UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

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

For the fiscal year ended 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 001-36646

Asterias Biotherapeutics, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**46-1047971**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

6300 Dumbarton Circle

Fremont, California 94555

(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code

(510) 456-3800

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

Title of each class	Name of exchange on which registered
Series A Common Stock, $0.0001 par value per share	NYSE MKT
Warrants to purchase Series A Common Stock, expiring September 29, 2017	NYSE MKT

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

None

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

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

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

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

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

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

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

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

The aggregate market value of shares of voting and non-voting common equity held by non-affiliates of the registrant on June 30, 2016 (based on the closing price for shares of the registrant's common stock as reported on the NYSE MKT under the symbol AST on that date) was approximately $57,203,887.

As of March 21, 2017, there were 48,952,645 outstanding shares of Series A Common Stock, par value $0.0001 per share.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of registrant's proxy statement for its 2017 annual meeting of shareholders filed within 120 days after the end of the registrant's fiscal year, are incorporated by reference to this annual report on Form 10-K

Asterias Biotherapeutics, Inc.
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PART I

Certain statements contained herein are forward-looking statements, within the meaning of the Private Securities Litigation Reform Act of 1995, including, but not limited to, statements pertaining to future financial and/or operating results, future growth in research, technology, clinical development, and potential opportunities for Asterias, along with other statements about the future expectations, beliefs, goals, plans, or prospects expressed by management. Any statements that are not historical fact (including, but not limited to statements that contain words such as "will," "believes," "plans," "anticipates," "expects," "estimates") should also be considered to be forward-looking statements. Forward-looking statements involve risks and uncertainties, including, without limitation, risks inherent in the development and/or commercialization of potential products, uncertainty in the results of clinical trials or regulatory approvals, need and ability to obtain future capital, and maintenance of intellectual property rights. Actual results may differ materially from the results anticipated in these forward-looking statements and as such should be evaluated together with the many uncertainties that affect the businesses of Asterias, particularly those mentioned in the cautionary statements found in Asterias' filings with the Securities and Exchange Commission. Asterias disclaims any intent or obligation to update these forward-looking statements.

References to "Asterias," the "Company," "we," "our" or "us" means Asterias Biotherapeutics, Inc.

The description or discussion, in this Form 10-K, of any contract or agreement is a summary only and is qualified in all respects by reference to the full text of the applicable contract or agreement.

Item 1. Business

Overview

We are a clinical-stage biotechnology company pioneering the development of novel therapies in the emerging fields of cell therapy and regenerative medicine. We are focused on developing therapies to treat conditions with high unmet medical needs, with an initial focus on the therapeutic areas of neurology and oncology. We have two core technology platforms. The first is a type of stem cell capable of becoming all of the cell types in the human body, a property called pluripotency. The second is a type of cell called "dendritic cells" used to teach cancer patients' immune systems to attack their tumors. We currently have three clinical stage programs based on these platforms:

- AST-OPC1 is a therapy derived from pluripotent stem cells that is currently in a Phase 1/2a clinical trial for spinal cord injuries ("SCI");
- AST-VAC1 is a patient-specific cancer immunotherapy focusing on Acute Myeloid Leukemia ("AML"); and
- AST-VAC2 is a non-patient-specific cancer immunotherapy for which the initiation of a Phase 1/2a clinical trial in non-small cell lung cancer is planned for 2017.

We believe that our technology platforms have the potential for application in additional indications, such as advanced multiple sclerosis and white matter stroke for AST-OPC1 and other additional cancer indications for our cancer immunotherapy platform. We were incorporated in Delaware on September 24, 2012. In October of 2013, we acquired intellectual property, cell lines, preclinical and clinical data, and other assets from Geron Corporation ("Geron") and also acquired rights to use certain human embryonic stem ("hES") cell lines and to practice certain patents from BioTime, Inc. ("BioTime"). Our two core technology platforms are supported by assets acquired from these transactions. Prior to May 13, 2016, we were a majority-owned and controlled subsidiary of BioTime.

We use hES cells as the starting cells for the production of AST-OPC1 and AST-VAC2. hES cells have almost unlimited capacity to expand and can be differentiated into the various cell types of the body. For AST-OPC1, Asterias has developed methods to produce a oligodendrocyte progenitor cells to help repair spinal cord injury lesions. Likewise for AST-VAC2 , the hES cells are induced to become dendritic cells which educate the immune system to target telomerase, a protein produced by most tumor cells.

Asterias uses hES cells rather than adult stem cells as the starting material for the production of its cell therapies for many reasons. Compared to adult stem cells, hES cells have a higher capacity to proliferate and therefore their production can be scaled to meet therapeutic demands. This feature is in contrast with adult stem cells which have a much lower propensity to proliferate and, for many therapeutics applications, require repeated harvesting. In addition, adult stem cells produce a much narrower range of cells types than hES cells. We believe hES cells have more therapeutic applications because they can form most cell types of the body.

Products Under Development

AST-OPC1

About AST-OPC1

Our AST-OPC1 product candidate is comprised of oligodendrocyte progenitor cells, which are cells that become oligodendrocytes after injection, derived from a current Good Manufacturing Practice ("cGMP") master cell bank of undifferentiated hES cells that has been fully qualified for human use. These cells, which are stored frozen until ready for use, are produced under cGMP conditions and screened for adventitious agents.

Oligodendrocytes are nature's neural insulating cells. Like the insulation covering an electrical wire, oligodendrocytes enable the conduction of electrical impulses along nerve fibers throughout the central and peripheral nervous system. They are also known to promote neural growth, as well as induce blood vessel formation around nerve axons. AST-OPC1 cells have been shown to reproduce the natural functions of oligodendrocytes in animals.

AST-OPC1 cells have been shown to reproduce the natural functions of oligodendrocytes in animals, including three potentially reparative functions that address the complex pathologies observed at the injury site of a spinal cord injury. These activities of AST-OPC1 include production of neurotrophic factors, stimulation of vascularization, and induction of remyelination of denuded axons, all of which are critical for survival, regrowth and conduction of nerve impulses through axons at the injury site. In preclinical animal testing, AST-OPC1 administration led to remyelination of axons, improved hindlimb and forelimb locomotor function, dramatic reductions in injury-related cavitation and significant preservation of myelinated axons traversing the injury site.

Clinical Studies

Phase 1 Study in Patients with Thoracic Spinal Cord Injuries

In a Phase 1 clinical trial, five patients with neurologically complete, thoracic spinal cord injury were administered two million AST-OPC1 cells at the spinal cord injury site 7-14 days post-injury. They also received low levels of immunosuppression for the next 60 days. Delivery of AST-OPC1 was successful in all five subjects with no serious adverse events associated with the administration of the cells, with AST-OPC1 itself, or the immunosuppressive regimen. All five patients have completed at least five years of follow-up visits. No evidence of rejection of AST-OPC1 was observed in detailed immune response monitoring of all patients. In four of the five patients, serial MRI scans indicated that reduced spinal cord cavitation may have occurred. There have been five minor adverse events possibly related to AST-OPC1 such as transient fever and nerve pain. There have been no unexpected neurological changes to date. Based on the results of this study, we received clearance from FDA to test AST-OPC1 in patients with complete cervical spine injuries, which represents the first targeted population for registration trials.

Phase 1/2a Study in Patients with Complete Cervical Spinal Cord Injuries

Based on the results of the completed Phase 1 trial of AST-OPC1 in thoracic spinal cord injury, we obtained permission from the FDA in August 2014 to initiate a Phase 1/2a dose escalation trial in patients with neurologically complete (AIS-A) cervical spinal cord injuries (the "SciStar study"). In May 2016, we were granted FDA clearance to expand patient enrollment to include two additional cohorts of patients with motor complete, sensory incomplete (AIS-B) cervical spinal cord injury. The SCiStar Phase 1/2a study is an open-label, single-arm trial testing three sequential escalating doses of AST-OPC1 administered at up to 20 million AST-OPC1 cells in as many as 35 patients with sub-acute, C-5 to C-7, motor complete (AIS-A or AIS-B) cervical spinal cord injuries (SCI). These individuals have essentially lost all movement below their injury site and experience severe paralysis of the upper and lower limbs. AIS-A patients have lost all motor and sensory function below their injury site, while AIS-B patients have lost all motor function but may retain some minimal sensory function below their injury site. AST-OPC1 is being administered 14 to 30 days post-injury. Patients will be followed by neurological exams and imaging procedures to assess the safety and activity of the product.

We completed enrollment in the first (AIS-A; two million cells) dose cohort in August 2015, and of the second (AIS-A; 10 million cells) dose cohort in August 2016. We are currently open for concurrent enrollment in the third (AIS-A; 20 million cells) and fourth (AIS-B; 10 million cells) cohorts. No serious adverse events related to AST-OPC1 or the administration procedure have been observed to date. In September 2016, we announced early but promising interim efficacy data for the AIS-A patients that had been dosed with 10 million AST-OPC1 cells and completed their 3 month follow-up.

In January 2017, we announced additional interim efficacy data from the study on the patients who were enrolled and dosed in the AIS-A 10 million-cell cohort, which we later updated in March 2017, which included the following observations:

Improvements in Motor Function

- Upper Extremity Motor Score - For the six patients dosed in the AIS-A 10 million-cell cohort, all six patients (100%) saw their early improvements in upper extremity motor score ("UEMS") at 3 months maintained or further increased through their most recent data point (6 months or 9 months, depending on the most recent data available for each patient).

- Motor Level Improvement - For the six patients, all six patients (100%) have achieved at least a one motor level improvement (using the ISNCSCI scale) over baseline on at least one side, and two of six (33%) have achieved two motor levels over baseline on at least one side, with one of these patients achieving a two motor level improvement on both sides.

- Matched Historical Control Data - We and other key experts in the spinal cord injury field have developed a set of matched historical control data for both UEMS and Motor Level Improvement to document expected spontaneous recovery in untreated patients for comparison to results seen in patients treated with AST-OPC1. The key results from this analysis showed a meaningful difference in the motor function recovery seen to date in the six patients treated with the 10 million cell dose of AST-OPC1.

Safety

- The trial results from the SciStar Phase 1/2a study continued to reveal a positive safety profile for AST-OPC1. There have been no serious adverse events related to AST-OPC1 and data from the study indicate that AST-OPC1 can be safely administered to patients in the subacute period after severe cervical spinal cord injury.

We expect to complete enrollment of the SciStar Phase 1/2a study in the second half of 2017, with interim updates occurring at various times in 2017 and 2018.

Manufacturing and Process Development

We have sufficient existing clinical-grade lots of AST-OPC1 for the ongoing SciStar Phase 1/2a trial, and are in the process of establishing additional cGMP master and working cell banks of undifferentiated hES cells of the H1 cell line for future clinical development and commercial use. We are also updating the manufacturing and clinical delivery process so AST-OPC1 can be manufactured on a larger scale to support any future registration trial and commercial needs.

In January 2017, we announced that we had completed the validation and start-up of our internal cGMP manufacturing facility at our headquarters in Fremont, CA. This facility will be used to produce additional cGMP cell banks and AST-OPC1 to supply any future registration trial and commercial drug supply.

Market Conditions

It is estimated that there are approximately 17,000 new spinal cord injuries annually in the United States (NSCISC SCI Facts and Figures at a Glance (2016)). Individuals with neurologically complete cervical spinal cord injury are part of an orphan population with a severe unmet medical need due to the loss of function in all four limbs. These individuals frequently require significant assistance for their care and activities of daily living. A published study estimated the lifetime costs of care for a person who suffers a cervical SCI at age 25 to up to $5.4 million (Y. C. Cao and M. J. DeVivo (2011)).

There are currently no drugs approved by the United States Food and Drug Administration (“FDA”) specifically for the treatment of spinal cord injury, although methylprednisolone, a corticosteroid generally used as an anti-inflammatory drug, is sometimes prescribed on an off-label basis to reduce acute inflammation in the injured spinal cord immediately after injury. It is believed that in order to effect substantial benefit in treating this complex injury, multiple mechanisms of action are required, such as re-myelination of the demyelinated axons, generation of new blood vessels to repair the ischemic damage from injury, and the presence of biologics that cause neuro-sprouting or new nerve growth to enable the severed axons to repair. In pre-clinical studies to date, AST-OPC1 cells have been shown to exhibit all three effects.

In February 2016, we announced that the FDA had granted our application for Orphan Drug Designation of AST-OPC1 for the treatment of acute spinal cord injury.

CIRM Grant and other Funding

In October 2014, we signed a Notice of Grant Award (“NGA”) with the California Institute for Regenerative Medicine (“CIRM”), effective October 1, 2014, with respect to a $14.3 million grant award for clinical development of AST-OPC1. The NGA, as amended, includes the terms under which CIRM will release grant funds to us. Under the NGA, as amended on March 2, 2016, CIRM will disburse the grant funds to us based on our attainment of certain progress milestones.

To date, we have received $12.8 million under the NGA. There can be no assurance we will receive the remaining $1.5 million. We will need to raise additional capital in order to conduct subsequent clinical trials and to complete product development work necessary for larger trials and commercialization. We intend to continue to seek additional non-dilutive funding through CIRM and other sources to develop this product.

AST-VAC1 and AST-VAC2

We are developing two experimental immunotherapeutic programs, AST-VAC1 and AST-VAC2, each designed to attack cancer cells by targeting the cancer cell's expression of telomerase. Both product candidates use an immune cell type known as dendritic cells to stimulate immune responses to telomerase. Dendritic cells are antigen processing and presenting cells which are potent initiators of a cellular and antibody-mediated immune response. Telomerase is a ubiquitous cancer antigen, expressed at high levels in nearly all human cancers, but at very low levels or not at all in normal human cells. The premise underlying these vaccines is to "teach" the patient's own immune system to attack cancer cells while sparing other normal healthy cells.

AST-VAC1

About AST-VAC1

AST-VAC1 is an autologous product candidate, or a product that is derived from cells that come from the treated patient. AST-VAC1 consists of mature antigen-presenting dendritic cells pulsed with RNA for the protein component of human telomerase ("hTERT") and a portion of a lysosomal targeting signal ("LAMP"). LAMP directs the telomerase RNA to the lysosome, the subcellular organelle that directs the RNA to a particular part of the cell membrane. AST-VAC1 is injected into the patient's skin, with the objective of having the dendritic cells travel to the lymph nodes and instruct cytotoxic T-cells to kill cancerous tumor cells that express telomerase on their surface.

Process Development

On August 3, 2016, we entered into a Development and Manufacturing Services Agreement (the "Services Agreement") with Cognate BioServices, Inc. ("Cognate"), a fully-integrated contract bioservices organization providing development and cGMP manufacturing services to companies and institutions engaged in the development of cell-based products. Under the Services Agreement, Cognate is performing process development studies in support of our clinical and commercial development activities of AST-VAC1 and production and manufacturing services of AST-VAC1 under cGMP.

Clinical Studies

A Phase 2 clinical trial of AST-VAC1 was conducted in patients with AML in complete clinical remission. This trial completed patient enrollment in December 2009. Thirty-three patients with AML entered the study in their first or second complete remission. Prior to or shortly after completing consolidation chemotherapy, patients underwent leukapheresis, a process of collecting white blood cells directly from the patient. AST-VAC1 was produced at a centralized manufacturing facility from the patient-specific white blood cells. Patient blood cells were differentiated to dendritic cells in culture, modified to express telomerase linked to the LAMP targeting signal, aliquoted and cryopreserved. AST-VAC1 was released for patient dosing contingent on several product specifications that included identity of mature dendritic cells, confirmation of telomerase expression, number of viable cells per dose after thawing, and product sterility.

Twenty-one patients received AST-VAC1 in the study, including 19 in clinical remission and two in early relapse. AST-VAC1 was found to have a favorable safety and tolerability profile in this study over multiple vaccinations, with up to 32 serial vaccinations administered (median = 17). Idiopathic thrombocytopenic purpura (bleeding into the skin caused by low platelets in blood) (grade 3-4) was reported in one patient. Other toxicities (grade 1-2) included rash or headache. Patient immune response to telomerase after vaccination with AST-VAC1 was evaluated using a test called the enzyme-linked immunosorbent spot ("ELISPOT") assay to measure the presence of activated T-cells specific to hTERT. Positive immune responses were detected in 55% of patients.

We subsequently performed follow-up data collection on the 19 patients treated in complete remission to determine the long-term effects of the AST-VAC1 administration on remission duration and disease-free survival. Eleven of 19 patients (58%) remained in complete remission at a median follow-up of 52 months. These results compare to historical data suggesting that between 20-40% of patients would be expected to be relapse free at 3-4 years. Additionally, of the 7 patients in the higher risk over 60 year old group, 4 (57%) remained relapse free at a median follow up of 54 months. Historically, relapse free survival rates in this population have been 10-20% at 3-4 years.

The next major step in clinical development for AST-VAC1 would be to conduct a confirmatory Phase 2b study in higher risk patients over 60 years old. We will need to receive additional sufficient funding prior to the commencement of such a study.

AST-VAC2

About AST-VAC2

AST-VAC2 is an allogeneic, or non-patient specific, cancer vaccine candidate designed to stimulate patient immune responses to telomerase. AST-VAC2 is produced from hES cells and can be modified with any antigen. We believe that the use of hES, as opposed to collecting and using the patient's own blood, as the starting material for AST-VAC2 provides a scalable system for the production of a large number of vaccine doses in a single lot. Allogeneic vaccine production has the potential to have lower manufacturing costs, provide "off-the-shelf" availability which provides broader access to patients, and ensure greater product consistency. In addition, we believe that this approach has the potential to stimulate a more robust immune response through an adjuvant effect of the immune mismatch between the genetic makeup of AST-VAC2 and patients receiving the therapy. Further, we believe AST-VAC2 may be synergistic with immune checkpoint inhibitors currently in development for many cancer indications. This is because immune checkpoint inhibitors function by relieving suppressive mechanisms exerted on T-cells by the tumor, whereas AST-VAC2 is designed to specifically instruct the T-cells to kill cancerous tumor cells that express telomerase on their surface.

Clinical Trial and Option Agreement with Cancer Research UK

During September 2014, we entered into a Clinical Trial and Option Agreement with Cancer Research UK ("CRUK") and Cancer Research Technology Limited, a wholly-owned subsidiary of CRUK (the "CRUK Agreement"). Under the CRUK Agreement, CRUK has agreed to fund Phase 1/2a clinical development of our AST-VAC2 product candidate loaded with the same LAMP-telomerase construct we have used in AST-VAC1. Under the terms of the CRUK Agreement, we are responsible, at our own cost, for completing process development and manufacturing scale-up of the AST-VAC2 manufacturing process and transferring the resulting cGMP-compatible process to CRUK. CRUK is responsible, at its own cost, for manufacturing clinical grade AST-VAC2 and for carrying out the Phase 1/2a clinical trial of AST-VAC2.

In January 2016, we announced that we had completed the technology transfer of the AST-VAC2 manufacturing process to CRUK. The next step is for CRUK's Centre for Drug Development ("CDD") to submit a Clinical Trial Authorization application to the UK regulatory authorities for the Phase 1/2 clinical trial in non-small cell lung cancer (NSCLC), which will be sponsored, managed and funded by CDD. The study will administer AST-VAC2 to treat up to 24 patients with either advanced or resected NSCLC to examine the safety, immunogenicity and activity of AST-VAC2 and position the immunotherapy for future clinical trials. We expect patient enrollment for this study to begin in the second half of 2017. We will continue to serve in a collaborative and advisory role with CRUK throughout this process.

Upon completion of the Phase 1/2a study, we will have an exclusive first option to acquire the data generated in the trial. If we exercise that option we will be obligated to make payments upon the execution of the license agreement and, upon the achievement of various milestones, as well as make royalty payments on sales of products. In connection with the CRUK Agreement, we sublicensed to CRUK for use in the clinical trials and product manufacturing process certain patents that have been licensed or sublicensed to us by third parties. We would also be obligated to make payments to those licensors and sublicensors upon the achievement of various milestones, and then royalties on sales of products if AST-VAC2 is successfully developed and commercialized.

Services Agreement with Cell Therapy Catapult Services Limited

In October 2015, we entered into a Services Agreement (the "Services Agreement") with Cell Therapy Catapult Services Limited ("Catapult"), a research organization specializing in the development of technologies which speed the growth of the cell and gene therapy industry. Under the Services Agreement, Catapult will license to us, certain background intellectual property and will develop a scalable manufacturing and differentiation process for our AST-VAC2 development program. In consideration for the license and Catapult's performance of services, we agreed to make aggregate payments of up to GBP £4,350,000 over the five years after the execution of the Services Agreement. At our option of, up to GBP £3,600,000 of such payments may be settled in shares of our Series A Common Stock. As of December 31, 2016, we have incurred costs since commencement of the Services Agreement of GBP £1,700,000 under the Services Agreement.

The Services Agreement may be terminated by us for any reason upon 60 days prior written notice. Catapult may terminate the Services Agreement on 60 days prior written notice if it encounters a technical issue that would prevent it from completing the services at all or without obtaining additional resources or if the estimated time and cost of completing the services will be exceeded and both parties do not reach agreement on revised time and cost terms. Catapult may terminate the Services Agreement in the event we fail to pay any amount due under the Services Agreement 30 days after Catapult makes a written demand for payment. In addition, a non-breaching party may terminate the Services Agreement upon the occurrence a material breach that is not remedied within 30 days. Either party may terminate the Services Agreement in the event the other party becomes subject to insolvency, receivership, liquidation, or a similar event.

Intellectual Property

The patent portfolio that we acquired pursuant to the Asset Contribution Agreement with Geron, dated January 4, 2013 (the "Asset Contribution Agreement"), includes approximately 400 patents and patent applications previously owned by or licensed to Geron that are directed to pluripotent stem ("pPS") cell-, hES cell-, and dendritic cell-based product opportunities. The portfolio encompasses a number of cell types that can be made from pPS cells, including hepatocytes (liver cells), cardiomyocytes (heart muscle cells), neural cells (nerve cells, including dopaminergic neurons and oligodendrocytes), chondrocytes (cartilage cells), pancreatic islet β cells, osteoblasts (bone cells), hematopoietic cells (blood-forming cells) and dendritic cells. Also included in the patent portfolio are technologies for growing hES cells or other pPS cells without the need for cell feeder layers or conditioned media, and novel synthetic growth surfaces. With respect to patents that are not specific to our core programs (AST-OPC1, AST-VAC1 and AST-VAC2), we are evaluating licensing and other partnering opportunities, including assignment of certain patents to third parties, on an ongoing basis. We are also evaluating maintenance costs relative to remaining patent term and may choose to no longer maintain certain of these patents. Collectively, these activities may result in a decrease in the total number of patents owned or controlled by us that are not specific to our core programs.

In February 2016, we executed a broad, non-exclusive cross-license (the "Cross-License") with BioTime and its subsidiary ES Cell International Pte Ltd. ("ESI"). Under the Cross-License, we have received: (i) non-exclusive worldwide rights in a range of therapeutic fields to over 30 patents and applications relating to hES cells, and (ii) non-exclusive worldwide rights for therapeutic applications of pluripotent stem cell-derived neural and cardiac cells to over 20 patents and applications relating to hydrogel formulations and, BioTime and ESI received a broad, non-exclusive license to certain of our patents and related patent rights for all purposes in the BioTime Licensed Field during the term of the Cross-License. The BioTime Licensed Field includes all fields of use except any and all applications (a) to treat disorders of the nervous system, and (b) utilizing the immune system to prevent, treat, or cure cancer, and (c) involving the use of cells comprising, derived from, or manufactured using, hES cells or human induced pluripotent stem cells for in vitro assay applications, including but not limited to drug discovery and development, drug monitoring, drug toxicology testing, and consumer products testing.

The patent positions for our two most advanced programs are summarized below.

Neural cells: This portfolio is related to our AST-OPC1 product. The patent rights relevant to neural cells, such as oligodendrocyte progenitor cells, include various patent families acquired by us from Geron that are directed to the differentiation of pluripotent stem cells (including hES cells) into various neural cell types, as well as various culture and purification methods. These patent rights also include rights licensed from the Regents of the University of California. There are issued patents in the United States, Australia, Canada, United Kingdom, Japan, China, Hong Kong, India, Korea, Singapore and Israel. Additionally, there are four new pending patent families owned by us directed to improved methods of producing oligodendrocyte progenitor cells, oligodendrocyte progenitor cell compositions and methods of treatment of spinal cord injury and stroke using oligodendrocyte progenitor cells. The stroke family is jointly owned with the Regents of the University of California; the other three new pending families are solely owned by us. The expiration dates of the patents acquired from Geron and in-licensed from the Regents of the University of California will be within 2021 to 2030. The potential expiry dates of the four new patent families with applications pending will be within 2036 to 2037. The commercial success of our AST-OPC1 product depends, in part, upon our ability to exclude competition in this product with this patent portfolio, regulatory exclusivity, or a combination of both.

Dendritic cells: This portfolio is related to our AST-VAC1 and AST-VAC2 products. The patent rights relevant to dendritic cells include various patent families acquired by us from Geron that are directed to the differentiation of pluripotent stem cells (including hES cells) into immature and mature dendritic cells, as well as various culture methods. The dendritic cell patent portfolio also includes several patent families in-licensed from third parties. There are issued patents in the United States, Australia, Europe, Canada, China, Hong Kong, Japan, Korea, Israel and Singapore. The expiration dates of these patents range from 2019 to 2029. The commercial success of our AST-VAC1 and AST-VAC2 products depends, in part, upon our ability to exclude competition in these products with this patent portfolio, regulatory exclusivity, or a combination of both.

In addition, we have patent protection in the Unites States and various other jurisdictions for producing cardiomyocytes, pancreatic islet cells, hepatocytes, chondrocytes, hematopoietic cells, and osteoblasts. The expiration dates of these patents range from 2020 to 2032. Should a competitor not be able to market a product covered by these patents or if we cannot license these patents before their expiration, the benefits for procurement and maintenance of these rights would not be fully realized and the associated costs would not be fully reimbursed.

Licensed Stem Cell Technology and Stem Cell Product Development Agreements

Telomerase Sublicense

We received the Telomerase Sublicense from Geron in connection with our acquisition of Geron's stem cell assets. The Telomerase Sublicense grants us an exclusive sublicense under certain patents owned by the University of Colorado's University License Equity Holdings, Inc. relating to telomerase and entitles us to use the technology covered by the patents in the development of AST-VAC1 and AST-VAC2 as immunological treatments for cancer. Under the Telomerase Sublicense, we paid Geron a one-time upfront license fee of $65,000, and we will pay Geron an annual license maintenance fee of $10,000 due on each anniversary of the effective date of the agreement, and a 1% royalty on sales of any products that we may develop and commercialize that are covered by the sublicensed patents. The Telomerase Sublicense will expire concurrently with the expiration of Geron's license. That license will terminate in November 2018 when the last of the licensed patents expires. The Telomerase Sublicense may also be terminated by us by giving Geron 90 days written notice, by us or by Geron if the other party breaches its obligations under the sublicense agreement and fails to cure their breach within the prescribed time period, or by us or by Geron upon the filing or institution of bankruptcy, reorganization, liquidation or receivership proceedings, or upon an assignment of a substantial portion of the assets for the benefit of creditors by the other party.

We are obligated to indemnify Geron, Geron's licensor, and certain other parties for certain liabilities, including those for personal injury, product liability, or property damage relating to or arising from the manufacture, use, promotion or sale of a product, or the use by any person of a product made, created, sold or otherwise transferred by us or our sublicensees that is covered by the patents sublicensed under this agreement.

License Agreement with University of California

Geron assigned to us its Exclusive License Agreement with The Regents of the University of California for patents covering a method for directing the differentiation of pPS cells to glial-restricted progenitor cells that generate pure populations of oligodendrocytes for remyelination and treatment of spinal cord injury. Pursuant to this agreement, we have an exclusive worldwide license under such patents, including the right to grant sublicenses, to create products for biological research, drug screening, and human therapy using the licensed patents.

Under the license agreement, we will be obligated to pay the university a royalty of 1% from sales of products that are covered by the licensed patent rights, and a minimum annual royalty of $5,000 starting in the year in which the first sale of a product covered by any licensed patent rights occurs, and continuing for the life of the applicable patent right under the agreement. The royalty payments due are subject to reduction, but not by more than 50%, to the extent of any payments that we may be obligated to pay to a third party for the use of patents or other intellectual property licensed from the third party in order to make, have made, use, sell, or import products or otherwise exercise our rights under the Exclusive License Agreement. We will be obligated to pay the university 7.5% of any proceeds, excluding debt financing and equity investments, and certain reimbursements, that we receive from sublicensees, other than our affiliates and joint ventures relating to the development, manufacture, purchase, and sale of products, processes, and services covered by the licensed patent.

The license agreement will terminate on the expiration of the last-to-expire of the university's issued licensed patents. If no further patents covered by the license agreement are issued, the license agreement would terminate in 2024. The university may terminate the agreement in the event of our breach of the agreement. We can terminate the agreement upon 60 days' notice.

World-Wide Non Exclusive WARF License

On October 7, 2013, we entered into a Non-Exclusive License Agreement with the Wisconsin Alumni Research Foundation ("WARF") under which we were granted a worldwide non-exclusive license under certain WARF patents and WARF-owned embryonic stem cell lines to develop and commercialize therapeutic, diagnostic and research products. The licensed patents include patents covering methods for growth and differentiation of primate embryonic stem cells. The licensed stem cell lines include the H1, H7, H9, H13 and H14 hES cell lines.

In consideration of the rights licensed to us, we have agreed to pay WARF an upfront license fee and have agreed to additional payments upon the attainment of specified clinical development milestones, royalties on sales of commercialized products, and, subject to certain exclusions, a percentage of any payments that we may receive from any sublicenses that we may grant to use the licensed patents or stem cell lines.

The license agreement will terminate with respect to licensed patents upon the expiration of the last licensed patent to expire. We may terminate the license agreement at any time by giving WARF prior written notice. WARF may terminate the license agreement if payments of earned royalties, once begun, cease for a specified period of time or if we and any third parties collaborating or cooperating with us in the development of products using the licensed patents or stem cell lines fail to spend a specified minimum amount on research and development of products relating to the licensed patents or stem cell lines for a specified period of time.

WARF also has the right to terminate the license agreement if we breach the license agreement or become bankrupt or insolvent or if any of the licensed patents or stem cell lines are offered to creditors.

We will indemnify WARF and certain other designated affiliated entities from liability arising out of or relating to the death or injury of any person or damage to property due to the sale, marketing, use, or manufacture of products that are covered by the licensed patents, or licensed stem cells, or inventions or materials developed or derived from the licensed patents or stem cell lines.

Royalty Agreement with Geron

In connection with our acquisition of Geron's stem cell assets, we entered into a royalty agreement with Geron (the "Royalty Agreement") pursuant to which we agreed to pay Geron a 4% royalty on net sales (as defined in the Royalty Agreement), by us or any of our affiliates or sales agents, of any products that we develop and commercialize that are covered by the patents Geron contributed to us. In the case of sales of such products by a person other than us or one of our affiliates or sales agents, we will be required to pay Geron 50% of all royalties and cash payments received by us or by our affiliate in respect of a product sale. Royalty payments will be subject to proration in the event that a product covered by a patent acquired from Geron is sold in combination with another product that is not covered by a patent acquired from Geron. The Royalty Agreement will terminate at the expiration or termination date of the last issued patent contributed by Geron under the Royalty Agreement. We estimate that the latest patent expiration date will be in 2032.

Protecting our Intellectual Property

We seek to protect our intellectual property ("IP") by, among other methods, filing United States and foreign patent applications related to our patentable IP that we consider important to the development and implementation of our business and strategy. In addition to relying on patents, we rely on trade secrets, know-how, and contractual agreements to protect our IP.

Our success depends, in part, upon our ability to obtain and maintain patent and other intellectual property protection for our product candidates including compositions-of-matter, dosages, and formulations, manufacturing methods, and novel applications, uses and technological innovations related to our product candidates and core technologies. Our business would be negatively impacted if we are not successful in developing additional proprietary technologies that are protected either as trade secrets or by filing additional patent applications.

We cannot ensure that patents will be granted with respect to any of our pending patent applications or with respect to any patent applications that may be filed by us in the future, nor can we ensure that any of our existing or subsequently granted patents will be useful in protecting our drug candidates, technological innovations, and processes. The claims of any patents that are issued may not provide meaningful protection, may not provide a basis for commercially viable products or may not provide us with any competitive advantages. Because of the extensive time required for clinical development and regulatory review of a product candidate, it is possible that any patent related to our product candidates may expire before any of our product candidates can be commercialized, or may remain in force for only a short period of time following commercialization, thereby reducing the advantage afforded by any such patent. In addition, others may independently develop similar or alternative technologies, duplicate any of our technologies and, if patents are licensed or issued to us, design around the patented technologies licensed to or developed by us. Therefore, our competitors may be able to commercialize similar products, or may be able to duplicate our business strategy, without infringing our patents or otherwise using our intellectual property.

The protection afforded by any particular patent depends upon many factors, including the type of patent, scope of coverage encompassed by the granted claims, availability of extensions of patent term and legal interpretation of patent laws in the United States and other countries that could diminish our ability to protect our inventions and to enforce our intellectual property rights. Furthermore, others may have patents that relate to our technology or business that may prevent us from marketing our product candidates unless we are able to obtain a license to those patents. Accordingly, while our ability to maintain and solidify our proprietary position for our products and core technologies will depend, in part, on our success in obtaining and enforcing valid patent claims, we cannot predict with certainty the enforceability of any granted patent claims or of any claims that may be granted from our patent applications.

The biotechnology and pharmaceutical industries are characterized by extensive litigation and other challenges regarding patents and other intellectual property rights that involve complex legal and factual questions making our patent position generally uncertain. Any existing or subsequently granted patents may be challenged, invalidated, found unenforceable, circumvented or infringed. We have been involved in the past in administrative proceedings with respect to our patents and patent applications and may, as a result of our extensive portfolio, be involved in such proceedings in the future. Additionally, in the future, we may claim that a third party infringes our intellectual property or a third party may claim that we infringe its intellectual property. In any of the administrative proceedings or in litigation, we may incur significant expenses, damages, attorneys' fees, costs of proceedings and experts' fees, and management and employees may be required to spend significant time in connection with these actions.

A patent interference proceeding may be instituted with the United States Patent and Trademark Office ("USPTO") when more than one person files a patent application covering the same technology, or if someone wishes to challenge the validity of an issued patent on patents and applications filed before March 16, 2013. At the completion of the interference proceeding, the USPTO will determine which competing applicant is entitled to the patent, or whether an issued patent is valid. Patent interference proceedings are complex, highly contested legal proceedings, and the USPTO's decision is subject to appeal. This means that if an interference proceeding arises with respect to any of our patent applications, we may experience significant expenses and delay in obtaining a patent, and if the outcome of the proceeding is unfavorable to us, the patent could be issued to a competitor rather than to us. For patents and applications filed after March 16, 2013 a derivation proceeding may be initiated where the USPTO may determine if one patent was derived from the work of an inventor on another patent. Inventorship may also be challenged in litigation.

In addition to interference proceedings, the USPTO can reevaluate issued patents at the request of a third party seeking to have the patent invalidated. There are proceedings at the USPTO (*ex parte* reexamination, post grant review, or *inter partes* review proceeding), which allow third parties to challenge the validity of an issued patent where there is a reasonable likelihood of invalidity. As with the USPTO interference proceedings, these USPTO proceedings will be very expensive to contest and can result in the cancelation of a patent. This means that patents owned or licensed by us may be subject to further administrative challenges and may be lost if the outcome of the challenge is unfavorable to us.

There are also challenges to obtaining patents in countries outside of the United States. In particular, under European patent law and the patent laws of certain other countries, oppositions to the issuance of patents may be filed. These foreign proceedings can be very expensive to contest and can result in significant delays in obtaining a patent or can result in a denial of a patent application. Also in Europe and certain other countries, there is uncertainty about the eligibility of hES cell subject matter for a patent. The European Patent Convention prohibits the granting of European patents for inventions that concern "uses of human embryos for industrial or commercial purposes". Following a December 2014 decision at the Court of Justice of the European Union which interpreted parthenogeneticly produced human pluripotent stem cells as patentable subject matter, the European Patent Office now recognizes that human pluripotent stem cells (including hES cells) can be created without a destructive use of human embryos as of June 5, 2003. Consequently, patent applications relating to hES cell subject matter with a filing and priority date after this date are no longer automatically excluded from patentability under Article 53 (a) EPC and Rule 28(c) EPC.

We may benefit from a variety of regulatory frameworks in the United States, Europe, China and other territories that provide periods of non-patent-based exclusivity for qualifying drug products. See "Government Regulation—FDA and Foreign Regulation."

Manufacturing

We currently occupy a 44,000 square foot facility in Fremont, California which includes a cGMP compliant facility. In January 2017, we announced that we had completed the validation and start-up of this facility which we eventually plan to use to manufacture AST-OPC1 to supply any future registration trial and commercial drug production. We will also rely on third party manufacturers to manufacture certain product candidates. For example, CRUK will manufacture clinical grade AST-VAC2 for the Phase 1/2a clinical trial of AST-VAC2 and Cognate has entered into an agreement with us to provide production and manufacturing services of AST-VAC1 in connection with future clinical studies.

Competition

The industry for stem-cell derived therapeutics is characterized by rapidly evolving technology and intense competition. Our competitors include major multinational pharmaceutical companies, specialty biotechnology companies, and chemical and medical products companies operating in the fields of regenerative medicine, cell therapy, tissue engineering, and tissue regeneration. Many of these companies are well-established and possess technical, research and development, financial, and sales and marketing resources significantly greater than ours. In addition, certain smaller biotech companies have formed strategic collaborations, partnerships and other types of joint ventures with larger, well established industry competitors that afford these companies' potential research and development and commercialization advantages. Academic institutions, governmental agencies, and other public and private research organizations are also conducting and financing research activities which may produce products directly competitive to those we are developing.

Some of our competitors may be trying to develop cell-based technologies and products that may compete with our potential products based on efficacy, safety, cost, and intellectual property positions.

We may also face competition from companies that have filed patent applications relating to the growth, differentiation and therapeutic use of stem cells and dendritic cells. We may be required to seek licenses from these competitors in order to commercialize certain of our proposed products, and such licenses may not be granted.

Government Regulation

Government authorities at the federal, state and local level, and in other countries, extensively regulate among other things, the development, testing, manufacture, quality, approval, distribution, labeling, packaging, storage, record keeping, marketing, import/export and promotion of drugs, biologics, and medical devices. Authorities also heavily regulate many of these activities for human cells, tissues and cellular and tissue-based products or HCT/Ps.

FDA and Foreign Regulation

We believe that the FDA will regulate most of our proposed products as biologics. In the United States, the FDA regulates drugs and biologics under the Federal Food, Drug and Cosmetic Act, the Public Health Service Act, and is responsible for implementing regulations. In addition, establishments that manufacture human cells, tissues, and cellular and tissue-based products are subject to additional registration and listing requirements, including current good tissue practice regulations. Many of our proposed products will be reviewed by the FDA staff in its Center for Biologics Evaluation and Research ("CBER") Office of Cellular, Tissue and Gene Therapies.

In the United States, biologic products like ours are subject to rigorous FDA review and approval procedures. After testing in animals to evaluate the potential efficacy and safety of the product candidate, an Investigational New Drug application ("IND") must be submitted to the FDA to obtain authorization for human testing. Extensive clinical testing, which is generally done in three phases, must then be undertaken at one or more hospitals or medical centers to demonstrate optimal use, safety, and efficacy of each product in humans. The FDA closely monitors the progress of each of the three phases of clinical testing and may, at its discretion, re-evaluate, alter, suspend, or terminate the clinical trial based upon the data which have been accumulated to that point and its assessment of the risk/benefit ratio to the intended patient population. All adverse events must be reported to the FDA. Monitoring of all aspects of the study to minimize risks is a continuous process. The time and expense required to perform this clinical testing can far exceed the time and expense of the research and development required to create the product.

In additional to regulating the clinical development of our products, the FDA regulates in the United States other areas involving our product, including:

- *Applications for Marketing Approval*: No action can be taken to market any therapeutic product in the United States until an appropriate application, which in the case of a cell therapy or vaccine product will be a Biologics License Application ("BLA"), has been approved by the FDA. FDA regulations also restrict the export of therapeutic products for clinical use prior to BLA approval. To date, the FDA has not granted marketing approval to any hES-based therapeutic products and it is possible that the FDA or foreign regulatory agencies may subject our product candidates to additional or more stringent review than drugs or biologics derived from other technologies.

- *Combination Products*: If we develop any products that are used with medical devices, they may be considered combination products, which are defined by the FDA to include products comprised of two or more regulated components or parts such as a biologic and a device. The regulatory requirements for a combination product comprised of a biologic administered with a delivery device can be more complex, because in addition to the individual regulatory requirements for each component, additional combination product regulatory requirements may apply.

- *Post-Approval Matters*: Even after initial FDA approval has been obtained, further studies may be required to provide additional data on safety or to gain approval for the use of a product as a treatment for clinical indications other than those initially targeted. Data resulting from these clinical trials may result in expansions or restrictions to the labeled indications for which a product has already been approved.

- *Manufacturing*: The FDA regulates the manufacturing process of pharmaceutical products, and human tissue and cell products, requiring that they be produced in compliance with cGMP.

- *FDA Regulation of Advertising and Product Promotion*: The FDA also regulates the content of advertisements used to market pharmaceutical and biological products. Claims made in advertisements concerning the safety and efficacy of a product, or any advantages of a product over another product, must be supported by clinical data filed as part of a BLA or an amendment to a BLA, and must be consistent with the FDA approved labeling and dosage information for that product.

Sales of pharmaceutical and biological products outside the United States are subject to foreign regulatory requirements that vary widely from country to country. Even if FDA approval has been obtained, approval of a product by comparable regulatory authorities of foreign countries must be obtained prior to the commencement of marketing the product in those countries. The time required to obtain such approval may be longer or shorter than that required for FDA approval.

California State Regulations

The state of California has adopted legislation and regulations that require institutions that conduct stem cell research to notify, and in certain cases obtain approval from, a Stem Cell Research Oversight Committee ("SCRO Committee") before conducting the research. Under certain California regulations, all hES cell lines that will be used in our research must be acceptably derived.

We also comply with certain California regulations that require certain records to be maintained with respect to stem cell research and the materials used.

In compliance with state regulations, we have formed a SCRO Committee which reviews each of Asterias' projects that involve the use of pluripotent stem cells. The committee reviews and confirms that we are using only hES cell lines that have been acceptably derived and that the research conducted using these cells lines is both scientifically and ethically justified. The AST-OPC1 and AST-VAC2 programs have been reviewed by the SCRO Committee and have been deemed to comply with federal and state guidelines. The hES cell lines that we use are all on the National Institutes of Health ("NIH") registry of lines that have been reviewed and meet standards for federal funding grants.

California Proposition 71

During November 2004, California State Proposition 71 ("Prop. 71"), the California Stem Cell Research and Cures Initiative, was adopted by state-wide referendum. Prop. 71 provides for a state-sponsored program designed to encourage stem cell research in the State of California, and to finance such research with State funds totaling approximately $295,000,000 annually for 10 years beginning in 2005. This initiative created CIRM, which will provide grants, primarily but not exclusively, to academic institutions to advance both hES cell research and adult stem cell research. On October 16, 2014 we signed a NGA with CIRM, effective October 1, 2014, with respect to a $14.3 million grant award for clinical development of our product, AST-OPC1. To date, we have received $12.8 million under the NGA. There can be no assurance we will receive the remaining $1.5 million.

Additional Information

We were incorporated in September 2012 under the name BioTime Acquisition Corporation in the state of Delaware. We changed our name to Asterias Biotherapeutics, Inc. in March 2013. Our principal executive offices are located at 6300 Dumbarton Circle, Fremont, California 94555. Our telephone number is (510) 456-3800. Our corporate website is *www.asteriasbiotherapeutics.com*.

Employees

As of March 21, 2017 we employed 55 persons on a full time basis, with 22 of our employees hold M.D. and/or Ph.D. degrees in one or more fields of medicine or science. None of our employees are subject to a collective bargaining agreement. All of our employees except for one individual located in the United Kingdom are based in the United States.

Research and Development

Our research and development expenses were $25.5 million, $17.3 million and $13.3 million for the years ended December 31, 2016, 2015, and 2014 respectively.

Item 1A. Risk Factors

Our business is subject to various risks, including those described below. You should consider the following risk factors, together with all of the other information included in this report, which could materially adversely affect our proposed operations, our business prospects, and financial condition, and the value of an investment in our business. There may be other factors that are not mentioned here or of which we are not presently aware that could also affect our business operations and prospects.

Risks Related to Our Business Operations

We have a history of operating losses and negative cash flows.

Since our inception in September 2012, we have incurred operating losses and negative cash flow, and we expect to continue to incur losses and negative cash flow in the future. Our net losses for the fiscal years ended December 31, 2016, 2015, and 2014 were $35.5 million, $15.0 million, and $10.1 million respectively, and we had an accumulated deficit of $83.7 million and $48.2 million as of December 31, 2016 and 2015, respectively. We have limited cash resources and will depend upon future equity financings, research grants, available through collaborations with third parties, and sales of BioTime and OncoCyte common shares that we have as a source of funding for our operations. There is no assurance that we will be able to obtain the financing we need from any of those sources, or that any such financing that may become available will be on terms that are favorable to us and our shareholders.

Failure to attract and retain skilled personnel and key relationships could impair our research and development efforts.

We will need to recruit and hire additional qualified research scientists, laboratory technicians, clinical development, and management personnel as we continue to develop our programs. Competition for these types of personnel is intense and we may experience delays in hiring the qualified people that we need. The inability to attract and retain sufficient qualified management, scientific, or technical personnel may significantly delay or prevent the achievement of our product development and other business objectives and could have a material adverse effect on our business, operating results and financial condition. We partially rely on BioTime to provide certain services related to financial accounting management and reporting. We will also rely on consultants and advisors who are either self-employed or employed by other organizations, and they may have conflicts of interest or other commitments, such as consulting or advisory contracts with other organizations, that may affect their ability to perform services for us.

We will spend a substantial amount of our capital on research and development but we might not succeed in developing products and technologies that are useful in medicine.

The product development work we plan to do is costly, time consuming and uncertain as to its results. We will attempt to develop new medical products and technologies that might not prove to be safe and efficacious in human medical applications. Many of the products and technologies that we will seek to develop have not been applied in human medicine and have only been used in laboratory studies in vitro or in animals. Only two of the product candidates that we acquired had been used in clinical trials at the time of acquisition, and those were early stage trials involving only a small number of patients. Even if we are successful in developing a new technology or product, refinement of the new technology or product and definition of the practical applications and limitations of the technology or product may take years and require the expenditure of large sums of money.

The amount and pace of research and development work that we can do or sponsor, and our ability to commence and complete clinical trials required to obtain FDA and foreign regulatory approval of our products, depends upon the amount of funding available to us.

We may have to limit our laboratory research and development work based on the amount of our cash resources. We plan to continue to seek research and development grants from government agencies and to enter into collaborative product development agreements through which third parties will provide funding or otherwise bear the cost of research and development or clinical trials of our product candidates. There is no assurance that the amount of any grants that we may receive will be adequate for our needs. The agreements we entered into to date with CIRM and CRUK are subject to termination if certain milestones are not achieved. Hence, there is no assurance that we will receive the full value of the agreement with either entity. Unless we are able to generate sufficient revenue or raise additional funds when needed, it is likely that we will be unable to continue our planned activities, even if we make progress in our research and development projects.

We will need to issue additional equity or debt securities in order to raise additional capital needed to pay our operating expenses.

We plan to incur substantial research and product development expenses, and we will need to raise additional capital to pay operating expenses until we are able to generate sufficient revenues from product sales, royalties, and license fees. Additional sales of equity or debt securities will be required in the future to meet our capital needs, unless we receive substantial research grants and revenues from the sale of any products that receive regulatory approval or we are successful in licensing or sublicensing our technology and we receive substantial licensing fees and royalties. Sales of additional equity securities could result in the dilution of the interests of present shareholders.

The availability of cells could impact the time and cost of commencing our research and product development programs.

The cells, cell lines and other biological materials that we acquired are being stored under cryopreservation protocols intended to preserve their functionality. We have successfully completed the verification of the viability of three lots of AST-OPC1 cells that we intend to use in our current SciStar Phase 1/2a study and our next anticipated clinical trial. However, we do not have sufficient amounts of AST-OPC1 cells to conduct a larger registration trial or for future commercial activities. We are developing additional cell banks and scaling up our process to generate sufficient amounts of AST-OPC1 cells for use in a larger registration trial and any future commercial activities. These process development and manufacturing-related activities increase the costs of our product development for AST-OPC1 and any delays in these activities could delay the overall AST-OPC1 program.

Any products that receive regulatory approval may be difficult and expensive to manufacture on a commercial scale.

hES derived therapeutic cells have only been produced on a small scale and not in quantities and at levels of purity and viability that will be needed for wide scale commercialization. If we are successful in developing products that consist of hES cells or other cells or products derived from hES or other cells, we will need to develop, alone or in collaboration with one or more pharmaceutical companies or contract manufacturers, technology for the commercial production of those products. Our hES cell or other cell-based products are likely to be more expensive to manufacture on a commercial scale than most other drugs on the market today. The high cost of manufacturing a product will require that we charge our customers a high price for the product in order to cover our costs and earn a profit. If the price of our products is too high, hospitals and physicians may be reluctant to purchase our products, especially if lower priced alternative products are available, and we may not be able to sell our products in sufficient volumes to recover our costs of development and manufacture or to earn a profit.

We do not have the ability to independently conduct clinical trials required to obtain regulatory approvals for our therapeutic product candidates.

We will need to rely on third parties, such as CRUK, contract research organizations, data management companies, contract clinical research associates, medical institutions, clinical investigators and contract laboratories to conduct any clinical trials that we may undertake for our products. We may also rely on third parties to assist with our preclinical development of therapeutic product candidates. If we outsource clinical trials, we may be unable to directly control the timing, conduct and expense of our clinical trials. If we enlist third parties to conduct clinical trials and they fail to successfully carry out their contractual duties or regulatory obligations or fail to meet expected deadlines, if the 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 clinical protocols or regulatory requirements or for other reasons, our preclinical development activities or clinical trials may be extended, delayed, suspended or terminated, and we may not be able to obtain regulatory approval for or successfully commercialize our therapeutic product candidates.

We will have certain obligations and may incur liabilities arising from clinical trials, and we do not yet know the scope of any resulting expenses that might arise.

We face the risk of incurring liabilities to patients who participate in clinical trials of our product candidates if they incur any injuries as a result of their participation. We will also be obligated to obtain information and prepare reports about the health of the clinical trial patients. In addition, we have assumed Geron's obligations to obtain information and prepare reports about the health of patients, and we have assumed any liabilities to those patients that might arise from any injuries they may have incurred, as a result of their participation in the clinical trials of Geron's GRN-OPC1 cell replacement therapy for spinal cord damage and its GRN-VAC1 immunological therapy for certain cancers. We are not aware of any claims by patients alleging injuries suffered as a result of any of those clinical trials, but if any claims are made and if liability can be established, the amount of any liability that we may incur, depending upon the nature and extent of any provable injuries, could exceed our insurance coverage, and the amount of the liability could be material to our financial condition.

Our business could be adversely affected if we lose the services of the key personnel upon whom we depend.

Our research and development programs are directed primarily by our President of Research and Development, Dr. Jane S. Lebkowski, our Chief Operating Officer, Dr. Katharine E. Spink, and our Chief Medical Officer, Dr. Edward D. Wirth, III. In addition, our success depends to a large extent on our President and CEO, Stephen L. Cartt, and our Chief Financial Officer and General Counsel, Ryan D. Chavez. If any of these key personnel should leave our employ we may be unable to locate and recruit sufficient replacement personnel without undue delay or additional cost or we may be unable to replace them at all. Any such delay or inability could delay or terminate some or all of our research programs, the commercialization of our products, or our ability to raise capital to fund our business. Even if we are able to attract suitable replacement personnel, we may incur delays during a transition period. Therefore, the loss of these key employees and others within our organization could have a material adverse effect on us.

Our business and operations could suffer in the event of system failures.

Despite the implementation of security measures, our internal computer systems and those of our contractors and consultants are vulnerable to damage from computer viruses, unauthorized access, natural disasters, terrorism, war and telecommunication and electrical failures. Such events could cause interruption of our operations. For example, the loss of data for our product candidates could result in delays in our regulatory filings and development efforts and significantly increase our costs. To the extent that any disruption or security breach was to result in a loss of or damage to our data or inappropriate disclosure of confidential or proprietary information, we could incur liability and the development of our product candidates could be delayed.

Failure of our internal control over financial reporting could harm our business and financial results.

Our management is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting for external purposes in accordance with accounting principles generally accepted in the U.S. Internal control over financial reporting includes maintaining records that in reasonable detail accurately and fairly reflect our transactions; providing reasonable assurance that transactions are recorded as necessary for preparation of our financial statements; providing reasonable assurance that receipts and expenditures of our assets are made in accordance with management authorization; and providing reasonable assurance that unauthorized acquisition, use or disposition of our assets that could have a material effect on the financial statements would be prevented or detected on a timely basis. Because of its inherent limitations, internal control over financial reporting is not intended to provide absolute assurance that a misstatement of our financial statements would be prevented or detected. Our growth and entry into new products, technologies and markets will place significant additional pressure on our system of internal control over financial reporting. Any failure to maintain an effective system of internal control over financial reporting could limit our ability to report our financial results accurately and timely or to detect and prevent fraud.

We continue to rely in part on financial systems maintained by BioTime and upon certain financial reporting services provided by BioTime personnel. BioTime allocates certain expenses among itself, us, and BioTime's other subsidiaries, which create a risk that the allocations may not accurately reflect the benefit of an expenditure or use of financial or other resources by us, BioTime as our parent company, and the BioTime subsidiaries among which the allocations are made.

Risks Related to Our Industry

We will face certain risks arising from regulatory, legal, and economic factors that affect our business and the business of other pharmaceutical and biological product development companies. Because we are a small company with limited revenues and limited capital resources, we may be less able to bear the financial impact of these risks than larger companies that have substantial income and available capital.

If we do not receive FDA or other regulatory approvals, we will not be permitted to sell our products.

The cell-based products that we are developing cannot be sold until the FDA or corresponding foreign regulatory authorities approve the products for medical use. The need to obtain regulatory approval to market a new product means that:

- we will have to conduct expensive and time consuming clinical trials of new products. The full cost of conducting and completing clinical trials necessary to obtain FDA and foreign regulatory approval of a new product cannot be presently determined, but could exceed our current financial resources;
- clinical trials and the regulatory approval process for a cell-based product can take several years to complete. As a result, we will incur the expense and delay inherent in seeking FDA and foreign regulatory approval of new products, even if the results of clinical trials are favorable;
- data obtained from preclinical and clinical studies is susceptible to varying interpretations that could delay, limit, or prevent regulatory agency approvals. Delays in the regulatory approval process or rejections of an application for approval of a new drug or cell-based product may be encountered as a result of changes in regulatory agency policy;
- because the therapeutic products we plan to develop with hES technology involve the application of new technologies and approaches to medicine, the FDA or foreign regulatory agencies may subject those products to additional or more stringent review than drugs or biologics derived from other technologies. No therapeutic product based on hES technology has been approved by the FDA to date.
- a product that is approved may be subject to restrictions on use;
- the FDA can limit or withdraw approval of a product if problems arise; and
- we will face similar regulatory issues in foreign countries.

Clinical trial failures can occur at any stage of the testing and we may experience numerous unforeseen events during, or as a result of, the clinical trial process that could delay or prevent commercialization of our current or future therapeutic product candidates.

All of our product candidates are either at early stages of clinical development or at the preclinical or research stages of development. Clinical trial failures or delays can occur at any stage of the trials, and may be directly or indirectly caused by a variety of factors, including but not limited to:

- delays in securing clinical investigators or trial sites for our clinical trials;
- delays in obtaining Institutional Review Board ("IRB") and other regulatory approvals to commence a clinical trial;
- slower than anticipated rates of patient recruitment and enrollment, or failing to reach the targeted number of patients due to competition for patients from other trials;
- limited or no availability of coverage, reimbursement and adequate payment from health maintenance organizations ("HMOs") and other third party payors for the use of agents used in our clinical trials;
- negative or inconclusive results from clinical trials;
- unforeseen side effects interrupting, delaying, or halting clinical trials of our therapeutic product candidates, and possibly resulting in the FDA or other regulatory authorities denying approval of our therapeutic product candidates;
- unforeseen safety issues;
- uncertain dosing issues;
- approval and introduction of new therapies or changes in standards of practice or regulatory guidance that render our clinical trial endpoints or the targeting of our proposed indications obsolete;
- inability to monitor patients adequately during or after treatment or problems with investigator or patient compliance with the trial protocols;
- inability to replicate in large controlled studies safety and efficacy data obtained from a limited number of patients in uncontrolled trials;
- inability or unwillingness of medical investigators to follow our clinical protocols; and
- unavailability of clinical trial product or other materials.

Government imposed bans or restrictions, and religious, moral and ethical concerns on the use of hES cells could prevent us from developing and successfully marketing stem-cell derived products.

Government imposed bans or restrictions on the use of embryos or hES cells research and development in the United States and abroad could generally constrain stem cell research, thereby limiting the market and demand for any of our products that receive regulatory approval. In March 2009, President Barack Obama lifted certain restrictions on federal funding of research involving the use of hES cells, and in accordance with President Obama's executive order, the NIH has adopted new guidelines for determining the eligibility of hES cell lines for use in federally funded research. The central focus of the proposed guidelines is to assure that hES cells used in federally funded research were derived from human embryos that were created for reproductive purposes, were no longer needed for this purpose, and were voluntarily donated for research purposes with the informed written consent of the donors. hES cells that were derived from embryos created for research purposes rather than reproductive purposes, and other hES cells that were not derived in compliance with the guidelines, are not eligible for use in federally funded research.

In May 2016, the Select Investigative Panel on Infant Lives of the United States House of Representatives Committee on Energy and Commerce (the "Panel") submitted a formal request that we provide certain information relating to, among other things, whether we have used fetal tissue in our research. We fully complied with this request and have provided evidence, to the Panel's full satisfaction, that we have never used fetal tissue in our research, as we only use specific hES cell lines that were deemed eligible for federal funding based on their original derivation by third parties according to ethical principles. We also provided evidence supporting that President George W. Bush in August 2001 signed an executive order approving, for research purposes, the use of these specific cell lines, among certain others, and approval for their use was subsequently reconfirmed under President Obama's March 2009 executive order.

California law requires that stem cell research be conducted under the oversight of a SCRO committee. Many kinds of stem cell research, including the derivation of new hES cell lines, may only be conducted in California with the prior written approval of the SCRO committee. A SCRO committee could prohibit or impose restrictions on the research we plan to do.

The use of hES cells gives rise to religious, moral and ethical issues regarding the appropriate means of obtaining the cells and the appropriate use and disposal of the cells. These considerations could lead to more restrictive government regulations or could generally constrain stem cell research thereby limiting the market and demand for any of our products that receive regulatory approval. From time to time, social views on religious, moral and ethical issues could change and could affect political viewpoints and government regulations. Therefore, it is difficult to forecast with certainty whether there will be additional government imposed bans or restrictions, and religious, moral and ethical concerns on our use of hES cells that could potentially give rise to proceedings, litigation or disputes that could cause us to incur substantial expense, require significant time and attention from our management and result in civil penalties against us. The results of any such proceedings, litigation or disputes could have a material adverse effect on our business and results of operations. Furthermore, it is possible that such proceedings, litigation or disputes could negatively impact the ability of our vendors, suppliers or collaborators to conduct their operations, which could also have a material adverse effect on our business and results of operations.

Risks Related to Our Intellectual Property

If our efforts to protect our proprietary technologies are not adequate, we may not be able to compete effectively in our market.

We rely upon a combination of patents, trade secret protection and contractual arrangements to protect the intellectual property related to our technologies. We will only be able to protect our products and proprietary information and technology by preventing unauthorized use by third parties to the extent that our patents, trade secrets, and contractual position allow us to do so. Any disclosure to or misappropriation by third parties of our trade secrets or confidential information could compromise our competitive position. Moreover, we have in the past been involved in, and may in the future be involved in legal or administrative proceedings involving our intellectual property and initiated by third parties, which proceedings can result in significant costs and commitment of management time and attention. As our product candidates continue in development, third parties may attempt to challenge the validity and enforceability of our patents and proprietary information and technologies.

We also have in the past been involved in, and may in the future be involved in initiating legal or administrative proceedings involving the product candidates and intellectual property of our competitors. These proceedings can result in significant costs and commitment of management time and attention, and there can be no assurance that our efforts would be successful in preventing or limiting the ability of our competitors to market competing products. Composition-of-matter patents relating to the active pharmaceutical ingredient are generally considered to be the strongest form of intellectual property protection for pharmaceutical products, as such patents provide protection not limited to any one method of use or manufacture. Method-of-use and method-of-manufacture patents protect the use or manufacture of a product for the specified method(s), and do not prevent a competitor from making and marketing a product that is identical to our product but produced using a method that is outside the scope of our patented method or for an indication that is outside the scope of our patented use. We rely on a combination of these and other types of patents to protect our product candidates, and there can be no assurance that our intellectual property will create and sustain the competitive position of our product candidates.

Biotechnology and pharmaceutical product patents involve highly complex legal and scientific questions and can be uncertain. Any patent applications that we own or license may fail to result in issued patents. Even if patents do successfully issue from our applications, third parties may challenge their validity or enforceability, which may result in such patents being narrowed, invalidated, or held unenforceable. Even if our patents and patent applications are not challenged by third parties, those patents and patent applications may not prevent others from designing around our claims and may not otherwise adequately protect our product candidates. If the breadth or strength of protection provided by the patents and patent applications we hold with respect to our product candidates is threatened, competitors with significantly greater resources could threaten our ability to commercialize our product candidates.

Subject to meeting other requirements for patentability, for United States patent applications filed prior to March 16, 2013, the first to invent the claimed invention is entitled to receive patent protection for that invention while, outside the United States, the first to file a patent application encompassing the invention is entitled to patent protection for the invention. The United States moved to a "first to file" system under the Leahy-Smith America Invents Act, or AIA, effective March 16, 2013. Discoveries are generally published in the scientific literature well after their actual development, and patent applications in the United States and other countries are typically not published until 18 months after filing and in some cases are never published. Accordingly, we cannot be certain that we or our licensors were the first to make the inventions claimed in our owned and licensed United States patents or patent applications filed prior to March 16, 2013, or that we or our licensors were the first to file for patent protection for inventions claimed in foreign patents or foreign patent applications and United States patents or patent applications filed on or after March 16, 2013. The AIA also includes new procedures for challenging issued patents and pending patent applications, which creates additional uncertainty. We may become involved in opposition or interference proceedings challenging our patents and patent applications or the patents and patent applications of others, and the outcome of any such proceedings are highly uncertain. An unfavorable outcome in any such proceedings could reduce the scope of, or invalidate our patent rights, allow third parties to commercialize our technology and compete directly with us, or result in our inability to manufacture, develop or commercialize our product candidates without infringing the patent rights of others.

In addition to the protection afforded by patents, we seek to rely on trade secret protection and confidentiality agreements to protect proprietary know-how, information, or technology that is not covered by our patents. Although our agreements require all of our employees to assign their inventions to us, and we require all of our employees, consultants, advisors and any third parties who have access to our trade secrets, proprietary know-how and other confidential information and technology to enter into appropriate confidentiality agreements, we cannot be certain that our trade secrets, proprietary know-how and other confidential information and technology will not be subject to unauthorized disclosure or that our competitors will not otherwise gain access to or independently develop substantially equivalent trade secrets, proprietary know-how and other information and technology. Furthermore, the laws of some foreign countries do not protect proprietary rights to the same extent or in the same manner as the laws of the United States. As a result, we may encounter significant problems in protecting and defending our intellectual property globally. If we are unable to prevent unauthorized disclosure of our intellectual property related to our product candidates and technology to third parties, we may not be able to establish or maintain a competitive advantage in our market, which could materially adversely affect our business and operations.

Intellectual property disputes with third parties and competitors may be costly and time consuming, and may negatively affect our competitive position.

Our commercial success may depend on our avoiding infringement of the patents and other proprietary rights of third parties as well as on enforcing our patents and other proprietary rights against third parties. Pharmaceutical and biotechnology intellectual property disputes are characterized by complex, lengthy and expensive litigation over patents and other intellectual property rights. We may initiate or become a party to, or be threatened with, future litigation or other proceedings regarding intellectual property rights with respect to our product candidates and competing products.

As our product candidates progress toward commercialization, we or our collaboration partners may be subject to patent infringement claims from third parties. The patent landscape in competitive product areas is highly complex, and there may be patents of third parties of which we are unaware that may result in claims of infringement. Accordingly, there can be no assurance that our product candidates do not infringe proprietary rights of third parties, and parties making claims against us may seek and obtain injunctive or other equitable relief, which could potentially block further efforts to develop and commercialize our product candidates. Any litigation involving defense against claims of infringement, regardless of the merit of such claims, would involve substantial litigation expense and would be a substantial diversion of management time.

We intend, if necessary, to vigorously enforce our intellectual property in order to protect the proprietary position of our product candidates. Efforts to enforce our patents may include litigation, administrative proceedings, or both, depending on the potential benefits that might be available from those actions and the costs associated with undertaking those efforts against third parties. We carefully review and monitor publicly available information regarding products that may be competitive with our product candidates and assert our intellectual property rights where appropriate.

We may consider administrative proceedings and other means for challenging third party patents and patent applications. Third parties may also challenge our patents and patent applications, through interference, reexamination, inter partes review, and post-grant review proceedings before the USPTO or through other comparable proceedings, such as oppositions or invalidation proceedings, before foreign patent offices. An unfavorable outcome in any such challenge could require us to cease using the related technology and to attempt to license rights to it from the prevailing third party, which may not be available on commercially reasonable terms, if at all, in which case our business could be harmed. Even if we are successful, participation in administrative proceedings before the USPTO or a foreign patent office may result in substantial costs and time on the part of our management and other employees.

Furthermore, there is a risk that any public announcements concerning the status or outcomes of intellectual property litigation or administrative proceedings may adversely affect the price of our stock. If securities analysts or our investors interpret such status or outcomes as negative or otherwise creating uncertainty, our common stock price may be adversely affected.

Our reliance on third parties and agreements with collaboration partners requires us to share our trade secrets, which increases the possibility that a competitor may discover them or that our trade secrets will be misappropriated or disclosed.

Our reliance on third party contractors to develop and manufacture our product candidates is based upon agreements that limit the rights of the third parties to use or disclose our confidential information, including our trade secrets and know-how. Despite the contractual provisions, the need to share trade secrets and other confidential information increases the risk that such trade secrets and information are disclosed or used, even if unintentionally, in violation of these agreements. In the highly competitive markets in which our product candidates are expected to compete, protecting our trade secrets, including our strategies for addressing competing products, is imperative, and any unauthorized use or disclosure could impair our competitive position and may have a material adverse effect on our business and operations.

In addition, our collaboration partners are larger, more complex organizations than ours, and the risk of inadvertent disclosure of our proprietary information may be increased despite their internal procedures and contractual obligations in place with our collaboration partners. Despite our efforts to protect our trade secrets and other confidential information, a competitor's discovery of such trade secrets and information could impair our competitive position and have an adverse impact on our business.

We have an extensive worldwide patent portfolio. The cost of maintaining our patent protection is high and maintaining our patent protection requires continuous review and compliance in order to maintain worldwide patent protection. We may not be able to effectively maintain our intellectual property position throughout the major markets of the world.

The USPTO and foreign patent authorities require maintenance fees and payments as well as continued compliance with a number of procedural and documentary requirements. Noncompliance may result in abandonment or lapse of the subject patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. Non-compliance may result in reduced royalty payments for lack of patent coverage in a particular jurisdiction from our collaboration partners or may result in competition, either of which could have a material adverse effect on our business.

We have made, and will continue to make, certain strategic decisions in balancing costs and the potential protection afforded by the patent laws of certain countries. As a result, we may not be able to prevent third parties from practicing our inventions in all countries throughout the world, or from selling or importing products made using our inventions in and into the United States or other countries. Third parties may use our technologies in territories in which we have not obtained patent protection to develop their own products and, further, may infringe our patents in territories which provide inadequate enforcement mechanisms, even if we have patent protection. Such third party products may compete with our product candidates, and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

The laws of some foreign countries do not protect proprietary rights to the same extent as do the laws of the United States, and we may encounter significant problems in securing and defending our intellectual property rights outside the United States.

Many companies have encountered significant problems in protecting and defending intellectual property rights in certain countries. The legal systems of certain countries do not always favor the enforcement of patents, trade secrets, and other intellectual property rights, particularly those relating to pharmaceutical and biotechnology products, which could make it difficult for us to stop infringement of our patents, misappropriation of our trade secrets, or marketing of competing products in violation of our proprietary rights. Proceedings to enforce our intellectual property rights in foreign countries could result in substantial costs and divert our efforts and attention from other aspects of our business, and could put our patents in these territories at risk of being invalidated or interpreted narrowly, or our patent applications at risk of not granting, and could provoke third parties to assert claims against us. We may not prevail in all legal or other proceedings that we may initiate and, if we were to prevail, the damages or other remedies awarded, if any, may not be commercially meaningful. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license.

Intellectual property rights do not address all potential threats to any competitive advantage we may have.

The degree of future protection afforded by our intellectual property rights is uncertain because intellectual property rights have limitations, and intellectual property rights may not adequately protect our business or permit us to maintain our competitive advantage. The following examples are illustrative:

- Others may be able to make cellular treatments that are the same as or similar to our current or future product candidates but that are not covered by the claims of the patents that we own or have exclusively licensed.
- We or any of our licensors or strategic partners might not have been the first to make the inventions covered by the issued patent or pending patent application that we own or have exclusively licensed.
- We or any of our licensors or strategic partners might not have been the first to file patent applications covering certain of our inventions.
- Others may independently develop similar or alternative technologies or duplicate any of our technologies without infringing our intellectual property rights.
- The prosecution of our pending patent applications may not result in granted patents.
- Granted patents that we own or have exclusively licensed may not provide us with any competitive advantages, or may be held invalid or unenforceable, as a result of legal challenges by our competitors.
- Patent protection on our product candidates may expire before we are able to develop and commercialize the product, or before we are able to recover our investment in the product.

- Our competitors might conduct research and development activities in the United States and other countries that provide a safe harbor from patent infringement claims for such activities, as well as in countries in which we do not have patent rights, and may then use the information learned from such activities to develop competitive products for sale in markets where we intend to market our product candidates.

If we fail to meet our obligations under license agreements, we may lose our rights to key technologies on which our business depends.

Our business will depend in part on several technologies that are based in part on technology licensed from third parties, including the Regents of the University of California, and the Wisconsin Alumni Research Foundation. Those third-party license agreements impose obligations on us, including payment obligations and obligations to pursue development of commercial products under the licensed patents or technology. If a licensor believes that we have failed to meet our obligations under a license agreement, the licensor could seek to limit or terminate our license rights, which could lead to costly and time-consuming litigation and, potentially, a loss of the licensed rights. During the period of any such litigation our ability to carry out the development and commercialization of potential products, and our ability to raise capital, could be significantly and negatively affected. If our license rights were restricted or ultimately lost, we would not be able to continue to use the licensed technology in our business.

The price and sale of any of our products that receive regulatory approval may be limited by health insurance coverage and government regulation.

Success in selling any of our products that receive regulatory approval may depend in part on the extent to which health insurance companies, HMOs, and government health administration authorities such as Medicare and Medicaid will pay for the cost of the products and related treatment. Until we actually introduce a new product into the medical market place we will not know with certainty whether adequate health insurance, HMO, and government coverage will be available to permit the product to be sold at a price high enough for us to generate a profit. In some foreign countries, pricing or profitability of health care products is subject to government control which may result in low prices for our products. In the United States, there have been a number of federal and state proposals to implement similar government controls, increased attention by Congress and others within the government regarding such proposals, and new proposals are likely to be made in the future.

There have been, and we expect there will continue to be, a number of federal legislative initiatives implemented to reform the U.S. healthcare system in ways that could adversely impact our business.

The FDA has established regulations, guidelines and policies to govern the drug development and approval process. Any change in regulatory requirements resulting from the adoption of new legislation, regulations or policies may require us to amend existing clinical trial protocols or add new clinical trials to comply with these changes. Such amendments to existing protocols or clinical trial applications or the need for new ones, may significantly and adversely affect the cost, timing and completion of the clinical trials for our drug candidates. In addition, the FDA's policies may change and additional government regulations may be issued that could prevent, limit or delay regulatory approval of our drug candidates, or impose more stringent product labeling and post-marketing testing and other requirements. The recent elections in the U.S. could result in significant changes in, and uncertainty with respect to, legislation, regulation and government policy that could significantly impact our business and the health care industry.

In addition, we expect that the Affordable Care Act, which we expect will be amended or repealed in the future, the 21st Century Cures Act, and other healthcare reform measures that may be adopted in the future, could have a material adverse effect on our industry generally and on our ability to commercialize our future products and establish and maintain product sales. If we are slow or unable to adapt to any such changes, our business, prospects and ability to achieve or sustain profitability would be adversely affected.

Risks Related to Our Relationship With BioTime

BioTime has a significant influence on our business operations.

As of December 31, 2016, BioTime owns approximately 46% of our issued and outstanding Common Stock. Because BioTime is by far our largest shareholder and owns close to a majority of the outstanding Common Stock, it has the voting power to significantly impact any matter that requires shareholder approval. Furthermore, three of the nine members of our Board of Directors are also directors of BioTime, and another director is an employee of Broadwood Capital, Inc., which is the general partner of Broadwood Partners, L.P., the partnership that is the largest shareholder of BioTime. Some of our directors also serve on the Boards of Directors of one or more of BioTime's other subsidiaries. As a result of the relationships described above, BioTime has significant influence over our business operations, and therefore, BioTime could cause corporate actions to be taken even if the interests of BioTime conflict with the interests of our other shareholders. This concentration of voting power could have the effect of deterring or preventing a change in control that might be beneficial to our other shareholders.

We partially rely upon BioTime for certain services and resources.

Although we have our own research facilities, scientific personnel, and management and administrative personnel, we partially rely on BioTime to provide certain administrative services, including certain financial services related to financial accounting and reporting. We have entered into a Shared Facilities and Services Agreement with BioTime under which we have agreed to bear costs allocated to us by BioTime for the use of BioTime human resources and for services and materials provided for our benefit by BioTime. We pay BioTime 105% of its costs of providing personnel and services to us, and for any use of its facilities by us, including an allocation of general overhead based on that use. We may also share the services of some research personnel with BioTime. Conflicts of interest may arise from our relationship with BioTime.

Our relationship with BioTime could give rise to certain conflicts of interest that could have an impact on our research and development programs, business opportunities, and operations generally.

We and BioTime or any of its other subsidiaries may determine to engage in research and development of the same or similar products or technologies, or products that would otherwise compete in the market place. Even if we utilize different technologies than BioTime or its other subsidiaries, we could find ourselves in competition with them for research scientists, financing and other resources, licensing, manufacturing, and distribution

Because of our relationship with BioTime as described in the prior risk factor, BioTime could prevent us from engaging in research and development programs, investments, business ventures, or agreements to develop, license, or acquire products or technologies that would or might compete with those owned, licensed, or under development by BioTime or any of its other subsidiaries.

In February 2016, we entered into a Cross-License with BioTime and a subsidiary of BioTime, ES Cell ("ESI"). Under this Cross-License, we received a fully-paid, non-royalty-bearing, world-wide, non-exclusive, sub-licensable license under certain patents and related patent rights owned by BioTime and ESI, and in exchange, we granted BioTime and ESI a fully-paid, non-royalty-bearing, world-wide, non-exclusive, sub-licensable license certain patents and related patent rights we own. In the future, we may enter into additional license or sublicense agreements with BioTime or another BioTime subsidiary. Conflicts of interest could arise in determining the scope and financial terms of any such licenses or sublicenses, including the fields of use permitted, licensing fees, and royalties, if any, and other matters.

BioTime and its other subsidiaries will engage for their own accounts in research and product development programs, investments, and business ventures and we will not be entitled to participate or to receive an interest in those programs, investments, or business ventures. BioTime and its other subsidiaries will not be obligated to present any particular research and development, investment, or business opportunity to us, even if the opportunity would be within the scope of our research and development plans or programs, business objectives, or investment policies. These opportunities may include, for example, opportunities to acquire businesses or assets, including but not limited to patents and other intellectual property that could be used by us or by BioTime or by any of BioTime's other subsidiaries. Our respective boards of directors will have to determine which company should pursue those opportunities, taking into account relevant facts and circumstances at the time, such as the financial and other resources of the companies available to acquire and utilize the opportunity, and the best "fit" between the opportunity and the business and research and development programs of the companies. However, by virtue of their significant voting power, BioTime has significant influence in decision making with respect to the allocation of opportunities.

Under the Cross-License, BioTime and ESI may have a conflict of interest in determining how and when they should enforce their rights under the Cross-License if they were to default or otherwise fail to perform any of their obligations under the Cross-License.

One of our significant assets is 3,852,880 BioTime common shares that we held as of December 31, 2016. We may sell the BioTime common shares from time to time, or to pledge those shares as collateral for loans, to raise capital to finance our operations. Because a sale of those shares could have a depressing effect on the market value of BioTime common shares, BioTime will have a continuing interest in the number of shares that we sell, the prices at which we sell the shares, and time and manner in which the shares are sold. Further, we may need or find it desirable to sell BioTime common shares at the same time as BioTime, or other BioTime subsidiaries that hold BioTime common shares, also desire to sell some of their BioTime common shares. Concurrent sales of BioTime common shares by us, BioTime, or other BioTime subsidiaries could have a depressing effect on the market price of the BioTime common shares, lowering the price at which we and they are able to sell BioTime common shares and resulting in lower net proceeds from the sales. We may coordinate any future sales of our BioTime common shares with BioTime and its other subsidiaries in order to provide an orderly and controlled process for raising capital through the sale of BioTime shares. This may include an agreement as to the number of shares to be sold, the time period or "market window" for selling shares, the use of a common securities broker-dealer, and a fair allocation of net sales based on average sales prices during any trading day on which we and they sell BioTime shares.

Each conflict of interest will be resolved by our respective boards of directors in keeping with their fiduciary duties and such policies as they may implement from time to time.

Risks Related to Our Dependence on Third Parties

We could lose our CIRM grant if we fail to meet the clinical trial milestones that are a condition to CIRM's obligation to provide funding.

We are depending upon our NGA from CIRM as a source of financing for the costs of conducting our SciStar Phase 1/2a clinical trial and process development of AST-OPC1. Under the terms of the NGA, as amended effective March 2, 2016, we must meet certain progress milestones pertaining to the clinical trial in order to receive additional payments. If we fail to meet the milestones, payments will be delayed. Additionally, under the NGACIRM has the right to suspend payment upon the occurrence of certain Suspension Events, which could force us to postpone, delay, or discontinue the clinical trial and development work for the product.

Establishing and maintaining strategic alliances is a key component of our business strategy. If we are unable to establish and maintain strategic alliances for our therapeutic product candidates, we may have to reduce or delay our product development or increase our expenditures.

A key component of our current strategy for developing, manufacturing and commercializing our therapeutic product candidates will be entering into strategic alliances with pharmaceutical companies or other industry participants to advance our programs and enable us to maintain our financial and operational capacity. We will face significant competition in seeking appropriate alliances. We may not be able to negotiate alliances on acceptable terms, if at all. If our strategic alliances do not result in the successful development and commercialization of our product candidates or if one or more of our collaborators terminates its agreement with us, we may not receive any future research and development funding or milestone or royalty payments under the collaboration. If we do not receive the funding we expect under these agreements, our continued development of our product candidates could be delayed and we may need to obtain additional funding, which may be unavailable or available only on unfavorable terms.

If we are able to enter into product development and marketing arrangements with pharmaceutical companies, we may license product development, manufacturing, and marketing rights to the pharmaceutical company or to a joint venture company formed with the pharmaceutical company. Under such arrangements we might receive only a royalty on sales of the products developed or an equity interest in a joint venture company that develops the product. As a result, our revenues from the sale of those products may be substantially less than the amount of revenues and gross profits that we might receive if we were to develop, manufacture, and market the products ourselves.

We may become dependent on possible future collaborations to develop and commercialize many of our product candidates and to provide the manufacturing, regulatory compliance, sales, marketing and distribution capabilities required for the success of our business.

We may enter into various kinds of collaborative research and development, manufacturing, and product marketing agreements to develop and commercialize our products. Any future milestone payments and cost reimbursements from collaboration agreements could provide an important source of financing for our research and development programs, thereby facilitating the application of our technology to the development and commercialization of our products, but there are risks associated with entering into collaboration arrangements.

There is a risk that we could become dependent upon one or more collaborative arrangements for product development or manufacturing or as a source of revenues from the sale of any products that may be developed by us alone or through one of the collaborative arrangements. A collaborative arrangement upon which we might depend might be terminated by our collaboration partner or they might determine not to actively pursue the development or commercialization of our products. A collaboration partner also may not be precluded from independently pursuing competing products and drug delivery approaches or technologies.

There is a risk that a collaboration partner might fail to perform its obligations under the collaborative arrangements or may be slow in performing its obligations. In addition, a collaboration partner may experience financial difficulties at any time that could prevent it from having available funds to contribute to the collaboration. If a collaboration partner fails to conduct its product development, manufacturing, commercialization, regulatory compliance, sales and marketing or distribution activities successfully and in a timely manner, or if it terminates or materially modifies its agreements with us, the development and commercialization of one or more product candidates could be delayed, curtailed or terminated because we may not have sufficient financial resources or capabilities to continue product development, manufacturing, and commercialization on our own.

Industry and other market data used in our SEC filings, including market data undertaken by us or our engaged consultants, may prove to be unrepresentative of current and future market conditions or future results.

Our SEC filings include statistical and other industry and market data that we obtained from industry publications and research, surveys and studies conducted by third parties, and surveys and studies we commissioned, regarding the market potential for our product candidates. Although we believe that such information has been obtained from sources believed to be reliable, neither the sources of such data, nor we, can guarantee the accuracy or completeness of such information. While we believe these industry publications and third party research, surveys and studies are reliable, we have not independently verified such data. With respect to the information from third party consultants, the results of that study represent the independent consultants' own methodologies, assumptions, research, analysis, projections, estimations, composition of respondent pool, presentation of data, and adjustments, each of which may ultimately prove to be incorrect, and cause actual results and market viability to differ materially from those presented in such report. Readers should not place undue reliance on this information.

Risks Pertaining to Our Common Stock

Ownership of our common stock will entail certain risks associated with the volatility of prices for our shares and the fact that we do not pay dividends on our common stock.

The price of our common stock may rise and fall rapidly.

The market price of our common stock like that of the shares of many biotechnology companies is highly volatile. The price of our common stock may rise or fall rapidly as a result of a number of factors, including:

- sales or potential sales of substantial amounts of our common stock;
- results of preclinical testing or clinical trials of our product candidates or those of our competitors;
- announcements about us or about our competitors, including clinical trial results, regulatory approvals, new product introductions and commercial results;
- the cost of our development programs;
- the success of competitive products or technologies;
- litigation and other developments relating to our issued patents or patent applications or other proprietary rights or those of our competitors;
- conditions in the pharmaceutical or biotechnology industries;
- actual or anticipated changes in estimates as to financial results, development timelines or recommendations by securities analysts;
- variations in our financial results or those of companies that are perceived to be similar to us, including the failure of our earnings to meet analysts' expectations; and
- general economic, industry and market conditions.

Many of these factors are beyond our control. The stock markets in general, and the market for pharmaceutical and biotechnological companies in particular, have been experiencing extreme price and volume fluctuations which have affected the market price of the equity securities without regard to the operating performance of the issuing companies. Broad market fluctuations, as well as industry factors and general economic and political conditions, may adversely affect the market price of our common stock.

The JOBS Act allows us to postpone the date by which we must comply with certain laws and regulations intended to protect investors and to reduce the amount of information we provide in our reports filed with the Commission, which could undermine investor confidence in our company and adversely affect the market price of our securities.

The JOBS Act is intended to reduce the regulatory burden on "emerging growth companies." As defined in the JOBS Act, a public company whose initial public offering of common equity securities occurred after December 8, 2011 and whose annual gross revenues are less than $1.0 billion will, in general, qualify as an emerging growth company. Under this definition, we are an emerging growth company and could remain an emerging growth company until as late as December 31, 2019. The JOBS Act provides that, so long as we qualify as an emerging growth company, we will, among other things:

- be exempt from the provisions of Section 404(b) of the Sarbanes-Oxley Act requiring that our independent registered public accounting firm provide an attestation report on the effectiveness of our internal control over financial reporting;

- be exempt from the "say on pay" provisions (requiring a non-binding stockholder vote to approve compensation of certain executive officers) and the "say on golden parachute" provisions (requiring a non-binding stockholder vote to approve golden parachute arrangements for certain executive officers in connection with mergers and certain other business combinations) of the Dodd-Frank Act and certain disclosure requirements of the Dodd-Frank Act relating to compensation of our named executive officers;

- be permitted to omit the detailed compensation discussion and analysis from proxy statements and reports filed under the Securities Exchange Act of 1934 and instead provide a reduced level of disclosure concerning executive compensation; and

- be exempt from any rules that may be adopted by the Public Company Accounting Oversight Board requiring mandatory audit firm rotation or a supplement to the auditor's report on the financial statements.

We currently take advantage of the reduced regulatory and reporting requirements that are available to us so long as we qualify as an "emerging growth company," except that (i) we currently hold say on pay advisory votes at required intervals, (ii) we currently elect to obtain an attestation report from our independent registered public accounting firm on the effectiveness of our internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act and (iii) we have irrevocably elected not to take advantage of the extension of time to comply with new or revised financial accounting standards available under Section 102(b) of the JOBS Act. Among other things, this means that our independent registered public accounting firm will not be required to provide an attestation report on the effectiveness of our internal control over financial reporting so long as we qualify as an emerging growth company, which may increase the risk that weaknesses or deficiencies in our internal control over financial reporting go undetected. Likewise, so long as we qualify as an emerging growth company, we may elect not to provide you with certain information, including certain financial information and certain information regarding compensation of our named executive officers, that we would otherwise have been required to provide in filings we make with the Commission, which may make it more difficult for investors and securities analysts to evaluate our company. As a result, investor confidence in our company and the market price of our securities may be materially and adversely affected.

Our stock price could decline due to the large number of outstanding shares of our common stock eligible for future sale.

Sales of substantial amounts of our common stock in the public market, or the perception that those sales could occur, could cause the market price of our common stock to decline. Sales of substantial amounts of common stock could also make it more difficult for us to sell equity or equity-related securities in the future at a time and price that we deem appropriate.

We do not currently intend to pay dividends on any of our classes of securities and, consequently, your ability to achieve a return on your investment will depend on the appreciation in the price of our securities.

We have never declared or paid any cash dividends on any class of our securities. We currently intend to retain any future earnings to fund our future growth and do not expect to declare or pay any dividend on any class of our securities in the foreseeable future. As a result, you may only realize a gain on your investment in our securities if the market price of our securities appreciates and you sell your securities at a price above your cost after accounting for any taxes. The price of our securities may not appreciate in value or ever exceed the price that you paid for our securities.

The price of our common stock, and the value of our assets, will be affected by changes in the value of the BioTime common shares that we own.

As of December 31, 2016, we held 3,852,880 BioTime common shares. The value of our common stock will reflect, in part, the value of the BioTime common shares that we hold. The value of the BioTime common shares we hold will vary with the price at which BioTime common shares trade in the public market. The market price of BioTime common shares will be impacted by a number of factors, including the results of BioTime's operations.

If securities analysts do not publish research or reports about our business or if they downgrade our stock, the price of our securities could decline.

The current trading market for our common stock relies in part on the research and reports that industry or financial analysts publish about us, our business, our markets and our competitors. We do not control these analysts. If securities analysts do not cover us, the lack of research coverage may adversely affect the market price of our common stock. Furthermore, if one or more of the analysts who do cover us downgrade our stock or if those analysts issue other unfavorable commentary about us or our business, our stock price would likely decline. If one or more of these analysts cease coverage of us or fails to regularly publish reports on us, we could lose visibility in the market and interest in our stock could decrease, which in turn could cause our stock price or trading volume to decline.

The implementation of a new FASB accounting standard could increase the risk that our future financial statements could be qualified by going concern uncertainty.

In August 2014, the FASB issued ASU No. 2014-15, "Presentation of Financial Statements-Going Concern (Subtopic 205-40): Disclosure of Uncertainties about an Entity's Ability to Continue as a Going Concern." ASU No. 2014-15 defines management's responsibility to assess an entity's ability to continue as a going concern, and to provide related footnote disclosures. ASU No. 2014-15 is effective for us for the year ended December 31, 2016, and all annual and interim periods thereafter. In connection with preparing financial statements for each annual and interim reporting period, ASU No. 2014-15 requires that an entity's management evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the entity's ability to continue as a going concern within one year after the date that the financial statements are issued (or within one year after the date that the financial statements are available to be issued when applicable). As a result of the implementation of ASU No. 2014-15, we will be required to have more cash, cash equivalents, and liquid investments on hand on the date we issue or file our financial statements than had been the case during prior years in order to avoid a going concern qualification in our auditor's report and in the footnotes to our financial statements. If our financial statements were to become subject to a going concern qualification or uncertainty or if we are unable to alleviate substantial doubt as part of our going concern assessment, or both, the market price of our common stock could decline.

BioTime and OncoCyte will also be impacted by ASU No. 2014-15 in much the same manner as us. If the financial statements of BioTime, or OncoCyte, or both, were to become subject to a going concern qualification or uncertainty, the market price of their common stock could decline, resulting in a loss or decline in value of the BioTime shares we own, the OncoCyte shares we own, or both, as available-for-sale equity securities at fair value.

You may experience dilution of your ownership interests because of the future issuance of additional shares of our common stock and our preferred stock.

In the future, we may issue our authorized but previously unissued equity securities, resulting in the dilution of the ownership interests of our present shareholders. We may issue additional shares of Common Stock or other securities in order to raise additional capital, or in connection with hiring or retaining employees or consultants, or in connection with future acquisitions of licenses to technology or rights to acquire products, in connection with future business acquisitions, or for other business purposes. The future issuance of any such additional shares of common stock or other securities may create downward pressure on the trading price of our Common Stock.

Item 1B. Unresolved Staff Comments

None

Item 2. Properties

In November 2015, we moved to our new office and research facility located at 6300 Dumbarton Circle, Fremont, California as discussed below. We believe that our current facilities are adequate to meet our operational needs for 2017.

We entered into a lease for our Fremont office and research facility on December 30, 2013. This facility consists of a building with approximately 44,000 square feet of space. The building will be used by us primarily as a laboratory and production facility that can be used to produce hES cells and related products under cGMP. We completed construction of certain tenant improvements for our use, which cost approximately $4.9 million, of which a maximum of $4.4 million was paid to us by the landlord.

The lease is for a term of 96 months commencing on October 1, 2014, with two available five-year options to extend the term, upon one year written notice from us. During the first 15 months of the lease term, from October 1, 2014 through December 31, 2015, we paid monthly base rent of $51,000 representing 22,000 square feet rather than 44,000 square feet. Beginning on January 1, 2016, base rent increased to $105,000 per month and will increase by approximately 3% annually on every October 1 thereafter.

In addition to monthly base rent, we pay all real estate taxes, insurance and the cost of maintenance, repair and replacement of the leased premises. During the first 15 months of the lease term, we will pay only 50% of the real estate taxes assessed on the premises provided that we are not in default in performing its obligations under the lease beyond any notice and cure periods. However, if any improvements or alterations to the premises that we construct or add are assessed for real property tax purposes at a valuation higher than the valuation of the improvements on the premises on the date it signed the lease, we will pay 100% of the taxes levied on the excess assessed valuation.

Item 3. Legal Proceedings

From time to time, we may be involved in routine litigation incidental to the conduct of our business. We are not presently involved in any material litigation or proceedings, and to our knowledge no such litigation or proceedings are contemplated.

Item 4. Mine Safety Disclosures

Not applicable

PART II

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

Our Series A Shares have been traded on the NYSE MKT under the symbol "AST" since October 7, 2014. The following table sets forth the range of high and low closing prices for our Series A Shares during 2016 and 2015 as reported by the NYSE MKT. We do not have any shares of our Series B common stock outstanding.

Quarter Ended	High	Low
Period		
2015		
March 31, 2015	$ 8.65	$ 3.30
June 30, 2015	$ 14.77	$ 3.70
September 30, 2015	$ 5.92	$ 3.48
December 31, 2015	$ 5.45	$ 3.78
2016		
March 31, 2016	$ 5.49	$ 2.60
June 30, 2016	$ 4.75	$ 2.35
September 30, 2016	$ 4.75	$ 2.58
December 31, 2016	$ 5.65	$ 3.00

As of March 21, 2017, we had 520 holders of record of our Series A Shares.

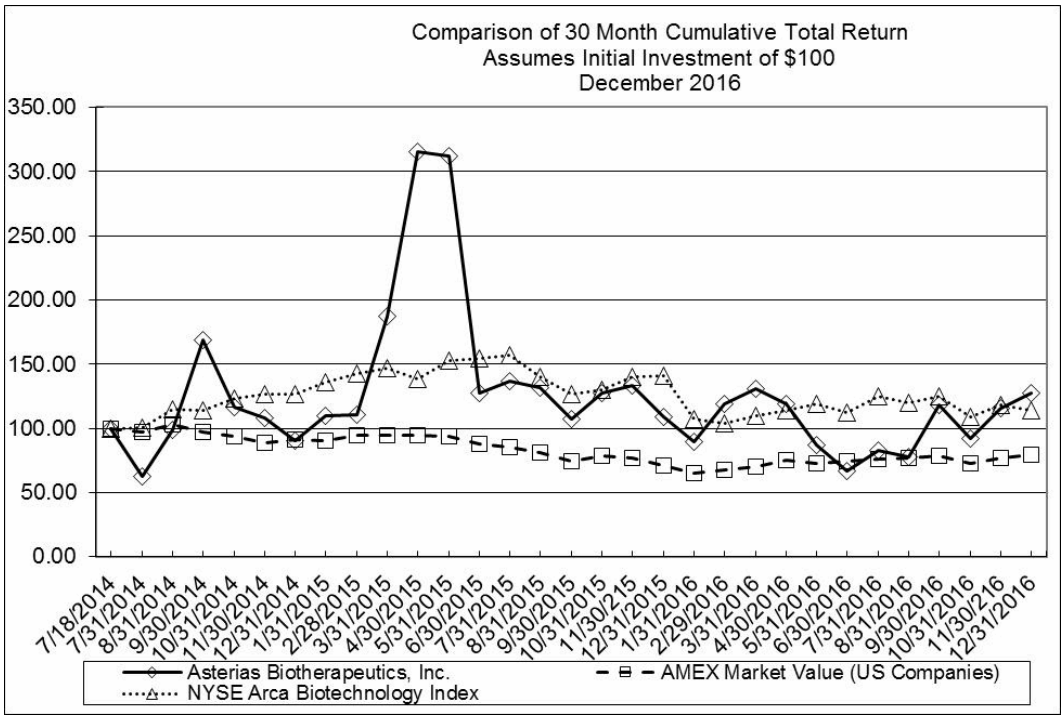
Dividend Policy

We have never paid cash dividends on our capital stock and we do not anticipate paying cash dividends in the foreseeable future, but intend to retain our capital resources for reinvestment in our business. Any future determination to pay cash dividends will be at the discretion of our Board of Directors and will be dependent upon our financial condition, results of operations, capital requirements and other factors as our Board of Directors deems relevant.

Performance Measurement Comparison [(1)]

The following graph compares total stockholder returns of Asterias Biotherapeutics, Inc. for the last thirty months beginning July 18, 2014 to two indices: the NYSE Amex Market Value – U.S. Companies (Amex Market Value) and the NYSE Arca Biotechnology Index (NYSE Arca Biotechnology Index). The total return for our stock and for each index assumes the reinvestment of dividends, although we have never declared dividends on our capital stock, and is based on the returns of the component companies weighted according to their capitalizations as of the end of each quarterly period. The NYSE Amex Market Value tracks the aggregate price performance of equity securities of U.S. companies listed therein. The NYSE Arca Biotechnology Index represents biotechnology companies, trading on NYSE MKT under the Standard Industrial Classification (SIC) Code Nos. 283 (Drugs) and 382 (Laboratory Apparatus and Analytical, Optical) main categories (2834:Pharmaceutical Preparations; 2835: Diagnostic Substances; 2836: Biological Products; 3826: Laboratory Analytical Instruments; and 3829: Measuring & Controlling Devices). Our common stock trades on the NYSE MKT and is a component of the NYSE Amex Market Value – US Companies.

Asterias Biotherapeutics, Inc., the Amex Market Value and Amex Biotechnology Index(2)



(1) This Section is not "soliciting material," is not deemed "filed" with the SEC and is not to be incorporated by reference in any filing of Asterias Biotherapeutics under the Securities Act of 1933, or the Securities Exchange Act of 1934, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

(2) Shows the cumulative total return on investment assuming an investment of $100 in each of Asterias Biotherapeutics, Inc., the Amex Market Value and NYSE Arca Biotechnology Index on July 18, 2014. The cumulative total return on our common stock has been computed based on a price of $3.60 per share, the price at which our shares closed on July 18, 2014, which is the date our common stock was initially listed on a the NYSE MKT.

Item 6. Selected Financial Data

The following Selected Financial Data should be read in conjunction with "Item 7 – Management's Discussion and Analysis of Financial Condition and Results of Operations" and "Item 8 – Financial Statements and Supplementary Data" included elsewhere in this Annual Report on Form 10-K.

	Year Ended December 31,				
Statement of Operations Data:	**2016**	**2015**	**2014**	**2013**	**2012**
(in thousands, except per share data)					
REVENUES:					
Grant income	$ 6,572	$ 3,007	$ 1,035	$ -	$ -
Sale of cell lines	-	40	-	-	-
License revenue	125	-	-	-	-
Royalties from product sales	257	535	189	-	-
Total revenues	6,954	3,582	1,224	-	-
Cost of sales	(128)	(268)	(95)	-	-
Total gross profit	6,826	3,314	1,129	-	-
OPERATING EXPENSES:					
Research and development	(25,467)	(17,321)	(13,310)	(4,319)	-
Acquired in-process research and development[1]	-	-	-	(17,459)	-
General and administrative	(15,482)	(7,901)	(5,280)	(3,883)	(759)
Total operating expenses	(40,949)	(25,222)	(18,590)	(25,661)	(759)
Loss from operations	(34,123)	(21,908)	(17,461)	(25,661)	(759)
OTHER INCOME/(EXPENSES):					
Loss from change in fair value of warrant liability	(3,108)	-	-	-	-
Interest expense, net	(546)	(341)	(10)	(2)	-
Other income (expense), net	(37)	(6)	(2)	2	-
Total other expenses, net	(3,691)	(347)	(12)	-	-
LOSS BEFORE INCOME TAX BENEFIT	(37,814)	(22,255)	(17,473)	(25,661)	(759)
Deferred income tax benefit	2,325	7,252	7,376	3,281	-
NET LOSS	$ (35,489)	$ (15,003)	$ (10,097)	$ (22,380)	$ (759)
BASIC AND DILUTED NET LOSS PER SHARE	$ (0.83)	$ (0.42)	$ (0.33)	$ (2.90)	$ (14.60)
WEIGHTED AVERAGE SHARES OUTSTANDING: BASIC AND DILUTED	42,934	35,443	30,720	7,726	52

(1) Represents the value of research and development projects acquired by Asterias from Geron under the Asset Contribution Agreement.

	As of December 31,				
Balance Sheet Data[2]:	**2016**	**2015**	**2014**	**2013**	**2012**
(in thousands)					
Cash and cash equivalents	$ 19,800	$ 11,183	$ 3,076	$ 2,171	$ -
Total assets	61,010	57,234	44,114	80,354	4
Total liabilities	18,982	12,135	11,483	26,573	761
Accumulated deficit	(83,728)	(48,239)	(33,236)	(23,139)	(759)
Total stockholders' equity (deficit)	42,028	45,099	32,631	53,780	(757)

(2) Balance Sheet Data as of December 31, 2015, 2014, 2013 and 2012 have been retroactively adjusted for the early adoption of ASU 2015-17, *Income Taxes: Balance Sheet Classification of Deferred Taxes* (see Note 10 to our financial statements included in Item 8).

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

The following Management's Discussion and Analysis of Financial Condition and Results of Operations is intended to provide information necessary to understand our audited financial statements for the years ended December 31, 2016, 2015 and 2014, and highlight certain other information which, in the opinion of management, will enhance a reader's understanding of our financial condition, changes in financial condition and results of operations. In particular, the discussion is intended to provide an analysis of significant trends and material changes in our financial position and the operating results of our business during the year ended December 31, 2016 as compared to 2015 and during the year ended December 31, 2014. This discussion should be read in conjunction with our financial statements for the three year period ended December 31, 2016 and related notes included elsewhere in this Annual Report on Form 10-K. These historical financial statements may not be indicative of our future performance. This Management's Discussion and Analysis of Financial Condition and Results of Operations contains a number of forward-looking statements, all of which are based on our current expectations and could be affected by the uncertainties and risks described throughout this filing, particularly in "Item 1A. Risk Factors."

Critical Accounting Policies and Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States ("GAAP") requires management to make estimates and assumptions that affect the reported amounts in our financial statements and related notes. Our significant accounting policies are described in Note 2 to our financial statements included in Item 8 of this Annual Report. We have identified below our critical accounting policies and estimates that we believe require the greatest amount of judgment. On an ongoing basis, we evaluate estimates which are subject to significant judgment, including those related to the going concern assessment of our financial statements, useful lives associated with long-lived assets, including evaluation of asset impairment, loss contingencies, deferred income taxes and tax reserves, including valuation allowances related to deferred income taxes, and assumptions used to value stock-based awards, liability or other equity instruments. Actual results could differ materially from those estimates. On an ongoing basis, we evaluate our estimates compared to historical experience and trends which form the basis for making judgments about the carrying value of assets and liabilities. To the extent that there are material differences between our estimates and our actual results, our future financial statement presentation, financial condition, results of operations and cash flows will be affected.

We believe the assumptions and estimates associated with the following have the greatest potential impact on our financial statements.

Going concern assessment – With the implementation of FASB's new standard on going concern, ASU No. 2014-15, beginning with the year ended December 31, 2016 and all annual and interim periods thereafter, we will assess going concern uncertainty for our financial statements to determine if we have sufficient cash and cash equivalents on hand and working capital to operate for a period of at least one year from the date the financial statements are issued or are available to be issued, which is referred to as the "look-forward period" as defined by ASU No. 2014-15. As part of this assessment, based on conditions that are known and reasonably knowable to us, we will consider various scenarios, forecasts, projections, and estimates, and we will make certain key assumptions, including the timing and nature of projected cash expenditures or programs, and our ability to delay or curtail those expenditures or programs, among other factors, if necessary, within the look-forward period in accordance with ASU No. 2014-15.

Revenue recognition – We comply with ASC 605-10 and record revenue when persuasive evidence of an arrangement exists, delivery has occurred or services have been rendered, the price is fixed or determinable, and collectability is reasonably assured. Grant income is recognized as revenue when the related research and development expenses are incurred. Royalty revenues consist of royalty payments on sales of products under license agreements. We recognize revenue in the quarter in which the royalty reports are received rather than the quarter in which the sales took place. When we are entitled to receive up-front nonrefundable licensing or similar fees pursuant to agreements under which we have no continuing performance obligations, the fees are recognized as revenues when collection is reasonably assured. When we receive up-front nonrefundable licensing or similar fees pursuant to agreements under which we do have continuing performance obligations, the fees are deferred and amortized ratably over the performance period. If the performance period cannot be reasonably estimated, we amortize nonrefundable fees over the life of the contract until such time that the performance period can be more reasonably estimated. Milestone payments, if any, related to scientific or technical achievements, subject to substantial uncertainty are recognized in income when the milestone is accomplished if (a) substantive effort was required to achieve the milestone, (b) the amount of the milestone payment appears reasonably commensurate with the effort expended, and (c) collection of the payment is reasonably assured.

Available-for-sale securities, at fair value – Marketable equity and debt securities not classified as held-to-maturity are classified as available-for-sale. Available-for-sale securities are carried at fair value, with the unrealized gains and losses, net of tax, reported in other comprehensive income or loss. Realized gains and losses, and declines in value judged to be other-than-temporary related to equity securities, are included in other income/(expense), net.

We account for the BioTime and OncoCyte shares we hold as available-for-sale equity securities in accordance with ASC 320-10-25, *Investments-Debt and Equity Securities*, as the shares have a readily determinable fair value quoted on the NYSE MKT and are held principally for future working capital purposes, as necessary. These shares are measured at fair value and reported as current assets on the balance sheet based on the closing trading price of the security as of the date being presented (see Note 4 to our financial statements included in Item 8). Unrealized holding gains and losses are excluded from the statements of operations and reported in equity as part of other comprehensive income or loss until realized.

Realized gains and losses on sale of BioTime shares prior to May 13, 2016, were reclassified out of other comprehensive income or loss and included in equity, as an increase or decrease in additional paid-in capital consistent with, and pursuant to, ASC 805-50, *Transactions Between Entities Under Common Control*. Beginning on May 13, 2016, due to the deconsolidation of our financial statements from BioTime and loss of control experienced by BioTime on us, as discussed in Note 1 to our financial statements included in Item 8, realized gains and losses, and declines in value judged to be other-than-temporary related to equity securities, are included in other income/(expense), net. For OncoCyte shares we hold, realized gains and losses, and declines in value judged to be other-than-temporary related to equity securities, are included in other income/(expense), net.

We review various factors in determining whether it should recognize an other-than-temporary impairment charge for its available-for-sale securities, including its intent and ability to hold the investment for a period of time sufficient for any anticipated recovery in market value, and the length of time and extent to which the fair value has been less than its cost basis. Based on consideration of these factors, as of December 31, 2016 and 2015, no other-than-temporary impairment was recognized.

Long-lived intangible assets – Long-lived intangible assets, consisting primarily of acquired patents, patent applications, and licenses to use certain patents are stated at acquired cost, less accumulated amortization. Amortization expense is computed using the straight-line method over the estimated useful lives of the assets, generally over 10 years.

Impairment of long-lived assets – Long-lived assets, including long-lived intangible assets, will be reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be fully recoverable. If an impairment indicator is present, Asterias evaluates recoverability by a comparison of the carrying amount of the assets to future undiscounted net cash flows expected to be generated by the assets. If the assets are impaired, the impairment will be recognized and measured by the amount by which the carrying amount exceeds the estimated fair value of the assets.

Accounting for warrants – We determine the accounting classification of warrants that are issued, as either liability or equity, by first assessing whether the warrants meet liability classification in accordance with ASC 480-10, *Accounting for Certain Financial Instruments with Characteristics of both Liabilities and Equity*, and then in accordance with ASC 815-40, *Accounting for Derivative Financial Instruments Indexed to, and Potentially Settled in, a Company's Own Stock*. Under ASC 480, warrants are considered liability classified if the warrants are mandatorily redeemable, obligate the issuer to settle the warrants or the underlying shares by paying cash or other assets, or warrants that must or may require settlement by issuing variable number of shares. If warrants do not meet liability classification under ASC 480-10, we assess the requirements under ASC 815-40, which states that contracts that require or may require the issuer to settle the contract for cash are liabilities recorded at fair value, irrespective of the likelihood of the transaction occurring that triggers the net cash settlement feature. If the warrants do not require liability classification under ASC 815-40, in order to conclude equity classification, we assess whether the warrants are indexed to our common stock and whether the warrants are classified as equity under ASC 815-40 or other applicable GAAP. After all relevant assessments are made, we conclude whether the warrants are classified as liability or equity. Liability classified warrants are required to be accounted for at fair value both on the date of issuance and on subsequent accounting period ending dates, with all changes in fair value after the issuance date recorded in the statements of operations as a gain or loss. Equity classified warrants are accounted for at fair value on the issuance date with no changes in fair value recognized subsequent to the issuance date.

We have issued warrants that are classified as equity and as a liability (see Note 6 to our financial statements included in Item 8).

Research and development – Research and development expenses consist of costs incurred for company-sponsored, collaborative and contracted research and development activities. These costs include direct and research-related overhead expenses including salaries, payroll taxes, consulting fees, research and laboratory fees, rent of research facilities, amortization of intangible assets, patent applications and prosecutions, license fees paid to third parties to acquire patents or licenses to use patents and other technology. We expense research and development costs as incurred. Research and development expenses incurred and reimbursed under grants approximate the grant income recognized in the statements of operations.

Income taxes – As of October 1, 2013, we filed our own U.S. federal tax returns. Operations prior to that period were included in BioTime's consolidated U.S. federal tax return. For California purposes our activity through May 12, 2016 was included in BioTime's combined tax return. Activity from May 13, 2016 on will be included in Asterias' separate California income tax return filing due to the deconsolidation of us from BioTime as of that date. We account for income taxes in accordance with ASC 740, *Income Taxes*, which prescribes the use of the asset and liability method, whereby deferred tax asset or liability account balances are calculated at the balance sheet date using current tax laws and rates in effect. Valuation allowances are established when necessary to reduce deferred tax assets when it is more likely than not that a portion or all of the deferred tax assets will not be realized. The guidance also prescribes a recognition threshold and a measurement attribute for the financial statement recognition and measurement of tax positions taken or expected to be taken in a tax return. For those benefits to be recognized, a tax position must be more-likely-than-not sustainable upon examination by taxing authorities. For federal purposes we are no longer subject to tax examination for years before 2013. For California purposes we are subject to income tax examinations by tax authorities for all years since inception. Although the statute is closed for purposes of assessing additional income and tax in those years, the taxing authorities may still make adjustments to the net operating loss and credit carryforwards used in open years. Therefore, the statute should be considered open as it relates to the net operating loss and credit carryforwards. We recognize accrued interest and penalties related to unrecognized tax benefits as income tax expense. No amounts were accrued for the payment of interest and penalties as of December 31, 2016 and 2015.

As further discussed in Note 10, we adopted early the provisions of Accounting Standards Update, ASU 2015-17, *Income Taxes (Topic 740): Balance Sheet Classification of Deferred Taxes*, on a retrospective basis.

Stock-based compensation – We account for share-based payments in accordance with ASC 718, *Compensation – Stock Compensation,* which require the measurement and recognition of compensation expense for all share-based payment awards made to directors and employees, including employee stock options, based on estimated fair values less estimated forfeitures. Consistent with those guidelines, we utilize the Black-Scholes-Merton option pricing model. Our determination of fair value of share-based payment awards on the date of grant using that option-pricing model is affected by our stock price as well as by assumptions regarding a number of complex and subjective variables. These variables include, but are not limited to, our expected stock price volatility over the term of the awards; the expected term of options granted; and a risk-free rate based on the U.S. Treasury rates in effect during the corresponding expected term of the grant. The expected term is derived from a combination of our own historical experience, to the extent available, and using the simplified method under SEC *Staff* Accounting *Bulletin* Topic 14, as applicable. We recognize stock-based compensation on a straight-line basis, net of estimated forfeitures, over the requisite service period.

We also, at times, issue restricted stock or restricted stock units (RSUs) to our executive officers, employees, and members of our Board of Directors (the Board), which are restricted and unvested common shares issued or shares issuable as RSUs vest. Restricted stock and RSU compensation expense is recognized on a straight-line basis over the requisite service period of generally four years, based on the grant-date fair value of the stock. Restricted stock is considered legally issued and outstanding on the grant date, while RSUs are not until RSUs vest. Once the RSUs are vested, equivalent common shares will be issued or issuable to the grantee and therefore the RSUs are not included in total common shares issued and outstanding until vested.

Stock-based compensation expense for non-employee stock-based awards is recognized in accordance with ASC 718 and ASC 505-50, *Equity-Based Payments to Non-Employees* ("ASC 505-50"). Stock option awards issued to non-employees, principally consultants and employees of BioTime or employees of BioTime subsidiaries who perform services for us, are accounted for at fair value using the Black-Scholes-Merton option pricing model. Management believes that the fair value of the stock options is more reliably measured than the fair value of services received. We record compensation expense based on the then-current fair values of the stock options at each financial reporting date. Compensation expense recorded during the service period is adjusted in subsequent periods for changes in the fair value of the stock options until the earlier of the date at which the non-employee's performance is complete or a performance commitment is reached, which is generally when the stock option award vests. Compensation expense for non-employee grants is recorded on a straight-line basis in the statements of operations.

Fair value of financial instruments – ASC 820*, Fair Value Measurements*, clarifies that fair value is an exit price, representing the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or liability.

ASC 820 requires that the valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. ASC 820 establishes a three tier value hierarchy, which prioritizes inputs that may be used to measure fair value as follows:

- Level 1 – Observable inputs that reflect quoted prices for identical assets or liabilities in active market.
- Level 2 – Observable inputs other than Level 1 prices such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.
- Level 3 – Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities.

The carrying amounts of current assets and current liabilities approximate their fair value because of the relatively short period until they mature or are required to be settled, except for money market funds and the investment in BioTime and OncoCyte shares, which are carried at fair value based on Level 1 inputs, and warrant liability which is carried at fair value based on Level 3 inputs (see Note 6 to our financial statements included in Item 8 for a discussion on the valuation of warrants classified as liabilities).

Results of Operations

Comparison of Years Ended December 31, 2016, 2015 and 2014

For the years ended December 31, 2016, 2015 and 2014 we recorded net losses of $35.5 million, $15.0 million and $10.1 million, respectively.

Revenues

The following table shows certain information about our revenues for the years ended December 31, 2016, 2015 and 2014 (in thousands):

	Year Ended December 31,		
	2016	2015	2014
Grant income	$ 6,572	$ 3,007	$ 1,035
Sale of cell lines	-	40	-
License revenue	125	-	-
Royalties from product sales	257	535	189
Total revenues	6,954	3,582	1,224
Cost of sales	(128)	(268)	(95)
Total gross profit	$ 6,826	$ 3,314	$ 1,129

Grant income in 2016 is entirely from the NGA with CIRM which awarded us a $14.3 million grant for clinical development of our product, AST-OPC1. Asterias received $0.9 during 2014 and $5.6 million during 2015. During 2016, we received an additional $6.2 million under the NGA with approximately $1.5 million expected upon further clinical milestone achievements. Revenues pursuant to the NGA recognized during the fiscal years ended December 31, 2016 and 2015 were $6.6 million and $3.0 million, respectively. Although the cash payments from CIRM are dependent on achieving certain milestones pursuant to the contract with CIRM, we recognize grant income as related research expenses are incurred.

Our royalty revenues from product sales is entirely from non-exclusive license agreements with Stem Cell Technologies, Inc., Corning Life Science, Life Tech, and Millipore which we assumed as part of the consideration received from Geron under the Asset Contribution Agreement. Our other licensing revenue in 2016 comes from the licensing of certain intellectual property that is unrelated to our core development programs to third parties.

Operating Expenses

The following table shows our operating expenses for the years ended December 31, 2016, 2015 and 2014 (in thousands):

	Year Ended December 31,		
	2016	2015	2014
Research and development expenses	$ 25,467	$ 17,321	$ 13,310
General and administrative expenses	15,482	7,901	5,280

Research and development expenses – Research and development expenses increased by approximately $8.2 million to $25.5 million for the year ended December 31, 2016 compared to $17.3 million for the year ended December 31, 2015. The increase in research and development expenses for the fiscal year ended December 31, 2016 compared to the same period in 2015 is primarily attributed to the following: an increase of $4.4 million in salaries, bonuses and stock based compensation expense due to an increase in headcount related to hiring personnel to support our AST-OPC1 program; a $0.9 million increase in scientific and related consulting services; a $0.8 million increase in clinical laboratory supplies for our laboratory and production facility in Fremont; a $0.7 million increase in outside service fees related to analytical testing; a $0.6 million increase in vendor fees related to process development activities for our AST-VAC1 program; a $0.5 million increase in clinical trial costs associated with our Phase 1/2a study for the AST-OPC1 program and a $0.5 million increase in depreciation expense.

Research and development expenses increased by approximately $4 million to $17.3 million for the year ended December 31, 2015 compared to $13.3 million for the year ended December 31, 2014. The increase in research and development expense during 2015 is primarily attributed to an increase of $2.7 million in salaries and stock based compensation related expenses, an increase of $1.5 million in clinical trial monitoring and protocols expenses associated with our Phase 1/2a study for AST-OPC1 program, an increase of $0.6 million for scientific vendors outside services, an increase of $0.3 million in patent legal expense, an increase of $0.2 million in scientific and related consulting expense, an increase of $0.2 million in utilities due to moving to the larger Fremont facility, and an increase of $0.2 million in recruiting expense. The increases were offset primarily by a decrease of $2.1 million in amortization of intangible assets.

General and administrative expenses – General and administrative expenses increased by approximately $7.6 million to $15.5 million for the year ended December 31, 2016 compared to $7.9 million for the year ended December 31, 2015. The increase in general and administrative expenses in 2016 is primarily attributed to the following: an increase of $5.3 in shareholder warrant distribution expense; an increase of $3.3 million in salaries, bonuses, stock based compensation, severance and related expenses; and an increase of $0.2 million in depreciation expense. These increases were in part offset by a decrease of $1.5 million in general and administrative expenses related to consulting services and tax payments.

General and administrative expenses increased by approximately $2.6 million to $7.9 million for the year ended December 31, 2015 compared to $5.3 million for the year ended December 31, 2014. The increase in general and administrative expenses is primarily attributed to the following: an increase of $1.4 million in compensation and stock based compensation to consultants; an increase of $0.5 million in legal expense; an increase of $0.3 million in audit and tax related services; an increase of $0.3 million in investor and public relations expense; an increase of $0.3 million in stock based compensation for outside directors; an increase of $0.2 million in recruiting fees; and an increase of $0.1 million in travel related expenses. Those increases were in part offset by a decrease of $0.8 million in salaries, bonuses, stock based compensation, severance and related expenses.

Other income and expenses, net

Other income and expenses, net, is mainly comprised of our liability classified warrants issued in May 2016, as discussed in Note 6 to our financial statements. These warrants are recorded at fair value with all changes in fair value included in our statements of operations. Increases in fair value are recognized as noncash losses and decreases are recognized as noncash gains included in other income and expenses, net. For the year ended December 31, 2016 and 2015, we generated other expenses, net, of $3.7 million and $0.3 million, respectively, the increase principally due to the $3.1 million loss recognized from these warrants in 2016.

Income Taxes

We recorded a deferred income tax benefit of approximately $2.3 million for the year ended December 31, 2016 related to a federal tax benefit. No state tax provision or benefit was recorded for year ended December 31, 2016. A deferred income tax benefit of $7.3 million was recorded for the year ended December 31, 2015, of which $7.4 million was related to federal taxes and $0.1 million was related to state taxes. A deferred income tax benefit of $7.4 million was recorded for the year ended December 31, 2014, of which $5.2 million was related to federal taxes and $2.2 million was related to state taxes.

As of December 31, 2015, we did not have any valuation allowance on our federal deferred tax assets since our deferred tax liabilities exceeded our deferred tax assets as of that date. Our deferred tax liabilities are primarily related to our acquisition of certain intellectual property and available for sale securities held in BioTime and OncoCyte common stock, and are a source of taxable income for our deferred tax assets. During the year ended December 31, 2016, as we continued to generate net operating losses and our deferred tax assets exceeded our deferred tax liabilities, we established a full valuation allowance for federal deferred tax assets as of December 31, 2016. For the California deferred tax assets, we established a valuation allowance as of December 31, 2016 and 2015. Accordingly, our current year deferred income tax benefit was limited to the $2.3 million net deferred tax liability balance as of December 31, 2015. Due to the full valuation allowance on our federal and California deferred tax assets as of December 31, 2016, we do not expect to record an income tax provision or benefit so long as our deferred tax assets continue to exceed our deferred tax liabilities.

Liquidity and Capital Resources

The following table shows our liquidity and capital resources for the years ended December 31, 2016 and 2015 (in thousands):

	December 31,	
	2016	2015
Cash and cash equivalents	$ 19,800	$ 11,183
Available-for-sale securities, at fair value	15,269	17,006

At December 31, 2016, we had $35.1 million of cash, cash equivalents and available for sale securities compared to $28.2 million at December 31, 2015. The increase in cash, cash equivalents and available-for-sale securities was primarily due to a financing completed in May 2016, additional funds received under the NGA and proceeds received from sales of our Series A common shares in at-the-market transactions partially offset by operational expenditures.

We may raise capital from time to time through the sale of our Series A common shares or other securities, or the sale of our BioTime or OncoCyte common shares. We may sell our Series A common shares or other securities in public offerings registered under the Securities Act of 1933, as amended (the "Securities Act"), by use of the at-the-market issuance sales agreement ("ATM" or "Sales Agreement") in place with MLV & Co. LLC ("MLV"), or in private placements to select investors. We may sell some or all of our BioTime common shares and OncoCyte common shares by any method permitted by law, including in privately negotiated transactions. The prices at which we may issue and sell our Series A common shares or other securities and our BioTime common shares in the future are not presently determinable and will depend upon many factors, including prevailing prices for those securities in the public market.

As of March 21, 2017, we have the following outstanding warrants to purchase shares of our Series A common stock:

	Outstanding warrants:		
	Warrants	Exercise Price	Expiration Date
Warrants Group 1 (Not publicly traded)	409,152	$ 4.28	September 29, 2017
Warrants Group 2 (Publicly traded)	3,329,002	5.00	September 29, 2017
Warrants Group 3 (Not publicly traded)	2,813,159	4.37	May 13, 2021

There can be no assurance that any of these warrants will be exercised but to the extent warrants are exercised we will receive proceeds from the exercise of such warrants.

We have been awarded $14.3 million under the NGA from CIRM to help fund our clinical development of AST-OPC1. We have received $12.8 million through December 31, 2016. We expect to receive the remaining $1.5 million in 2017 upon achieving a clinical milestone related to the enrollment of the current AST-OPC1 clinical study.

Pursuant to the CRUK Agreement, CRUK has agreed to fund Phase 1/2 clinical development of our AST-VAC2 product candidate. We have completed process development and manufacturing scale-up of the AST-VAC2 manufacturing process and transferred the resulting cGMP-compatible process to CRUK. CRUK will, at its own cost, manufacture clinical grade AST-VAC2 and will carry out the Phase 1/2 clinical trial of AST-VAC2 in cancer patients both resected early-stage and advanced forms of lung cancer.

We plan to use the cash we have available for general corporate purposes, including to fund our ongoing clinical programs, to develop certain of our product candidates and technology, to acquire new stem cell products and technology through licenses or similar agreements from other companies, and to defray overhead expenses and to pay general and administrative expenses. We expect to continue to incur operating losses and negative cash flows.

At December 31, 2016, we had an accumulated deficit of $83.7 million, working capital of $30.9 million and stockholders' equity of $42.0 million. We have evaluated our projected cash flows and believe that our cash and cash equivalents of $19.8 million and our available for sale securities of $15.3 million as of December 31, 2016 will be sufficient to fund our operations through at least twelve months from the issuance date of the financial statements included in Item 8, or at least through March 31, 2018. If we were to lose our grant funding, if we are unable to obtain additional grant funding to support future trials, if the value of our available for sale securities were to decrease, or if we are unable to obtain future adequate financing for our clinical trials, then we may be required to delay, postpone, or cancel our clinical trials or limit the number of clinical trial sites, or otherwise reduce or curtail our operations. Future financings, if necessary, may not be available to us at acceptable terms, or if at all. Sales of additional equity securities would result in the dilution of interests of current shareholders.

Cash Flows

Cash used in operations

During the year ended December 31, 2016, our total research and development expenses were $25.5 million and our general and administrative expenses were $15.5 million. Net loss for the year ended December 31, 2016 amounted to $35.5 million. Our sources of cash from operations during 2016 primarily consisted of $257,000 from royalty revenues on product sales by licensees, $125,000 from license revenue and grant payments of $6.6 million from CIRM. As of December 31, 2016 and 2015, we had a working capital of $30.9 million and $24.8 million, and an accumulated deficit of $83.7 million and $48.2 million, respectively.

Net cash used in operating activities during the year ended December 31, 2016 amounted to $19 million. The difference between the net loss and net cash used in operating activities during the year ended December 31, 2016 was primarily attributable to the following noncash items: the distribution of warrants to our shareholders of $5.3 million, stock-based compensation paid to employees of $4.8 million, noncash loss on warrant liability for mark to market adjustment of $3.1 million, amortization of intangible assets of $2.7 million, depreciation expense of $1.2 million, and $0.9 million related to issuance of common stock for services, offset by the deferred tax benefit of $2.3 million.

Net cash used in operating activities during the year ended December 31, 2015 amounted to $12.4 million. The difference between the net loss and net cash used in operating activities during the year ended December 31, 2015 was primarily attributable to the following noncash items: stock-based compensation paid to employees of $3.6 million, amortization of intangible assets of $2.7 million, deferred grant income of $2.5 million, an increase in accrued expenses of $0.6 million, depreciation expense of $0.6 million, and shares issued to a vendor for services of $0.5 million. The difference was primarily offset by our deferred income tax benefit of $7.2 million and decreases in prepaid expenses and other current assets of $0.7 million.

Investing and financing activities

Net cash used in investing activities during the year ended December 31, 2016 amounted to $0.9 million. In 2016, we paid $894,000 for property, plant and equipment including tenant improvements and other fixed assets.

Net cash used in investing activities during the year ended December 31, 2015 amounted to $4.6 million. During the year ended December 31, 2015, we used $4.3 million in cash to pay for construction in progress for our Fremont facility and $0.3 million to purchase equipment.

Net cash provided by financing activities during the year ended December 31, 2016 amounted to $28.5 million and resulted from the following:

- In May 2016, Asterias completed the sale and the underwriters' exercise of the overallotment for 5,889,480 shares of its common stock and warrants to purchase 2,959,559 shares of its common stock, through the Asterias Offering, for $3.40 per unit, or net proceeds to Asterias of $18.2 million from the Asterias Offering.

- In 2016, we raised approximately $8.0 million in gross proceeds under our ATM from the sale of 1,811,522 shares of our common stock at a weighted average price of $4.40 per share.

- During 2016, we received $567,000 from our landlord on reimbursable construction in progress financed by the landlord. In addition, we received $2.0 million from the exercise of stock options, offset by payments made for the landlord liability and capital lease obligations of $0.4 million.

- In December 2016, we raised approximately $651,000 from the exercise of warrants to purchase our common stock.

Net cash provided by financing activities during the year ended December 31, 2015 amounted to $25.1 million and resulted from the following:

- In May 2015, we received $11.7 million from the exercise of 5,000,000 warrants to purchase our common stock.
- In February 2015, we raised approximately $5.5 million in aggregate gross proceeds from the sale of 1,410,255 shares of our common stock at a price of $3.90 per share through an underwritten public offering and a private placement.
- During 2015, we raised approximately $4.8 million in gross proceeds under our ATM from the sale of 685,465 shares of our common stock at a weighted average price of $7.01 per share.
- During year ended December 31, 2015, we incurred financing costs of $0.7 million.
- We also received $3.8 million from our landlord on reimbursable construction in progress.

Contractual Obligations

As of December 31, 2016, our contractual obligations for the next five years and thereafter were as follows (in thousands):

	Payments Due by Period				
Contractual Obligations (1)	**Total**	**Less Than 1 Year**	**1-3 Years**	**4-5 Years**	**After 5 Years**
Operating leases (2)	$ 8,077	$ 1,309	$ 2,734	$ 2,904	$ 1,130
Capital lease (3)	31	8	16	7	-
Total Contractual Obligations	$ 8,108	$ 1,317	$ 2,750	$ 2,911	$ 1,130

(1) This table does not include payments to key employees that could arise if they were involuntarily terminated or if their employment terminated following a change in control.

(2) Includes the lease of our principal office and laboratory facilities in Fremont, California, including the lease liability (see Note 8 to our financial statements included in Item 8).

(3) Includes one capital lease for phone equipment.

Off-Balance Sheet Arrangements

As of December 31, 2016 and 2015, we did not have any off-balance sheet arrangements, as defined in Item 303(a)(4)(ii) of SEC Regulation S-K.

Item 7A. Quantitative and Qualitative Disclosures about Market Risk

Foreign Currency Exchange Risk

We are not presently exposed in a significant degree to foreign exchange currency risks because we are not otherwise conducting international business at this time, and we do not engage in foreign currency hedging activities. If we engage in international transactions, we will need to translate foreign currencies into U.S. dollars for reporting purposes, and currency fluctuations could have a greater impact on our financial results.

Credit Risk

We place some of our cash in U.S. banks and invest most of our cash in money market funds. Deposits with banks may temporarily exceed the amount of insurance provided on such deposits. We will monitor the cash balances in the accounts and adjust the cash balances as appropriate, but if the amount of a deposit at any time exceeds the federally insured amount at a bank, the uninsured portion of the deposit could be lost, in whole or in part, if the bank were to fail. Our investments in money market funds are not insured or guaranteed by the United States government or any of its agencies.

Interest Rate Risk

We invest most of our cash in money market funds. The primary objective of our investments will be to preserve principal and liquidity while earning a return on our invested capital, without incurring significant risks. Our future investment income is not guaranteed and may fall short of expectations due to changes in prevailing interest rates, or we may suffer losses in principal if the net asset value of a money market fund falls below $1 per share.

Market Risk

At December 31, 2016 we hold 3,852,880 shares of BioTime common stock and 192,644 shares of OncoCyte common stock. These shares are classified as available for sale securities and carried at fair value. As a result, the carrying values are subject to changes in the stock price of BioTime and OncoCyte shares. BioTime common stock trades on the NYSE MKT under the ticker “BTX” and OncoCyte common stock trades on the NYSE MKT under the ticker “OCX”. As of December 31, 2016, the 52 week high/low stock price per share range for BioTime and OncoCyte shares were $3.97 - $2.08 and $10.11 - $2.62, respectively.

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
Asterias Biotherapeutics, Inc.

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

We conducted our audits in accordance with the standards of the Public Company Accounting Oversight Board (United States). Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit also includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, 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 financial statements referred to above present fairly, in all material respects, the financial position of Asterias Biotherapeutics, Inc. at December 31, 2016 and 2015, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2016 in conformity with accounting principles generally accepted in the United States of America.

As discussed in Note 10 to the financial statements, in 2016 the Company changed the classification of deferred taxes in the balance sheets due to the adoption of ASU 2015-17, *Balance Sheet Classification of Deferred Taxes*. This change was applied retrospectively to all periods presented.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), Asterias Biotherapeutics, Inc.'s internal control over financial reporting as of December 31, 2016, based on criteria established in Internal Control – Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission and our report dated March 28, 2017 expressed an unqualified opinion thereon.

/s/ OUM & CO. LLP

San Francisco, California
March 28, 2017

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders
Asterias Biotherapeutics, Inc.

We have audited Asterias Biotherapeutics, Inc.'s internal control over financial reporting as of December 31, 2016, based on criteria established in Internal Control – Integrated Framework (2013*)* issued by the Committee of Sponsoring Organizations of the Treadway Commission (the "COSO criteria"). Asterias Biotherapeutics, Inc.'s management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying Item 9A, *Management's Report on Internal Control Over Financial Reporting*. Our responsibility is to express an opinion on the company's internal control over financial reporting based on our audit.

We conducted our audit 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 effective internal control over financial reporting was maintained in all material respects. Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the 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 our opinion, Asterias Biotherapeutics, Inc. maintained, in all material respects, effective internal control over financial reporting as of December 31, 2016, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States), the balance sheets of Asterias Biotherapeutics, Inc. as of December 31, 2016 and 2015, and the related statements of operations, comprehensive loss, stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2016 and our report dated March 28, 2017 expressed an unqualified opinion thereon.

/s/ OUM & CO. LLP

San Francisco, California
March 28, 2017

Item 8. Financial Statements and Supplementary Data

ASTERIAS BIOTHERAPEUTICS, INC.
BALANCE SHEET
(IN THOUSANDS EXCEPT PAR VALUE AMOUNTS)

	December 31, 2016	December 31, 2015 (see Note 10)
ASSETS		
CURRENT ASSETS		
Cash and cash equivalents	$ 19,800	$ 11,183
Available-for-sale securities, at fair value	15,269	17,006
Landlord receivable	-	567
Prepaid expenses and other current assets	1,921	1,033
Total current assets	36,990	29,789
NONCURRENT ASSETS		
Intangible assets, net	18,130	20,816
Property, plant and equipment, net	5,475	5,756
Investment in affiliates	-	416
Other assets	415	457
TOTAL ASSETS	$ 61,010	$ 57,234
LIABILITIES AND STOCKHOLDERS' EQUITY		
CURRENT LIABILITIES		
Amount due to BioTime, Inc.	$ 288	$ 530
Accounts payable	1,076	747
Accrued expenses	2,495	1,183
Capital lease liability, current	7	7
Deferred grant income	2,185	2,513
Total current liabilities	6,051	4,980
LONG-TERM LIABILITIES		
Warrant liability	8,665	-
Capital lease liability, noncurrent	20	26
Deferred tax liabilities, net	-	2,550
Deferred rent liability	266	179
Lease liability	3,980	4,400
TOTAL LIABILITIES	18,982	12,135
Commitments and contingencies (see Note 8)		
STOCKHOLDERS' EQUITY		
Preferred Stock, $0.0001 par value, authorized 5,000 shares; none issued and outstanding	-	-
Common Stock, $0.0001 par value, authorized 75,000 Series A Common Stock and 75,000 Series B Common Stock; 47,567 and 38,228 shares Series A Common Stock issued and outstanding at December 31, 2016 and 2015, respectively; no Series B Common Stock issued and outstanding at December 31, 2016 and 2015	5	4
Additional paid-in capital	126,829	92,900
Accumulated other comprehensive income (loss)	(1,078)	434
Accumulated deficit	(83,728)	(48,239)
Total stockholders' equity	42,028	45,099
TOTAL LIABILITIES AND STOCKHOLDERS' EQUITY	$ 61,010	$ 57,234

The accompanying notes are an integral part of these financial statements.

ASTERIAS BIOTHERAPEUTICS, INC.
STATEMENTS OF OPERATIONS
(IN THOUSANDS, EXCEPT PER SHARE DATA)

	Year Ended December 31,		
	2016	**2015**	**2014**
REVENUES:			
Grant income	$ 6,572	$ 3,007	$ 1,035
Sale of cell lines	-	40	-
License revenue	125	-	-
Royalties from product sales	257	535	189
Total revenues	6,954	3,582	1,224
Cost of sales	(128)	(268)	(95)
Total gross profit	6,826	3,314	1,129
OPERATING EXPENSES:			
Research and development	(25,467)	(17,321)	(13,310)
General and administrative	(15,482)	(7,901)	(5,280)
Total operating expenses	(40,949)	(25,222)	(18,590)
Loss from operations	(34,123)	(21,908)	(17,461)
OTHER INCOME/(EXPENSES):			
Loss from change in fair value of warrant liability	(3,108)	-	-
Interest expense, net	(546)	(341)	(10)
Other expense, net	(37)	(6)	(2)
Total other expenses, net	(3,691)	(347)	(12)
LOSS BEFORE INCOME TAX BENEFIT	(37,814)	(22,255)	(17,473)
Deferred income tax benefit	2,325	7,252	7,376
NET LOSS	$ (35,489)	$ (15,003)	$ (10,097)
BASIC AND DILUTED NET LOSS PER SHARE	$ (0.83)	$ (0.42)	$ (0.33)
WEIGHTED AVERAGE SHARES OUTSTANDING: BASIC AND DILUTED	42,934	35,443	30,720

The accompanying notes are an integral part of these financial statements.

ASTERIAS BIOTHERAPEUTICS, INC.
STATEMENTS OF COMPREHENSIVE LOSS
(IN THOUSANDS)

	Years Ended December 31,		
	2016	2015	2014
NET LOSS	$ (35,489)	$ (15,003)	$ (10,097)
Other comprehensive income (loss), net of tax:			
Unrealized gain/(loss) on available for sale securities, net of taxes	(1,512)	937	2,432
COMPREHENSIVE LOSS	$ (37,001)	$ (14,066)	$ (7,665)

The accompanying notes are an integral part of these financial statements.

ASTERIAS BIOTHERAPEUTICS, INC.
STATEMENT OF STOCKHOLDERS' EQUITY
(IN THOUSANDS)

	Common Stock				Additional Paid-In Capital	Accumulated Other Comprehensive Income (Loss)	Accumulated Deficit	Stockholders' Equity
	Series A		Series B					
	Shares	Amount	Shares	Amount				
Balance as of December 31, 2013	6,538	$ 1	23,961	$ 2	$ 79,851	$ (2,935)	$ (23,139)	$ 53,780
Common stock issued to officer at $2.34 per share	—	—	200	—	468	—	—	468
Sale of BioTime shares	—	—	—	—	(10,366)	—	—	(10,366)
Stock-based compensation expense	—	—	—	—	1,580	—	—	1,580
Restricted stock granted for compensation at $2.34 per share	—	—	200	—	234	—	—	234
Warrants issued to outside investors as part of the sale of 5,000,000 BioTime shares	—	—	—	—	3,184	—	—	3,184
Series B converted to Series A on October 3, 2014	24,361	2	(24,361)	(2)	—	—	—	—
Issuance of common stock upon exercise of stock options	3	—	—	—	8	—	—	8
Deferred tax liability adjustment on BioTime shares	—	—	—	—	(8,592)	—	—	(8,592)
Unrealized gain on available-for-sale securities, net of taxes	—	—	—	—	—	2,432	—	2,432
Net loss	—	—	—	—	—	—	(10,097)	(10,097)
Balance as of December 31, 2014	30,902	3	—	—	66,367	(503)	(33,236)	32,631
Stock-based compensation	145	—	—	—	3,625	—	—	3,625
Shares retired to pay employee taxes	(24)	—	—	—	(98)	—	—	(98)
Unrealized gain on available-for-sale securities, net of deferred tax liability	—	—	—	—	—	937	—	937
Sale of common stock under at-the-market transactions	686	—	—	—	4,839	—	—	4,839
Financing costs to issue common stock	—	—	—	—	(665)	—	—	(665)
Issuance of common stock upon exercise of warrants	5,000	1	—	—	11,700	—	—	11,701
Common stock issued at Private Placement	1,026	—	—	—	4,000	—	—	4,000
Common stock issued in public offering	385	—	—	—	1,500	—	—	1,500
Issuance of common stock upon exercise of stock options	12	—	—	—	29	—	—	29
OncoCyte common stock received as a dividend from BioTime, net of taxes	—	—	—	—	1,117	—	—	1,117
Common stock issued for services	96	—	—	—	486	—	—	486
Net loss	—	—	—	—	—	—	(15,003)	(15,003)
Balance as of December 31, 2015	38,228	4	—	—	92,900	434	(48,239)	45,099
Stock-based compensation	557	—	—	—	4,797	—	—	4,797
Shares retired to pay employee taxes	(37)	—	—	—	(168)	—	—	(168)
Unrealized loss on available-for-sale securities, net of taxes	—	—	—	—	—	(1,512)	—	(1,512)
Sale of common stock under at-the-market transactions	1,812	—	—	—	7,969	—	—	7,969
Financing costs for at-the-market sales	—	—	—	—	(328)	—	—	(328)
Issuance of common stock upon exercise of stock options	827	—	—	—	2,026	—	—	2,026
Issuance of common stock upon exercise of warrants, including fair value of warrants	148	—	—	—	1,102	—	—	1,102
Issuance of common stock in public offering	5,889	1	—	—	14,014	—	—	14,015
Financing costs of public offering	—	—	—	—	(1,275)	—	—	(1,275)
Distribution of warrants to shareholders other than BioTime	—	—	—	—	5,285	—	—	5,285
Common stock issued for services	219	—	—	—	922	—	—	922
Cross-License and Share Transfer with BioTime, net	(76)	—	—	—	(415)	—	—	(415)

Net loss	—	—	—	—	—	—	(35,489)	(35,489)
Balance as of December 31, 2016	47,567	$ 5	—	$ —	$ 126,829	$ (1,078)	$ (83,728)	$ 42,028

The accompanying notes are an integral part of these financial statements.

ASTERIAS BIOTHERAPEUTICS, INC.
STATEMENTS OF CASH FLOWS
(IN THOUSANDS)

	Year Ended December 31,		
	2016	2015	2014
CASH FLOWS FROM OPERATING ACTIVITIES:			
Net loss	$ (35,489)	$ (15,003)	$ (10,097)
Adjustments to reconcile net loss to net cash used in operating activities:			
Depreciation and amortization expense	1,176	564	530
Stock-based compensation	4,797	3,625	1,814
Amortization of intangible assets	2,686	2,686	4,789
Amortization of prepaid rent	-	85	85
Deferred income tax benefit	(2,325)	(7,252)	(7,376)
Common stock issued for services in lieu of cash	922	486	-
Loss from change in fair value of warrant liability	3,108	-	-
Distribution of Asterias warrants to shareholders other than BioTime	5,285	-	-
Changes in operating assets and liabilities:			
Grant receivable	-	118	(118)
Prepaid expenses and other current assets	(887)	(680)	(182)
Other assets	10	(95)	-
Accounts payable	329	(24)	120
Accrued expenses	1,863	584	199
Deferred rent liability	87	85	94
Deferred grant income	(328)	2,513	-
Amount due to BioTime	(242)	(85)	(1,449)
Net cash used in operating activities	(19,008)	(12,393)	(11,591)
CASH FLOWS FROM INVESTING ACTIVITIES:			
Purchase of property, plant and equipment, including leasehold improvements	(894)	(313)	(115)
Payments on construction in progress	-	(4,279)	(219)
Proceeds from the sale of available-for-sale investments	-	-	12,661
Reimbursement (payment) of security deposit, net	31	(1)	(307)
Net cash provided by/(used in) investing activities	(863)	(4,593)	12,020
CASH FLOWS FROM FINANCING ACTIVITIES:			
Proceeds from sale of common shares under at-the-market transactions…	7,969	4,839	-
Financing costs for at-the-market sales	(328)	(157)	-
Proceeds from sale of common shares in public offering	14,014	5,500	468
Proceeds allocated to warrants classified as liabilities	6,009	-	-
Proceeds from exercise of warrants	651	11,700	-
Financing costs for sale of common stock in public offering	(1,275)	(508)	-
Financing costs allocated to warrants classified as liabilities	(550)	-	-
Proceeds from exercises of stock options	2,026	29	8
Repayment of lease liability and capital lease obligation	(427)	(1)	-
Shares retired to pay for employees' taxes	(168)	(98)	-
Reimbursement from landlord on construction in progress	567	3,789	-
Net cash provided by financing activities	28,488	25,093	476
NET INCREASE IN CASH AND CASH EQUIVALENTS	8,617	8,107	905
At beginning of year	11,183	3,076	2,171
At end of year	$ 19,800	$ 11,183	$ 3,076
SUPPLEMENTAL SCHEDULE OF NON-CASH FINANCING AND INVESTING ACTIVITIES:			
OncoCyte common stock received as a dividend in kind from BioTime, net of taxes	$ -	$ 1,117	$ -
Construction in progress in accounts payable and accrued expenses	$ -	$ -	$ 186
Landlord receivable	$ -	$ (189)	$ (378)
Lease liability	$ -	$ 189	$ 378
Cross-License and Share Transfer with BioTime Inc., net	$ 415	$ -	$ -

The accompanying notes are an integral part of these financial statements.

ASTERIAS BIOTHERAPEUTICS, INC.
NOTES TO FINANCIAL STATEMENTS

1. Organization, Basis of Presentation and Liquidity

Asterias Biotherapeutics, Inc. ("Asterias") was incorporated in Delaware on September 24, 2012. Prior to May 13, 2016, Asterias was a majority-owned and controlled subsidiary of BioTime, Inc. ("BioTime"). As further discussed below, on May 13, 2016, BioTime deconsolidated Asterias' financial statements due to BioTime's loss of control of Asterias as defined by generally accepted accounting principles.

Asterias is a biotechnology company focused on the emerging fields of cell therapy and regenerative medicine. Asterias has two core technology platforms. The first is a type of stem cell capable of becoming all of the cell types in the human body, a property called pluripotency. The second is a type of cell called "dendritic cells" used to teach cancer patients' immune systems to attack their tumors. Asterias currently has three clinical stage programs based on these platforms: AST-OPC1 is a therapy derived from pluripotent stem cells that is currently in a Phase 1/2a clinical trial for spinal cord injuries ("SCI"); AST-VAC1 is a patient-specific cancer immunotherapy for Acute Myeloid Leukemia ("AML"); and AST-VAC 2 is a non-patient specific cancer immunotherapy for which the initiation of a Phase 1/2a clinical trial in non-small cell lung cancer is planned for 2017.

The financial statements and the notes thereto are presented in accordance with accounting principles generally accepted in the U.S. ("GAAP") and with the accounting and reporting requirements to Form 10-K and Article 10 of Regulation S-X of the Securities and Exchange Commission ("SEC").

Prior to May 13, 2016, BioTime consolidated the results of Asterias into BioTime's consolidated results based on BioTime's ability to control Asterias' operating and financial decisions and policies through a majority ownership of Asterias common stock. On May 13, 2016, Asterias completed the sale and the underwriters' exercise of the overallotment for 5,889,480 shares of its common stock and warrants to purchase 2,959,559 shares of its common stock, through an underwritten public offering (the "Asterias Offering") (see Note 6). BioTime did not participate in the Asterias Offering. As a result of the sale of Asterias common stock in the Asterias Offering and the issuance of 708,333 shares of Asterias common stock upon the exercise of certain stock options by a former Asterias executive, BioTime's percentage ownership of the outstanding common stock of Asterias declined to less than 50% on May 13, 2016. Under generally accepted accounting principles, loss of control of a subsidiary is deemed to have occurred when, among other things, a parent company owns less than a majority of the outstanding shares of common stock of the subsidiary, lacks a controlling financial interest in the subsidiary, and is unable to unilaterally control the subsidiary through other means such as having, or having the ability to obtain, a majority of the subsidiary's Board of Directors. BioTime determined that all of these loss of control factors were present for BioTime as of May 13, 2016. Accordingly, BioTime deconsolidated Asterias' financial statements and results of operations from those of BioTime, effective May 13, 2016, in accordance with ASC, 810-10-40-4(c), *Consolidation*.

BioTime continues to allocate expenses such as salaries and payroll related expenses incurred and paid on behalf of Asterias based on the amount of time that particular employees of BioTime devote to Asterias affairs. Other expenses such as legal, accounting, travel, and entertainment expenses are allocated to Asterias to the extent that those expenses are incurred by or on behalf of Asterias. BioTime also allocates certain overhead expenses such as insurance, internet, and telephone expenses based on a percentage determined by management. These allocations are made based upon activity-based allocation drivers such as time spent, percentage of square feet of office or laboratory space used, if applicable, and percentage of personnel devoted to Asterias operations or management. These allocated and overhead expenses have decreased during the second half of 2016 and are expected to decrease further in 2017 as Asterias continues to hire its operations and management personnel. Management evaluates the appropriateness of the percentage allocations on a quarterly basis and believes that this basis for allocation is reasonable.

In connection with the services performed by employees of BioTime, or employees of other BioTime commonly controlled and consolidated subsidiaries within the BioTime group of affiliated entities, Asterias has in the past granted stock options to those performing services for Asterias, for which Asterias records stock-based compensation expense in its statements of operations for such services performed in the relevant periods (see Note 9).

Liquidity – Since inception, Asterias has incurred operating losses and has funded its operations primarily through issuance of equity securities, warrants, payments from research grants, and royalties from product sales, and the support from BioTime. At December 31, 2016, Asterias had an accumulated deficit of $83.7 million, working capital of $30.9 million and stockholders' equity of $42.0 million. Asterias has evaluated its projected cash flows and believes that its cash and cash equivalents of $19.8 million and available for sale securities of $15.3 million as of December 31, 2016, will be sufficient to fund Asterias' operations through at least twelve months from the issuance date of these financial statements, or at least through March 31, 2018 (see Note 16). Some of the clinical trials being conducted by Asterias will continue to be funded in part with funds from the $14.3 million grant awarded in 2014 by the California Institute for Regenerative Medicine ("CIRM") ($1.5 million of which are still subject to meeting certain milestones as of December 31, 2016) and not from cash on hand, and the value of our available for sale securities is subject to market risk. If Asterias were unable to obtain the remaining grant funding from CIRM, the value of its available for sale securities decreases, or it is unable to obtain future adequate financing for its clinical trials, it may be required to delay, postpone, or cancel its clinical trials or limit the number of clinical trial sites, or otherwise reduce or curtail its operations. Future financings, if necessary, may not be available to Asterias at acceptable terms, or if at all. Sales of additional equity securities would result in the dilution of interests of current shareholders.

2. Summary of Significant Accounting Policies

Use of estimates – The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period with consideration given to materiality. Significant estimates and assumptions used include those related to the going concern assessment of our financial statements, useful lives associated with long-lived assets, including evaluation of asset impairment, loss contingencies, deferred income taxes and tax reserves, including valuation allowances related to deferred income taxes, and assumptions used to value stock-based awards, liability or other equity instruments. Actual results could differ materially from those estimates.

Going concern assessment – With the implementation of FASB's new standard on going concern, ASU No. 2014-15, beginning with the year ended December 31, 2016 and all annual and interim periods thereafter, Asterias will assess going concern uncertainty for its financial statements to determine if Asterias has sufficient cash and cash equivalents on hand and working capital to operate for a period of at least one year from the date the financial statements are issued or are available to be issued, which is referred to as the "look-forward period" as defined by ASU No. 2014-15. As part of this assessment, based on conditions that are known and reasonably knowable to Asterias, Asterias will consider various scenarios, forecasts, projections, and estimates, and Asterias will make certain key assumptions, including the timing and nature of projected cash expenditures or programs, and its ability to delay or curtail those expenditures or programs, among other factors, if necessary, within the look-forward period in accordance with ASU No. 2014-15.

Revenue recognition – Asterias complies with ASC 605-10 and records revenue when persuasive evidence of an arrangement exists, delivery has occurred or services have been rendered, the price is fixed or determinable, and collectability is reasonably assured. Grant income is recognized as revenue when the related research and development expenses are incurred. Royalty revenues consist of royalty payments on sales of products under license agreements. Asterias recognizes revenue in the quarter in which the royalty reports are received rather than the quarter in which the sales took place. When Asterias is entitled to receive up-front nonrefundable licensing or similar fees pursuant to agreements under which Asterias has no continuing performance obligations, the fees are recognized as revenues when collection is reasonably assured. When Asterias receives up-front nonrefundable licensing or similar fees pursuant to agreements under which Asterias does have continuing performance obligations, the fees are deferred and amortized ratably over the performance period. If the performance period cannot be reasonably estimated, Asterias amortizes nonrefundable fees over the life of the contract until such time that the performance period can be more reasonably estimated. Milestone payments, if any, related to scientific or technical achievements, subject to substantial uncertainty, are recognized in income when the milestone is accomplished if (a) substantive effort was required to achieve the milestone, (b) the amount of the milestone payment appears reasonably commensurate with the effort expended, and (c) collection of the payment is reasonably assured.

Cash and cash equivalents – Asterias considers all highly liquid investments purchased with an original maturity of three months or less to be cash equivalents. As of December 31, 2016 and 2015, Asterias had $13.7 million and $10.0 million in money market funds, respectively, considered to be cash equivalents.

Concentrations of credit risk – Financial instruments that potentially subject Asterias to significant concentrations of credit risk consist primarily of cash and cash equivalents. Asterias limits the amount of credit exposure of cash balances by maintaining its accounts in high credit quality financial institutions. Cash equivalent deposits with financial institutions may occasionally exceed the limits of insurance on bank deposits; however, Asterias has not experienced any losses on such accounts.

Comprehensive income/loss – ASC 220, *Comprehensive Income*, requires that an entity's change in equity or net assets during a period from transactions and other events from non-owner sources be reported. Asterias reports unrealized gains and losses on its available-for-sale securities as other comprehensive income/(loss).

Available-for-sale securities, at fair value – Marketable equity and debt securities not classified as held-to-maturity are classified as available-for-sale. Available-for-sale securities are carried at fair value, with the unrealized gains and losses, net of tax, reported in other comprehensive income or loss. Realized gains and losses, and declines in value judged to be other-than-temporary related to equity securities, are included in other income/(expense), net.

Asterias accounts for the BioTime and OncoCyte shares it holds as available-for-sale equity securities in accordance with ASC 320-10-25, *Investments-Debt and Equity Securities*, as the shares have a readily determinable fair value quoted on the NYSE MKT and are held principally for future working capital purposes, as necessary. These shares are measured at fair value and reported as current assets on the balance sheet based on the closing trading price of the security as of the date being presented (see Note 4). Unrealized holding gains and losses are excluded from the statements of operations and reported in equity as part of other comprehensive income or loss until realized.

Realized gains and losses on the sale of BioTime shares prior to May 13, 2016, were reclassified out of other comprehensive income or loss and included in equity, as an increase or decrease in additional paid-in capital consistent with, and pursuant to, ASC 805-50, *Transactions Between Entities Under Common Control*. Beginning on May 13, 2016, due to the deconsolidation of Asterias financial statements from BioTime and loss of control experienced by BioTime on Asterias, as discussed in Note 1, realized gains and losses, and declines in value judged to be other-than-temporary related to equity securities, are included in other income/(expense), net. For OncoCyte shares that Asterias holds, realized gains and losses, and declines in value judged to be other-than-temporary related to equity securities, are included in other income/(expense), net.

Asterias reviews various factors in determining whether it should recognize an other-than-temporary impairment charge for its available-for-sale securities, including its intent and ability to hold the investment for a period of time sufficient for any anticipated recovery in market value, and the length of time and extent to which the fair value has been less than its cost basis. Based on consideration of these factors, as of December 31, 2016 and 2015, no other-than-temporary impairment loss was recognized.

Property, plant and equipment – Property, plant and equipment includes equipment, fixtures and leasehold improvements stated at cost. Depreciation is calculated using the straight-line method over a period of their estimated useful lives ranging from 36 to 120 months. Leasehold improvements are amortized using the shorter of the useful life or the lease term.

Long-lived intangible assets – Long-lived intangible assets, consisting primarily of acquired patents, patent applications, and licenses to use certain patents are stated at acquired cost, less accumulated amortization. Amortization expense is computed using the straight-line method over the estimated useful lives of the assets, generally over 10 years.

Impairment of long-lived assets – Long-lived assets, including long-lived intangible assets, will be reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be fully recoverable. If an impairment indicator is present, Asterias evaluates recoverability by a comparison of the carrying amount of the assets to future undiscounted net cash flows expected to be generated by the assets. If the assets are impaired, the impairment will be recognized and measured by the amount by which the carrying amount exceeds the estimated fair value of the assets.

Accounting for warrants – Asterias determines the accounting classification of warrants that it issues, as either liability or equity, by first assessing whether the warrants meet liability classification in accordance with ASC 480-10, *Accounting for Certain Financial Instruments with Characteristics of both Liabilities and Equity*, and then in accordance with ASC 815-40, *Accounting for Derivative Financial Instruments Indexed to, and Potentially Settled in, a Company's Own Stock*. Under ASC 480, warrants are considered liability classified if the warrants are mandatorily redeemable, obligate the issuer to settle the warrants or the underlying shares by paying cash or other assets, or warrants that must or may require settlement by issuing variable number of shares. If warrants do not meet liability classification under ASC 480-10, Asterias assesses the requirements under ASC 815-40, which states that contracts that require or may require the issuer to settle the contract for cash are liabilities recorded at fair value, irrespective of the likelihood of the transaction occurring that triggers the net cash settlement feature. If the warrants do not require liability classification under ASC 815-40, in order to conclude equity classification, Asterias assesses whether the warrants are indexed to its common stock and whether the warrants are classified as equity under ASC 815-40 or other applicable GAAP. After all relevant assessments are made, Asterias concludes whether the warrants are classified as liability or equity. Liability classified warrants are required to be accounted for at fair value both on the date of issuance and on subsequent accounting period ending dates, with all changes in fair value after the issuance date recorded in the statements of operations as a gain or loss. Equity classified warrants are accounted for at fair value on the issuance date with no changes in fair value recognized subsequent to the issuance date.

Asterias has issued warrants that are classified as equity and as a liability (see Note 6).

Research and development – Research and development expenses consist of costs incurred for company-sponsored, collaborative and contracted research and development activities. These costs include direct and research-related overhead expenses including salaries, payroll taxes, consulting fees, research and laboratory fees, rent of research facilities, amortization of intangible assets, patent applications and prosecutions and license fees paid to third parties to acquire patents or licenses to use patents and other technology. Asterias expenses research and development costs as incurred. Research and development expenses incurred and reimbursed under grants approximate the grant income recognized in the statements of operations.

General and administrative – General and administrative expenses consist of compensation and related benefits, including stock-based compensation, for executive and corporate personnel; professional and consulting fees; and allocated overhead. General and administrative expenses also include costs allocated from BioTime pursuant to the Shared Facilities and Services Agreement (see Note 9).

Income taxes – As of October 1, 2013, Asterias has filed its own U.S. federal tax returns. Operations prior to that period were included in BioTime's consolidated U.S. federal tax return. For California purposes Asterias' activity through May 12, 2016 was included in BioTime's combined tax return. Activity from May 13, 2016 on will be included in Asterias' separate California income tax return filing due to the deconsolidation of Asterias from BioTime as of that date. Asterias accounts for income taxes in accordance with ASC 740, *Income Taxes*, which prescribes the use of the asset and liability method, whereby deferred tax asset or liability account balances are calculated at the balance sheet date using current tax laws and rates in effect. Valuation allowances are established when necessary to reduce deferred tax assets when it is more likely than not that a portion or all of the deferred tax assets will not be realized. The guidance also prescribes a recognition threshold and a measurement attribute for the financial statement recognition and measurement of tax positions taken or expected to be taken in a tax return. For those benefits to be recognized, a tax position must be more-likely-than-not sustainable upon examination by taxing authorities. For federal purposes Asterias is no longer subject to tax examination for years before 2013. For California purposes Asterias is subject to income tax examinations by tax authorities for all years since inception. Although the statute is closed for purposes of assessing additional income and tax in those years, the taxing authorities may still make adjustments to the net operating loss and credit carryforwards used in open years. Therefore, the statute should be considered open as it relates to the net operating loss and credit carryforwards. Asterias will recognize accrued interest and penalties related to unrecognized tax benefits as income tax expense. No amounts were accrued for the payment of interest and penalties as of December 31, 2016 and 2015.

As further discussed in Note 10, Asterias adopted early the provisions of Accounting Standards Update, ASU 2015-17, *Income Taxes (Topic 740): Balance Sheet Classification of Deferred Taxes*, on a retrospective basis.

Stock-based compensation – Asterias accounts for share-based payments in accordance with ASC 718, *Compensation – Stock Compensation,* which require the measurement and recognition of compensation expense for all share-based payment awards made to directors and employees, including employee stock options, based on estimated fair values less estimated forfeitures. Consistent with those guidelines, Asterias utilizes the Black-Scholes-Merton option pricing model. Asterias' determination of fair value of share-based payment awards on the date of grant using that option-pricing model is affected by Asterias' stock price as well as by assumptions regarding a number of complex and subjective variables. These variables include, but are not limited to, Asterias' expected stock price volatility over the term of the awards; the expected term of options granted; and a risk-free rate based on the U.S. Treasury rates in effect during the corresponding expected term of the grant. Expected term is derived from a combination of Asterias own, historical experience, to the extent available, and using the simplified method under SEC *Staff* Accounting *Bulletin* Topic 14, as applicable. Asterias recognizes stock-based compensation on a straight-line basis, net of estimated forfeitures, over the requisite service period.

Asterias also, at times, issues restricted stock or restricted stock units (RSUs) to its executive officers, employees, and members of its Board of Directors, which are restricted and unvested common shares issued or shares issuable as RSUs vest. Restricted stock and RSU compensation expense is recognized on a straight-line basis over the requisite service period of generally four years, based on the grant-date fair value of the stock. Restricted stock is considered legally issued and outstanding on the grant date, while RSUs are not until RSUs vest. Once the RSUs are vested, equivalent common shares will be issued or issuable to the grantee and therefore the RSUs are not included in total common shares issued and outstanding until vested.

Stock-based compensation expense for non-employee stock-based awards is recognized in accordance with ASC 718 and ASC 505-50, *Equity-Based Payments to Non-Employees* ("ASC 505-50"). Stock option awards issued to non-employees, principally consultants and employees of BioTime or employees of BioTime subsidiaries who perform services for Asterias, are accounted for at fair value using the Black-Scholes-Merton option pricing model. Management believes that the fair value of the stock options is more reliably measured than the fair value of services received. Asterias records compensation expense based on the then-current fair values of the stock options at each financial reporting date. Compensation expense recorded during the service period is adjusted in subsequent periods for changes in the fair value of the stock options until the earlier of the date at which the non-employee's performance is complete or a performance commitment is reached, which is generally when the stock option award vests. Compensation expense for non-employee grants is recorded on a straight-line basis in the statements of operations.

Fair value of financial instruments – ASC 820*, Fair Value Measurements*, clarifies that fair value is an exit price, representing the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or liability.

ASC 820 requires that the valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. ASC 820 establishes a three tier value hierarchy, which prioritizes inputs that may be used to measure fair value as follows:

- Level 1– Observable inputs that reflect quoted prices for identical assets or liabilities in active markets.
- Level 2– Observable inputs other than Level 1 prices, such as quoted prices for similar assets or liabilities; quoted prices in markets that are not active; or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.
- Level 3– Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities.

The carrying amounts of current assets and current liabilities approximate their fair value because of the relatively short period until they mature or are required to be settled, except for money market funds and the investment in BioTime and OncoCyte shares, which are carried at fair value based on Level 1 inputs, and warrant liability which is carried at fair value based on Level 3 inputs (see Note 6).

The following table shows the activity in warrants classified as a liability discussed in Note 6 (in thousands):

	Warrant Liability	Warrant Shares
Fair value of warrants issued on May 13, 2016	$ 6,009	2,959
Fair value of warrants exercised on December 2, 2016	(452)	(146)
Increase in fair value of warrants during 2016	3,108	-
Fair value of warrants at December 31, 2016	$ 8,665	2,813

Basic and diluted net loss per share – Basic net loss per share is computed by dividing net loss by the weighted-average number of shares of common stock outstanding for the year. Diluted net loss per share reflects the weighted-average number of shares of common stock outstanding plus the potential effect of dilutive securities or contracts which are convertible to common stock, such as options and warrants (using the treasury stock method) and shares issuable in future periods, such as restricted stock or RSU awards, except in cases where the effect would be anti-dilutive.

The computations of basic and diluted net loss per share are as follows (in thousands, except per share data):

	Year Ended December 31,		
	2016	2015	2014
Net loss	$ (35,489)	$ (15,003)	$ (10,097)
Weighted average common shares outstanding – basic and diluted	42,934	35,443	30,720
Net loss per share – basic and diluted	$ (0.83)	$ (0.42)	$ (0.33)

The following common stock equivalents were excluded from the computation of diluted net loss per share of common stock for the periods presented because including them would have been antidilutive (in thousands):

	Year Ended December 31,		
	2016	2015	2014
Stock options and restricted stock units	6,266	5,178	3,347
Warrants	6,552	3,500	8,500

Reclassification– Certain prior year amounts in the statement of cash flows have been reclassified to conform to the current year presentation. There was no change or impact to total amounts reported in the prior years.

Recently Issued Accounting Pronouncements – The following accounting standards, which are not yet effective, are presently being evaluated by Asterias to determine the impact that they might have on its financial statements.

On January 5, 2016, the FASB issued Accounting Standards Update 2016-01, *Financial Instruments–Overall: Recognition and Measurement of Financial Assets and Financial Liabilities* (ASU No. 2016-01). Changes to the current GAAP model primarily affect the accounting for equity investments, financial liabilities under the fair value option, and the presentation and disclosure requirements for financial instruments. In addition, ASU No. 2016-01 clarified guidance related to the valuation allowance assessment when recognizing deferred tax assets resulting from unrealized losses on available-for-sale debt securities. The accounting for other financial instruments, such as loans, investments in debt securities, and financial liabilities is largely unchanged. The more significant amendments are to equity investments in unconsolidated entities.

In accordance with ASU No. 2016-01, all equity investments in unconsolidated entities (other than those accounted for using the equity method of accounting) will generally be measured at fair value through earnings. There will no longer be an available-for-sale classification (changes in fair value reported in other comprehensive income) for equity securities with readily determinable fair values. The classification and measurement guidance will be effective for public business entities in fiscal years beginning after December 15, 2017, including interim periods within those fiscal years. ASU No. 2016-01, when adopted, could have a material impact on Asterias' financial statements based on the current accounting of available-for-sale securities Asterias holds as discussed in Note 4.

In December 2016, FASB issued Accounting Standards Update, ASU, 2016-20, *Technical Corrections and Improvements to Topic 606, Revenue from Contracts with Customers (ASU 2016-20)* which amends narrow aspects of accounting standard ASU 2014-09 *Revenue from Contracts with Customers (Topic 606)*. ASU-2016-20 is effective for periods beginning after December 15, 2017.

In May 2014, the FASB issued ASU 2014-09, *Revenue from Contracts with Customers (Topic 606)*, which supersedes nearly all existing revenue recognition guidance under GAAP. The core principle of ASU 2014-09 is to recognize revenues when promised goods or services are transferred to customers in an amount that reflects the consideration to which an entity expects to be entitled for those goods or services. ASU 2014-09 defines a five-step process to achieve this core principle and, in doing so, more judgments and estimates may be required in the revenue recognition process than are required under existing GAAP. The revised revenue standard is effective for public entities for annual periods beginning after December 15, 2017, and interim periods therein, using either of the following transition methods: (i) a full retrospective approach reflecting the application of the standard in each prior reporting period with the option to elect certain practical expedients; or (ii) a retrospective approach with the cumulative effect of initially adopting ASU 2014-09 recognized at the date of adoption (which includes additional footnote disclosures).

Asterias has completed an initial assessment of the new revenue recognition standard under Topic 606, which will be effective for Asterias beginning on January 1, 2018, and Asterias will be working on an implementation plan to evaluate the accounting and disclosure requirements under the new standard. Based on the work performed to date, Asterias does not expect adoption of the new standard to have a material impact on the financial statements. Asterias has not finalized its transition method for adoption.

In March 2016, the FASB issued ASU 2016-09, *Compensation—Stock Compensation (Topic 718): Improvements to Employee Share-Based Payment Accounting,* which simplifies several aspects of the accounting for share-based payment transactions, including the income tax consequences, forfeitures, classification of awards as either equity or liabilities, and classification of awards on the statement of cash flows. The update is effective for fiscal years beginning after December 15, 2016, and interim periods within those annual periods. Asterias is currently evaluating the impact the adoption of ASU 2016-09 will have on its financial statements.

In February 2016, the FASB issued ASU 2016-02, *Leases (Topic 842),* which requires lessees to recognize assets and liabilities for leases with lease terms greater than twelve months in the statement of financial position. Leases will be classified as either finance or operating, with classification affecting the pattern of expense recognition in the income statement. ASU 2016-02 also requires improved disclosures to help users of financial statements better understand the amount, timing and uncertainty of cash flows arising from leases. The update is effective for fiscal years beginning after December 15, 2018, including interim reporting periods within that reporting period. Early adoption is permitted. Although Asterias has not completed its evaluation of the impact of the adoption of ASU 2016-02, since the significant operating leases Asterias has are currently on its balance sheet (see Note 8), the adoption of ASU 2016-02 is not expected to have a material impact to Asterias financial statements.

3. Balance Sheet Components

Property, plant and equipment, net

As of December 31, 2016 and 2015, property, plant and equipment, net were comprised of the following (in thousands):

	December 31,	
	2016	2015
Computers, machinery and equipment	$ 2,545	$ 1,789
Furniture, fixtures and leasehold improvements	5,421	5,283
	7,966	7,072
Less - accumulated depreciation and amortization	(2,491)	(1,316)
Property, plant and equipment, net	$ 5,475	$ 5,756

Depreciation and amortization expense amounted to $1.2 million, $564,000, and $530,000 for the years ended December 31, 2016, 2015 and 2014, respectively.

Accrued expenses

As of December 31, 2016 and 2015, accrued expenses were comprised of the following (in thousands):

	December 31,	
	2016	2015
Accrued compensation and benefits	$ 1,770	$ 188
Other accrued expenses	725	995
Accrued expenses	$ 2,495	$ 1,183

4. Investment in BioTime and OncoCyte Common Stock

Investment in BioTime Common Stock

BioTime common shares (traded on NYSE: MKT under the symbol "BTX") are included at fair value in current assets on the balance sheets as the shares are available for use and could be sold at fair value for working capital purposes. As of December 31, 2016 and 2015, Asterias held 3,852,880 BioTime shares which are valued at $13.9 million and $15.8 million, respectively, based on the closing price on those dates.

Investment in OncoCyte Common Stock

On December 31, 2015, in connection with BioTime's distribution of OncoCyte common stock to BioTime shareholders, on a pro rata basis, Asterias received 192,644 shares of OncoCyte common stock from BioTime as a dividend in kind. On this date, BioTime shareholders, including Asterias, received one share of OncoCyte common stock for every twenty shares of BioTime common stock held. Asterias recorded the fair value of the OncoCyte common stock as contributed capital from BioTime. The OncoCyte common stock distribution resulted in a taxable gain to Asterias of $819,000 (see Note 10).

The OncoCyte shares are included in available-for-sale securities at fair value in current assets in Asterias' balance sheets as the shares are traded on NYSE: MKT (symbol "OCX") and available for working capital purposes. As of December 31, 2016 and 2015, the OncoCyte shares are valued at $1.4 million and $1.2 million, respectively, based on the OncoCyte closing price on those dates.

5. Intangible assets, net

As of December 31, 2016 and, 2015, Asterias had capitalized intangible assets acquired from Geron Corporation, primarily related to patents and other intellectual property rights related to hES cells. These assets are being amortized over their estimated useful lives of 10 years.

Intangible assets, net at December 31, 2016 and, 2015 are shown in the following table (in thousands):

	December 31,	
	2016	2015
Intangible assets	$ 26,860	$ 26,860
Less - accumulated amortization	(8,730)	(6,044)
Intangible assets, net	$ 18,130	$ 20,816

Asterias recognized $2.7 million, $2.7 million, and $4.8 million in amortization expense of intangible assets for the years ended December 31, 2016, 2015 and 2014, respectively.

Amortization of intangible assets for periods subsequent to December 31, 2016 is as follows (in thousands):

Year Ending December 31,	Amortization Expense
2017	$ 2,686
2018	2,686
2019	2,686
2020	2,686
2021	2,686
Thereafter	4,700
Total	$ 18,130

6. Common Stock and Warrants

At December 31, 2016, Asterias had outstanding 47,566,596 Series A Shares and no Series B Shares. At December 31, 2015, Asterias had outstanding 38,228,120 Series A Shares and no Series B Shares. All outstanding Series B Shares were converted into Series A Shares on October 3, 2014.

Common Stock Issuance

On May 13, 2016, Asterias completed the sale and the underwriters' exercise of the overallotment for 5,889,480 shares of its common stock and warrants to purchase 2,959,559 shares of its common stock, through an underwritten public offering (the "Asterias Offering"), for $3.40 per unit, or net proceeds to Asterias of $18.2 million. Total financing costs were approximately $1.8 million, of which $1.3 million were allocated to the Asterias common stock (see *Warrants classified as liability* below). The net proceeds allocated to the common stock were $12.7 million and the net proceeds allocated to the warrants were $5.5 million.

During the year ended December 31, 2016, Asterias received approximately $7.6 million in net proceeds from at-the-market transactions and issued 1.8 million shares of Asterias common stock.

During the year ended December 31, 2016, Asterias received approximately $2.7 million in net proceeds from exercise of stock options and warrants.

During the year ended December 31, 2015, Asterias raised approximately $5.5 million in aggregate gross proceeds from the sale of 1,410,255 shares of common stock at a price of $3.90 per share through an underwritten public offering and a private placement. Broadwood Partners, L.P., British & American Investment Trust PLC and Pedro Lichtinger, related parties, purchased an aggregate of 1,025,640 of the shares.

On April 10, 2015, Asterias entered into an at-the-market (ATM) Sales Agreement with MLV, pursuant to which Asterias may sell up to a maximum of $20.0 million of its common stock from time to time through MLV under Asterias' previously filed and currently effective shelf registration statement on Form S-3 (File No. 333-200745). During the fiscal year ended December 31, 2016, Asterias raised approximately $8.0 million in gross proceeds under the ATM from the sale of 1,811,522 shares of its common stock at a weighted average price of $4.41 per share. During the fiscal year ended December 31, 2015, Asterias raised approximately $4.8 million in gross proceeds from the sale of 685,465 shares of its common stock at a weighted average price of $7.01 per share. As of December 31, 2016, up to approximately $7.2 million of shares of Asterias common stock are available for issuance and sale pursuant to the terms of the ATM (see Note 16).

During 2016 and 2015, pursuant to a services agreement with Cell Therapy Catapult Services Limited, Asterias had issued 218,520 shares and 94,479 shares, respectively of Asterias Series A common stock with a fair value of $922,000 and $486,000, respectively to pay for services in lieu of cash (see Note 13).

Asterias issued 148,594 shares of common stock pursuant to the exercise of warrants in 2016. Asterias issued 5,000,000 shares of common stock pursuant to the exercise of warrants in 2015.

Warrants classified as a liability

On May 13, 2016, included in the Asterias Offering, Asterias issued 2,959,559 warrants (the "Asterias Offering Warrants"). The Asterias Offering Warrants have an exercise price $4.37 per share and expire in five years of the issuance date, or May 13, 2021. The Asterias Offering Warrants also contain certain provisions in the event of a Fundamental Transaction, as defined in the warrant agreement governing the Asterias Offering Warrants ("Warrant Agreement"), that Asterias or any successor entity will be required to purchase, at a holder's option, exercisable at any time concurrently with or within thirty days after the consummation of the fundamental transaction, the Asterias Offering Warrants for cash. This cash settlement will be in an amount equal to the value of the unexercised portion of such holder's warrants, determined in accordance with the Black Scholes-Merton option pricing model as specified in the Warrant Agreement.

In accordance with ASC 815-40, *Accounting for Derivative Financial Instruments Indexed to, and Potentially Settled in, a Company's Own Stock*, contracts that require or may require the issuer to settle the contract for cash are liabilities recorded at fair value, irrespective of the likelihood of the transaction occurring that triggers the net cash settlement feature. Changes to the fair value of those liabilities are recorded in the statements of operations. Accordingly, since Asterias may be required to net cash settle the Asterias Offering Warrants in the event of a Fundamental Transaction; the Asterias Offering Warrants are classified as noncurrent liabilities at fair value, with changes in fair value recorded in other income or expense, net, in the statements of operations.

The fair value of the Asterias Offering Warrants at the time of issuance was determined by using a combination of the Binomial Lattice and Black-Scholes-Merton option pricing models under various probability-weighted outcomes which take into consideration the probability of the fundamental transaction and net cash settlement occurring, using the contractual term of the warrants. In applying these models, the fair value is determined by applying Level 3 inputs, as defined by ASC 820; these inputs have included assumptions around the estimated future stock price of Asterias common stock, volatility and the timing of, and varying probabilities that certain events will occur. The Asterias Offering Warrants are revalued each reporting period using the same methodology described above. Changes in any of the key assumptions used to value the Asterias Offering Warrants could materially impact the fair value of the warrants and Asterias' financial statements.

On May 13, 2016, the fair value of the Asterias Offering Warrants was approximately $6.0 million. Because the Asterias Offering Warrants are accounted for as liabilities, the total proceeds from the Asterias Offering were allocated first entirely to the Asterias Offering Warrants' fair value and the remaining residual proceeds to the Asterias common stock. In addition, of the total $1.8 million of the Asterias Offering discounts and expenses incurred, $0.6 million were allocated to the Asterias Offering Warrants, based on the full fair value of the Asterias Offering Warrants and total gross proceeds, and immediately expensed as general and administrative expenses. Total net proceeds allocated to the Asterias Offering Warrants were $5.5 million.

On December 2, 2016, certain investors exercised 146,400 Asterias Offering Warrants for cash proceeds to Asterias of approximately $640,000 (see Note 2).

At December 31, 2016, based on a valuation performed by Asterias Offering Warrants using the methodology described above, the fair value of the Asterias Offering Warrants liability was $8.7 million, resulting in Asterias recording an unrealized loss of $3.1 million for the year ended December 31, 2016, included in other income and expenses, net, in the statements of operations.

Warrants classified as equity

On March 30, 2016, Asterias' board of directors declared a distribution of Asterias common stock purchase warrants to all Asterias shareholders other than BioTime, in the ratio of one warrant for every five shares of Asterias common stock owned of record as of the close of business on April 11, 2016. On April 25, 2016, Asterias distributed 3,331,229 warrants (the "Distribution Warrants"). The distribution of the Distribution Warrants was treated as a disproportionate distribution since, in accordance with the terms of the Share Transfer with BioTime, no warrants were distributed to BioTime (see Note 9). The Distribution Warrants are classified as equity, have an exercise price of $5.00 per share, and were set to expire on September 30, 2016. Asterias recorded the Distribution Warrants at a fair value of approximately $3.1 million with a noncash charge to shareholder expense included in general and administrative expenses and a corresponding increase to equity as of March 30, 2016 as the Distribution Warrants were deemed to be issued for accounting purposes on that date.

On September 19, 2016, Asterias extended the expiration date of the Distribution Warrants to February 15, 2017, no other terms were changed. As a result of the extension of the expiration date of these warrants, Asterias recorded a $2.0 million noncash charge to shareholder expense included in general and administrative expenses and a corresponding increase to equity for the year ended December 31, 2016. On February 3, 2017, Asterias extended the expiration date of the Distribution Warrants to September 29, 2017 (see Note 16).

In connection with the warrant distribution to shareholders discussed above, 350,000 warrants with an exercise price of $5.00 per share held by Romulus Films, Ltd. were adjusted to become exercisable into 409,152 shares at an exercise price of $4.28 per share (the "Romulus Warrants"). These warrants had an original expiration date of September 30, 2016. On September 19, 2016, Asterias extended the expiration date of the Romulus Warrants to February 15, 2017, no other terms were changed. As a result of the extension of the expiration date of these warrants, Asterias recorded a $0.2 million noncash charge to shareholder expense included in general and administrative expenses and a corresponding increase to equity for the year ended December 31, 2016. On February 3, 2017, Asterias extended the expiration date of the Romulus Warrants to September 29, 2017 (see Note 16).

Warrants Outstanding in 2016, 2015 and 2014

At December 31, 2014, warrants to purchase 8,500,000 common shares with a weighted average exercise price of $3.44 and a weighted average remaining contractual life of 0.99 years were outstanding. At December 31, 2015, warrants to purchase 3,500,000 common shares with an exercise price of $5.00 and a weighted average remaining contractual life of 0.75 years were outstanding (see Note 15).

In February 2016, of the warrants to purchase 3,500,000 shares, 3,150,000 were returned to Asterias by BioTime as part of the Share Transfer between Asterias and BioTime (see Note 9). As of March 20, 2016, these warrants to purchase 3,150,000 shares were retired by Asterias. Asterias warrants to purchase common shares outstanding ending December 31, 2016 was 6,552,479.

Activity related to equity and liability classified warrants in 2016 and 2015, is presented in the table below (in thousands, except per share and weighted average exercise prices):

	Number of Warrants	Per share exercise price	Weighted Average Exercise Price
Outstanding, January 1, 2015	8,500	$ 2.34-5.00	$ 3.44
Exercised in 2015	(5,000)	2.34	2.34
Outstanding, December 31, 2015	3,500	$ 5.00	$ 5.00
Issued in 2016	6,350	4.28-5.00	4.69
Exercised in 2016	(148)	4.37-5.00	4.38
Retired in 2016	(3,150)	5.00	5.00
Outstanding, December 31, 2016	6,552	$ 4.28-5.00	$ 4.68

7. Equity Incentive Plan

During March 2013, Asterias' Board of Directors approved an Equity Incentive Plan (the "Plan") under which Asterias has reserved 4,500,000 shares of common stock for the grant of stock options or the sale of restricted stock. Initially, Asterias issued Series B Shares under the Plan. Since the date on which all of the outstanding Series B Shares were converted into Series A Shares, Asterias has issued Series A Shares under the Plan. The Plan also permits Asterias to issue such other securities as its Board of Directors or the Compensation Committee administering the Plan may determine. Asterias' stockholders approved the Plan in September 2013.

During May 2015, Asterias' Board of Directors approved an amendment that would increase the number shares authorized for issuance under the Plan by 3,500,000 shares. This amendment was approved by the shareholders at the 2015 annual meeting of shareholders held on July 9, 2015.

During May 2016, Asterias' Board of Directors approved an amendment to increase the number of shares authorized for issuance under the Plan by 3,000,000 shares. This amendment was approved by the shareholders at the 2016 annual meeting of shareholders held on June 9, 2016.

No options may be granted under the Plan more than ten years after the date upon which the Plan was adopted by the Board of Directors, and no options granted under the Plan may be exercised after the expiration of ten years from the date of grant. Under the Plan, options to purchase common stock may be granted to employees, directors and certain consultants at prices not less than the fair market value at date of grant, subject to certain limited exceptions for options granted in substitution of other options. Options may be fully exercisable immediately, or may be exercisable according to a schedule or conditions specified by the Board of Directors or the Compensation Committee. The Plan also permits Asterias to award restricted stock for services rendered or to sell common stock to employees subject to vesting provisions under restricted stock agreements that provide for forfeiture of unvested shares upon the occurrence of specified events under a restricted stock award agreement. Asterias may permit employees or consultants, but not officers or directors, who purchase stock under restricted stock purchase agreements, to pay for their shares by delivering a promissory note that is secured by a pledge of their shares.

Asterias may also grant stock appreciation rights ("SARs") and hypothetical units issued with reference to Asterias common stock (restricted stock units or "RSUs") under the Plan. A SAR is the right to receive, upon exercise, an amount payable in cash or shares or a combination of shares and cash, as determined by the Board of Directors or the Compensation Committee, equal to the number of shares subject to the SAR that is being exercised multiplied by the excess of (a) the fair market value of a share of Asterias common stock on the date the SAR is exercised, over (b) the exercise price specified in the SAR Award agreement.

The terms and conditions of a grant of RSUs is determined by the Board of Directors or Compensation Committee. No shares of stock will be issued at the time a RSU is granted, and Asterias will not be required to set aside a fund for the payment of any such award. A recipient of RSUs will have no voting rights with respect to the Restricted Stock Units. Upon the expiration of the restrictions applicable to a RSU, Asterias will either issue to the recipient, without charge, one share of common stock per RSU or cash in an amount equal to the fair market value of one share of common stock.

Stock Options, Restricted Stock and Restricted Stock Units

As of December 31, 2016, Asterias had outstanding to certain officers, employees, and directors, options to purchase a total of 6,065,938 shares of common stock at a weighted average exercise price of $3.35 per share and 200,000 restricted stock/RSUs.

A summary of Asterias' Plan activity and related information follows (in thousands, except per share amounts):

Stock options	Number of Options Outstanding	Weighted Average Exercise Price
Options outstanding at January 1, 2014	2,840	$ 2.34
Options granted	1,590	2.50
Options exercised	(3)	2.34
Options expired/forfeited	(1,280)	2.34
Options outstanding at December 31, 2014	3,147	$ 2.42
Options granted	2,005	3.81
Options exercised	(12)	2.34
Options forfeited/cancelled	(9)	3.22
Options outstanding at December 31, 2015	5,131	$ 3.17
Options granted	3,175	3.53
Options exercised	(827)	2.45
Options forfeited/cancelled	(1,413)	3.68
Options outstanding at December 31, 2016	6,066	$ 3.35
Options vested and expected to vest at December 31, 2016	6,066	$ 3.35
Options exercisable at December 31, 2016	2,683	$ 3.01

The intrinsic value of options exercised was $1.9 million and $0.1 million in 2016 and 2015, respectively. The aggregate intrinsic value of shares vested during 2016 and 2015 was $4.0 million and $2.0 million respectively.

Restricted stock and Restricted stock units	Number of Shares	Weighted Average Remaining Contractual Term	Aggregate Intrinsic Value
Restricted stock/RSUs outstanding at January 1, 2016	48		
Restricted stock/RSUs awarded	515		
Restricted stock/RSUs released	(360)		
Restricted stock/RSUs forfeited	(3)		
Restricted stock/RSUs outstanding at December 31, 2016	200	0.7	$ 677
Restricted stock/RSUs vested and expected to vest at December 31, 2016	200	0.7	$ 677

During 2016, the Company awarded 200,000 shares of Restricted Stock and 314,918 Restricted Stock Units. The Restricted Stock vests 50% at the end of 6 months and the remaining 50% vests at end of 12 months. RSU's vests 25% at the end of the first year and monthly thereafter over 3 years. Vested shares are net-share settled such that the Company withholds shares with value equivalent to the employees' minimum statutory obligation for the applicable income and other employment taxes, and remits the cash to the appropriate tax authorities. The aggregate value of Restricted Stock and RSUs vesting during 2016 was $0.4 million and $0.9 million, respectively.

Restricted Stock awarded in 2016 and 2015 had an average grant date fair value per award of $3.64 and $2.34, respectively. The aggregate fair value of Restricted Stock vesting during 2016 and 2015 was $0.4 million and $0.5 million, respectively. The RSUs awarded in 2016 and 2015 had an average grant date fair value per award of $3.57 and $3.90, respectively. The aggregate fair value of RSU's vesting during 2016 and 2015 was $0.9 million and $0.6 million, respectively.

As of December 31, 2016, there were 2,318,821 shares reserved for future awards. Restricted stock and RSUs are counted against the available for grant pool two to one.

Stock-Based Compensation Expense

The weighted-average estimated fair value of stock options granted during the years ended December 31, 2016, 2015 and 2014 was $3.53, $2.92, and $1.50 per share respectively, using the Black-Scholes-Merton model with the following weighted-average assumptions:

	Years Ended December 31,		
	2016	2015	2014
Expected life (in years)	$ 5.81	$ 6.10	$ 3.98
Risk-free interest rates	1.37%	1.74%	1.31%
Volatility	74.89%	77.78%	83.49%
Dividend yield	0%	0%	0%

The risk-free rate is based on the rates in effect at the time of grant for zero coupon U.S. Treasury notes with maturities approximately equal to each grant's expected life. A dividend yield of zero is applied since Asterias has not historically paid dividends and does not expect to pay dividends in the foreseeable future. The expected volatility is based upon the volatility of Asterias' own trading stock and of a group of publicly traded industry peer companies. The expected term of options granted is derived from a combination of Asterias historical experience, to the extent available, and using the simplified method under SEC *Staff Accounting Bulletin* Topic 14.

Stock-based compensation expense is recognized based on awards that are ultimately expected to vest, and as a result, the amount has been reduced by estimated forfeitures. Forfeitures are estimated at the time of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates. Forfeitures are estimated based on Asterias' historical experience and future expectations.

The determination of stock-based compensation is inherently uncertain and subjective and involves the application of valuation models and assumptions requiring the use of judgment. If Asterias had made different assumptions, its stock-based compensation expense, and net loss for years ended December 31, 2016, 2015 and 2014, may have been significantly different.

Asterias does not recognize deferred income taxes for incentive stock option compensation expense, and records a tax deduction only when a disqualified disposition has occurred.

Operating expenses include stock-based compensation expense as follows (in thousands):

	Year Ended December 31,		
	2016	2015	2014
Research and development	$ 2,655	$ 1,604	$ 478
General and administrative	2,142	2,021	1,336
Total stock-based compensation expense	$ 4,797	$ 3,625	$ 1,814

At December 31, 2016 and 2015, Asterias had $7.3 million and $6.7 million, respectively, of total unrecognized compensation expense, net of estimated forfeitures, related to the Plan that will be recognized over a weighted-average period of approximately 3.4 and 2.4 years, respectively.

8. Commitments and Contingencies

Development and Manufacturing Services Agreement

On August 3, 2016, Asterias entered into a Development and Manufacturing Services Agreement (the "Services Agreement") with Cognate BioServices, Inc. ("Cognate"), a fully-integrated contract bioservices organization providing development and cGMP manufacturing services to companies and institutions engaged in the development of cell-based products.

Under the Services Agreement, Cognate is performing under an Initial Statement of Work process development studies in support of Asterias' clinical and commercial development activities of AST-VAC1 and production and manufacturing services of AST-VAC1 under cGMP under the Second Statement of Work. In consideration for the process development services set forth in the Initial Statement of Work, Asterias agreed to make aggregate payments of up to approximately $1.7 million in fees over the term of the Initial Statement of Work and pay for additional pass through costs for materials and equipment estimated by management to be approximately $0.5 million. In consideration of the production and manufacturing services set forth in the Second Statement of Work, once the services under the Initial Statement of Work are completed and if Asterias receives FDA concurrence on the clinical protocol for an AST-VAC1 trial, then Asterias will make an initial start-up payment, a monthly payment for dedicated manufacturing capacity, and certain other manufacturing fees.

The Services Agreement will expire on the later of (a) August 3, 2019; or (b) the completion of all services contracted for by the parties in the Statements of Work under the Services Agreement prior to August 3, 2019. The term of the Services Agreement and any then pending Statements of Work thereunder may be extended by Asterias continuously for additional two-year periods upon written notice to Cognate at least thirty days prior to the expiration of the then-current term.

The Services Agreement provides certain termination rights to each party and customary provisions relating to indemnity, confidentiality and other matters. Asterias incurred $574,000 of expense payable to Cognate pursuant to the Services Agreement for the year ended December 31, 2016.

Fremont Lease

On December 30, 2013, Asterias entered into a lease for an office and research facility located in Fremont, California, consisting of an existing building with approximately 44,000 square feet of space. The building is being used by Asterias as a combined office, laboratory and production facility that can be used to produce hES and related products under current good manufacturing procedures. Asterias completed the tenant improvements in November 2015, which cost approximately $4.9 million, of which the maximum of $4.4 million was paid to Asterias by the landlord. Asterias placed the asset into service in November 2015 and is amortizing the leasehold improvements and the landlord liability over the remaining lease term through September 30, 2022.

As of December 31, 2016 and 2015, the landlord liability was $4.0 million and $4.4 million and the deferred rent liability was $266,000 and $179,000, respectively.

Beginning on January 1, 2016, base rent increased to $105,000 per month and will increase by approximately 3% annually on every October 1 thereafter. On October 1, 2016, the base rent increased to $108,000 per month.

In addition to monthly base rent, Asterias will pay all real estate taxes, insurance and the cost of maintenance, repair and replacement of the leased premises. During the first 15 months of the lease term, Asterias will pay only 50% of the real estate taxes assessed on the premises provided that Asterias is not in default in performing its obligations under the lease beyond any notice and cure periods. However, if any improvements or alterations to the premises that Asterias constructs or adds are assessed for real property tax purposes at a valuation higher than the valuation of the improvements on the premises on the date it signed the lease, Asterias will pay 100% of the taxes levied on the excess assessed valuation.

Asterias is considered the owner of the asset for accounting purposes only under build-to-suit under ASC 840-40-55 as Asterias, among other things, has the primary obligation to pay for construction costs and Asterias will retain exclusive use of the building for its office and research facility requirements after construction is completed. In addition, the lease does not qualify for sale-leaseback accounting under ASC 840-40-25, *Accounting for Leases, Sale-Leaseback Transactions*, due to Asterias' significant continuing involvement with the facility that Asterias considers to be other than a normal leaseback as defined by ASC 840-40-25. In accordance with this guidance, amounts previously expended by Asterias for construction would continue to be reported as construction in progress in Asterias' financial statements, and the landlord reimbursement proceeds received, including amounts earned by Asterias but not yet paid by the landlord at period end, are reported as a lease liability. The property was placed in service in November 2015 and Asterias commenced depreciating the property. Lease payments allocated to the landlord liability are accounted for as debt service payments on that liability using the finance method of accounting per ASC 840-40-55. As of December 31, 2015, Asterias had incurred $4.9 million of construction costs included in property, plant and equipment (see Note 3), of which $4.4 million was the lease liability included in long term liabilities at December 31, 2015. The lease liability is being amortized using the effective interest method.

Total rent expense for all rented facilities for the years ended December 31, 2016, 2015, and 2014 was $0.5 million, $1.0 million and $0.8 million, respectively.

Future minimum annual lease payments, including the lease liability, under the Fremont Lease for the years ending after December 31, 2016 are as follows (in thousands):

Year Ending December 31,	Minimum Lease Payments
2017	$ 1,309
2018	1,347
2019	1,387
2020	1,430
2021	1,474
Thereafter	1,130
Total	$ 8,077

Litigation – General

Asterias will be subject to various claims and contingencies in the ordinary course of its business, including those related to litigation, business transactions, employee-related matters, and others. When Asterias is aware of a claim or potential claim, it assesses the likelihood of any loss or exposure. If it is probable that a loss will result and the amount of the loss can be reasonably estimated, Asterias will record a liability for the loss. If the loss is not probable or the amount of the loss cannot be reasonably estimated, Asterias discloses the claim if the likelihood of a potential loss is reasonably possible and the amount involved could be material. Asterias is not aware of any claims likely to have a material adverse effect on its financial condition or results of operations.

Employment Contracts

Asterias has entered into employment contracts with certain executive officers. Under the provisions of the contracts, Asterias may be required to incur severance obligations for matters relating to changes in control, as defined and involuntary terminations. In 2016, Asterias paid $309,000 in severance to two former executives in accordance with their respective separation agreements.

At December 31, 2016, total potential severance obligations in connection with the termination of employment contracts approximated $960,000 for termination without cause and $1.6 million for termination due to a change in control.

Indemnification

In the normal course of business, Asterias may provide indemnifications of varying scope under Asterias' agreements with its directors and executive employees or other companies or consultants, typically Asterias' clinical research organizations, investigators, clinical sites, suppliers and others. Pursuant to these agreements, Asterias will generally agree to indemnify, hold harmless, and reimburse the indemnified parties for losses and expenses suffered or incurred by the indemnified parties arising from claims of third parties in connection with the use or testing of Asterias' products and services. Indemnification provisions could also cover third party infringement claims with respect to patent rights, copyrights, or other intellectual property pertaining to Asterias products and services. The term of these indemnification agreements will generally continue in effect after the termination or expiration of the particular research, development, services, or license agreement to which they relate. The potential future payments Asterias could be required to make under these indemnification agreements will generally not be subject to any specified maximum amount. Historically, Asterias has not been subject to any claims or demands for indemnification. Asterias maintains various liability insurance policies that limit Asterias' exposure. As a result, Asterias believes the fair value of these indemnification agreements is minimal. Accordingly, Asterias has not recorded any liabilities for these agreements as of December 31, 2016 and 2015.

9. Shared Facilities and Service Agreement

On April 1, 2013, Asterias and BioTime executed a Shared Facilities and Services Agreement ("Shared Facilities Agreement"). Under the terms of the Shared Facilities Agreement, BioTime will allow Asterias to use its premises and equipment located at Alameda, California for the sole purpose of conducting business. BioTime will provide basic accounting, billing, bookkeeping, payroll, treasury, collection of accounts receivable (excluding the institution of legal proceedings or taking of any other action to collect accounts receivable), payment of accounts payable, and other similar administrative services to Asterias. BioTime may also provide the services of attorneys, accountants, and other professionals who may also provide professional services to BioTime and its other subsidiaries. BioTime will also provide Asterias with the services of its laboratory and research personnel, including BioTime employees and contractors, for the performance of research and development work for Asterias at the premise.

BioTime will charge Asterias a fee for the services and usage of facilities, equipment, and supplies aforementioned. For each billing period, BioTime will equitably prorate and allocate its employee costs, equipment costs, insurance costs, lease costs, professional costs, software costs, supply costs, and utilities costs, between BioTime and Asterias based upon actual documented use and cost by or for Asterias or upon proportionate usage by BioTime and Asterias, as reasonably estimated by BioTime. Asterias shall pay 105% of the allocated costs (the "Use Fee"). The allocated cost of BioTime employees and contractors who provide services will be based upon records maintained of the number of hours of such personnel devoted to the performance of services.

The Use Fee will be determined and invoiced to Asterias on a quarterly basis for each calendar quarter of each calendar year. If the Shared Facilities Agreement terminates prior to the last day of a billing period, the Use Fee will be determined for the number of days in the billing period elapsed prior to the termination of the Shared Facilities Agreement. Each invoice will be payable in full by Asterias within 30 days after receipt. Any invoice or portion thereof not paid in full when due will bear interest at the rate of 15% per annum until paid, unless the failure to make a payment is due to any inaction or delay in making a payment by BioTime employees from Asterias funds available for such purpose, rather than from the unavailability of sufficient funds legally available for payment or from an act, omission, or delay by any employee or agent of Asterias.

In addition to the Use Fees, Asterias will reimburse BioTime for any out of pocket costs incurred by BioTime for the purchase of office supplies, laboratory supplies, and other goods and materials and services for the account or use of Asterias, provided that invoices documenting such costs are delivered to Asterias with each invoice for the Use Fee. Furthermore, BioTime will have no obligation to purchase or acquire any office supplies or other goods and materials or any services for Asterias, and if any such supplies, goods, materials or services are obtained for Asterias, BioTime may arrange for the suppliers thereof to invoice Asterias directly.

Asterias in turn may charge BioTime or any Other Subsidiary for similar services provided by Asterias at the same rate and terms as aforementioned. "Other Subsidiary" means a subsidiary of BioTime other than Asterias and other than a subsidiary of Asterias.

The Shared Facilities Agreement's initial term ended on December 31, 2016 but the Shared Facilities Agreement was automatically renewed for an additional year. Under the Shared Facilities Agreement, the term of the Shared Facilities Agreement will automatically be renewed and the termination date will be extended for an additional year each year, unless either party gives the other party written notice stating that the Shared Facilities Agreement will terminate on December 31 of that year.

General and administrative expenses also include costs allocated from BioTime pursuant to the Shared Facilities and Services Agreement. BioTime allocated $265,000, $282,000, and $201,000 of general overhead expenses to Asterias during the years ended December 31, 2016, 2015 and 2014, respectively. At December 31, 2016 and 2015, Asterias had $288,000 and $530,000, respectively, payable to BioTime under the Shared Services Agreement.

10. Income Taxes

Asterias early adopted ASU 2015-17, *Income Taxes: Balance Sheet Classification of Deferred Taxes*, effective December 31, 2016, on a retrospective basis. Accordingly, Asterias adjusted the December 31, 2015, balance sheet for noncurrent deferred tax assets and current deferred tax liabilities to conform to the presentation for the current year due to the early adoption of ASU 2015-17 as follows (in thousands):

	December 31, 2015		
	As reported	Adjustment due to retrospective adoption of ASU 2015-17	As adjusted
Total assets	$ 66,978	$ (9,744)	$ 57,234
Total liabilities	21,879	(9,744)	12,135
Total liabilities and stockholders' equity	66,978	(9,744)	57,234
Working capital	19,535	5,274	24,809

The adoption of this standard had no impact on the statements of operations or cash flows.

The primary components of the deferred tax assets and liabilities at December 31, 2016 and 2015 were as follows (in thousands):

	December 31,	
	2016	2015
Deferred tax assets:		
Net operating loss carryforwards	$ 16,844	$ 9,939
Research and development credits	2,395	1,898
Stock based compensation and other	2,597	801
Valuation allowance	(8,081)	(2,894)
Total deferred tax assets	13,755	9,744
Deferred tax liabilities:		
Patents and licenses	(7,564)	(7,020)
Securities held as available for sale	(6,191)	(5,274)
Total deferred tax liabilities	(13,755)	(12,294)
Net deferred tax liabilities	$ -	$ (2,550)

Income taxes differed from the amounts computed by applying the U.S. federal income tax of 34% to pretax losses from operations as a result of the following:

	Years Ended December 31,	
	2016	2015
Computed tax benefit at federal statutory rate	34%	34%
Permanent differences	(10%)	(3%)
State tax benefit, net of effect on federal income taxes	(3%)	13%
Change in valuation allowance	(16%)	(13%)
Research and development credits	1%	2%
	6%	33%

As of December 31, 2016, Asterias has net operating loss carryforwards of approximately $40.9 million and $33.4 million, respectively, for federal and California tax purposes, which expire between 2032 and 2036. In addition, as of December 31, 2016, Asterias has federal and California research tax credit carry forwards of $1.2 million and $1.2 million, respectively. The federal tax credits expire between 2032 and 2036, while the state tax credits have no expiration date.

A deferred income tax benefit of approximately $2.3 million was recorded for the year ended December 31, 2016 related to federal taxes. No state tax provision or benefit was recorded for year ended December 31, 2016. A deferred income tax benefit of approximately $7.3 million was recorded for the year ended December 31, 2015, of which approximately $7.4 million was related to federal taxes and $0.1 million was related to state taxes. A deferred income tax benefit of approximately $7.4 million was recorded for the year ended December 31, 2014, of which approximately $5.2 million was related to federal taxes and $2.2 million was related to state taxes.

Asterias established deferred tax liabilities primarily related to its acquisition of certain intellectual property and available for sale securities held in BioTime and OncoCyte common stock. Asterias established a full valuation allowance for federal deferred tax assets as of December 31, 2016. As of December 31, 2015, Asterias did not have any valuation allowance on its federal deferred tax assets due to the deferred tax liabilities exceeding the deferred tax assets as of that date. Asterias' deferred tax liabilities are a source of taxable income as prescribed by ASC 740-10-30-17. For the California deferred tax assets, Asterias established a valuation allowance as of December 31, 2016 and 2015.

In June 2014, Asterias sold 5,000,000 BioTime shares that resulted in a taxable gain of approximately $10.3 million. Asterias received the BioTime shares from BioTime as part of the consideration for the Asterias common stock and warrants issued to BioTime under an Asset Contribution Agreement among BioTime, Asterias, and Geron Corporation, in a tax-free transaction. This taxable gain was offset by available net operating losses, resulting in no income taxes due from the sale. The transaction was treated as a deemed distribution by Asterias and recorded as a charge to equity.

On December 31, 2015, BioTime distributed 4.7 million shares of OncoCyte common stock to its shareholders, including Asterias, on a pro rata basis as a dividend in kind. As part of the distribution of OncoCyte common stock, Asterias, as it also holds BioTime common stock, received 192,644 shares of OncoCyte common stock as contributed capital from BioTime resulting in a taxable gain to Asterias of $819,000. Asterias has sufficient current year losses from operations to offset the entire taxable gain resulting in no income taxes due. As the distribution was treated as a dividend in kind for financial reporting purposes, Asterias recorded the tax effect of this gain through equity consistent with BioTime's treatment of the distribution in accordance with ASC 740-20-45-11(g).

On February 16, 2016, Asterias entered into a Cross-License Agreement and Share Transfer Agreement with BioTime and BioTime's wholly owned subsidiary ES Cell International Pte. Ltd. ("ESI"). The transfer of assets was a taxable transaction to Asterias generating a taxable gain of approximately $3.1 million. Asterias has sufficient current year losses from operations to offset the entire gain resulting in no income taxes due. As the transfer of assets and the resulting taxable gain is due to a direct effect of transactions between Asterias and its then parent company, BioTime, Asterias recorded the tax effect of this gain through equity with a corresponding release of the valuation allowance, in accordance with ASC 740-20-45-11(g), during the year ended December 31, 2016.

Internal Revenue Code Section 382 places a limitation ("Section 382 Limitation") on the amount of taxable income that can be offset by net operating loss ("NOL") carryforwards after a change in control (generally greater than 50% change in ownership within a three-year period) of a loss corporation. California has similar rules. Generally, after a control change, a loss corporation cannot deduct NOL carryforwards in excess of the Section 382 Limitation. Due to these "change in ownership" provisions, utilization of the NOL and tax credit carryforwards may be subject to an annual limitation regarding their utilization against taxable income in future periods.

Asterias will file an income tax return in the U.S. federal jurisdiction, and may file income tax returns in various U.S. states and foreign jurisdictions.

Asterias may be subject to potential examination by U.S. federal, U.S. states or foreign jurisdiction authorities in the areas of income taxes. These potential examinations may include questioning the timing and amount of deductions, the nexus of income among various tax jurisdictions and compliance with U.S. federal, U.S. state and foreign tax laws. Asterias' management does not expect that the total amount of unrecognized tax benefits will materially change over the next twelve months.

11. Segment Information

Operating segments are defined as components of an enterprise that engage in business activities for which separate financial information is available and evaluated by the chief operating decision maker in deciding how to allocate resources and assess performance. Asterias' executive management team represents its chief operating decision maker. The executive management team reviews financial information presented on a consolidated basis for purposes of allocating resources and evaluating financial performance and there are no managers who are held accountable for levels or components below the consolidated unit level. Asterias executive management views Asterias' operations as one segment.

12. Selected Quarterly Financial Information (unaudited) (in thousands)

Asterias has derived this data from the unaudited interim financial statements that, in Asterias' opinion, have been prepared on substantially the same basis as the audited financial statements contained in this report and include all normal recurring adjustments necessary for a fair presentation of the financial information for the periods presented. These unaudited quarterly results should be read in conjunction with the financial statements and notes thereto included in this report. The operating results in any quarter are not necessarily indicative of the results that may be expected for any future period.

Year Ended December 31, 2016	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Revenues, net	$ 1,541	$ 1,526	$ 2,017	$ 1,742
Operating expenses	12,633	8,600	9,442	10,274
Loss from operations before deferred tax benefits	(11,239)	(5,610)	(11,550)	(9,415)
Basic and diluted net loss per share	(0.27)	(0.12)	(0.24)	(0.20)
Year Ended December 31, 2015				
Revenues, net	$ 728	$ 734	$ 1,247	$ 605
Operating expenses	5,265	5,541	6,183	8,233
Loss from operations before deferred tax benefits	(4,557)	(4,859)	(5,068)	(7,771)
Basic and diluted net loss per share	(0.09)	(0.10)	(0.09)	(0.13)

13. License and Royalty Obligations

Services Agreement with Cell Therapy Catapult Services Limited

In October 2015, Asterias entered into a Services Agreement (the "Services Agreement") with Cell Therapy Catapult Services Limited ("Catapult"), a research organization specializing in the development of technologies which speed the growth of the cell and gene therapy industry. Under the Services Agreement, Catapult will license to Asterias, certain background intellectual property and will develop a scalable manufacturing and differentiation process for Asterias' human embryonic stem cell derived dendritic cell cancer vaccine development program. In consideration for the license and Catapult's performance of services, Asterias agreed to make aggregate payments of up to GBP £4,350,000 over the next five years (approximately $5.4 million based on the foreign currency exchange rate on December 31, 2016). At the option of Asterias, up to GBP £3,600,000 (approximately $4.4 million based on the foreign currency exchange rate on December 31, 2016) of such payments may be settled in shares of Asterias Series A Common Stock instead of cash. If Asterias elects to pay for the services in stock and Catapult is unable to sell the stock in the market within 60 days of issuance, after reasonable and diligent efforts through its broker, Catapult may request that the unsold portion of the stock payment, if any, be paid by Asterias in cash at a value equal to approximately 91% of the total amount that was issued in stock. This right by Catapult to put the unsold shares back to Asterias for cash expires the earlier to occur of the sale of the stock in the market or after 60 days of issuance. As of December 31, 2016, we have incurred costs since commencement of the Services Agreement of GBP £1,700,000 under the Services Agreement.

The Services Agreement may be terminated by Asterias for any reason upon 60 days prior written notice. Catapult may terminate the Services Agreement on 60 days prior written notice if it encounters a technical issue that would prevent it from completing the services at all or without obtaining additional resources, or if the estimated time and cost of completing the services will be exceeded and Catapult and Asterias do not reach agreement on revised time and cost terms. Catapult may terminate the Services Agreement in the event Asterias fails to pay any amount due under the Services Agreement 30 days after Catapult makes a written demand for payment. In addition, a non-breaching party may terminate the Services Agreement upon the occurrence a material breach that is not remedied within 30 days. Either party may terminate the Services Agreement in the event the other party becomes subject to insolvency, receivership, liquidation, or a similar event.

Advance payments for research and development services to be performed by Catapult are deferred and recognized as research and development expense ratably as the services are performed. Advance payments related to licenses will be expensed when paid due to the experimental nature of the project. Pursuant to the Services Agreement, if there are any issued, but unsold Asterias stock, to Catapult for payment of services and the 60-day put right has not expired as of the period end being reported on, Asterias will present that amount as "temporary" equity in accordance with ASC 480-10-S99. Once the put right expires or the shares are sold by Catapult, the temporary equity amount will be reclassified by Asterias to permanent equity without adjustment to the carrying value of the stock.

During 2016 and 2015, pursuant to the Services Agreement, Asterias issued 218,520 shares and 96,000 shares, respectively of Asterias Series A common stock with a fair value of $922,000 and $486,000, respectively Catapult to pay for services in lieu of cash.

Royalty Agreement with Geron

In connection with our acquisition of Geron's stem cell assets, Asterias entered into a royalty agreement with Geron (the "Royalty Agreement") pursuant to which Asterias agreed to pay Geron a 4% royalty on net sales (as defined in the Royalty Agreement), by Asterias or any of its affiliates or sales agents, of any products that Asterias develops and commercializes that are covered by the patents Geron contributed to Asterias. In the case of sales of such products by a person other than Asterias or one of its affiliates or sales agents, Asterias will be required to pay Geron 50% of all royalties and cash payments received by Asterias or by its affiliate in respect of a product sale. Royalty payments will be subject to proration in the event that a product covered by a patent acquired from Geron is sold in combination with another product that is not covered by a patent acquired from Geron. The Royalty Agreement will terminate at the expiration or termination date of the last issued patent contributed by Geron under the Royalty Agreement. Asterias estimates that the latest patent expiration date will be in 2032.

Asterias License from WARF

Asterias has entered into a Non-Exclusive License Agreement with Wisconsin Alumni Research Foundation ("WARF") under which Asterias was granted a worldwide non-exclusive license under certain WARF patents and WARF-owned embryonic stem cell lines to develop and commercialize therapeutic, diagnostic and research products.

In consideration of the rights licensed, Asterias has agreed to pay WARF an upfront license fee, payments upon the attainment of specified clinical development milestones, royalties on sales of commercialized products, and, subject to certain exclusions, a percentage of any payments that Asterias may receive from any sublicenses that it may grant to use the licensed patents or stem cell lines.

The license agreement will terminate with respect to licensed patents upon the expiration of the last licensed patent to expire. Asterias may terminate the license agreement at any time by giving WARF prior written notice. WARF may terminate the license agreement if payments of earned royalties, once begun, cease for a specified period of time or if Asterias and any third parties collaborating or cooperating with Asterias in the development of products using the licensed patents or stem cell lines fail to spend a specified minimum amount on research and development of products relating to the licensed patents or stem cell lines for a specified period of time. WARF also has the right to terminate the license agreement if Asterias breaches the license agreement or becomes bankrupt or insolvent or if any of the licensed patents or stem cell lines are offered to creditors. The payments to WARF were a recurring $25,000 license maintenance fee for each of the years 2016, 2015 and 2014.

Asterias License from the University of California

Geron assigned to Asterias its Exclusive License Agreement with The Regents of the University of California for patents covering a method for directing the differentiation of multipotential hES cells to glial-restricted progenitor cells that generate pure populations of oligodendrocytes for remyelination and treatment of spinal cord injury. Pursuant to this agreement, Asterias has an exclusive worldwide license under such patents, including the right to grant sublicenses, to create products for biological research, drug screening, and human therapy using the licensed patents. Under the license agreement, Asterias will be obligated to pay the university a royalty of 1% from sales of products that are covered by the licensed patent rights, and a minimum annual royalty of $5,000 starting in the year in which the first sale of a product covered by any licensed patent rights occurs, and continuing for the life of the applicable patent right under the agreement. The royalty payments due are subject to reduction, but not by more than 50%, to the extent of any payments that Asterias may be obligated to pay to a third party for the use of patents or other intellectual property licensed from the third party in order to make, have made, use, sell, or import products or otherwise exercise its rights under the Exclusive License Agreement. Asterias will be obligated to pay the university 7.5% of any proceeds, excluding debt financing and equity investments, and certain reimbursements, that its receives from sublicensees, other than Asterias' affiliates and joint ventures relating to the development, manufacture, purchase, and sale of products, processes, and services covered by the licensed patent. The Company had no expenses related to these fees in the years 2016, 2015, and 2014, respectively. The license agreement will terminate on the expiration of the last-to-expire of the university's issued licensed patents. If no further patents covered by the license agreement are issued, the license agreement would terminate in 2024. The university may terminate the agreement in the event of Asterias' breach of the agreement. Asterias can terminate the agreement upon 60 days' notice.

Asterias Sublicense from Geron

Asterias has received from Geron an exclusive sublicense under certain patents owned by the University of Colorado's University License Equity Holdings, Inc. relating to telomerase (the "Telomerase Sublicense"). The Telomerase Sublicense entitles Asterias to use the technology covered by the patents in the development of AST-VAC1 and AST-VAC2 as immunological treatments for cancer. Under the Telomerase Sublicense, Asterias paid Geron a one-time upfront license fee of $65,000, and will pay Geron an annual license maintenance fee of $10,000 due on each anniversary of the effective date of the Telomerase Sublicense, and a 1% royalty on sales of any products that Asterias may develop and commercialize that are covered by the sublicensed patents. In 2016, 2015 and 2014 Asterias paid $134,000, $281,000, and $105,000 respectively under this agreement in combined maintenance and royalty fees.

The Telomerase Sublicense will expire concurrently with the expiration of Geron's license. That license will terminate in November 2018 when the licensed patents expire.

14. Clinical Trial and Option Agreement with CRUK and CIRM Grant Award

During September 2014, Asterias entered into a Clinical Trial and Option Agreement (the "CRUK Agreement") with Cancer Research UK ("CRUK") and Cancer Research Technology Limited, a wholly-owned subsidiary of CRUK, pursuant to which CRUK has agreed to fund Phase 1/2 clinical development of Asterias' human embryonic stem cell derived AST-VAC2 allogeneic (non-patient specific) dendritic cancer vaccine product candidate. Asterias, at its own cost, completed process development and manufacturing scale-up of the AST-VAC2 manufacturing process and transferred the resulting cGMP-compatible process to CRUK. CRUK will, at its own cost, manufacture clinical grade AST-VAC2 and will carry out the Phase 1/2 clinical trial of AST-VAC2 in cancer patients both resected early-stage and advanced forms of lung cancer. Asterias will have an exclusive first option to obtain a license to use the data from the clinical trial. If Asterias exercises that option, then Asterias will be obligated to make payments upon the execution of the License Agreement, upon the achievement of various milestones, and royalties on sales of products. In connection with the CRUK Agreement, Asterias sublicensed to CRUK for use in the clinical trials and product manufacturing process certain patents that have been licensed or sublicensed to us by third parties. Asterias would also be obligated to make payments to those licensors and sublicensors upon the achievement of various milestones, and then royalties on sales of products if AST-VAC2 is successfully developed and commercialized.

On October 16, 2014 Asterias signed a Notice of Grant Award ("NGA") with CIRM, effective October 1, 2014, with respect to a $14.3 million grant award for clinical development of Asterias' product, AST-OPC1. The NGA was subsequently amended effective November 26, 2014 and March 2, 2016. The NGA includes the terms under which CIRM will release grant funds to Asterias. Under the NGA as amended on March 2, 2016, CIRM will disburse the grant funds to Asterias based on Asterias' attainment of certain progress milestones.

Asterias received $0.9 million during 2014 and an additional $5.7 million under the NGA during 2015. During the fiscal year ended December 31, 2016, Asterias received an additional $6.2 million under the NGA grant with approximately $1.5 million expected upon further clinical milestone achievements. There can be no assurance Asterias will receive this remaining amount or that the milestones will be met. Revenues pursuant to the NGA recognized during the fiscal years ended December 31, 2016, 2015 and 2014 were $6.6 million and $3.0 million and $1.0 million, respectively. Although the cash payments from CIRM are dependent on achieving certain milestones pursuant to the contract with CIRM, Asterias recognizes grant income as related research expenses are incurred. Deferred revenues relating to the CIRM grant were $2.2 million and $2.5 million at December 31, 2016 and 2015, respectively.

15. Cross-License and Share Transfer with BioTime and Subsidiaries

On February 16, 2016, Asterias entered into a Cross-License Agreement (the "Cross-License") with BioTime and BioTime's wholly owned subsidiary ESI. Under the terms of the Cross-License, Asterias received a fully-paid, non-royalty-bearing, world-wide, non-exclusive, sub-licensable license under certain BioTime patents and related patent rights and ESI patents and related patent rights specified in the Cross-License, for all purposes in the Asterias Licensed Field, as defined in the Cross-License agreement, during the term of the license.

Under the terms of the Cross-License, BioTime and ESI received a fully-paid, non-royalty-bearing, world-wide, non-exclusive, sub-licensable license in, to, and under the certain Asterias patents and related patent rights for all purposes in the BioTime/ESI Licensed Field, as defined in the Cross-License agreement, during the term of the license.

On February 16, 2016, Asterias also entered into a Share Transfer Agreement ("Share Transfer") with BioTime and ESI pursuant to which (a) Asterias transferred to BioTime 2,100,000 shares of common stock of OrthoCyte Corporation ("OrthoCyte) and 21,925 ordinary shares of Cell Cure Neurosciences Ltd ("Cell Cure"), each a majority-owned subsidiary of BioTime, with an aggregate carrying value at the time of the transaction of approximately $416,000 and (b) BioTime transferred to Asterias 75,771 shares of Series A common stock of Asterias with a carrying value at the time of the transaction of approximately $197,000 and warrants to purchase 3,150,000 Series A common stock of Asterias at an exercise price of $5.00 per share, with a carrying value at the time of the transaction of approximately $2.0 million, as additional consideration for the license of patents and patent rights from Asterias under the Cross License. On March 20, 2016, the warrants to purchase 3,150,000 shares of Series A common stock were retired by Asterias in addition to 75,771 shares of Series A common stock retired.

The Cross-License and Share Transfer transaction was accounted for a transfer of assets between entities under common control and recorded at carrying value, with the resulting gain on transfer of approximately $1.8 million recorded by Asterias in equity as contributed capital to BioTime in accordance with, and pursuant to ASC 805-50, *Transactions Between Entities Under Common Control*. Accordingly, the net financial reporting impact of the Cross-License and Share Transfer of $0.4 million charged to additional paid-in capital was comprised of the retirement of the aggregate $2.2 million carrying value of the warrants and the Series A Common Stock offset by the $1.8 million transfer gain.

The transfer of assets was also a taxable transaction to Asterias generating a taxable gain of approximately $3.1 million as further discussed in Note 10.

16. Subsequent Events

Extension of Warrants

On February 3, 2017, Asterias extended the expiration date of the outstanding Distribution Warrants and the Romulus Warrants to September 29, 2017. As a result of this extension, Asterias will recognize a $2.0 million expense which will be included in general and administrative expenses for the quarter ending March 31, 2017.

Amendment to ATM Agreement

On March 28, 2017, Asterias entered into an amendment to its Sales Agreement, dated April 10, 2015, with MLV. The amendment to the Sales Agreement was entered into by Asterias, MLV and FBR Capital Markets & Co. ("FBR" and together with MLV, the "Agents"), which acquired MLV. Under the Sales Agreement, as amended, Asterias may issue and sell shares of its Series A common stock having an aggregate offering price of up to $25 million from time to time on or after March 28, 2017, through the Agents, subject to certain limitations, including the number of shares registered and available under the Company's previously filed and currently effective shelf registration statement on Form S-3 (File No. 333-215154) (the "Registration Statement"). From January 1 through March 21, 2017, Asterias has sold approximately 1.3 million shares of Series A common stock for gross proceeds of $5.3 million.

Any sales of shares of the Company's Series A common stock pursuant to the Sales Agreement, as amended, will be made under the Registration Statement and the related prospectus supplement to filed pursuant to thereunder. The Agents may sell the Series A common stock under the Sales Agreement, as amended, by any method that is deemed to be an "at-the-market offering" as defined in Rule 415 promulgated under the Securities Act of 1933, as amended, including by means of ordinary brokers' transactions at market prices, in block transactions or as otherwise agreed by the Agents and Asterias. The Agents may also sell the Series A common stock in negotiated transactions, subject to Asterias' prior approval. Subject to the terms and conditions of the Sales Agreement, as amended, the Agents will use its commercially reasonable efforts consistent with its normal trading and sales practices and applicable laws, rules and regulations to sell the shares of the Series A common stock from time to time, based upon Asterias' instructions (including any price, time or size limits or other parameters or conditions Asterias may impose). Asterias will pay the Agents a commission of up to 3.0% of the gross proceeds of the sale of any Series A common stock sold through FBR as agent under the Sales Agreement, as amended. Asterias has also provided the Agents with customary indemnification rights.

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

Not applicable.

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

Our management, with the participation of our principal executive officer and our principal financial officer, have reviewed and evaluated the effectiveness of our disclosure controls and procedures as December 31, 2016. Following this review and evaluation, our principal executive officer and principal financial officer have concluded that our disclosure controls and procedures were effective to ensure that information required to be disclosed by us in reports that we file or submit under the Securities Exchange Act of 1934 ("Exchange Act") (i) is recorded, processed, summarized and reported within the time periods specified in SEC rules and forms; and (ii) is accumulated and communicated to management, including our principal executive officer and our principal financial officer, as appropriate to allow timely decisions regarding required disclosure.

Management's Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting. Internal control over financial reporting, as defined in Exchange Act Rule 13a-15(f), is a process designed by, or under the supervision of, our principal executive officer and our principal financial officer, and effected by our Board of Directors, management, and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles and includes those policies and procedures that:

- Pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of our assets;
- Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that our receipts and expenditures are being made only in accordance with authorizations of our management and directors; and
- Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on the financial statements.

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

Our management assessed the effectiveness of our internal control over financial reporting as of December 31, 2016, based on criteria established in the 2013 Internal Control - Integrated Framework issued by COSO. Based on this assessment, management believes that, as of that date, our internal control over financial reporting was effective.

This annual report includes an attestation report of our registered public accounting firm regarding internal control over financial reporting for the year ended December 31, 2016. The attestation is included with the accounting firm's report on our audited financial statements.

Changes in Internal Control over Financial Reporting

There were no changes in our internal control over financial reporting identified in connection with the evaluation required by Exchange Act rules 13a-15(d) and 15d-15(d) that occurred during the quarter ended December 31, 2016 that have materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

On March 28, 2017, Asterias entered into an amendment to its Sales Agreement, dated April 10, 2015, with MLV. The amendment to the Sales Agreement was entered into by Asterias, MLV and FBR, which acquired MLV. Under the Sales Agreement, as amended, Asterias may issue and sell shares of its Series A common stock having an aggregate offering price of up to $25 million from time to time on or after March 28, 2017, through the Agents, subject to certain limitations, including the number of shares registered and available under the Company's previously filed and currently effective shelf registration statement on Form S-3 (File No. 333-215154) (the "Registration Statement").

Any sales of shares of the Company's Series A common stock pursuant to the Sales Agreement, as amended, will be made under the Registration Statement and the related prospectus supplement to filed pursuant to thereunder. The Agents may sell the Series A common stock under the Sales Agreement, as amended, by any method that is deemed to be an "at-the-market offering" as defined in Rule 415 promulgated under the Securities Act of 1933, as amended, including by means of ordinary brokers' transactions at market prices, in block transactions or as otherwise agreed by the Agents and Asterias. The Agents may also sell the Series A common stock in negotiated transactions, subject to Asterias' prior approval. Subject to the terms and conditions of the Sales Agreement, as amended, the Agents will use its commercially reasonable efforts consistent with its normal trading and sales practices and applicable laws, rules and regulations to sell the shares of the Series A common stock from time to time, based upon Asterias' instructions (including any price, time or size limits or other parameters or conditions Asterias may impose). Asterias will pay the Agents a commission of up to 3.0% of the gross proceeds of the sale of any Series A common stock sold through FBR as agent under the Sales Agreement, as amended. Asterias has also provided the Agents with customary indemnification rights.

Asterias is not obligated to make any sales of Series A common stock under the Sales Agreement, as amended, and no assurance can be given that Asterias will sell any shares under the Sales Agreement, as amended, or, if it does, as to the price or amount of shares that it will sell, or the dates on which any such sales will take place. The Sales Agreement, as amended, will terminate upon the earlier of the sale of all the Series A common stock subject to the Sales Agreement as amended, or termination by Asterias or the Agents.

The foregoing description of the Sales Agreement, as amended, is not complete and is qualified in its entirety by reference to the full text of the amendment to the Sales Agreement, a copy of which is filed as Exhibit 10.24 to this Annual Report on Form 10-K and is incorporated herein by reference, and the Sales Agreement, a copy of which was filed as Exhibit 10.1 to the Current Report on Form 8-K filed on April 10, 2015, is also incorporated herein by reference.

The above disclosure shall not constitute an offer to sell or the solicitation of an offer to buy the securities discussed herein, nor shall there be any offer, solicitation, or sale of the securities in any state in which such offer, solicitation or sale would be unlawful prior to registration or qualification under the securities laws of any such state.

The Sales Agreement, as amended, has been included herein to provide shareholders and other investors with information regarding its terms. It is not intended to provide any other factual information about Asterias. Any representations, warranties and covenants contained in the Sales Agreement or in the amendment to the Sales Agreement were made only for purposes of the transaction contemplated thereby, and, as of the specific dates therein, were solely for the benefit of the parties to such agreement, and may be subject to limitations agreed upon by the contracting parties, including being qualified by confidential disclosures exchanged between the parties in connection with the execution and issuance of the Sales Agreement. The representations and warranties may have been made for the purposes of allocating contractual risk between the parties to the Sales Agreement instead of establishing those matters as facts, and may be subject to standards of materiality applicable to the contracting parties that differ from those applicable to the shareholders and other investors. Shareholders and other investors should not rely on any representations, warranties and covenants in the Sales Agreement or the amendment as characterizations of the actual state of facts or condition of Asterias or any of its affiliates. Moreover, information concerning the subject matter of the representations and warranties may change after the date of the Sales Agreement or the amendment, which subsequent information may or may not be fully reflected in Asterias' public disclosures.

This Annual Report on Form 10-K shall not constitute an offer to sell or the solicitation of an offer to buy any security nor shall there by any sale of these securities in any state in which such offer, solicitation or sale would be unlawful prior to registration or qualification under the securities laws of any such state.

PART III

Item 10. Directors, Executive Officers, and Corporate Governance

Information regarding our directors, executive officers and corporate governance required under this Item 10. Directors, Executive Officers and Corporate Governance will be included in our definitive proxy statement for our annual general meeting of shareholders, which will be filed with the United States Securities and Exchange Commission within 120 days after the end of our fiscal year.

Item 11. Executive Compensation

Compensation Committee Interlocks and Insider Participation in Compensation Decisions

Information regarding the compensation of our named executive officers and directors required under this Item 11. Executive Compensation will be included in our definitive proxy statement for our annual general meeting of shareholders, which will be filed with the United States Securities and Exchange Commission within 120 days after the end of our fiscal year.

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

Information regarding individuals or groups which own more than 5% of our ordinary shares, as well as information regarding the security ownership of our executive officers and directors, and other shareholder matters required under this Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters will be included in our definitive proxy statement for our annual general meeting of shareholders, which will be filed with the United States Securities and Exchange Commission within 120 days after the end of our fiscal year.

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

Information regarding transactions with related parties and director independence required under this Item 13. Certain Relationships and Related Transactions, and Director Independence will be included in our definitive proxy statement for our annual general meeting of shareholders, which will be filed with the United States Securities and Exchange Commission within 120 days after the end of our fiscal year.

Item 14. Principal Accounting Fees and Services

General

Information regarding the services provided by and the fees paid to our independent auditors required under this Item 14. Principal Accounting Fees and Services will be included in our definitive proxy statement for our annual general meeting of shareholders, which will be filed with the United States Securities and Exchange Commission within 120 days after the end of our fiscal year.

PART IV

Item 15. Exhibits, Financial Statement Schedules

(a-1) Financial Statements.

The following financial statements of Asterias Biotherapeutics, Inc. are filed in the Form 10-K:

Balance sheets
Statements of operations
Statements of comprehensive loss
Statements of stockholders' equity
Statements of cash flows

Notes to Financial Statements

(a-2) Financial Statement Schedules

All schedules are omitted because the required information is inapplicable or the information is presented in the financial statements or the notes thereto.

(a-3) Exhibits.

Exhibit Numbers	Description
2.1	Asset Contribution Agreement, dated January 4, 2013, by and among BioTime, Inc., BioTime Acquisition Corporation, and Geron Corporation. (1) Schedules to the Asset Contribution Agreement have been omitted. Asterias agrees to furnish supplementally a copy of the omitted schedules to the Commission upon request
3.1	Amended and Restated Certificate of Incorporation (2)
3.2	Bylaws (2)
4.1	Specimen of Series A Common Stock Certificate (3)
4.2	Warrant Agreement, dated October 1, 2013, by Asterias Biotherapeutics, Inc. for the benefit of Romulus Films Ltd. (4)
4.3	Form of Warrant Agreement by and between the Company and American Stock Transfer & Trust Company, including the form of Warrant. (5)
10.1	Stock and Warrant Purchase Agreement, dated January 4, 2013, between BioTime Acquisition Corporation and Romulus Films Ltd. (2)
10.2	Shared Facilities and Services Agreement, dated April 1, 2013, between Asterias Biotherapeutics, Inc. and BioTime, Inc. (2)
10.3	Amended and restated 2013 Equity Incentive Plan (6)
10.4	Form of Employee Incentive Stock Option Agreement (7)
10.5	Form of Non-employee Director Stock Option Agreement (7)
10.6	Employment Agreement, dated as of June 24, 2013, between Katharine E. Spink and Asterias Biotherapeutics, Inc. (8)

10.7	Employment Agreement, dated as of June 24, 2013, between Jane S. Lebkowski and Asterias Biotherapeutics, Inc. (8)
10.8	Royalty Agreement, dated October 1, 2013 between Asterias Biotherapeutics, Inc. and Geron Corporation (8)
10.9	Exclusive Sublicense Agreement between Geron Corporation and Asterias Biotherapeutics, Inc. (8)
10.10	Sublicense Agreement between BioTime, Inc. and Asterias Biotherapeutics, Inc. (8)
10.11	Exclusive License Agreement, dated February 20, 2003, and First Amendment thereto dated September 7, 2004, between The Regents of the University of California and Geron Corporation (8)
10.12	Non-exclusive License Agreement, dated October 7, 2013, between the Wisconsin Alumni Research Foundation and Asterias Biotherapeutics, Inc. (Portions of this exhibit have been omitted pursuant to a request for confidential treatment) (8)
10.13	Lease, dated December 30, 2013, by and between BMR 6300 Dumbarton Circle, LP, and Asterias Biotherapeutics, Inc. (9)
10.14	At the Market Issuance Sales Agreement, dated April 10, 2015, by and between the Registrant and MLV & Co. LLC. (10)
10.15	Employment Agreement with Edward D. Wirth III, dated June 16, 2013. (11)
10.16	Services Agreement, dated October 8, 2015 by Asterias and Catapult. (12)
10.17	Employment Agreement dated February 28, 2016 between Stephen L. Cartt and Asterias Biotherapeutics, Inc. (13)
10.18	Separation Agreement, as of March 10, 2016, between Pedro Lichtinger and Asterias Biotherapeutics, Inc. (13)
10.19	Amendment to the Notice of Award from the California Institute of Regenerative Medicine dated March 2, 2016 (13) +
10.20	Separation Agreement, as of March 21, 2016, between Georgia Erbez and Asterias Biotherapeutics, Inc. (13)
10.21	Development and Manufacturing Services Agreement, dated August 3, 2016, between Asterias and Cognate BioServices, Inc. (14) +
10.22	Employment Agreement of Ryan D. Chavez, dated July 18, 2016. (15)
10.23	At the Market Sales Agreement, dated April 10, 2015, by and between the Company and MLV & Co. (16)
10.24	Amendment to the At the Market Sales Agreement, dated March 28, 2017, by and between the Company, MLV & Co. and FBR Capital Markets & Co. *
23.1	Consent of OUM & Co. LLP *
31	Rule 13a-14(a)/15d-14(a) Certification.*

32	Section 1350 Certification.*
101	Interactive Data File
101.INS	XBRL Instance Document *
101.SCH	XBRL Taxonomy Extension Schema *
101.CAL	XBRL Taxonomy Extension Calculation Linkbase *
101.LAB	XBRL Taxonomy Extension Label Linkbase *
101.PRE	XBRL Taxonomy Extension Presentation Linkbase *
101.DEF	XBRL Taxonomy Extension Definition Document *

+ Portions of this exhibit have been omitted pursuant to a confidential treatment order from the Securities and Exchange Commission.

(1) Incorporated by reference to Asterias' Current Report on Form 8-K filed by BioTime, Inc. with the Securities and Exchange Commission on January 8, 2013.

(2) Incorporated by reference to Registration Statement on Form S-1 (333-187706) filed with the Securities and Exchange Commission on April 3, 2013.

(3) Incorporated by reference to Amendment No. 3 to Registration Statement on Form S-1 (333-187706) filed with the Securities and Exchange Commission on September 3, 2013

(4) Incorporated by reference to Current Report on Form 8-K filed with the Securities and Exchange Commission on October 1, 2013.

(5) Incorporated by reference to the Current Report on Form 8-K filed with the Securities and Exchange Commission on May 10, 2016.

(6) Incorporated by reference to the Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on August 15, 2016.

(7) Incorporated by reference to Amendment No. 2 to Registration Statement on Form S-1 (333-187706) filed with the Securities and Exchange Commission on August 13, 2013.

(8) Incorporated by reference to Asterias' Quarterly Report on Form 10-Q for the quarter ended September 30, 2013, filed November 12, 2013.

(9) Incorporated by reference to Asterias' Annual Report on Form 10-K for the year ended December 31, 2013, filed March 17, 2014.

(10 Incorporated by reference to Asterias' Current Report on Form 8-K, filed April 10, 2015.

(11) Incorporated by reference to Asterias' Quarterly Report on Form 10-Q, for the period ended June 30, 2015, filed August 10, 2015.

(12) Incorporated by reference to Asterias' Current Report on Form 8-K, filed August 10, 2015.

(13) Incorporated by reference to Asterias' Annual Report on Form 10-K, for the year ended December 31, 2015, filed March 29, 2016.

(14) Incorporated by reference to Asterias' Quarterly Report on Form 10-Q, for the period ended September 30, 2016, filed November 14, 2016.

(15) Incorporated by reference to Asterias' Current Report on Form 8-K, filed November 17, 2016.

(16) Incorporated by reference to Asterias' Current Report on Form 8-K, filed April 10, 2015.

* Filed herewith.

Item 16. Form 10-K Summary

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized on the 28th day of March, 2017.

ASTERIAS BIOTHERAPEUTICS, INC.

By: /s/ *Stephen L. Cartt*
Stephen L. Cartt,
President and Chief Executive Officer

Signature	Title	Date
/s/ *Stephen L. Cartt* STEPHEN L. CARTT	Chief Executive Officer and Director (Principal Executive Officer)	March 28, 2017
/s/ *Ryan Chavez* RYAN CHAVEZ	Chief Financial Officer (Principal Financial and Accounting Officer)	March 28, 2017
/s/ *Andrew Arno* ANDREW ARNO	Director	March 28, 2017
/s/ *Don M. Bailey* DON M. BAILEY	Director	March 28, 2017
/s/ *Alfred D. Kingsley* ALFRED D. KINGSLEY	Director	March 28, 2017
/s/ *Richard LeBuhn* RICHARD LEBUHN	Director	March 28, 2017
/s/ *Howard Scher, M.D.* HOWARD SCHER, M.D.	Director	March 28, 2017
/s/ *Natale Ricciardi* NATALE RICCIARDI	Director	March 28, 2017
/s/ *Adi Mohanty* ADI MOHANTY	Director	March 28, 2017
/s/ *Michael D. West, Ph.D.* MICHAEL D. WEST, Ph.D.	Director	March 28, 2017

Exhibit 10.24

AMENDMENT NO. 1 TO AT MARKET ISSUANCE SALES AGREEMENT

March 28, 2017

FBR Capital Markets & Co.
1300 North 17th Street, Suite 1400
Arlington, VA 22209

MLV & Co. LLC
299 Park Avenue, 7th Floor
New York, NY 10171

Ladies and Gentlemen:

Asterias Biotherapeutics, Inc. (the "Company"), and MLV & Co. LLC ("MLV"), are parties to that certain At Market Issuance Sales Agreement dated April 10, 2015 (the "Original Agreement"). All capitalized terms not defined herein shall have the meanings ascribed to them in the Original Agreement. The parties, together with FBR Capital Markets & Co. ("FBR"), intending to be legally bound, hereby amend the Original Agreement as follows:

1. All references to "MLV & Co. LLC" set forth in the Original Agreement are revised to read "MLV & Co. LLC and FBR Capital Markets & Co." All references to "MLV" shall refer to FBR and MLV, each individually as an "Agent" and collectively, "the Agent."

2. Section 1 of the Original Agreement is hereby amended to replace:

"The Company agrees that, from time to time during the term of this Agreement, on the terms and subject to the conditions set forth herein, it may issue and sell through MLV, shares (the "Placement Shares") of the Company's Series A common stock, par value $0.0001 per share (the "Common Stock") up to an aggregate offering price of $20,000,000, *provided however,* that in no event shall the Company issue or sell through MLV such number of Placement Shares that (a) exceeds the number of shares of Common Stock registered on the effective Registration Statement (as defined below) pursuant to which the offering is being made, or (b) exceeds the number of authorized but unissued shares of Common Stock that are not reserved for any other purpose (the lesser of (a) and (b), the "Maximum Amount"). Notwithstanding anything to the contrary contained herein, the parties hereto agree that compliance with the limitations set forth in this Section 1 on the number or amount of Placement Shares issued and sold under this Agreement shall be the sole responsibility of the Company and that MLV shall have no obligation in connection with such compliance. The issuance and sale of Placement Shares through MLV will be effected pursuant to the Registration Statement (as defined below), although nothing in this Agreement shall be construed as requiring the Company to use the Registration Statement to issue any Placement Shares.

The Company has filed, in accordance with the provisions of the Securities Act of 1933, as amended, and the rules and regulations thereunder (the "Securities Act"), with the Securities and Exchange Commission (the "Commission"), a registration statement on Form S-3 (333-200745), including a base prospectus relating to certain securities to be issued from time to time by the Company, and which incorporates by reference documents that the Company has filed or will file in accordance with the provisions of the Securities Exchange Act of 1934, as amended, and the rules and regulations thereunder (the "Exchange Act").

With,

"The Company agrees that, from time to time, beginning on March [•], 2017, on the terms and subject to the conditions set forth herein, it may issue and sell through the Agent, shares (the "Placement Shares") of the Company's Series A common stock, par value $0.0001 per share (the "Common Stock") up to an aggregate offering price of $25,000,000, *provided however,* that in no event shall the Company issue or sell through the Agent such number of Placement Shares that (a) exceeds the number of shares of Common Stock registered on the effective Registration Statement (as defined below) pursuant to which the offering is being made, or (b) exceeds the number of authorized but unissued shares of Common Stock that are not reserved for any other purpose (the lesser of (a) and (b), the "Maximum Amount"). Notwithstanding anything to the contrary contained herein, the parties hereto agree that compliance with the limitations set forth in this Section 1 on the number or amount of Placement Shares issued and sold under this Agreement shall be the sole responsibility of the Company and that the Agent shall have no obligation in connection with such compliance. The issuance and sale of Placement Shares through the Agent will be effected pursuant to the Registration Statement (as defined below), although nothing in this Agreement shall be construed as requiring the Company to use the Registration Statement to issue any Placement Shares.

The Company has filed, in accordance with the provisions of the Securities Act of 1933, as amended, and the rules and regulations thereunder (the "Securities Act"), with the Securities and Exchange Commission (the "Commission"), a registration statement on Form S-3 (333-215154), including a base prospectus relating to certain securities to be issued from time to time by the Company, and which incorporates by reference documents that the Company has filed or will file in accordance with the provisions of the Securities Exchange Act of 1934, as amended, and the rules and regulations thereunder (the "Exchange Act").

3. All references to "April 10, 2015" set forth in Schedule I and Exhibit 7(l) of the Original Agreement are revised to read "April 10, 2015 (as amended by Amendment No. 1 to At Market Issuance Sales Agreement, dated March [•], 2017)".

4. Section 14 of the Original Agreement is hereby amended to replace,

"MLV & Co. LLC
1301 Avenue of the Americas, 43rd Floor
New York, New York 10019
Attention: General Counsel
Telephone: (212) 542-5880
Email: mlvlegal@mlvco.com
Facsimile No.: (212) 317-1515

with a copy (which shall not constitute notice) to:

LeClairRyan, A Professional Corporation
885 Third Avenue
New York, NY 10022
Attention: James T. Seery
Telephone: (973) 491-3315
Email: james.seery@leclairryan.com

and if to the Company, shall be delivered to:

Asterias Biotherapeutics, Inc.
230 Constitution Drive
Menlo Park, California 94025
Attention: Chief Executive Officer
Facsimile No.: (650) 433-2998"

With,

"MLV & Co. LLC
299 Park Avenue, 7th Floor
New York, NY 10171
Attention: Legal Department
Facsimile: (212) 542-5880
Email: mlvlegal@mlvco.com

And

FBR Capital Markets & Co.
1300 North 17th Street, Suite 1400
Arlington, VA 22209
Attention: Legal Department
Email: atmadmin@fbr.com

with a copy (which shall not constitute notice) to:

Duane Morris LLP
One Riverfront Plaza
1037 Raymond Boulevard, Suite 1800
Newark, NJ 07102
Attention: James T. Seery
Email: JTSeery@duanemorris.com

and if to the Company, shall be delivered to:

Asterias Biotherapeutics, Inc.
6300 Dumbarton Circle
Fremont, CA 94555
Attention: Chief Financial Officer
Email: rchavez@asteriasbio.com
Facsimile No.: (510) 456-3796"

5. Schedule 3 is hereby amended to replace,

"The Company

Pedro Lichtinger	plichtinger@asteriasbio.com
Robert Peabody	rpeabody@biotimemail.com

MLV

Randy Billhardt	rbillhardt@mlvco.com
Ryan Loforte	rloforte@mlvco.com
Patrice McNicoll	pmcnicoll@mlvco.com
Miranda Toledano	mtoledano@mlvco.com

With a copy to mlvatmdesk@mlvco.com"

With,

"The Company

Stephen L. Cartt	scartt@asteriasbio.com
Ryan D. Chavez	rchavez@asteriasbio.com

MLV and FBR

Patrice McNicoll	pmcnicoll@fbr.com
Matthew Feinberg	mfeinberg@fbr.com
Ryan Loforte	rloforte@fbr.com

With a copy to atmadmin@fbr.com."

6. Except as specifically set forth herein, all other provisions of the Original Agreement shall remain in full force and effect.

7. Entire Agreement; Amendment; Severability . This Amendment No. 1 to Sales Agreement together with the Original Agreement (including all schedules and exhibits attached hereto and thereto and Placement Notices issued pursuant hereto and thereto) constitutes the entire agreement and supersedes all other prior and contemporaneous agreements and undertakings, both written and oral, among the parties hereto with regard to the subject matter hereof. All references in the Original Agreement to the "Agreement" shall mean the Original Agreement as amended by this Amendment No. 1; *provided, however*, that all references to "date of this Agreement" in the Original Agreement shall continue to refer to the date of the Original Agreement, and the reference to "time of execution of this Agreement" set forth in Section 13(a) shall continue to refer to the time of execution of the Original Agreement.

8. Applicable Law; Consent to Jurisdiction. This amendment shall be governed by, and construed in accordance with, the internal laws of the State of New York without regard to the principles of conflicts of laws. Each party hereby irrevocably submits to the non-exclusive jurisdiction of the state and federal courts sitting in the City of New York, borough of Manhattan, for the adjudication of any dispute hereunder or in connection with any transaction contemplated hereby, and hereby irrevocably waives, and agrees not to assert in any suit, action or proceeding, any claim that it is not personally subject to the jurisdiction of any such court, that such suit, action or proceeding is brought in an inconvenient forum or that the venue of such suit, action or proceeding is improper. Each party hereby irrevocably waives personal service of process and consents to process being served in any such suit, action or proceeding by mailing a copy thereof (certified or registered mail, return receipt requested) to such party at the address in effect for notices to it under this amendment and agrees that such service shall constitute good and sufficient service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any manner permitted by law.

9. Waiver of Jury Trial. The Company, MLV and FBR each hereby irrevocably waives any right it may have to a trial by jury in respect of any claim based upon or arising out of this amendment or any transaction contemplated hereby.

10. Counterparts. This amendment may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument. Delivery of an executed amendment by one party to the other may be made by facsimile transmission.

[*Signature Page Follows*]

If the foregoing correctly sets forth the understanding among the Company, MLV and FBR, please so indicate in the space provided below for that purpose, whereupon this letter shall constitute a binding amendment to the Agreement between the Company, MLV and FBR.

Very truly yours,

ASTERIAS BIOTHERAPEUTICS, INC.

By: /s/ Stephen L. Cartt
Name: Stephen L. Cartt
Title: President and Chief Executive Officer

MLV & CO. LLC

By: /s/ Patrice McNicoll
Name: Patrice McNicoll
Title: Chief Executive Officer

FBR CAPITAL MARKETS & CO.

By: /s/ Patrice McNicoll
Name: Patrice McNicoll
Title: Co-Head of Capital Markets

EXHIBIT 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in the Registration Statements on Form S-3 (Registration No. 333-200745, 333-204441 and 333-215154), and on Form S-8 (Registration No. 333-202674,333-206237 and 333-211995) and related prospectuses of Asterias Biotherapeutics, Inc. of our reports dated March 28, 2017 relating to the financial statements and the effectiveness of internal control over financial reporting of Asterias Biotherapeutics, Inc., which appear in this Annual Report on Form 10-K.

/s/ OUM & CO. LLP

San Francisco, California
March 28, 2017

Exhibit 31

CERTIFICATIONS

I, Stephen L. Cartt, certify that:

1. I have reviewed this annual report on Form 10-K of Asterias Biotherapeutics, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rule 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this periodic report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 28, 2017

/s/ *Stephen L. Cartt*
Stephen L. Cartt
Principal Executive Officer

Exhibit 31

CERTIFICATIONS

I, Ryan Chavez, certify that:

1. I have reviewed this annual report on Form 10-K of Asterias Biotherapeutics, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rule 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this periodic report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and

Date: March 28, 2017

/s/ *Ryan Chavez*
Ryan Chavez
Principal Financial Officer

Exhibit 32

CERTIFICATION PURSUANT TO 18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

In connection with the Annual Report on Form 10-K of Asterias Biotherapeutics, Inc. (the "Company") for the year ended December 31, 2016 as filed with the Securities and Exchange Commission on the date hereof (the "Report"), we Stephen L. Cartt, Chief Executive Officer, and Ryan Chavez, Chief Financial Officer of the Company, certify pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended; and

2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

Date: March 28, 2017

/s/ *Stephen L. Cartt*
Stephen L. Cartt
Principal Executive Officer

/s/ *Ryan Chavez*
Ryan Chavez
Principal Financial Officer