertible into common stock, we issue in connection with future capital raising or strategic transactions. Our 2013 Equity Incentive Plan provides for the grant of equity-based awards, including restricted stock, restricted stock units, stock options, stock appreciation rights and other equity-based awards to our directors, officers and other employees, advisors and consultants. In addition, your percentage ownership will be diluted by our issuance of common stock following the exercise of options, or vesting of restricted stock units, we issued pertaining to the adjustment and conversion of outstanding Harvard Bioscience equity awards as a result of the Separation. The issuance of any shares of our stock would dilute the proportionate ownership and voting power of existing security holders.

Provisions of Delaware law, of our amended and restated charter and amended and restated bylaws and our Shareholder Rights Plan may make a takeover more difficult, which could cause our stock price to decline.

Provisions in our amended and restated certificate of incorporation and amended and restated bylaws and in the Delaware corporate law may make it difficult and expensive for a third party to pursue a tender offer, change in control or takeover attempt, which is opposed by management and the Board of Directors. Public stockholders who might desire to participate in such a transaction may not have an opportunity to do so. Our Board of Directors has adopted a Shareholder Rights Plan that could make it more difficult for a third party to acquire, or could discourage a third party from acquiring, our company or a large block of our common stock. A third party that acquires 20% or more of our common stock could suffer substantial dilution of its ownership interest under the terms of the Shareholder Rights Plan through the issuance of common stock to all stockholders other than the acquiring person. We also have a staggered Board of Directors that makes it difficult for stockholders to change the composition of the Board of Directors in any one year. Any removal of directors will require a super-majority vote of the holders of at least 75% of the outstanding shares entitled to be cast on the election of directors which may discourage a third party from making a tender offer or otherwise attempting to obtain control of us. These anti-takeover provisions could substantially impede the ability of public stockholders to change our management and Board of Directors. Such provisions may also limit the price that investors might be willing to pay for shares of our common stock in the future.

Any issuance of preferred stock in the future may dilute the rights of our common stockholders.

Our Board of Directors has the authority to issue up to 2,000,000 shares of preferred stock and to determine the price, privileges and other terms of these shares. Our Board of Directors is empowered to exercise this authority without any further approval of stockholders. The rights of the holders of common stock may be adversely affected by the rights of future holders of preferred stock.

We have in the past issued, and we may at any time in the future issue, additional shares of authorized preferred stock. For example, in connection with our February 2015 public offering, we issued 695,857 shares of Series B Convertible Preferred Stock and each preferred share was subsequently converted into 5 shares of our common stock.

We do not intend to pay cash dividends on our common stock.

Currently, we do not anticipate paying any cash dividends to holders of our common stock. As a result, capital appreciation, if any, of our common stock will be a stockholder’s sole source of gain.

The JOBS Act allows us to postpone the date by which we must comply with certain laws and regulations and to reduce the amount of information provided in reports filed with the SEC. We cannot be certain if the reduced disclosure requirements applicable to emerging growth companies will make our common stock less attractive to investors.

We are and we will remain an “emerging growth company” until the earliest to occur of (i) the last day of the fiscal year during which our total annual revenues equal or exceed $1 billion (subject to adjustment for inflation), (ii) the last day of the fiscal year following the fifth anniversary of the date of our first sale of common equity securities pursuant to an effective registration statement, (iii) the date on which we have, during the previous three-year period, issued more than $1 billion in non-convertible debt, or (iv) the date on which we are deemed a “large accelerated filer” under the Securities and Exchange Act of 1934, as amended, or the Exchange Act. For so long as we remain an “emerging growth company” as defined in the JOBS Act, we may take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not “emerging growth companies” including, but not limited to, not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements, and exemptions from the requirements of holding a non-binding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. We cannot predict if investors will find our common stock less attractive because we will rely on some or all of these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be more volatile. If we avail ourselves of certain exemptions from various reporting requirements, our reduced disclosure may make it more difficult for investors and securities analysts to evaluate us to a level acceptable by them and may result in less investor confidence.

We have received notices from NASDAQ of non-compliance with its continuing listing rules.

On July 16, 2015, we received a notice from NASDAQ of non-compliance with its continuing listing rules, namely that the audit committee of our Board of Directors had two members following James McGorry’s appointment as our President and Chief Executive Officer instead of the required minimum of three members. In accordance with NASDAQ continued listing rules, we were given until the earlier of our next annual shareholders’ meeting or July 6, 2016 to add a third audit committee member. On March 10, 2016, Blaine McKee, Ph.D. was appointed as a member of the Board of Directors and its audit committee, and we regained compliance with that requirement.

On November 10, 2015, we received a notice from NASDAQ of non-compliance with its listing rules regarding the requirement that the listed securities maintain a minimum bid price of $1 per share. Based upon the closing bid price for the 30 consecutive business days preceding the notice, the Company no longer met this requirement. However, the NASDAQ rules also provide the Company a period of 180 calendar days in which to regain compliance and, in some circumstances, a second 180-day compliance period. On November 25, 2015, we regained compliance with the minimum bid price requirement when the closing price of our common stock was at least $1 per share for ten consecutive business days.

On November 18, 2016, we received a notice from NASDAQ of non-compliance with its listing rules regarding the minimum bid price requirement. As noted above, the NASDAQ rules provide the Company a period of 180 calendar days in which to regain compliance and, in some circumstances, a second 180-day compliance period. We are monitoring the closing bid price of our common stock and will consider available options to resolve the non-compliance with the minimum bid price requirement as may be necessary, including the possibility of seeking stockholder approval of a reverse stock split. There can be no assurance that we would be successful in receiving such stockholder approval.

The failure to meet continuing compliance standards subjects our common stock to a possible delisting. A delisting of our common stock would have an adverse effect on the market liquidity of our common stock and, as a result, the market price for our common stock could become more volatile. Further, a delisting also could make it more difficult for us to raise additional capital.

Item 1B. ***Unresolved Staff Comments.***

None.

Item 2. ***Properties.***

On November 1, 2013 we entered into a sublease of approximately 17,000 square feet of mixed use space of the facility located at 84 October Hill Road, Suite 11, Holliston, Massachusetts from Harvard Bioscience, which is our corporate headquarters. Our principal facilities incorporate manufacturing, laboratory, development, sales and marketing, and administration functions. We believe our current facilities are adequate for our needs for the foreseeable future.

Item 3. ***Legal Proceedings.***

From time to time, we may be involved in various claims and legal proceedings arising in the ordinary course of business. We are not currently a party to any such significant claims or proceedings.

Item 4. ***Mine Safety Disclosures.***

Not Applicable.

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PART II

Item 5. *Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities.*

Unregistered Sales of Equity Securities

Aspire Capital, LLC Transaction

On December 15, 2015, we entered into a Common Stock Purchase Agreement (the "Purchase Agreement") with Aspire Capital Fund, LLC, an Illinois limited liability company ("Aspire Capital"), which provided that, upon the terms and subject to the conditions and limitations set forth therein, Aspire Capital was committed to purchase up to an aggregate of $15.0 million of shares of our common stock (the "Purchase Shares") over the 30-month term set forth in the Purchase Agreement.

On December 15, 2015, we issued 150,000 shares of our common stock to Aspire Capital in consideration for entering into the Purchase Agreement (the "Commitment Shares") and sold 500,000 shares to Aspire Capital for an aggregate purchase price of $1,000,000 (the "Initial Purchase Shares"). Under the Purchase Agreement, the Purchase Shares could be sold by us to Aspire Capital on any business day in two ways: (1) through a regular purchase of up to 150,000 shares at a known price based on the market price of our common stock prior to the time of each sale, and (2) through a VWAP purchase of a number of shares up to 30% of the volume traded on the purchase date at a price equal to the lessor of the closing sale price or 97% of the volume weighted average price for such purchase date.

On May 12, 2016, we issued 150,000 shares of common stock under this arrangement in exchange for gross proceeds of approximately $371,000. We terminated the Aspire Purchase Agreement effective as of May 17, 2016.

May 2016 Offering

On May 15, 2016, we entered into a Securities Purchase Agreement (the "Purchase Agreement") with certain investors (the "Investors") for the sale by us of 2,836,880 registered shares of our common stock at a purchase price of $1.7625 per share. Concurrently with the sale of the shares of our common stock, pursuant to the Purchase Agreement we also sold unregistered warrants to purchase 1,418,440 shares of our common stock. The aggregate gross proceeds for the sale of the shares of common stock and the warrants was approximately $5.0 million. Subject to certain ownership limitations, the warrants are initially exercisable commencing six months from the issuance date at an exercise price equal to $1.7625 per share of common stock, subject to adjustments as provided under the terms of the warrants. The warrants are exercisable for five years from the initial exercise date. The closing of the sales of these securities under the Purchase Agreement occurred on May 19, 2016.

We entered into an engagement letter (the "Engagement Letter") H.C. Wainwright & Co., LLC ("Wainwright"), pursuant to which Wainwright agreed to serve as exclusive placement agent for the issuance and sale of our shares of common stock and the warrants. Pursuant to the Engagement Letter, we granted to Wainwright unregistered warrants to purchase up to 5% of the aggregate number of shares sold in the transactions (the "Wainwright Warrants"). The Wainwright Warrants have substantially the same terms as the warrants.

Price Range of Common Stock

Our common stock trades on The NASDAQ Capital Market under the symbol "BSTG." Prior to April 1, 2016, in connection with our name change, our common stock traded on The NASDAQ Capital Market under the symbol "HART" since October 21, 2013. The following table sets forth the range of the high and low sales prices per share of our common stock as reported on the NASDAQ Capital Market for the quarterly periods indicated.

Fiscal Year Ended December 31, 2016	High	Low
First Quarter	$2.60	$1.08
Second Quarter	2.86	0.92
Third Quarter	1.22	0.90
Fourth Quarter	1.42	0.73

Fiscal Year Ended December 31, 2015	High	Low
First Quarter	$4.43	$1.85
Second Quarter	3.83	1.36
Third Quarter	1.73	0.56
Fourth Quarter	3.47	0.53

On March 14, 2017, the closing sale price of our common stock on the NASDAQ Capital Market was $0.38 per share. There were 180 holders of record of our common stock as of March 6, 2017. We believe that the number of beneficial owners of our common stock at that date was substantially greater.

Dividend Policy

We have never declared or paid cash dividends on our common stock in the past and do not intend to pay cash dividends on our common stock in the foreseeable future. Any future determination to pay cash dividends will be at the discretion of our Board of Directors and will depend on our financial condition, results of operations, capital requirements and other factors our Board of Directors deems relevant.

Item 6. ***Selected Financial Data***

Not Applicable.

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

NOTE REGARDING FORWARD-LOOKING STATEMENTS

Forward-Looking Statements

The following section of this Annual Report on Form 10-K entitled "Management's Discussion and Analysis of Financial Condition and Results of Operations" contains statements that are not statements of historical fact and are forward-looking statements within the meaning of federal securities laws. These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. These statements reflect our current views with respect to future events and are based on assumptions and subject to risks and uncertainties.

In some cases, you can identify forward-looking statements by terms such as "believe," "may," "estimate," "continue," "anticipate," "intend," "should," "could," "would," "target," "seek," "aim," "believe," "predicts," "think," "objectives," "optimistic," "new," "goal," "strategy," "potential," "is likely," "will," "expect," "plan" "project," "permit" and similar expressions intended to identify forward-looking statements. These statements reflect our current views with respect to future events, are based on assumptions and are subject to risks and uncertainties. Given these uncertainties, you should not place undue reliance on these forward-looking statements. We discuss many of these risks in greater detail in Item 1A."Risk Factors" of this Annual Report on Form 10-K. You should carefully review all of these factors, as well as the comprehensive discussion of forward-looking statements on page 1 of this Annual Report on Form 10-K.

Overview

We are a biotechnology company developing bioengineered organ implants based on our novel Cellframe technology. Our Cellframe technology is comprised of a biocompatible scaffold that is seeded with the recipient's own stem cells. This technology is being developed to treat life-threatening conditions of the esophagus, trachea or bronchus with the objective of dramatically improving the treatment paradigm for those patients.

We believe that our Cellframe technology will provide surgeons with new ways to address damage to the esophagus, bronchus, and trachea due to cancer, infection, trauma or congenital abnormalities. Products being developed based on our Cellframe technology for those indications are called Cellspan products.

A portion of all patients diagnosed with esophageal cancer are treated via a surgical procedure known as an esophagectomy. The current standard of care for an esophagectomy requires a complex surgical procedure that involves moving the patient's stomach or a portion of their colon into the chest to replace the portion of esophagus resected by the removal of the tumor. These current procedures have high rates of complications, and can lead to a severely diminished quality of life and require costly ongoing care. Our Cellspan esophageal implants aim to simplify the procedure, reduce complications, result in a better quality of life and reduce the overall cost of these patients to the healthcare system.

We announced favorable preliminary pre-clinical results of large-animal studies for the esophagus, trachea and bronchus in November 2015. Based on our pre-clinical testing to date, the Cellspan esophageal implant product will be our lead development product.

In May 2016, we reported an update of recent results from pre-clinical large-animal studies. We disclosed that the study had demonstrated in a predictive large-animal model the ability of Biostage Cellspan organ implants to successfully stimulate the regeneration of sections of esophagus that had been surgically removed for the study. Cellspan esophageal implants, consisting of a proprietary biocompatible synthetic scaffold seeded with the recipient animal's own stem cells, were surgically implanted in place of the esophagus section that had been removed.

Study animals were returned to a solid diet two weeks after implantation surgery. The scaffolds, which are intended to be in place only temporarily, were later retrieved via the animal's mouth in a non-surgical endoscopic procedure. After 2.5 months post-surgery, a complete epithelium and other specialized esophagus tissue layers were regenerated. Animals in the study demonstrated weight gain and appear healthy and free of any significant side effects, including two that are now more than 120 days post implantation, and are receiving no specialized care.

In June 2016, we submitted our application with the U.S. Food and Drug Administration, or the FDA, seeking orphan drug designation for our Cellspan Esophageal Implants. Orphan drug status would provide market exclusivity in the U.S. for seven years from the date of the product's approval for marketing. This exclusivity is in addition to any exclusivity we may obtain due to our patents. Additionally, orphan designation provides certain incentives, including tax credits and a waiver of the BLA fee. We also intend to apply for orphan drug designation for our Cellspan esophageal implant in Europe in the near term. Orphan drug status in Europe provides market exclusivity there for ten years from the date of the product's approval for marketing. In November 2016, we were granted Orphan Drug Designation for our Cellspan esophageal implant by the FDA to restore the structure and function of the esophagus subsequent to esophageal damage due to cancer, injury or congenital abnormalities.

We are conducting Good Laboratory Practice (GLP) studies to demonstrate that our technology, personnel, systems and practices are sufficient for advancing into clinical trials. GLP safety studies are required to advance to an IND application with the FDA, which would seek approval to initiate clinical trials for Biostage Cellspan esophageal implants in humans.

In October 2016, we announced a regulatory update following our planned pre-Investigational New Drug, or pre-IND, meeting with the FDA, for the advancement of our lead product candidate, Cellspan Esophageal Implant, into human clinical studies. We expect to file an IND application with the FDA in the third quarter of 2017 based on our election to extend the duration of our ongoing GLP animal studies following the feedback provided by the FDA.

Our products are currently in development and have not yet received regulatory approval for sale anywhere in the world.

On May 12, 2016, we issued 150,000 shares of common stock under the common stock purchase agreement with Aspire Capital Fund, LLC (the “Aspire Purchase Agreement”) in exchange for gross proceeds of $371,000, or $349,000 net of issuance costs. On May 17, 2016, we terminated the Aspire Purchase Agreement. The Aspire Purchase Agreement was terminated without any penalty or cost to us.

On May 19, 2016, we closed on a Securities Purchase Agreement (the “Purchase Agreement”) for the sale of 2,836,880 shares of our common stock at a purchase price of $1.7625 per share and the issuance of warrants to purchase 1,418,440 shares of common stock at an exercise price of $1.7625 per warrant for gross proceeds of $5.0 million. Additionally, we issued to the placement agent warrants to purchase 141,844 shares of common stock to the placement agent for the offering at an exercise price of $1.7625 per warrant. The warrants are initially exercisable commencing November 19, 2016 through their expiration date of May 19, 2021.

On February 10, 2017, we completed a public offering of 20,000,000 shares of common stock at a purchase price of $0.40 per share and the issuance of warrants to purchase 20,000,000 shares of common stock at an exercise price of $0.40 per warrant for gross proceeds of $8.0 million. Additionally, we issued to the placement agent warrants to purchase 1,000,000 shares of common stock to the placement agent for the offering at an exercise price of $0.40 per warrant.

We have incurred substantial operating losses since inception, and as of December 31, 2016 have an accumulated deficit of approximately $36.3 million. We expect to continue to incur operating losses and negative cash flows from operations in 2017 and in future years. On February 10, 2017, we completed a public offering with gross proceeds of $8.0 million, and net proceeds of approximately 6.8 million. We believe that our cash at March 14, 2017 will be sufficient to meet the Company's obligations through the third quarter of 2017. Therefore, these conditions raise substantial doubt about the Company's ability to continue as a going concern.

We will need to raise additional funds in future periods to fund our operations. In the event that we do not raise additional capital from outside sources in the near future, we may be forced to curtail or cease our operations. Cash requirements and cash resource needs will vary significantly depending upon the timing and the financial and other resource needs that will be required to complete ongoing development and pre-clinical and clinical testing of products as well as regulatory efforts and collaborative arrangements necessary for our products that are currently under development. We will seek to raise necessary funds through a combination of publicly or private equity offerings, debt financings, other financing mechanisms, or strategic collaborations and licensing arrangements. We may not be able to obtain additional financing on terms favorable to us, if at all.

Results of Operations

Components of Operating Loss

Research and development expense. Research and development expense consists of salaries and related expenses, including stock-based compensation, for personnel and contracted consultants and various materials and other costs to develop our new products, primarily: synthetic organ scaffolds, including investigation and development of materials and investigation and optimization of cellularization, and 3D organ bioreactors. Other research and development expenses include the costs of outside service providers and material costs for prototype and test units and outside laboratories and testing facilities performing cell growth and materials experiments, as well as the costs of all other preclinical research and testing including animal studies and expenses related to potential patents. We expense research and development costs as incurred.

Selling, general and administrative expense. Selling, general and administrative expense consists primarily of salaries and other related expenses, including stock-based compensation, for personnel in executive, accounting, information technology and human resources roles. Other costs include professional fees for legal and accounting services, insurance, investor relations and facility costs. Our sales and marketing expenses included salaries and related expenses, including stock-based compensation, for personnel performing sales, marketing, and business development roles through December 31, 2015. In 2016, our sales and marketing expenses were immaterial given our focus on research and development and moving toward submission of an Investigational New Drug application, or IND with the U.S. Food and Drug Administration (FDA) for our Cellspan esophageal implant in the third quarter of 2017.

Changes in fair value of warrant liability, net of issuance costs. Changes in fair value of warrant liability, net of issuance costs, represent the change in the fair value of common stock warrants from the date of issuance to the end of the reporting period during the year ended December 31, 2016 and in subsequent quarterly periods, the change in the fair value of common stock warrants from the date between each reporting period until the liability is settled. We use the Black-Scholes pricing model to value the related warrant liability. The costs associated with the issuance of the warrants have been recorded as an expense upon issuance.

Critical Accounting Estimates

Management's discussion and analysis of our financial condition and results of operations is based on our consolidated financial statements, which have been prepared in accordance with Generally Accepted Accounting Principles in the United States ("U.S. GAAP"). The preparation of these consolidated financial statements requires us to make estimates and assumptions for the reported amounts of assets, liabilities, revenues, expenses and related disclosures. We believe the following policies to be critical to the judgments and estimates used in the preparation of our financial statements.

Share-based Compensation

We account for our share-based compensation in accordance with the fair value recognition provisions of current authoritative guidance. Share-based awards, including stock options, are measured at fair value as of the grant date and recognized as expense over the requisite service period (generally the vesting period), which we have elected to amortize on a straight-line basis. Expense on share-based awards for which vesting is performance or milestone based is recognized on a straight-line basis from the date when we determine the achievement of the milestone is probable to the vesting/ milestone achievement date. Since share-based compensation expense is based on awards ultimately expected to vest, it has been reduced by an estimate for future forfeitures. We estimate forfeitures at the time of grant and revise our estimate, if necessary, in subsequent periods. We estimate the fair value of options granted using the Black-Scholes option valuation model. Significant judgment is required in determining the proper assumptions used in these models. The assumptions used include the risk-free interest rate, expected term, expected volatility and expected dividend yield. We base our assumptions on historical data when available or when not available, on a peer group of companies. However, these assumptions consist of estimates of future market conditions, which are inherently uncertain and subject to our judgment, and therefore any changes in assumptions could significantly impact the future grant date fair value of share-based awards

Total share-based compensation expense for the years ended December 31, 2016 and 2015 was $1.3 million and $4.0 million, respectively. Share based compensation is further described in Note 12 to the Consolidated Financial Statements.

Warrant Accounting

The Company classifies a warrant to purchase shares of its common stock as a liability on its consolidated balance sheets as this warrant is a free-standing financial instrument that may require the Company to transfer cash consideration upon exercise. The warrant was initially recorded at fair value on date of grant using the Black-Scholes model and net of issuance costs, and it is subsequently re-measured to fair value at each subsequent balance sheet date. Changes in fair value of the warrant are recognized as a component of other income (expense), net in the consolidated statement of operations and comprehensive loss. The Company will continue to adjust the liability for changes in fair value until the earlier of the exercise or expiration of the warrant.

Results of Operations

Year Ended December 31, 2016 Compared to Year Ended December 31, 2015

Revenues

Revenues decreased $36 thousand, or 30.5%, to $82 thousand for the year ended December 31, 2016 compared with the year ended December 31, 2015. Revenues represent the sale of research bioreactor equipment through our distributor, Harvard Bioscience, to end users working on organ regeneration research. We do not expect to have any additional significant sales of research bioreactor equipment in the future.

Cost of revenues

Cost of revenues decreased $23 thousand, or 16.6%, to $116 thousand for the year ended December 31, 2016 compared with the year ended December 31, 2015 due to the decrease in revenues. Cost of revenues includes labor, materials and allocated overhead for our research bioreactor equipment.

Research and Development Expense

Research and development expense increased $2.8 million, or 58.9%, to $7.6 million for the year ended December 31, 2016 compared with $4.8 million for the year ended December 31, 2015. The $2.8 million increase was primarily due to increased spending on preclinical studies of $1.5 million, laboratory services and consulting of $0.5 million, $0.2 million for laboratory supplies and $0.6 million of other salary related research and development expenses.

Selling, General and Administrative Expense

Selling, general and administrative expense decreased $2.4 million, or 34.9%, to $4.5 million for the year ended December 31, 2016 compared with $6.9 million for the year ended December 31, 2015. The $2.4 million decrease was due primarily to a $2.6 million decrease in stock-based compensation costs, related primarily to the departure of our former Chairman and CEO in April 2015, offset by the cost of rebranding to Biostage and increased professional fees in 2016.

Change in fair value of warrant liability, net of issuance costs

The change in fair value of the warrant liability, which was issued in May 2016, amounted to an increase of $0.5 million for the year ended December 31, 2016.

Liquidity and Capital Resources

Sources of liquidity. We have incurred operating losses since inception, and as of December 31, 2016 we had an accumulated deficit of approximately $36.3 million. We are currently investing significant resources in the development and commercialization of our products for use by clinicians and researchers in the field of regenerative medicine. As a result, we expect to incur operating losses and negative operating cash flow for the foreseeable future.

Operating activities. Net cash used in operating activities of $9.1 million for the year ended December 31, 2016 was primarily a result of our $11.6 million net loss, offset by a $1.3 million add-back of non-cash expenses of stock-based compensation and depreciation and favorable changes in working capital of $1.2 million.

Net cash used in operating activities of $7.2 million for the year ended December 31, 2015 was primarily a result of our $11.7 million net loss, offset by a $4.5 million add-back of non-cash expenses of stock-based compensation and depreciation.

Investing activities. Net cash used in investing activities for the years ended December 31, 2016 and 2015 totaled $0.3 million and $0.2 million, respectively, and represented additions to property, plant and equipment.

Financing activities. Net cash generated from financing activities during the year ended December 31, 2016 in the amount of $4.8 million consisted of the net proceeds in the amount of $4.5 million from the issuance of 2,836,880 shares of the Company's common stock at a purchase price of $1.7625 per share and the issuance of warrants to purchase 1,418,440 shares of common stock at an exercise price of $1.7625 per warrant, as well as net proceeds in the amount of $0.3 million from the issuance of 150,000 shares of common stock under the Aspire Purchase Agreement.

Net cash generated from financing activities of $9.6 million for the year ended December 31, 2015 reflected $4.2 million of net proceeds from the issuance of common stock and $5.4 million in net proceeds from the issuance of convertible preferred stock. All convertible preferred stock issued during 2015 was converted into common stock by December 31, 2015.

Recently Issued Accounting Pronouncements

In August 2014, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2014-15, " *Disclosure of Uncertainties about an Entity's Ability to Continue as a Going Concern,"* to provide guidance on management's responsibility in evaluating whether there is substantial doubt about a company's ability to continue as a going concern and to provide related footnote disclosures. This update is effective for annual periods ending after December 15, 2016, and interim periods within annual periods beginning after December 15, 2016. Early application is permitted for annual or interim reporting periods for which the financial statements have not previously been issued. We have adopted ASU 2014-15 and the adoption did not have a significant impact on our consolidated financial statements or related disclosures.

In February 2016, the FASB, issued ASU, 2016-02- *Leases (Topic 842)*. The ASU requires companies to recognize on the balance sheet the assets and liabilities for the rights and obligations created by leased assets. ASU 2016-02 will be effective for the first quarter of 2019, with early adoption permitted. We are currently evaluating the impact that the adoption of ASU 2016-02 will have on our consolidated financial statements or related disclosures.

In March 2016, the FASB issued ASU 2016-09, *Stock Compensation - Improvements to Employee Share-Based Payment Accounting,* ("ASU 2016-09"), which simplifies several aspects of the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, classification on the statement of cash flows and policy elections on the impact for forfeitures. ASU 2016-09 is effective for fiscal years beginning after December 15, 2017 and interim periods within annual periods beginning after December 15, 2018. We have not adopted ASU 2016-09 and do not expect the adoption to have a significant impact on our consolidated financial statements or related disclosures.

In August 2016, the FASB issued ASU No. 2016-15, Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments (FASB ASU 2016-15). This amendment addresses eight classification issues related to the statement of cash flows. For public business entities, the amendments in FASB ASU 2016-15 are effective for public business entities for annual and interim periods in fiscal years beginning after December 15, 2017. Early adoption is permitted, including adoption in an interim period. We have not yet selected a transition method and are evaluating the effect the updated standard will have on our consolidated financial statements and related disclosures.

In November 2016, the FASB issued ASU 2016-18 *Statement of Cash Flows*, which requires that amounts generally described as restricted cash and restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. ASU 2016-18 is effective for fiscal years beginning after December 15, 2018 and should be applied using a retrospective transition method to each period presented. Early adoption is permitted. We are in the process of evaluating the impact of ASU 2016-17 on our financial statements.

In January 2017, the FASB issued ASU 2017-01, *Business Combinations,* which clarifies the definition of a business and provides a screen to determine when a set of assets and activities is not a business. The screen requires that when substantially all of the fair value of the gross assets acquired (or disposed of) is concentrated in a single identifiable asset or a group of similar identifiable assets, the set is not a business. This screen reduces the number of transactions that need to be further evaluated. ASU 2017-01 is effective for fiscal years beginning after December 15, 2017. We do not expect the impact of ASU 2017-01 to have an impact on its financial statements.

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

Off - Balance Sheet Arrangements

We do not have any off - balance sheet arrangements.

Item 7A. ***Quantitative and Qualitative Disclosures about Market Risk.***

Not Applicable.

Item 8. ***Financial Statements and Supplementary Data.***

The information required by this item is contained in the consolidated financial statements filed as part of this Annual Report on Form 10-K listed under Item 15 of Part IV below.

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

None.

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

This Report includes the certifications of our Chief Executive Officer and Chief Financial Officer required by Rule 13a-14 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"). See Exhibits 31.1 and 31.2. This Item 9A includes information concerning the controls and control evaluations referred to in those certifications.

(a) Evaluation of Disclosure Controls and Procedures

Disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act) are designed to ensure that information required to be disclosed in reports filed or submitted under the Exchange Act is recorded, processed, summarized, and reported within the time periods specified in SEC rules and forms and that such information is accumulated and communicated to management, including the Chief Executive Officer and the Chief Financial Officer, to allow timely decisions regarding required disclosures.

In connection with the preparation of this Annual Report on the Form 10-K, our management, under the supervision and with the participation of our Chief Executive Officer and Chief Financial Officer, conducted an evaluation of the effectiveness of the design and operation of our disclosure controls and procedures as of December 31, 2016. Our disclosure controls and procedures are designed to provide reasonable assurance that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the Securities and Exchange Commission’s rules and forms, and our management necessarily was required to apply its judgment in evaluating and implementing our disclosure controls and procedures. Based upon the evaluation described above, our Chief Executive Officer and Chief Financial Officer have concluded that they believe that our disclosure controls and procedures were effective, as of the end of the period covered by this report, in providing reasonable assurance that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is accumulated and communicated to our management, including our Chief Executive Officer and Chief Financial Officer, to allow timely decisions regarding required disclosures, and is recorded, processed, summarized and reported within the time periods specified in the Securities and Exchange Commission’s rules and forms.

(b) Management’s Annual Report on Internal Control Over Financial Reporting

Our management, under the supervision of the Chief Executive Officer and the Chief Financial Officer, is responsible for establishing and maintaining an adequate system of internal control over financial reporting. Internal control over financial reporting (as defined in Rules 13a-15(f) and 15d(f) under the Exchange Act) is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles in the United States of America (“U.S. GAAP”).

A company’s internal control over financial reporting includes those policies and procedures that: (a) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of our assets; (b) provide reasonable assurance that transactions are recorded as necessary to permit preparation of consolidated financial statements in accordance with U.S. GAAP; (c) provide reasonable assurance that receipts and expenditures are being made only in accordance with appropriate authorization of management and the board of directors; and (d) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of our assets that could have a material effect on the consolidated financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, 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.

In connection with the preparation of this report, our management conducted an evaluation of the effectiveness of our internal control over financial reporting as of December 31, 2016 based on the criteria established in *Internal Control - Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO). As a result of that evaluation, management has concluded that our internal control over financial reporting was effective as of December 31, 2016.

As an "emerging growth company" under the Jumpstart Our Business Startups Act, we are exempt from the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002. As a result, KPMG LLP, our independent registered public accounting firm, has not audited or issued an attestation report with respect to the effectiveness of our internal control over financial reporting as of December 31, 2016.

(c) Changes in Internal Controls Over Financial Reporting

Our management, with the participation of the Chief Executive Officer and the Chief Financial Officer, has evaluated whether any change in our internal control over financial reporting occurred during the fourth quarter ended December 31, 2016. Based on that evaluation, management concluded that there were no changes in our internal controls over financial reporting during the quarter ended December 31, 2016 that materially affected, or are reasonably likely to materially affect our internal controls over financial reporting.

Item 9B. ***Other Information.***

None.

PART III

Item 10. *Directors, Executive Officers and Corporate Governance.*

Incorporated by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A under the Exchange Act, in connection with our 2017 Annual Meeting of Stockholders. Information concerning executive officers of our Company is included in Part I of this Annual Report on Form 10-K as Item 1. Business-Executive Officers of the Registrant and incorporated herein by reference.

Item 11. *Executive Compensation.*

Incorporated by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A under the Exchange Act in connection with our 2017 Annual Meeting of Stockholders.

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

Incorporated by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A under the Exchange Act in connection with our 2017 Annual Meeting of Stockholders.

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

Incorporated by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A under the Exchange Act in connection with our 2017 Annual Meeting of Stockholders

Item 14. *Principal Accounting Fees and Services.*

Incorporated by reference to our definitive Proxy Statement to be filed pursuant to Regulation 14A under the Exchange Act in connection with our 2017 Annual Meeting of Stockholders.

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Item 15. ***Exhibits, Financial Statement Schedules.***

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

(1) Financial Statements. The consolidated financial statements of Biostage, Inc. and its subsidiaries filed under this Item 15:

(2) Financial Statement Schedules: None. Financial statement schedules have been omitted since the required information is included in our consolidated financial statements contained elsewhere in this Annual Report on Form 10-K.

(3) Exhibits. The exhibits listed in the accompanying Exhibit Index are filed as a part of this Annual Report on Form 10-K.

(b) Exhibits: The exhibits listed in the accompanying Exhibit Index are filed as a part of this Annual Report on Form 10-K.

(c) Separate Financial Statements and Schedules: None. Financial statement schedules have been omitted since the required information is included in our consolidated financial statements contained elsewhere in this Annual Report on Form 10-K.

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

BIOSTAGE, INC.

Report of Independent Registered Public Accounting Firm

The Board of Directors and Stockholders

Biostage, Inc.:

We have audited the accompanying consolidated balance sheets of Biostage, Inc. and subsidiaries as of December 31, 2016 and 2015, and the related consolidated statements of operations and comprehensive loss, stockholders' equity and cash flows for each of the years in the two-year period ended December 31, 2016. These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on these consolidated financial statements based on our audits.

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the consolidated financial statements referred to above present fairly, in all material respects, the financial position of Biostage, Inc. and subsidiaries as of December 31, 2016 and 2015, and the results of their operations and their cash flows for each of the years in the two-year period ended December 31, 2016, in conformity with U.S. generally accepted accounting principles.

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in note 4 to the consolidated financial statements, the Company has suffered recurring losses from operations and will require additional financing to fund future operations which raise substantial doubt about its ability to continue as a going concern. Management's plans in regard to these matters are also described in note 4. The consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty.

/s/ KPMG LLP

Cambridge, Massachusetts

March 16, 2017

BIOSTAGE, INC.

CONSOLIDATED BALANCE SHEETS

(in thousands, except par value and share data)

	December 31, 2016	December 31, 2015
ASSETS		
Current assets:		
Cash	$ 2,941	$ 7,456
Accounts receivable	42	21
Inventory	-	75
Prepaid expenses	291	330
Other current assets	212	-
Total current assets	3,486	7,882
Property, plant and equipment, net	1,065	1,074
Total non-current assets	1,065	1,074
Total assets	$ 4,551	$ 8,956
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable	$ 962	$ 357
Accrued and other current liabilities	1,210	297
Warrant liability	605	-
Total current liabilities	2,777	654
Total liabilities	2,777	654
Commitments and contingencies (note 8)		
Stockholders' equity:		
Undesignated preferred stock, $0.01 par value; 1,000,000 shares authorized; none issued and outstanding	-	-
Series B convertible preferred stock, par value $0.01 per share, 1,000,000 shares authorized; 695,857 shares issued and none outstanding	-	-
Common stock, par value $0.01 per share, 60,000,000 and 30,000,000 shares authorized, respectively; 17,108,968 and 14,101,395 issued and outstanding, respectively	171	141
Additional paid-in capital	37,921	32,908
Accumulated deficit	(36,318)	(24,739)
Accumulated other comprehensive loss	-	(8)

Total stockholders' equity	1,774	8,302
Total liabilities and stockholders' equity	$ 4,551	$ 8,956

See accompanying notes to consolidated financial statements.

BIOSTAGE, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS

(in thousands, except per share data)

	Years ended December 31, 2016	2015
Revenues	$ 82	$ 118
Cost of revenues	116	139
Gross loss	(34)	(21)
Operating expenses:		
Research and development	7,603	4,786
Selling, general and administrative	4,489	6,894
Total operating expenses	12,092	11,680
Operating loss	(12,126)	(11,701)
Other income (expense):		
Change in fair value of warrant liability, net of issuance costs of $129	547	-
Other income (expense), net	-	(3)
	547	(3)
Loss before income taxes	(11,579)	(11,704)
Income taxes	-	-
Net loss	$ (11,579)	$ (11,704)
Basic and diluted net loss per share	$ (0.73)	$ (1.05)
Weighted average common shares, basic and diluted	15,971	11,154
Comprehensive loss:		
Net loss	$ (11,579)	$ (11,704)
Foreign currency translation adjustments	8	(9)
Total comprehensive loss	$ (11,571)	$ (11,713)

See accompanying notes to consolidated financial statements.

BIOSTAGE, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(in thousands)

	Number of Common Shares Outstanding	Number of Series B Convertible Preferred Shares Outstanding	Common Stock	Series B Convertible Preferred Stock	Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Income (Loss)	Total Stockholders' Equity
Balance at December 31, 2014	7,856	-	79	-	19,449	(13,035)	1	6,494
Net loss	-	-	-	-	-	(11,704)	-	(11,704)
Share based compensation	-	-	-	-	3,966	-	-	3,966
Issuance of common stock under employee stock purchase plan	39		-	-	76	-	-	76
Vesting of restricted stock units	6	-	-	-	-	-	-	-
Issuance of Series B convertible preferred stock, net of offering cost	-	696	-	5,357	-	-	-	5,357
Conversion of Series B preferred stock to common stock	3,480	(696)	35	(5,357)	5,322	-	-	-
Issuance of common stock, net of offering costs	2,720	-	27	-	4,095	-	-	4,122
Other comprehensive loss	-	-	-	-	-		(9)	-
Balance at December 31, 2015	14,101	-	$ 141	$ -	$ 32,908	$ (24,739)	$ (8)	$ 8,302
Net loss	-	-	-	-	-	(11,579)		(11,579)
Share based compensation	-	-	-	-	1.327	-	-	1,327
Issuance of common stock under employee stock purchase plan	20	-	-	-	22	-	-	22
	1	-	-	-	-	-	-	-

Vesting of restricted stock units								
Issuance of common stock, net of offering costs	2,987	-	30	-	3,664	-	-	3,694
Other comprehensive income	-	-	-	-	-	-	8	8
Balance at December 31, 2016	17,109	-	$ 171	$ -	$ 37,921	$ (36,318)	$ -	$ 1,774

BIOSTAGE, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

(in thousands)

	Years ended December 31, 2016	2015
Cash flows used in operating activities:		
Net loss:	$ (11,579)	$ (11,704)
Adjustments to reconcile net loss to net cash used in operating activities:		
Stock-based compensation expense	1,327	3,966
Depreciation	454	478
Change in fair value of warrant liability, net of issuance costs of $129	(547)	-
Changes in operating assets and liabilities:		
Related party receivables, net	-	11
Accounts receivable	(21)	(16)
Inventories	75	132
Prepaid expenses	39	(13)
Other current assets	(212)	-
Accounts payable	472	(13)
Accrued and other current liabilities	934	(27)
Net cash used in operating activities	(9,058)	(7,186)
Cash flows used in investing activities:		
Additions to property, plant and equipment	(302)	(176)
Net cash used in investing activities	(302)	(176)
Cash flows from financing activities:		
Proceeds from issuance of common stock and warrants, net of offering costs	4,496	-
Proceeds from issuance of common stock, net of offering costs	349	4,198
Proceeds from issuance of Series B convertible preferred stock, net of offering costs	-	5,357
Net cash provided by financing activities	4,845	9,555
Effect of exchange rate changes on cash	-	(9)
Net (decrease) increase in cash	(4,515)	2,184
Cash at the beginning of the year	7,456	5,272
Cash at the end of the year	$ 2,941	$ 7,456
Supplemental disclosure of non-cash investing and financing activities:		
Equipment purchases included in accounts payable	$ 133	$ -
Grant date fair value of warrants issued to placement agent	$ 116	$ -

See accompanying notes to consolidated financial statements.

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

Years Ended December 31, 2016 and 2015

1. Organization

Overview and Basis of Presentation

Overview

Biostage, Inc., formerly Harvard Apparatus Regenerative Technology, Inc. (“Biostage” or the “Company”) is a biotechnology company developing bioengineered organ implants based on the Company’s novel Cellframe™ technology. The Company’s Cellframe technology is comprised of a biocompatible scaffold that is seeded with the recipient’s own stem cells. The Company believes that this technology may prove to be effective for treating patients across a number of life-threatening medical indications who currently have unmet medical needs. The Company is currently developing its Cellframe technology to treat life-threatening conditions of the esophagus, bronchus or trachea with the objective of dramatically improving the treatment paradigm for those patients.

Since inception, the Company has devoted substantially all of its efforts to business planning, research and development, recruiting management and technical staff, and acquiring operating assets.

The Company changed its name from Harvard Apparatus Regenerative Technology, Inc. to Biostage, Inc. on March 31, 2016. All references to the Company have been changed to Biostage in the accompanying consolidated financial statements and notes thereto.

The Company has one business segment and does not have significant costs or assets outside the United States.

Basis of Presentation

The financial statements reflect the Company's financial position, results of operations and cash flows in conformity with generally accepted accounting principles in the United States ("GAAP").

2. Summary of Significant Accounting Policies

(a) Principles of Consolidation

The consolidated financial statements include the accounts of Biostage and its three wholly-owned subsidiaries, Harvard Apparatus Regenerative Technology GmbH (Germany), Harvard Apparatus Regenerative Technology AB (Sweden) and Biostage Limited (UK). All intercompany balances and transactions have been eliminated in consolidation.

(b) Use of Estimates

The process of preparing financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the amounts reported in the financial statements and accompanying notes. Such estimates include, but are not limited to, stock-based compensation, valuation of warrant liability, accruals, depreciation and income taxes. Actual results could differ from those estimates and changes in estimates may occur.

(c) Inventories

The Company values its inventories at the lower of the actual cost to purchase (first-in, first-out method) and/or manufacture the inventories or the current estimated market value of the inventories. The Company regularly reviews inventory quantities on hand and records a provision to write down excess and obsolete inventories to its estimated net realizable value if less than cost, based primarily on its estimated forecast of product demand. Inventories consisted entirely of raw materials at December 31, 2015. There were no inventory amounts at December 31, 2016.

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

2. Summary of Significant Accounting Policies (continued)

(d) Property, Plant and Equipment

Property, plant and equipment are carried at cost and depreciated using the straight-line method over the estimated useful lives of the assets as follows:

Leasehold improvements	Shorter of expected useful life or lease term
Furniture, machinery and equipment, computer equipment and software	3- 7 years

Maintenance and repairs are charged to expense as incurred, while any additions or improvements are capitalized.

(e) Impairment of Long-Lived Assets

Long-lived assets are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of the assets may not be recoverable. An asset, or group of assets, are considered to be impaired when the undiscounted estimated net cash flows expected to be generated by the asset, or group of assets, are less than its carrying amount. The impairment recognized is the amount by which the carrying amount exceeds the fair market value of the impaired asset, or group of assets.

(f) Revenue Recognition

The Company follows the provisions of FASB ASC 605, " *Revenue Recognition* ". The Company recognizes product revenue when persuasive evidence of a sales arrangement exists, the price to the buyer is fixed or determinable, delivery has occurred, and collectability of the sales price is reasonably assured. To date, the Company has recognized revenues only for sales of its research bioreactor systems. Sales of some of the Company's products include additional services such as installation and training. Revenues on these products are recognized when the additional services have been performed. Service agreements on its equipment are typically sold separately from the sale of the equipment.

The Company accounts for shipping and handling fees and costs in accordance with the provisions of FASB ASC 605-45-45, “ *Revenue Recognition - Principal Agent Considerations* ”, which requires all amounts charged to customers for shipping and handling to be classified as revenues. Costs related to shipping and handling are classified as cost of revenues. Provisions for warranties and product returns are estimated and accrued at the time sales are recorded. The Company has no obligations to customers after the date products are shipped or installed, if applicable, other than pursuant to warranty obligations. The Company provides for the estimated amount of future returns upon shipment of products or installation, if applicable, based on historical experience.

(g) Research and Development

Research and development costs are expensed as incurred.

(h) Stock-based Compensation

The Company accounts for stock-based payment awards in accordance with the provisions of FASB ASC 718, “ *Compensation - Stock Compensation* ”, which requires it to recognize compensation expense for all stock-based payment awards made to employees, non-employees, and directors including employee stock options, restricted stock units, and employee stock purchases related to the Employee Stock Purchase Plan (“employee stock purchases”).

FASB ASC 718 requires companies to estimate the fair value of stock-based payment awards, except restricted stock units, on the date of grant using an option-pricing model. The value of the portion of the award that is ultimately expected to vest is recognized as expense over the requisite service periods in its consolidated statements of operations.

We measure share-based awards granted to consultants and non-employees based on the fair value of the award on the date at which the related service is complete. Compensation expense is recognized over the period during which services are rendered by such consultants and non-employees until completed. At the end of each financial reporting period prior to completion of the service, the fair value of these awards is re-measured using the then-current fair value of our ordinary shares and updated assumption inputs in the Black-Scholes option-pricing model

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

2. Summary of Significant Accounting Policies (continued)

Under FASB ASC 718, the Company elected the Black-Scholes option-pricing model for valuation of stock-based payment awards. The determination of fair value of stock-based payment awards on the date of grant using the Black-Scholes option-pricing model is affected by its stock price as well as assumptions regarding a number of and subjective variables. These variables include, but are not limited to its expected stock price volatility over the term of the awards and actual and projected employee stock option exercise behaviors. The Company records stock compensation expense on a straight-line basis over the requisite service period for all awards granted since the adoption of FASB ASC 718. When performance based grants are issued the Company recognizes no expense until achievement of the performance requirement is deemed probable.

Share-based compensation expense is based on awards ultimately expected to vest and has been reduced for annualized estimated forfeitures. Forfeitures were estimated based on historical experience and weighting of various employee classes under the respective Plans at the time of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates.

The fair values of Restricted Stock Units (RSU) are based on the number of shares granted and market price of the stock on the date of grant and are recorded as compensation expense ratably over the applicable service period, which is generally four years. Unvested restricted stock units and vested and unvested stock options are forfeited in the event of termination of employment.

The compensation expense recognized for all equity-based awards is net of estimated forfeitures and is recognized using the straight-line method over the applicable service period, where the minimum amount of expense recorded is at least equal to the percent of an award vested.

(i)Income Taxes

Income taxes are accounted for under the asset and liability method. Deferred tax assets and liabilities are recognized for the future tax consequences attributable to differences between the financial statement carrying amounts of existing assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates expected to be applied to taxable income in the years in which those temporary differences are expected to be recovered or settled. The effect on deferred tax assets and liabilities of a change in tax rates is recognized in income in the period that includes the enactment date.

A valuation allowance is recorded when it is more likely than not that some or all of the deferred tax assets will not be realized. Accordingly, the Company provides a valuation allowance, if necessary, to reduce deferred tax assets to amounts that are expected to be realizable.

Tax positions taken or expected to be taken in the course of preparing our tax returns are required to be evaluated to determine whether the tax positions are “more-likely-than-not” of being sustained by the applicable tax authority. Tax positions not deemed to meet a more-likely-than-not threshold would be recorded as a tax expense in the current year.

(j)Net Loss per Share

Basic net loss per share is computed using the weighted average number of common shares outstanding during the period. Diluted net loss per share is computed using the sum of the weighted average number of common shares outstanding during the period and, if dilutive, the weighted average number of potential shares of common stock, including the assumed exercise of stock options and warrants and unvested restricted stock.

The Company applied the two-class method to calculate basic and diluted net loss per share attributable to common stockholders in 2016, as its warrants to purchase common stock are participating securities.

The two-class method is an earnings allocation formula that treats a participating security as having rights to earnings that otherwise would have been available to common stockholders. However, the two-class method does not impact the net loss per share of common stock as the Company was in a net loss position for the year ended December 31, 2016 and warrant holders do not participate in losses.

Basic and diluted shares outstanding are the same for each period presented as all common stock equivalents would be antidilutive due to the net losses incurred.

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

2. Summary of Significant Accounting Policies (continued)

(k) Foreign Currency Translation

The functional currency of the Company's foreign subsidiaries is their local currency. All assets and liabilities of its foreign subsidiaries are translated at exchange rates in effect at period-end. Income and expenses are translated at rates which approximate those in effect on the transaction dates. The resulting translation adjustment is recorded as a separate component of stockholders' equity in accumulated other comprehensive loss in the consolidated balance sheets. Gains and losses resulting from foreign currency transactions are included in net loss.

(l) Comprehensive Loss

Comprehensive loss is comprised of net loss and other comprehensive loss. The Company follows the provisions of Financial Accounting Standards Board ("FASB") Accounting Standards Codification ("ASC") 220, "Comprehensive Income". FASB ASC 220 requires companies to report all changes in equity during a period, resulting from net income (loss) and transactions from non-owner sources, in a financial statement in the period in which they are recognized. The Company has chosen to disclose comprehensive loss, which encompasses net loss, foreign currency translation adjustments, net of tax, in the consolidated statements of operations and comprehensive loss.

(m) Warrant Accounting

The Company classifies a warrant to purchase shares of its common stock as a liability on its consolidated balance sheets as this warrant is a free-standing financial instrument that may require the Company to transfer consideration upon exercise. Each warrant is initially recorded at fair value on date of grant using the Black-Scholes model and net of issuance costs, and it is subsequently re-measured to fair value at each subsequent balance sheet date. Changes in fair value of the warrant are recognized as a component of other income (expense), net in the consolidated statement of operations and comprehensive loss. The Company will continue to adjust the liability for changes in fair value until the earlier of the exercise or expiration of the warrant.

(n) ***Reclassification***

Sales and marketing expenses of $0.3 million for the year ended December 31, 2015 have been reclassified to selling, general and administrative expenses to conform to the 2016 presentation.

(o)Recently Issued Accounting Pronouncements

In August 2014, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2014-15, " *Disclosure of Uncertainties about an Entity's Ability to Continue as a Going Concern,"* to provide guidance on management's responsibility in evaluating whether there is substantial doubt about a company's ability to continue as a going concern and to provide related footnote disclosures. This update is effective for annual periods ending after December 15, 2016, and interim periods within annual periods beginning after December 15, 2016. Early application is permitted for annual or interim reporting periods for which the financial statements have not previously been issued. The Company has adopted ASU 2014-15 and the adoption did not have a significant impact on the Company's consolidated financial statements or related disclosures.

In February 2016, the FASB, issued ASU, 2016-02- *Leases (Topic 842)*. The ASU requires companies to recognize on the balance sheet the assets and liabilities for the rights and obligations created by leased assets. ASU 2016-02 will be effective for the Company in the first quarter of 2019, with early adoption permitted. The Company is currently evaluating the impact that the adoption of ASU 2016-02 will have on the Company's consolidated financial statements or related disclosures.

In March 2016, the FASB issued ASU 2016-09, *Stock Compensation - Improvements to Employee Share-Based Payment Accounting,* ("ASU 2016-09"), which simplifies several aspects of the accounting for share-based payment transactions, including the income tax consequences, classification of awards as either equity or liabilities, classification on the statement of cash flows and policy elections on the impact for forfeitures. ASU 2016-09 is effective for fiscal years beginning after December 15, 2017 and interim periods within annual periods beginning after December 15, 2018. The Company has not adopted ASU 2016-09 and does not expect the adoption to have a significant impact on the Company's consolidated financial statements or related disclosures.

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

2. Summary of Significant Accounting Policies (continued)

In August 2016, the FASB issued ASU No. 2016-15, Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments (FASB ASU 2016-15). This amendment addresses eight classification issues related to the statement of cash flows. For public business entities, the amendments in FASB ASU 2016-15 are effective for public business entities for annual and interim periods in fiscal years beginning after December 15, 2017. Early adoption is permitted, including adoption in an interim period. The Company has not yet selected a transition method and is evaluating the effect the updated standard will have on its consolidated financial statements and related disclosures.

In November 2016, the FASB issued ASU 2016-18 *Statement of Cash Flows*, which requires that amounts generally described as restricted cash and restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. ASU 2016-18 is effective for fiscal years beginning after December 15, 2018 and should be applied using a retrospective transition method to each period presented. Early adoption is permitted. The Company is in the process of evaluating the impact of ASU 2016-17 on its financial statements.

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

3. Concentration of Credit Risk

Sales to Harvard Bioscience, the Company’s distributor of research bioreactor systems, accounted for 100% of the revenues and receivables for all periods presented.

4. Liquidity

The Company has incurred substantial operating losses since its inception, and as of December 31, 2016 has an accumulated deficit of approximately $36.3 million. The Company expects to continue to incur operating losses and negative cash flows from operations in 2017 and in future years. On February 10, 2017, we completed a public offering with gross proceeds of $8.0 million, or approximately $6.8 million net of issuance costs (see note 14). Management believes that the Company's cash as of March 14, 2017 will be sufficient to meet the Company's obligations through the third quarter of 2017. Therefore, these conditions raise substantial doubt about the Company's ability to continue as a going concern.

The Company will need to raise additional funds in future periods to fund its operations. In the event the Company does not raise additional capital from outside sources in the near future, it may be forced to curtail or cease its operations. Cash requirements and cash resource needs will vary significantly depending upon the timing and the financial and other resource needs that will be required to complete ongoing development and pre-clinical and clinical testing of products as well as regulatory efforts and collaborative arrangements necessary for the Company's products that are currently under development. The Company will seek to raise necessary funds through a combination of publicly or private equity offerings, debt financings, other financing mechanisms, or strategic collaborations and licensing arrangements. The Company may not be able to obtain additional financing on terms favorable to us, if at all.

The Company's operations will be adversely affected if it is unable to raise or obtain needed funding and may materially affect the Company's ability to continue as a going concern. The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern and therefore, the financial statements do not include any adjustments to reflect the possible future effects on the recoverability and classification of assets or the amount and classifications of liabilities that may result from the outcome of this uncertainty.

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

5. Fair Value Measurements

Fair value is defined as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date.

As discussed in Note 11, on May 19, 2016, the Company closed on the Purchase Agreement for the sale by the Company of shares of the Company's common stock and the issuance of warrants to purchase 1,418,440 shares of common stock at an exercise price of $1.7625 per warrant. Additionally, the Company issued the placement agent warrants to purchase 141,844 shares of Common Stock at an exercise price of $1.7625 per warrant. The warrants were initially exercisable commencing November 19, 2016 through their expiration date of May 19, 2021. The liability associated with those warrants was initially recorded at fair value in the Company's consolidated balance sheet upon issuance, and subsequently re-measured each fiscal quarter. The changes in the fair value between issuance and December 31, 2016 were recorded as a component of other income (expense), net in the consolidated statement of operations and comprehensive loss.

The Company utilizes a valuation hierarchy for disclosure of the inputs to the valuations used to measure fair value. This hierarchy prioritizes the inputs into three broad levels as follows. Level 1 inputs are quoted prices (unadjusted) in active markets for identical assets or liabilities. Level 2 inputs are quoted prices for similar assets and liabilities in active markets or inputs that are observable for the asset or liability, either directly or indirectly through market corroboration, for substantially the full term of the financial instrument. Level 3 inputs are unobservable inputs based on the Company's own assumptions used to measure assets and liabilities at fair value. A financial asset or liability's classification within the hierarchy is determined based on the lowest level input that is significant to the fair value measurement.

The Company had no assets or liabilities classified as Level 1 or Level 2. The Company has concluded that the warrants issued in connection with the Purchase Agreement, meet the definition of a liability under *ASC 480 Distinguishing liabilities From Equity* and has classified the liability as Level 3.

The Company has measured the liability at inception and re-measured the liability at December 31, 2016 at its estimated fair value, using the Black-Scholes option pricing model with the following assumptions:

	May 19, 2016		December 31, 2016	
Risk-free interest rate	1.38	%	1.93	%
Expected volatility	73.7	%	72.7	%
Expected term	5.5 years		4.9	
Expected dividend yield	0.0	%	0.0	%

The following fair value hierarchy table presents information about the Company's financial assets and liabilities measured at fair value on a recurring basis as of December 31, 2016:

	Fair Value Measurement as of December 31, 2016 (In thousands)			
	Level 1	Level 2	Level 3	Total
Warrant liability	$ -	$ -	$ 605	$ 605
Total	$ -	$ -	$ 605	$ 605

The following table presents a reconciliation of the Company's liabilities measured at fair value on a recurring basis using significant unobservable inputs (Level 3) for the year ended December 31, 2016:

	Warrant Liability (in thousands)
Balance at December 31, 2015	$ -
Issuance of warrants	1,281
Change in fair value upon re-measurement	(676)
Balance at December 31, 2016	$ 605

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

5. Fair Value Measurements (continued)

During the year ended December 31, 2015, the Company had no assets or liabilities requiring fair value measurements. There were no transfers between Level 1 and Level 2 in either of the years ended December 31, 2016 and 2015.

6. Related Party Transactions

On October 31, 2013, Harvard Bioscience, Inc. (“Harvard Bioscience”) contributed its regenerative medicine business assets, plus $15 million of cash, into Biostage (the “Separation”). On November 1, 2013, the spin-off of the Company from Harvard Bioscience was completed. On that date, the Company became an independent company that operates the regenerative medicine business previously owned by Harvard Bioscience. The spin-off was completed through the distribution to Harvard Bioscience stockholders of all the shares of common stock of Biostage (the “Distribution”).

In connection with the Separation, the Company entered into a series of agreements with Harvard Bioscience. These agreements include: (i) a Separation and Distribution Agreement to effect the separation and spin-off distribution and provide other agreements to govern the Company’s relationship with Harvard Bioscience after the spin-off; (ii) an Intellectual Property Matters Agreement, which governs various intellectual property related arrangements between the Company and Harvard Bioscience, including the separation of intellectual property rights between the Company and Harvard Bioscience, as well as certain related cross-licenses between the two companies; (iii) a Product Distribution Agreement, which provided that each company be the exclusive distributor for the other party for products such other party develops for sale in the markets served by the other; (iv) a Tax Sharing Agreement, which governs the Company’s and Harvard Bioscience’s respective rights, responsibilities and obligations with respect to tax liabilities and benefits, tax attributes, the preparation and filing of tax returns, the control of audits and other tax proceedings and other matters regarding taxes for periods before, during and after the spin-off; and (v) a Transition Services Agreement, which ended in 2014.

At the time of the Separation, the Company entered into a 10-year product distribution agreement with Harvard Bioscience under which each company will become the exclusive distributor for the other party for products such other party develops for sale in the markets served by the other. In addition, Harvard Bioscience has agreed that except for certain existing activities of its German subsidiary, to the extent that any Harvard Bioscience businesses desires to resell or distribute any bioreactor that is then manufactured by the Company, the Company will be the exclusive manufacturer of such bioreactors and Harvard Bioscience will purchase such bioreactors from the Company. Since inception of the Company, sales to Harvard Bioscience accounted for 100% of the Company's revenues and receivables.

From inception through April 17, 2015, Harvard Bioscience was considered to be a related party to the Company because David Green, the Company's former Chairman and CEO, was also a director of Harvard Bioscience. After Mr. Green's April 17, 2015 resignation as Chairman and CEO of the Company, Harvard Bioscience is no longer considered a related party. Mr. Green's service on the Company's Board of Directors ended on May 26, 2016 but Mr. Green remains a member of the Board of Directors of Harvard Bioscience. Related party rent expenses with Harvard Bioscience for the period of January 1, 2015 through December 31, 2015, were $51,000.

During the year ended December 31, 2015, the Company recognized $165,000 in recruiting expense related to professional search fees paid to RobinsonButler, an executive recruiting consultancy firm where Thomas Robinson, a Member of the Company's Board of Directors, is a partner. RobinsonButler was retained by the Company's Board of Directors to complete the search for the Company's Chief Executive Officer.

There were no related party transactions for the year ended December 31, 2016.

7. Property, Plant and Equipment, Net

Property, plant and equipment, net consist of the following:

	December 31,	
	2016	2015
	(in thousands)	
Leasehold improvements	$467	$451
Furniture, machinery and equipment	1,563	1,292
Computer equipment and software	447	406
Construction in progress	108	-
	2,585	2,149
Less: accumulated depreciation	(1,520)	(1,075)
Property, plant and equipment, net	$1,065	$1,074

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

8. Commitments and Contingent Liabilities

Lease Arrangement

In October 2013, the Company entered into a sublease with Harvard Bioscience effective November 1, 2013 for its headquarters, offices, manufacturing, and research and development facilities located in Holliston, Massachusetts. The operating lease was non-cancelable for an initial eighteen month period. The sublease automatically extends for additional successive twelve month periods if neither party provides notice of termination 180 days in advance through May 31, 2017. Total rent expense was $0.1 million and $0.1 million for the years ended December 31, 2016 and 2015, respectively. Future minimum lease payments for operating leases with initial or remaining terms in excess of one year at December 31, 2016 amounts to $43 thousand in 2017.

Other

From time to time, the Company may be involved in various claims and legal proceedings arising in the ordinary course of business. The Company is not currently a party to any such significant claims or proceedings.

9. Income Taxes

Income taxes for the years ended December 31, 2016 and 2015 differed from the amount computed by applying the U.S. federal income tax rate of 34% to pre-tax loss as a result of the following:

	Years ended December 31,	
	2016	2015
	(in thousands)	

Computed "expected" income tax benefit	$ (3,937)	$ (3,979)
Increase (decrease) in income taxes resulting from:		
Foreign tax rate and regulation differential	1	17
State income tax benefit, net of federal income tax benefit	(694)	(703)
Non-deductible stock-based compensation expense	(185)	68
Tax credits	(400)	(200)
Change in valuation allowance allocated to income tax expense	5,215	4,797
Total income taxes	$ -	$ -

The Company has incurred pre-tax losses for the years ended December 31, 2016 and 2015:

	Years ended December 31,	
	2016	2015
	(in thousands)	
Domestic	$ (11,569)	$ (11,601)
Foreign	(10)	(103)
Total	$ (11,579)	$ (11,704)

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

9. Income Taxes (continued)

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

	Years ended December 31,	
	2016	2015
	(in thousands)	
Deferred tax assets:		
Operating loss and credit carryforwards	$ 7,207	$ 4,459
Capitalized research and development	5,282	2,941
Stock-based compensation	2,683	2,457
Accrued expenses	(95)	17
Property, plant and equipment	63	51
Total deferred tax assets	15,140	9,925
Less: valuation allowance	(15,140)	(9,925)
Deferred tax assets, net	$ -	$ -

The amounts recorded as deferred tax assets as of December 31, 2016 and 2015 represent the amount of tax benefits of existing deductible temporary differences or carryforwards that are more likely than not to be realized through the generation of sufficient future taxable income within the carryforward period. Significant management judgment is required in determining any valuation allowance recorded against deferred tax assets and liabilities. Due to the operating results, the Company's cumulative loss position and uncertainty surrounding its forecasts, the Company concluded that a full valuation allowance was needed to offset its deferred tax assets at each period end. As previously mentioned, all deferred tax assets prior to the Separation remained with Harvard Bioscience, Inc. The Company has determined that any uncertain tax positions would have no material impact on the consolidated financial statements of the Company.

Under the provisions of the Internal Revenue Code, the net operating loss and tax credit carryforwards are subject to review and possible adjustment by the Internal Revenue Service and state tax authorities. Net operating loss and tax credit carryforwards may become subject to an annual limitation in the event of certain cumulative changes in the ownership interest of significant shareholders over a three-year period in excess of 50 percent, as defined under Sections 382 and 383 of the Internal Revenue Code, respectively, as well as similar state provisions. This could limit the amount of tax attributes that can be utilized annually to offset future taxable income or tax liabilities. The amount of the annual limitation is determined based on the value of the Company immediately prior to the ownership change. Subsequent ownership changes may further affect the limitation in future years. In each year ended December 31, 2015 and 2016, the Company completed two equity financings transactions which may have resulted in a change in control as defined by Sections 382 and 383 of the Internal Revenue Code, or could result in a change in control in the future. The Company has not, as of yet, conducted a study to determine if any such changes have occurred that could limit its ability to use the net operating loss and credit carryforwards.

For all years through December 31, 2016, the Company generated research credits but has not conducted a study to document the qualified activities. This study may result in an adjustment to the Company's research and development credit carryforwards; however, until a study is completed and any adjustment is known, no amounts are being presented as an uncertain tax position. A full valuation allowance has been provided against the Company's research and development credits and, if an adjustment is required, this adjustment would be offset by an adjustment to the deferred tax asset established for the research and development credit carryforwards and the valuation allowance.

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

9. Income Taxes (continued)

Tax free distribution

Harvard Bioscience received a Supplemental Ruling to the Private Letter Ruling dated March 22, 2013 from the IRS to the effect that, among other things, the Separation and related distribution of all of the shares of the Company's common stock by Harvard Bioscience will qualify as a transaction that is tax-free for U.S. federal income tax purposes under Section 355 and 368(a)(1)(D) of the Internal Revenue Code continuing in effect. The private letter and supplemental rulings and the tax opinion that Harvard Bioscience received from legal counsel to Harvard Bioscience rely on certain representations, assumptions and undertakings, including those relating to the past and future conduct of the Biostage business, and neither the private letter and supplemental rulings nor the opinion would be valid if such representations, assumptions and undertakings were incorrect. Moreover, the private letter and supplemental rulings do not address all the issues that are relevant to determining whether the Distribution will qualify for tax-free treatment. Notwithstanding the private letter and supplemental rulings and opinion, the IRS could determine the Distribution should be treated as a taxable transaction for U.S. federal income tax purposes if, among other reasons, it determines any of the representations, assumptions or undertakings that were included in the request for the private letter and supplemental rulings are false or have been violated or if it disagrees with the conclusions in the opinion that are not covered by the IRS ruling.

To preserve the tax-free treatment to Harvard Bioscience of the Separation and Distribution, for the two-year period following the Distribution, which such period ended November 1, 2015, the Company was limited, except in specified circumstances, from entering into certain transactions pursuant to which all or a portion of the Company's stock would be acquired, whether by merger or otherwise; issuing equity securities beyond certain thresholds; repurchasing the Company's common stock; and ceasing to actively conduct the Company's regenerative medicine business. In addition, at all times, including during and following such two-year period, the Company may not take or fail to take any other action that prevents the Separation and Distribution and related transactions from being tax-free.

If the Distribution fails to qualify for tax-free treatment, in general, Harvard Bioscience would be subject to tax as if it had sold the Company's common stock in a taxable sale for its fair market value, and Harvard Bioscience stockholders who receive shares of Biostage common stock in the Distribution would be subject to tax as if they had received a taxable Distribution equal to the fair market value of such shares.

Under the tax sharing agreement between Harvard Bioscience and the Company, the Company would generally be required to indemnify Harvard Bioscience against any tax resulting from the Distribution to the extent that such tax resulted from (i) an acquisition of all or a portion of our stock or assets, whether by merger or otherwise, (ii) other actions or failures to act by the Company, or (iii) any of the Company's representations or undertakings being incorrect or violated. The Company's indemnification obligations to Harvard Bioscience and its subsidiaries, officers and directors are not limited by any maximum amount. If the Company is required to indemnify Harvard Bioscience or such other persons under the circumstances set forth in the tax sharing agreement, the Company may be subject to substantial liabilities.

10. Employee Benefit Plans

The Company sponsors a retirement plan for their U.S. employees, which includes employee savings plans established under Section 401(k) of the U.S. Internal Revenue Code (the "401(k) Plan"). The 401(k) Plan cover substantially all full-time employees who meet certain eligibility requirements. Contributions to the retirement plan are at the discretion of management. For the years ended December 31, 2016 and 2015, the Company's matching contributions to the plan were approximately $94 thousand and $93 thousand, respectively.

11. Capital Stock

Preferred Stock

Undesignated Preferred Stock

The Company's Board of Directors has the authority to issue up to 2,000,000 undesignated shares of $0.01 par value preferred stock along with the right to determine the price, privileges and other terms of the shares. The Board of Directors may exercise this authority without any further approval of stockholders.

Series B Convertible Preferred Stock

On February 18, 2015 the Company closed an underwritten public offering of 2,070,000 registered shares of its common stock, at a price to the public of $1.75 per share, and 695,857 registered shares of its Series B Convertible Preferred Stock ("Series B") at a price to the public of $8.75 per share. The Company received proceeds from the sale of Series B of $5.4 million, net of $0.7 million of underwriting and offering costs. At the option of the investor, each share of Series B was convertible into five shares of common stock of Biostage, and voted with the common stock on all matters on an as-converted basis, each subject to certain beneficial ownership caps. The Series B had no preference to the common shares in respect of dividends, voting, liquidation or otherwise. During the year ended December 31, 2015, all 695,857 shares of issued Series B had converted into 3,479,285 shares of common stock. As of December 31, 2016 and 2015, no shares of Series B convertible preferred stock were outstanding.

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

Common Stock

Shareholders Rights Plan

The Company has adopted a Shareholder Rights Plan and declared a dividend distribution of one preferred stock purchase right for each outstanding share of the Company's common stock. Initially, these rights will not be exercisable and will trade with the shares of the Company's common stock. Under the Shareholder Rights Plan, the rights generally will become exercisable if a person becomes an "acquiring person" by acquiring 20% or more of the common stock of the Company or if a person commences a tender offer that could result in that person owning 20% or more of the common stock of the Company. If a person becomes an acquiring person, each holder of a right (other than the acquiring person) would be entitled to purchase, at the then-current exercise price, such number of shares of preferred stock which are equivalent to shares of the Company's common stock having a value of twice the exercise price of the right. If the Company is acquired in a merger or other business combination transaction after any such event, each holder of a right would then be entitled to purchase, at the then-current exercise price, shares of the acquiring company's common stock having a value of twice the exercise price of the right.

May 2016 Offering

On May 19, 2016, the Company closed on a Securities Purchase Agreement (the "Purchase Agreement") for the sale of 2,836,880 shares of common stock at a purchase price of $1.7625 per share and the issuance of warrants to purchase 1,418,440 shares of common stock at an exercise price of $1.7625 per warrant for gross proceeds of $5.0 million. Additionally, the Company issued to the placement agent warrants to purchase 141,844 shares of common stock to the placement agent for the offering at an exercise price of $1.7625 per warrant. The warrants were exercisable commencing November 19, 2016 through their expiration date of May 19, 2021. As of December 31, 2016 all 1,560,284 warrants remain outstanding.

February 2015 Shares Offering

On February, 18, 2015, in the registered public offering of the Series B Convertible Preferred Stock described above, the Company also issued 2,070,000 shares of its common stock, at a price to the public of $1.75 per share. The Company received proceeds from the sale of common stock of $3.2 million, net of $0.4 million of offering costs.

Aspire Purchase Agreement

On December 15, 2015, the Company entered into a common stock purchase agreement (the "Purchase Agreement"), with Aspire Capital Fund, LLC, ("Aspire Capital"), under which Aspire Capital is committed to purchase up to an aggregate of $15.0 million of our common stock over the approximately 30-month term of the Purchase Agreement. In consideration for entering into the Purchase Agreement, concurrently with the execution of the Purchase Agreement, Biostage issued Aspire Capital 150,000 shares of its common stock as a commitment fee (the "Commitment Shares").

Upon execution of the Purchase Agreement, the Company sold to Aspire Capital 500,000 shares of common stock at $2.00 per share (the "Initial Purchase Shares"). Net proceeds from the sale of shares to Aspire as of December 31, 2015 were approximately $0.9 million.

Pursuant to the Purchase Agreement and Registration Rights Agreement, the Company registered 2,688,933 shares of its common stock. This includes the Commitment Shares and the Initial Purchase Shares issued to Aspire Capital and 2,038,933 shares of common stock which Biostage may issue to Aspire Capital in the future.

Under the approximately 30-month term of the Purchase Agreement, on any trading day on which the closing sale price of its common stock exceeded $0.50, the Company had the right, in its sole discretion, to direct Aspire Capital to purchase up to 150,000 shares of the Company's common stock per trading day, at a per share price (the "Purchase Price") calculated by reference to the prevailing market price of its common stock. In addition, the Company had the right, from time to time in its sole discretion, to sell Aspire Capital an amount of stock equal to up to 30% of the aggregate shares of the Company's common stock traded on the Nasdaq Capital Market on the next trading day, subject to a maximum number of shares which Biostage may determine and a minimum trading price.

The purchase price per purchase share pursuant to such purchase notices are calculated by reference to the prevailing market price of Biostage's common stock.

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

11. Capital Stock (continued)

On May 12, 2016, the Company issued 150,000 shares of common stock under the common stock purchase agreement with Aspire Capital Fund, LLC (the "Aspire Purchase Agreement") in exchange for gross proceeds of $371,000, or $349,000 net of issuance costs. On May 17, 2016, the Company terminated the Aspire Purchase without any penalty or cost.

Employee Stock Purchase Plan

In 2013, the Company approved the 2013 Equity Incentive Plan (the "2013 Plan"). Under this plan, participating employees can authorize the Company to withhold a portion of their base pay during consecutive six-month payment periods for the purchase of shares of the Company's common stock. At the conclusion of the period, participating employees can purchase shares of the Company's common stock at 85% of the lower of the fair market value of the Company's common stock at the beginning or end of the period. Shares are issued under the plan for the six-month periods ending June 30 and December 31. Under this plan, 150,000 shares of common stock are authorized for issuance of which 58,638 and 38,872 were issued as of December 31, 2016 and 2015 respectively.

12. Share-Based Compensation

Biostage 2013 Equity Incentive Plan

The Company maintains the 2013 Equity Incentive Plan (the "Plan") for the benefit of certain of its officers, employees, non-employee directors, and other key persons (including consultants and advisory board members). All options and awards granted under the Plan consist of the Company's shares of common stock. The Company's policy is to issue stock available from its registered but unissued stock pool through its transfer agent to satisfy stock option exercises and vesting of the restricted stock units. The vesting period for awards is generally four years and the contractual life is ten years. In March 2016, the Company's board of directors approved an increase of 2.0 million shares from

3,960,000 shares of its common stock authorized to be issued under the Plan to 5,960,000.

The Company also issued equity awards under the Plan at the time of the Distribution to all holders of Harvard Bioscience equity awards as part of an adjustment (the "Adjustment") to prevent a loss of value due to the Distribution. Compensation expense recognized under the Plan relates to service provided by employees, board members and a non-employee of the Company. There was no required compensation associated with the Adjustment awards to employees who remained at Harvard Bioscience. During 2016 and 2015 no options or restricted stock units were granted to Harvard Bioscience employees or directors, and the Company does not anticipate issuing any to Harvard Bioscience employees in the future.

Stock option activity under the Plan for the year ended December 31, 2016 was as follows:

	Amount	Weighted-average exercise price	**Weighted-average contractual life**
Outstanding at December 31, 2015	3,253,118	$ 3.29	8.31
Granted	1,000,000	1.54	
Canceled	(375,437)	3.68	
Outstanding at December 31, 2016	3,877,681	$ 2.81	8.37
Options exercisable	1,746,144	$ 3.70	7.96
Options vested and expected to vest	3,635,649	$ 2.88	

BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

12. Share-Based Compensation (continued)

Aggregate intrinsic value for outstanding options and exercisable options for the year ended December 31, 2016 was $15 thousand and $14 thousand, respectively based on the Company's closing stock price of $0.89 per share as of December 31, 2016. As of December 31, 2016, the total compensation costs related to unvested awards not yet recognized is $1.7 million and the weighted average period over which it is expected to be recognized is 2.29 years.

The Company uses the Black- Scholes model to value its stock options. The weighted average assumptions for valuing those options granted were as follows:

	Year Ended December 31,			
	2016		2015	
Volatility	74.18	%	76.84	%
Risk-free interest rate	1.53	%	1.73	%
Expected holding period	6.14 years		6.09 years	
Dividend yield	-	%	-	%

The Company used the volatility of comparable companies, as management did not believe that our trading history was of a sufficient duration to provide an accurate estimate of expected volatility.

The risk-free interest rate assumption is based upon observed Treasury bill interest rates (risk-free) appropriate for the expected term of the Company's employee stock options. The simplified method of estimating expected term was used.

The Company also estimated the fair value of non-employee share options using the Black-Scholes option pricing model reflecting the same assumptions as applied to employee and director options in each of the reporting periods, other than the expected life, which is assumed to be the remaining contractual life of the options.

The weighted average estimated fair value of stock options granted using the Black-Scholes model was $1.01 per share during 2016 and $1.41 per share during 2015.

In April 2015, David Green resigned as Chief Executive Officer, President and Chairman of the Board of Directors of Biostage. Mr. Green remained a member of the Board of Directors until May of 2016. Under the terms of Mr. Green's employment agreement, certain equity awards immediately vested upon his resignation. This acceleration of vesting resulted in a non-cash share based compensation expense of approximately $1.0 million being recognized in the year ended December 31, 2015. Mr. Green's employment agreement also entitled him to a cash payment equal to two years of his salary, or approximately $1.0 million. The Company and Mr. Green agreed to a modification to accelerate vesting on certain options and extend the exercise period on those and other vested stock options in lieu of the cash payment. These modifications resulted in an additional non-cash share-based compensation expense related to Mr. Green of approximately $1.1 million being recorded in the year ended December 31, 2015. Of the modified options, 387,000 were vested prior to resignation, 290,252 were vested as a result of the resignation and as such required no modification to vesting, and 48,375 options were modified to vest immediately. All 725,627 modified options retained their original exercise price of $4.29 and had the time period during which they could be exercised extended from 30 days from resignation to 7 years. Mr. Green's options to buy shares of Harvard Bioscience stock issued under the Harvard Bioscience Plan remained outstanding and the Company continues to record the associated expense on them through May 2016 while Mr. Green provided service to Biostage in his position on the Board of Directors.

The Company also has issued restricted stock units under the Plan. Unvested shares of restricted common stock may not be sold or transferred by the holder. The following table summarizes the Company's unvested restricted stock unit activity under the Plan for the year ended December 31, 2016:

	Amount	Grant date fair value
Unvested at December 31, 2015	1,105	$ 6.00
Vested	(837)	6.00
Unvested at December 31, 2016	268	$ 6.00

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BIOSTAGE, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

12. Share-Based Compensation (continued)

Harvard Bioscience Stock Option and Incentive Plan

Harvard Bioscience maintains the Third Amended and Restated 2000 Stock Option and Incentive Plan (as amended, the “Harvard Bioscience Plan”) for the benefit of certain of its officers, directors and employees. All awards that were granted to the Company’s employees and directors were at exercise prices equal to or greater than fair market value of the Harvard Bioscience’s common stock on the date of grant. In connection with the Separation, those employees of Harvard Bioscience who became employees of Biostage were allowed to continue vesting in their stock-based awards of stock options and restricted stock units granted under the Harvard Bioscience Plan. Accordingly, the Company recognizes compensation expense as services are provided by those employees. The vesting period is generally four years and the contractual life is ten years.

As of December 31, 2016, there was no unrecognized compensation costs as all awards were fully vested.

Share-based compensation expense related to both the Plan and the Harvard Bioscience Plan for the years ended December 31, 2016 and 2015 was allocated as follows:

	Years Ended December 31,	
	2016	2015
	(in thousands)	
Research and development	$ 668	$ 724
Selling, general and administrative	659	3,242
Total stock-based compensation	$ 1,327	$ 3,966

The Company did not capitalize any share-based compensation.

13. Quarterly Financial Information (Unaudited)

Statement of Operations Data:

2016	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Fiscal Year
	(in thousands, except per share data)				
Revenues	$-	$28	$26	$28	$82
Cost of product revenues	-	44	13	59	116
Gross (loss) profit	-	(16)	13	(31)	(34)
Total operating expenses	2,472	2,906	3,162	3,552	12,092
Operating loss	(2,472)	(2,922)	(3,149)	(3,583)	(12,126)
Other income, net	-	210	96	241	547
Loss before income taxes	(2,472)	(2,712)	(3,053)	(3,342)	(11,579)
Income taxes	-	-	-	-	-
Net loss	$(2,472)	$(2,712)	$(3,053)	$(3,342)	$(11,579)
Basic and diluted net loss per share	$(0.18)	$(0.17)	$(0.18)	$(0.20)	$(0.73)

2015	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Fiscal Year
	(in thousands, except per share data)				
Revenues	$-	$73	$37	$8	$118
Cost of product revenues	-	37	18	84	139
Gross profit (loss)	-	36	19	(76)	(21)
Total Operating expenses	2,620	4,535	2,311	2,214	11,680
Operating loss	(2,620)	(4,499)	(2,292)	(2,290)	(11,701)
Other expense, net	(3)	-	-	-	(3)
Loss before income taxes	(2,623)	(4,499)	(2,292)	(2,290)	(11,704)
Income taxes	-	-	-	-	-
Net loss	$(2,623)	$(4,499)	$(2,292)	$(2,290)	$(11,704)
Basic and diluted net loss per share	$(0.30)	$(0.44)	$(0.19)	$(0.17)	$(1.05)

14. Subsequent events

On February 10, 2017, the Company completed a public offering of 20,000,000 shares of common stock at a purchase price of $0.40 per share and the issuance of warrants to purchase 20,000,000 shares of common stock at an exercise price of $0.40 per warrant for gross proceeds of $8.0 million or approximately $6.8 million net of issuance costs. Additionally, the Company issued to the placement agent warrants to purchase 1,000,000 shares of common stock for the offering at an exercise price of $0.50 per warrant.

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.

	Biostage, Inc.
Date: March 16, 2017	By: /s/ James McGorry James McGorry Chief Executive 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:

Signature	Title	Date
/s/ James McGorry **James McGorry**	Chief Executive Officer and Director (Principal Executive Officer)	March 16, 2017
/s/ Thomas McNaughton **Thomas McNaughton**	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	March 16, 2017
/s/ John Canepa **John Canepa**	Director	March 16, 2017
/s/ John Kennedy **John Kennedy**	Director	March 16, 2017
/s/ Blaine McKee **Blaine McKee**	Director	March 16, 2017
/s/ Thomas Robinson **Thomas Robinson**	Director	March 16, 2017

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EXHIBIT INDEX

The following exhibits are filed as part of this Annual Report on Form 10-K. Where such filing is made by incorporation by reference to a previously filed document, such document is identified.

Exhibit Number	Description of Exhibit
2.1§ (3)	Separation and Distribution Agreement between Biostage, Inc. and Harvard Bioscience, Inc. dated as of October 31, 2013.
3.1 (1)	Amended and Restated Certificate of Incorporation of Biostage, Inc.
3.2 (14)	Certificate of Amendment to Amended and Restated Certificate of Incorporation of Biostage, Inc. dated March 30, 2016.
3.3*	Certificate of Amendment to Amended and Restated Certificate of Incorporation of Biostage, Inc. dated May 26, 2016.
3.4 (14)	Amended and Restated By-laws of the Biostage, Inc.
3.5 (2)	Certificate of Designations, Preferences and Rights of Series A Preferred Stock of Biostage, Inc. classifying and designating the Series A Junior Participating Cumulative Preferred Stock.
3.6 (6)	Certificate of Designation of Series B Convertible Preferred Stock of Biostage, Inc. classifying and designating the Series B Convertible Preferred Stock.
4.1 (1)	Specimen Stock Certificate evidencing shares of common stock
4.2 (7)	Specimen Series B Convertible Preferred Stock Certificate
4.3 (2)	Shareholder Rights Agreement, dated as of October 31, 2013, between Biostage, Inc. and Registrar and Transfer Company, as Rights Agent.
4.4 (6)	Amendment to Shareholder Rights Agreement, dated as of February 12, 2015 between Biostage, Inc. and Computershare Trust Company, N.A., as successor to Registrar and Transfer Company.
4.5 (10)	Registration Rights Agreement, dated December 15, 2015, between Biostage, Inc. and Aspire Capital Fund, LLC.
10.1 (3)	Intellectual Property Matters Agreement between Biostage, Inc. and Harvard Bioscience, Inc. dated as of October 31, 2013.
10.2 (3)	Product Distribution Agreement between Biostage, Inc. and Harvard Bioscience, Inc. dated as of October 31, 2013.
10.3 (3)	Tax Sharing Agreement between Biostage, Inc. and Harvard Bioscience, Inc. dated as of October 31, 2013.
10.4 (3)	Transition Services Agreement between Biostage, Inc. and Harvard Bioscience, Inc. dated as of October 31, 2013.
10.5 (3)	Sublease by and between Biostage, Inc. and Harvard Bioscience, Inc. dated as of October 31, 2013.
10.6# (3)	Employment Agreement between Biostage, Inc. and David Green dated as of October 31, 2013.
10.7# (3)	Employment Agreement between Biostage, Inc. and Thomas McNaughton dated as of October 31, 2013.
10.8 (1)	Form of Indemnification Agreement for Officers and Directors.
10.9 (1)	2013 Equity Incentive Plan.
10.10 (1)	Employee Stock Purchase Plan.

10.11 [1]	Form of Incentive Stock Option Agreement.
10.12 [1]	Form of Non-Qualified Stock Option Agreement for executive officers.
10.13 [1]	Form of Non-Qualified Stock Option Agreement for directors.
10.14 [1]	Form of Deferred Stock Award Agreement.
10.15# [1]	Director Compensation Arrangements.
10.16† [4]	Sublicense Agreement dated as of December 7, 2012 between Biostage, Inc. and Harvard Bioscience, Inc., and related Trademark License Agreement, dated December 19, 2002, by and between Harvard Bioscience, Inc. and President and Fellows of Harvard College.
10.17 [1]	Patent Rights Assignment dated December 21, 2012 between Biostage, Inc. and Dr. Paolo Macchiarini.
10.18 [1]	Sponsored Research Agreement dated August 5, 2009 by and among Biostage, Inc. (as assignee of Harvard Bioscience, Inc.), Sara Mantero, Maria Adelaide Asnaghi, and Department of Bioengineering of the Politecnico Di Milano

10.19†[5]	Exclusive License Agreement dated August 6, 2009 by and between Biostage, Inc. (as assignee of Harvard Bioscience, Inc.) and Sara Mantero and Maria Adelaide Asnaghi.
10.20 [1]	Novel Surgery Agreement dated as of May 21, 2012 between Biostage, Inc. and State Budget Institution of Public Health Department Regional Clinical Hospital #1 and Vladimir Alekseevich Porhanov.
10.21 [1]	Novel Surgery Agreement dated as of May 24, 2012 between Biostage, Inc. and OSF Healthcare System, owner and operator of Saint Francis Medical Center and Children's Hospital of Illinois, and Mark Holterman, M.D.
10.22 [1]	Amendment to Novel Surgery Agreement dated as of April 5, 2013 between Biostage, Inc. and OSF Healthcare System, owner and operator of Saint Francis Medical Center and Children's Hospital of Illinois, and Mark Holterman, M.D.
10.23 [1]	Amendment to Novel Surgery Agreement dated as of June 26, 2013 between Biostage, Inc. and State Budget Institution of Public Health Department Regional Clinical Hospital #1 and Igor S. Polyakov.
10.24 [6]	Underwriting Agreement dated as of February 12, 2015, between Biostage, Inc. and National Securities Corporation as representative of the underwriters named therein.
10.25# [8]	Employment Agreement between Biostage, Inc. and James McGorry dated as of June 23, 2015.
10.26# [9]	Employment Agreement between Biostage, Inc. and Saverio LaFrancesca, M.D. dated as of April 8, 2014.
10.27 [10]	Common Stock Purchase Agreement, dated December 15, 2015 between Biostage, Inc. and Aspire Capital Fund, LLC.
10.28# [11]	Amendment to Employment Agreement, dated as of March 24, 2016, between Biostage, Inc. and Saverio LaFrancesca, M.D.
10.29 [12]	Securities Purchase Agreement, dated May 15, 2016, between Biostage, Inc. and the purchasers named therein.
10.30 [12]	Form of Common Stock Purchase Warrant
10.31 [12]	Engagement Letter, dated as of May 15, 2016, between Biostage, Inc. and Rodman & Renshaw, a unit of H.C. Wainwright & Co., LLC.
10.32 [13]	Amendment to Engagement Letter, dated as of May 18, 2016, between Biostage, Inc. and Rodman & Renshaw, a unit of H.C. Wainwright & Co., LLC.
10.33*#	Letter Agreement, dated as of December 17, 2016, between Biostage, Inc. and Saverio LaFrancesca, M.D.
10.34 [15]	Form of Securities Purchase Agreement.
10.35 [15]	Form of Common Stock Purchase Warrant.
10.36 [15]	Form of Placement Agent Common Stock Purchase Warrant.
10.37 [15]	Engagement Agreement, dated as of January 3, 2017, between Biostage, Inc. and Rodman & Renshaw, a unit of H.C. Wainwright.
10.38 [15]	Amendment to Engagement Agreement, dated February 7, 2017, between Biostage, Inc. and Rodman & Renshaw, a unit of H.C. Wainwright.
21.1*	Subsidiaries of Biostage, Inc.
23.1*	Consent of KPMG LLP.
31.1*	Certification of Chief Financial Officer of Biostage., pursuant to Rules 13a-15(e) and 15d-15(e), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
31.2*	Certification of Chief Executive Officer of Biostage, Inc., pursuant to Rules 13a-15(e) and 15d-15(e), as adopted pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.
32.1**	Certification of Chief Financial Officer of Biostage, Inc., pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.
32.2**	Certification of Chief Executive Officer of Biostage, Inc., pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.

101.INS*	XBRL Instance Document.
101.SCH*	XBRL Taxonomy Extension Schema 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.

(1) Previously filed as an exhibit to the Company's Registration Statement on Form 10-12B (filed July 31, 2013) and incorporated by reference thereto.

(2) Previously filed as an exhibit to the Company's Registration Statement on Form 8-A (filed October 31, 2013) and incorporated by reference thereto.

(3) Previously filed as an exhibit to the Company's Current Report on Form 8-K (filed on November 6, 2013) and incorporated by reference thereto.

(4) Previously filed as an exhibit to the Company's Amendment No. 2 to Form S-1 Registration Statement (filed on February 15, 2013) and incorporated by reference thereto.

(5) Previously filed as Exhibit 10.19 to the Registrant's Amendment No. 2 to Form S-1 Registration Statement (filed on February 15, 2013) and incorporated by reference thereto.

(6) Previously filed as an exhibit to the Company's Current Report on Form 8-K (filed on February 12, 2015) and incorporated by reference thereto.

(7) Previously filed as an exhibit to the Company's Annual Report on Form 10-K (filed on March 27, 2015) and incorporated by reference thereto.

(8) Previously filed as an exhibit to the Company's Current Report on Form 8-K (filed on July 6, 2015) and incorporated by reference thereto.

(9) Previously filed as an exhibit to the Company's Quarterly Report on Form 10-Q (filed on August 14, 2015) and incorporated by reference thereto.

(10) Previously filed as an exhibit to the Company's Current Report on Form 8-K (filed on December 15, 2015) and incorporated by reference thereto.

(11) Previously filed as an exhibit to the Company's Current Report on Form 8-K (filed on March 24, 2016) and incorporated by reference thereto.

(12) Previously filed as an exhibit to the Company's Current Report on Form 8-K (filed on May 16, 2016) and incorporated by reference thereto.

(13) Previously filed as an exhibit to the Company's Current Report on Form 8-K (filed on May 20, 2016) and incorporated by reference thereto.

(14) Previously filed as an exhibit to the Company's Current Report on Form 8-K (filed on March 31, 2016) and incorporated by reference thereto.

(15) Previously filed as an exhibit to the Company's Amendment No. 2 to Form S-1 Registration Statement (filed on February 7, 2017) and incorporated by reference thereto.

* Filed herewith.

** This certification shall not be deemed "filed" for purposes of Section 18 of the Securities Exchange Act of 1934, or otherwise subject to the liability of that section, nor shall it be deemed to be incorporated by reference into any filing under the Securities Act of 1933 or the Securities Exchange Act of 1934.

Management contract or compensatory plan or arrangement.

§ The schedules and exhibits to the Separation and Distribution Agreement have been omitted. A copy of any omitted schedule or exhibit will be furnished to the SEC supplementally upon request. The Company will furnish to stockholders a copy of any exhibit without charge upon written request.

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Confidential portions of this exhibit have been redacted and filed separately with the SEC pursuant to a confidential treatment request in accordance with Rule 24b-2 of the Securities Exchange Act of 1934, as amended.

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