BIOTIME INC
Form 10-K
March 11, 2015

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, 2014

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 1-12830

BioTime, Inc.
(Exact name of registrant as specified in its charter)

California	94-3127919
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

1301 Harbor Bay Parkway, Suite 100
Alameda, California 94502
(Address of principal executive offices) (Zip Code)

Registrant's telephone number, including area code (510) 521-3390

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

Title of each class	Name of exchange on which registered
Common shares, no par value	NYSE MKT
Common share purchase warrants expiring October 1, 2018	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 approximate aggregate market value of voting common shares held by non-affiliates computed by reference to the price at which common shares were last sold as of June 30, 2014 was $120,375,039. Shares held by each executive officer and director and by each person who beneficially owns more than 5% of the outstanding common shares have been excluded in that such persons may under certain circumstances be deemed to be affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

The number of common shares outstanding as of March 9, 2015 was 83,154,787.

Documents Incorporated by Reference
Portions of the registrant's Proxy Statement for 2015 Annual Meeting of Shareholders are incorporated by reference in Part III

BioTime, Inc.

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PART I

Statements made in this Form 10-K that are not historical facts may constitute forward-looking statements that are subject to risks and uncertainties that could cause actual results to differ materially from those discussed. Words such as “expects,” “may,” “will,” “anticipates,” “intends,” “plans,” “believes,” “seeks,” “estimates,” and similar expressions identify forward-looking statements. See “Risk Factors.”

References to “we” means BioTime, Inc. and its subsidiaries unless the context otherwise indicates.

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 biotechnology company focused on the emerging field of regenerative medicine. Our core technologies center on stem cells capable of becoming all of the cell types in the human body, a property called pluripotency, for use in a variety of fields of medicine, including various age-related degenerative diseases. We are attempting to develop cell based therapeutic products for diseases such as neurological disorders, cancer, age related macular degeneration, orthopedic disorders, and age-related cardiovascular disease. We are also pursuing nearer term commercial opportunities such as: Renevia™ a product currently in clinical trials in Europe to facilitate cell transplantation; ReGlyde™ and Premvia™ for tendon and wound-management applications, respectively; PanC-Dx™, a family of novel blood and urine-based cancer screens; our current line of research products, including PureStem® human embryonic progenitor cell lines (“hEPSc”), associated ESpan™ culture media, human embryonic stem cell lines derived by our subsidiary ES Cell International Pte Ltd (“ESI”) under current good manufacturing practices (“cGMP”); HyStem® hydrogel products; the LifeMap Database Suite, and mobile health software products.

“Regenerative medicine” refers to an emerging field of therapeutic product development that may allow all human cell and tissue types to be manufactured on an industrial scale. This new technology is made possible by the isolation of human embryonic stem (“hES”) cells, and by the development of “induced pluripotent stem (“iPS”) cells” which are created from regular cells of the human body using technology that allows adult cells to be “reprogrammed” into cells with pluripotency similar to hES cells. These pluripotent hES and iPS cells have the unique property of being able to branch out into each and every kind of cell in the human body, including the cell types that make up the brain, the blood, the heart, the lungs, the liver, and other tissues. Unlike adult-derived stem cells that have limited potential to become different cell types, pluripotent stem cells may have vast potential to supply an array of new regenerative therapeutic products, especially those targeting the large and growing markets associated with age-related degenerative disease. Unlike pharmaceuticals that require a molecular target, therapeutic strategies in regenerative medicine are generally aimed at regenerating or replacing affected cells and tissues, and therefore may have broader applicability. Regenerative medicine represents a revolution in the field of biotechnology with the promise of providing therapies for diseases previously considered incurable.

The field of regenerative medicine includes a broad range of disciplines, including tissue banking, cellular therapy, gene therapy, and tissue engineering. Our commercial efforts in regenerative medicine include the development and sale of products designed for research applications in the near term as well as products designed for diagnostic and therapeutic applications in the medium and long term.

We have also developed and out-licensed manufacturing and marketing rights to Hextend®, a physiologically balanced blood plasma volume expander used for the treatment of hypovolemia in surgery, emergency trauma treatment, and other applications. Hypovolemia is a condition caused by low blood volume, often from blood loss

during surgery or from injury. Hextend® maintains circulatory system fluid volume and blood pressure and helps sustain vital organs during surgery or when a patient has sustained substantial blood loss due to an injury. Hextend® is the only blood plasma volume expander that contains lactate, multiple electrolytes, glucose, and a medically approved form of starch called hetastarch. Hextend® is sterile, so its use avoids the risk of infection. Health insurance reimbursements and HMO coverage now include the cost of Hextend® used in surgical procedures. Hextend® is manufactured and distributed in the United States by Hospira, Inc., and in South Korea by CJ HealthCare Corporation ("CJ Health"), a subsidiary of CheilJedang Corporation.

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The following table summarizes the status of our primary research and development programs in stem cell research and regenerative medicine.

Therapeutic Area	Program or Product	Status	Development Company
		Phase I/IIa dose escalation trial underway in cervical spinal cord injury.	
Cervical Spinal Cord Injury	AST-OPC-1: Glial Cells	$14.3 million grant from California Institute for Regenerative Medicine to provide matching funds for AST-OPC1 clinical trial and process development. Proof of concept established in multiple in vitro systems.	Asterias
Non-Small Cell Lung Cancer	AST-VAC2 Allogeneic Dendritic Cells Loaded with Telomerase antigen	Agreement by Cancer Research UK to conduct Phase I/IIa clinical trial of AST-VAC2 in subjects with non-small cell lung cancer. Manufacturing process being developed for transfer to Cancer Research UK for clinical trials.	Asterias
Age Related Macular Degeneration (AMD)	OpRegen® and OpRegen®-Plus	Received approval from Israel ministry of health and US FDA to begin a Phase I/IIa clinical trial to determine safety and effective dose for OpRegen® in patients with geographic atrophy stage of dry AMD. The trial will enroll at least 15 patients beginning in the second quarter of 2015. We expect this phase to take several months and then will follow each patient for a minimum of 12 months.	Cell Cure Neurosciences
Bone Repair	Bone repair using embryonic-derived progenitor cells (Spinal fusion, trauma and cranial maxillo-facial)	Initiated in vitro optimization of bone differentiation and induction using progenitor cells.	OrthoCyte
Age Related Vascular Disease, including Cardiovascular Disorders	Therapeutic products for age related vascular disease, including cardiovascular disorders utilizing proprietary ReCyte™ technology and human pluripotent stem cell derived cells.	Evaluating progenitor stem cell-based and cell-derived therapeutics. Conducting ongoing collaboration with researchers at Cornell Weill Medical College for derivation and preclinical testing of endothelial progenitor cells for the treatment of age-related vascular disease.	ReCyte Therapeutics

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Nearer-Term Commercial Opportunities	Program or Product	Status	Development Company
HIV-related Lipoatrophy	Renevia™ (the trade name for HyStem® used in lipotransfer)	Commenced a pivotal trial for Renevia™ in Europe to show effectiveness of Renevia™ in lipotransfer for patients suffering from HIV related lipoatrophy of the face. Completed first human clinical safety trial for Renevia™ Results confirmed that Renevia™ was safe in humans at the proposed dosage concentration for this particular use.	BioTime
Other Clinical Areas	Biocompatible hydrogels that mimic the human extracellular matrix	Received ISO13485:2003 Certification from BSI (British Standards Institution) for design, development, manufacture, and distribution of BioTime HyStem® hydrogels for cell delivery applications. ISO certification is a prerequisite for CE marking of medical devices within the European Union and will be needed in order to market Renevia™ in Europe. Entrance into License Agreement with Cornell University through which Weill Cornell Medical College will provide blood samples derived from healthy people and lung cancer patients for comparative analysis using OncoCyte's proprietary PanC-Dx™ diagnostic tests.	BioTime
Diagnostic Tests for Lung Cancer, Bladder Cancer; and Breast Cancer	PanC-Dx™	Completion by collaborators at The Wistar Institute of a large, multi-site study involving 600 patients evaluating a blood-based lung cancer diagnostic test; Completion of enrollment in the initial clinical study, which involved 100 patients, of a urine-based bladder cancer diagnostic test conducted in collaboration with investigators in the Department of Pathology, Division of Cytopathology, at a leading medical institution with an international reputation for excellence and discovery; Expansion of the clinical development of a urine-based bladder cancer diagnostic test by initiating a multi-site clinical trial which will involve up to 1,200 patient samples obtained from at least four large urology clinics located throughout the United States; and Expansion of the clinical development of a blood-based breast cancer diagnostic test through collaboration with Abcodia, a UK-based company focusing on the early detection of cancer that has exclusive commercial access to a unique longitudinal biobank of over 5,000,000 serum samples collected through the UK Collaborative Trial for Ovarian Cancer Screening.	OncoCyte
Marketing On-Line Searchable Data Bases	GeneCards®	A database of human genes that provides concise genomic, transcriptomic, genetic, proteomic, functional and disease related information, on all known and predicted human	LifeMap Sciences

		genes.	
	MalaCards™	A database of human diseases that is based on the GeneCards® platform and contains computerized “cards” classifying information relating to a wide array of human diseases.	
	LifeMap Discovery®	A database of embryonic development, stem cell research and regenerative medicine.	
	VarElect™	A powerful, yet easy-to-use application for prioritizing gene variants resulting from next generation sequencing experiments.	
	GeneAnalytics™	A novel gene set analysis tool.	
Mobile Health	Mobile health software development	Developing mobile health software products in conjunction with the Icahn School of Medicine at Mount Sinai.	LifeMap Solutions

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Key Accomplishments in 2014

- BioTime commenced a pivotal human clinical trial of Renevia™ in Europe in patients with HIV-related lipoatrophy.

- BioTime received ISO13485:2003 Certification from BSI (British Standards Institution) for design, development, manufacture, and distribution of BioTime HyStem® hydrogels for cell delivery applications. ISO certification is a prerequisite for CE marking of medical devices within the European Union and will be needed to market Renevia™ in Europe.

- BioTime received United States Food and Drug Administration ("FDA") premarket notification clearance for Premvia™ 510(k) for wound management.

- Subsidiary Asterias Biotherapeutics, Inc. ("Asterias") received FDA clearance and initiated enrollment in a Phase I/IIa clinical trial of AST-OPC1 in patients with complete cervical spinal cord injury.

- Asterias was awarded a $14.3 million grant by the California Institute for Regenerative Medicine ("CIRM") to support the Phase I/IIa clinical trial of AST-OPC1.

- Subsidiary Cell Cure Neurosciences Ltd received FDA authorization to initiate a Phase I/IIa clinical trial of human embryonic stem cell-derived OpRegen® for the treatment of the dry form of age-related macular degeneration.

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Additional Information

Espy®, HyStem®, Hextend®, PureStem®, and PentaLyte® are registered trademarks of BioTime, Inc., and Renevia™, ReGlyde™, Premvia™, ESpan™ and ESI BIO™ are trademarks of BioTime, Inc. ACTCellerate™ is a trademark licensed to u by Advanced Cell Technology, Inc., now Ocata Therapeutics, Inc., ("Ocata"). ReCyte™ is a trademark of ReCyte Therapeutics, Inc. PanC-Dx™ is a trademark of OncoCyte Corporation. OpRegen® is a registered trademark of Cell Cure Neurosciences, Ltd. GeneCards® is a registered trademark of Yeda Research and Development Co. Ltd.

BioTime was incorporated in 1990 in the state of California. Our principal executive offices are located at 1301 Harbor Bay Parkway, Alameda, California 94502. Our telephone number is (510) 521 3390.

Business Strategy

One of our goals is to develop cell-based regenerative therapies for age-related degenerative disease. If we are successful developing our products, achieving FDA approval and commercializing our products, we may be able to increase both length and quality of life for elderly patients suffering from a variety of age-related degenerative diseases. Additionally, the degenerative diseases of aging meet several criteria that make them an attractive business opportunity. First, the elderly comprise a large and growing segment of the U.S. and world population. Second, chronic degenerative diseases account for nearly 75% of health care costs. Third, because many age-related diseases appear to be caused by the inherent limited capacity of aged human cells to regenerate damaged tissues in the body, our cell replacement technologies may eliminate the high costs associated with care for these diseases.

Our effort in regenerative medicine also includes research on more than 200 purified, scalable, and novel human embryonic progenitor cell types produced from hES and iPS cells. This research has included extensive gene expression studies of the unique properties of the cells, as well as conditions that cause the cells to differentiate into many of the cell types in the body. We have filed patent applications on the compositions of these cells, the media in which they can be expanded, and a variety of uses of the cells, including drug discovery and cell replacement therapies. This novel manufacturing technology may provide us with a competitive advantage in producing highly purified, identified, and scalable cell types for potential use in therapy.

We have organized several subsidiaries to undertake our cell replacement therapeutic programs, diagnostic product programs, and our research product programs. We have provided funding, through cash infusions, loan facilities and the issuance of our stock, and will continue to partly or wholly fund these subsidiaries, recruit their management teams, assist them in acquiring technology, and provide general guidance for building the subsidiary companies. We may license patents and technology to the subsidiaries that we do not wholly own under agreements that will entitle us to receive royalty payments from the commercialization of products or technology developed by the subsidiaries.

The joint ownership of subsidiaries with other investors allows us to fund the expensive development costs in a manner that spreads the costs and risk and reduces our need to obtain more equity financing of our own that could be dilutive to our shareholders. This structure also allows investors the flexibility to invest in BioTime, which is a broad portfolio of companies focused on regenerative medicine, or to invest in a particular subsidiary that is targeting a specific field of medicine or product market.

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The following table shows our subsidiaries, their respective principal fields of business, our percentage ownership, directly and through subsidiaries, as at December 31, 2014, and the country where their principal business is located:

Subsidiary	Field of Business	BioTime Ownership	Country
Asterias Biotherapeutics, Inc.	Research, development and commercialization of human therapeutic products from stem cells, focused initially in the fields of neurology and oncology	70.6%(1)	USA
BioTime Asia, Limited	Stem cell products for research	81%	Hong Kong
Cell Cure Neurosciences Ltd.	Age-related macular degeneration Multiple sclerosis Parkinson's disease	62.5%(2)	Israel
ES Cell International Pte Ltd	Stem cell products for research, including clinical grade cell lines produced under cGMP	100%	Singapore
LifeMap Sciences, Inc.	Biomedical, gene, disease, and stem cell databases and tools	74.5%	USA
LifeMap Sciences, Ltd.	Biomedical, gene, disease, and stem cell databases and tools	(3)	Israel
LifeMap Solutions, Inc.	Mobile health software	(3)	USA
OncoCyte Corporation	Cancer diagnostics	75.3%	USA
OrthoCyte Corporation	Orthopedic diseases, including chronic back pain and osteoarthritis	100%(4)	USA
ReCyte Therapeutics, Inc.	Vascular disorders, including cardiovascular-related diseases, ischemic conditions, vascular injuries Stem cell-derived endothelial and cardiovascular related progenitor cells that have applications in research, drug testing, and therapeutics	94.8%	USA

(1) During February 2015, Asterias sold 1,410,255 shares of its Series A Common Stock to investors, which reduced our percentage ownership of Asterias to 67.5%.
(2) Includes shares owned by BioTime, Asterias, and ESI.
(3) LifeMap Sciences, Ltd. and LifeMap Solutions, Inc. are wholly-owned subsidiaries of LifeMap Sciences, Inc.
(4) Includes shares owned by BioTime and Asterias.

Another tenet of our business strategy is the development and sale of advanced human stem cell products and technologies that can be used by researchers at universities and other institutions, at companies in the bioscience and biopharmaceutical industries, and at other companies that provide research products to companies in those industries. By providing products and technologies that will be used by researchers and drug developers at larger institutions and corporations, we believe that we will be able to commercialize products more quickly and inexpensively, and realize greater revenues than would be possible with the development of therapeutic products alone.

We have made the filing and prosecution of patent applications an integral part of our business strategy in order to protect our investment in our products and that we and our subsidiaries have developed or licensed from others.

Renevia™ and Other HyStem® Cell Delivery Medical Devices

Our HyStem® hydrogel product line is one of the components in our near-term revenue strategy. HyStem® is a patented biomaterial that mimics the extracellular matrix ("ECM"), the network of molecules surrounding cells in

organs and tissues that is essential to cellular function. Many tissue engineering and regenerative cell-based therapies will require the delivery of therapeutic cells in a matrix or scaffold for proper function. HyStem® is a unique hydrogel that has been shown to support cellular attachment and proliferation in vivo. Current research at leading medical institutions has shown that HyStem® is compatible with a wide variety of tissue types including brain, bone, skin, neural, cartilage, and heart tissues.

The patented technology underlying our HyStem® hydrogels such as ReGlyde™ and Premvia™ was developed at the University of Utah and has been licensed to us for human therapeutic uses. The HyStem® technology is based on a unique thiol cross-linking strategy to prepare hyaluronan-based hydrogels from thiol-modified hyaluronan. Since the first published report in 2002, there have been over 120 academic scientific publications supporting the biocompatibility of thiol cross-linked hyaluronan based hydrogels and their applications as medical devices and in cell culture, tissue engineering, and animal models of cell-based therapies.

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The building blocks for HyStem® hydrogels are hyaluronan and in some applications, gelatin, each of which has been thiol-modified by carbodiimide mediated hydrazide chemistry. HyStem® hydrogels are formed by cross-linking mixtures of these thiolated macromolecules with polyethylene glycol diacrylate ("PEGDA"). This unique cross-linking chemistry works through an elegant chemical reaction between the acrylate groups on the PEGDA and the sulfhydryl groups on the thiolated macromolecules, that does not generate any toxic by-products, pH change or heat. The rate of the cross-linking reaction turning the liquid mixture into a hydrogel (gelation rate) as well as hydrogel stiffness can be controlled by varying the amount of the PEGDA cross-linker. Due to the unique cross-linking chemistry, HyStem® hydrogels can be injected or applied as a liquid which allows the hydrogel to conform to the cavity or space, and gelation occurs in situ without harming the recipient tissue. This property of HyStem® hydrogels offers several distinct advantages over other hydrogels, including the possibility of mixing bioactive materials with the hydrogel at the point of use and the ability to inject or otherwise apply the material in its liquid state with precision at surgical or wound sites. Building upon this platform, we have developed the HyStem® family of unique, biocompatible resorbable hydrogels.

Renevia™

We are developing Renevia™, a clinical grade HyStem® hydrogel, as an injectable product. Renevia™ may address an immediate need in cosmetic and reconstructive surgeries and other procedures by improving the process of transplanting adipose derived cells or other adult stem cells. Adult stem cell types such as adipose stem cells obtained from a patient through liposuction can be transplanted back into the same patient at another location in the body, without the risk of rejection associated with the transplant of donor tissues. However, the transplantation of cells without the molecular matrix in which cells normally reside often leads to widespread cell death or the failure of the transplanted cells to remain at the transplant site. The transfer of cells in Renevia™ may resolve this issue by localizing the transplanted cells at the intended site and by providing a three-dimensional scaffold upon which cells can rebuild normal tissue. Renevia™ may also support other emerging cell and tissue transplant therapies such as those derived from hES and iPS cells, in addition to its potential application in the treatment of a number of conditions such as osteoarthritis, brain tumors, stroke, bone fracture, and wounds.

We have commenced a pivotal clinical study to assess the efficacy of Renevia™ as a delivery matrix for adipose cells to restore normal skin contours in patients where the subcutaneous adipose tissue has been lost to HIV related facial lipoatrophy. Lipoatrophy is a localized loss of fat beneath the skin and is often a consequence of the normal aging process, but lipoatrophy can also be associated with trauma, surgery, and diseases. Lipoatrophy is frequently experienced by HIV patients being treated with anti-viral drugs. The resulting facial wasting ages the individual's appearance prematurely and, along with a thinning of the skin, allows musculature and vasculature to be easily seen, resulting in what is commonly known as "the face of AIDS." Treatment of the condition has been determined to be medically advisable to improve the individual's self-esteem and quality of life.

The pivotal clinical study include a minimum of 56 and up to 92 HIV positive males and females between 18-65 years of age. Subjects will be randomized with half in a treatment group and half in a delayed-treatment cohort, each receiving a single treatment procedure of Renevia™ with autologous adipose cells harvested by liposuction and implanted in the mid-facial region. The primary effectiveness measure will be the comparison of the change in skin thickness between the treatment and delayed treatment groups. A secondary endpoint will be mid-face volume deficit and global aesthetic improvement scores. Patients will be monitored at one, three, and six-month intervals after treatment.

The clinical study has commenced at The Stem Center in Palma de Mallorca, Spain located within the hospital Clinica USP Palmaplanas in Palma, where a successful safety trial, Renevia-01, was completed during 2013.

Renevia™ is manufactured in the US in compliance with cGMP requirements and has been tested pursuant to ISO 10993 standards for implantable medical devices and shown to be biocompatible without adverse effects in animal

studies. Our plan is to bring Renevia™ to the medical market first in the European Union ("EU"), where the anticipated cost of the clinical trials would be relatively low. Once the use of Renevia™ in surgery is established in the EU, we plan to seek approval from the FDA to market Renevia™ in the larger American market where there are approximately 4 million surgical reconstructive procedures performed per year.

Premvia™

Premvia™, is a HyStem® hydrogel formulation of cross-linked thiol-modified hyaluronan and thiol-modified gelatin for the management of wounds including partial and full-thickness wounds, ulcers, tunneled/undermined wounds, surgical wounds, and burns. Due to its high water content, Premvia™ is able to donate water molecules to the wound surface and to maintain a moist environment at the wound bed, which is critical for wound healing. Additionally, the biodegradable matrix provides a scaffold for the cellular infiltration and proliferation as well as capillary growth needed to promote healing. There is significant competition in the wound healing dressing space, however, one advantage that Premvia™ appears to have over most other technologies is the ability to flow into the wound thereby providing a moist environment to every part of a wound which a traditional covering cannot.

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We submitted a 510(k) for Premvia™ and received clearance from the U.S. FDA in August 2014 to market Premvia™ as a medical device for wound management. Premvia™ utilizes the same cGMP components used in our clinical trials of Renevia™. Plans to move Premvia™ forward in 2015 are in progress.

Premvia™ is also intended to serve as a foundation for the further development of bioactive products that could deliver biological factors or cells to accelerate wound healing. Such new products would require clinical testing to demonstrate safety and efficacy of the new products, and additional FDA review and approval.

ReGlyde™

ReGlyde™, a cross-linked thiol-modified hyaluronan hydrogel is being developed for the management and protection of tendon injuries following surgical repair of the digital flexor or extensor tendons of the hand. The product is intended to be applied to the repaired tendon area via a syringe or similar device immediately prior to closing of the surgical area. Separation of the tendon from surrounding tissue has been shown to significantly reduce post-surgical adhesions that can lead to complications such as restricted finger mobility and flexibility. We believe that the flowable and in-situ gelling capability of ReGlyde™ could provide an advantage over the existing technology that is in the form of a sheet causing difficulty in application in what is often a small compartment after surgery. ISO 10993 biocompatibility studies and pre-clinical studies in animal models to demonstrate safety and efficacy are on-going. ReGlyde™ is expected to be regulated as a medical device in the United States, and we believe that it is eligible for 510(k) market approval. If these requisite studies do not show biocompatibility and efficacy, we will have to reconsider our development plans. We may be required to provide human clinical data demonstrating safety and efficacy for approval as a medical device if the FDA determines that marketing approval should not be granted on the basis of a 510(k) application.

HyStem® Hydrogel in Research

Other HyStem® hydrogels are currently being used by researchers at a number of medical schools in pre-clinical studies of stem cell therapies to facilitate wound healing; the treatment of ischemic stroke, brain cancer, vocal fold scarring; and myocardial infarct repair. HyStem® hydrogels may have other applications when combined with the diverse and scalable cell types our scientists have derived from hES cells. Our HyStem® technology forms the foundation for unique stem cell delivery products in both the adult and embryonic stem cell marketplace, including products manufactured using our PureStem® technology. Recent publications have highlighted the combined use of HyStem® hydrogels with PureStem® progenitors resulting in a combined product that produces cartilage- producing cell masses known as chondrocytes. We call this experimental product HyStem®-4D. In collaboration with William Marsh Rice University, we are also using HyStem® technology to develop 3D cell culture platforms for improved methods of screening new anti-cancer drug candidates.

We have submitted a Device Master File (called an MAF) to the FDA with the details of the manufacturing, testing, and biocompatibility of the HyStem® hydrogels, of which Renevia™ is one version. The MAF was filed in order to allow the FDA to easily access the manufacturing and biocompatibility information to support any future clinical studies that third party investigators may elect to initiate for their cell or drug products utilizing HyStem® hydrogels.

OncoCyte: Novel Cancer Diagnostics and Therapeutics.

Formed in 2009, OncoCyte is developing novel products for the diagnosis and treatment of cancer in order to improve the quality and length of life of cancer patients. OncoCyte is presently focusing its efforts on developing PanC-Dx™ diagnostic products for use in detecting breast, bladder, and lung cancers.

PanC-Dx™ for Diagnosis of Cancer

OncoCyte's lead product is PanC-Dx™ a class of non-invasive cancer diagnostics based on a proprietary set of cancer markers characterized, in part, by broad gene expression patterns in numerous cancer types. The diagnostic products under development are designed to detect cancer using simple, low cost blood tests or, in the case of bladder cancer, a urine test. The apparent high correlation of certain combinations of biomarkers in breast cancer and bladder cancer has made these indications attractive initial targets. OncoCyte is also evaluating markers that may be used in a PanC-Dx™ screen for lung cancer. Clinical studies designed to test the performance of PanC-Dx™ markers in these three cancers were initiated in early 2014. Initial studies in bladder and lung cancer have been completed while the breast cancer study is expected to be completed in early 2015. The performance of the marker panels in determining the presence or the progression of disease in various categories of patients in these clinical studies will determine the specific nature of the tests to be developed and the approval pathway that OncoCyte will pursue.

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The PanC-Dx™ biomarkers were discovered as a result of ongoing research within OncoCyte and BioTime on the gene expression patterns associated with embryonic development. This research has demonstrated that many of the same genes associated with normal growth during development are abnormally reactivated by cancer cells. These genes regulate such diverse processes as cell proliferation, cell migration and blood vessel formation. Many of these genes have not been previously associated with cancer. Moreover, expression of a large subset of these genes is found across numerous cancer types (e.g. cancers of the breast, colon, ovaries, etc.), suggesting these genes may control fundamental processes during cancer growth and progression. In addition to their potential value in developing diagnostic biomarkers, an understanding of the pattern of expression of these genes may also enable the development of powerful new cancer therapeutics that target rapidly proliferating cancer cells.

OncoCyte has initiated clinical development of its bladder cancer diagnostic test in both the United States and China. In the United States, OncoCyte has entered into a Clinical Trial Agreement with a leading medical institution with an international reputation for excellence and discovery, while in China, OncoCyte has entered into a Fee-for-Service Agreement with China Medicine Inc., a contract research organization serving nine major medical institutions. The goal of these clinical studies is the testing of OncoCyte's proprietary diagnostic technology in the most common type of bladder cancer, urothelial carcinoma ("UC") (previously designated transitional cell carcinoma). Investigators in the collaborating institutions will collect urine samples from patients at the time of bladder cancer diagnosis as well as from those with a risk for recurrent disease. In certain cases, current standard-of-care diagnostic strategies such as the cellular microscopic analysis of the urine samples will be compared with OncoCyte's proprietary markers. A statistical analysis of these and other results will be performed to determine the overall relative performance of OncoCyte's PanC-Dx™ markers.

The ability of the markers tested in the studies to determine the absence, presence, or progression of UC in patients will determine the specific nature of the bladder cancer test to be developed and the regulatory approval pathway that OncoCyte will pursue. UC constitutes more than 90% of bladder cancers in the Americas, Europe and Asia. Although most patients with bladder cancer can be treated with organ-sparing chemotherapy, UC has a relapse rate of nearly 70% and can progress to invasive, metastatic, and lethal disease. The regular surveillance and treatment of recurrent disease from the time of diagnosis for the remainder of a patient's life makes UC the most costly malignancy on a per patient basis. The problem is amplified because the standard of care for surveillance – microscopic assessment of urinary cytology specimens – often lacks the sensitivity sufficient to ever declare a patient truly disease free. While cytology has a very high positive predictive value (low false positive rate), it has a low negative predictive value and a high indeterminate rate. Patients who have indeterminate urine cytology results commonly undergo cystoscopy, which is painful, time consuming, costly, and unnecessary in many cases since a neoplasm is often not present. In UC, as in virtually all other cancers, earlier and more accurate diagnosis, including diagnosis of disease recurrence, is generally associated with better outcomes and lower cost.

Overall markets for bladder cancer diagnostics are large and growing. Based on National Cancer Institute statistics released in 2012, it was estimated that in 2013 over 72,000 new cases of bladder cancer would occur in the United States and a total of over 550,000 men and women alive would have a history of bladder cancer and be subject to recurrence surveillance testing using cystoscopy or urine cytology. Based on data released in 2012, the overall incidence of bladder cancer in China is 6.1 cases per 100,000 individuals. That number is expected to increase markedly in the next two decades. It is estimated that the annual number of urine cytological analyses performed in the U.S. is over 1.5 million, with more than 3 million tests performed annually in the developed world.

During October 2013, OncoCyte entered into a Sponsored Research Agreement and a Material Transfer Agreement with The Wistar Institute to collaboratively develop lung cancer diagnostic products. As part of the collaboration, Wistar investigators are conducting a multi-center patient study in which they are assessing gene expression patterns in blood cells of patients with malignant versus non-malignant lung disease. OncoCyte scientists will analyze blood samples obtained from patients in the study to determine levels of tumor-associated proteins using its proprietary PanC-Dx™ diagnostic tests. The performance of markers tested in the study in determining the presence or the

progression of disease in various categories of patients may determine the specific nature of the lung cancer test to be developed and the regulatory approval pathway that OncoCyte will pursue. OncoCyte will have an option to exclusively license any inventions, discoveries or technology developed by Wistar, or by OncoCyte using Wistar technology, in the course of the collaborative research.

Lung cancer remains a primary cause of cancer-related death, in part because there is no effective diagnostic test to screen patients for lung cancer at an early stage. The Wistar-sponsored study was conducted on patients recruited through grant partners at multiple clinical sites. Enrollment in this study was completed in mid-2014. It is expected that the results of this study will be presented at scientific conferences and published in a peer-reviewed journal during the first half of 2015.

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Cancer Therapy

Although OncoCyte is presently devoting its research and development efforts to PanC-Dx™, OncoCyte has also conducted research to derive vascular endothelial cells engineered to deliver a toxic payload to the developing blood vessels of a tumor, with the aim of removing malignant tumors while not affecting nearby normal tissues in the body.

The progression of human solid tumors almost always requires the development of a support network of blood vessels to provide nutrients to the expanding tumor mass. The developing tumor vasculature affords an attractive target for anti-cancer therapeutics. Drugs targeting the growth of blood vessels have shown some efficacy in specific cancer applications. However, there is clear need for additional therapeutic approaches that can be used to treat advanced, metastatic cancers. OncoCyte intends to develop a new class of cellular therapeutics that would specifically target the development of tumor vasculature in advanced cancers as an entry point for the delivery of regulated tumoricidal activities.

Through the acquisition of Cell Targeting, Inc., OncoCyte has access to technology that uses peptides selected for their ability to adhere to diseased tissues. By coating or "painting" these peptides onto the surface of therapeutic cells using techniques that do not modify the cell physiology, OncoCyte has been able to produce tissue-specific and disease-specific cell modification agents. This technology may be used in conjunction with the development of genetically modified hES-derived vascular progenitors designed to target and destroy malignant tumors.

Our Ownership of OncoCyte

We presently own 75.3% of the OncoCyte common stock outstanding. The other shares of OncoCyte common stock are owned by two private investors. OncoCyte has adopted a stock option plan under which it may issue up to 4,000,000 shares of its common stock to officers, directors, employees, and consultants of OncoCyte and BioTime. As of December 31, 2014, options to purchase 2,722,500 shares of OncoCyte common stock had been granted.

Asterias: Stem Cell Therapies

During September 2012, we formed Asterias to acquire assets in the stem cell field for use in developing and commercializing products for regenerative medicine. On October 1, 2013, Asterias acquired intellectual property, cell lines and other human embryonic stem cell related assets from Geron Corporation ("Geron") and also acquired a quantity of certain hES cell lines from BioTime, which provides Asterias with the use of cell lines and other biological materials, patents, and technology developed by Geron over 12 years of work focused in the following complementary lines of research:

- The establishment of cell banks of undifferentiated hES cells produced under current good manufacturing procedures "cGMP" and suitable for human therapeutic use;

- The development of scalable differentiation methods which convert, at low cost, undifferentiated hES cells into functional cells suitable for human therapeutic cells that can be stored and distributed in the frozen state for "off the shelf" use;

- The development of regulatory paradigms to satisfy both U.S. and European regulatory authority requirements to begin human clinical testing of products made from hES cells; and

- The continuous filing and prosecution of patents covering inventions to protect commercialization rights, as well as consummating in-licenses to enable freedom to operate in a variety of fields.

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Products Under Development

Asterias' product candidates are summarized in the following table:

Product Candidate Description	Target Market	Estimated Number of Potential Patients[1]	Status
AST-OPC1 – Glial Cells	Current development focus: Spinal Cord Injury ("SCI")	12,000 new cases per year in U.S.	Phase I Trial in thoracic SCI completed in U.S. 5 Patients treated – no serious adverse events related to the AST-OPC1 drug product to date. Phase I/IIa dose escalation trial underway in cervical SCI. $14.3 million grant obtained from CIRM to provide matching funds for clinical trial and process development.
	Additional potential markets:		
	Multiple Sclerosis ("MS")	180,000 new cases per year in U.S.	Proof of principle achieved in animal models.
	Stroke	800,000 new cases per year in U.S.	Pre-clinical research.
AST-VAC2 – Allogeneic Dendritic Cells loaded with Telomerase antigen	Current development focus:		
	Non-small Cell Lung Cancer	166,000 new cases per year in U.S.	Cells derived and characterization studies performed (parameters analyzed showed normal cell functions in vitro[2]). Proof of concept established in multiple human in in vitro[2] systems. Manufacturing process being transferred to Cancer Research UK for conduct of Phase I/IIa trial.
	Additional potential markets: Multiple cancer types, antigens and infectious diseases		

(1) The estimates of the numbers of potential patients shown in the table are based on data for the United States only and do not include potential patients in other countries.
(2) In vitro means in tissue culture dishes.

Additional product candidates that Asterias may determine to develop from various cell types that it acquired from Geron are summarized in the following table:

Product Candidate Description	Target Market	Estimated Number of Potential Patients [1]	Status
AST-VAC1 – Autologous Monocyte – Derived Dendritic Cells (infused cells derived from the treated patient)	Cancer	Prostate: 240,000 new cases per year in U.S.	Phase I study in metastatic prostate cancer completed (Journal of Immunology, 2005, 174: 3798-3807).
		Acute myelogenous leukemia: more than 12,000 new cases per year in U.S.	Phase I/II study in acute myelogenous leukemia completed. Manuscript in preparation.

(1) The estimates of the numbers of potential patients shown in the table are based on data for the United States only and do not include potential patients in other countries.

Asterias may also use the acquired assets, along with technology that it may develop itself or that it may acquire from third parties, to pursue the development of other products. Asterias' product development efforts may be conducted by Asterias alone or in collaboration with others if suitable co-development arrangements can be made.

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AST-OPC1 Glial Progenitor Cells

Asterias' AST-OPC1 (formerly GRNOPC1) product is comprised of glial progenitor cells, which are cells that become glial cells after injection, derived from a 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. These glial progenitor cells were the first hES cell-derived cellular therapy to enter human clinical testing when Geron initiated a Phase 1 trial of these cells in spinal cord injury in 2010.

Glial cells are nature's neuronal insulating cells. Like the insulation covering an electrical wire, glial cells 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 reproduce all of the natural functions of glial cells in animal models, including: producing myelin that wraps around nerve fibers; producing neurotrophic factors which encourage neuro-regeneration and sprouting of new nerve endings, and inducing new blood vessels which provide nutrients and remove waste matter from neural tissue as it functions in the body.

The pathology of spinal cord injury involves extensive loss of the myelin sheath (insulation) produced by glial cells at the site of injury. Although neurons are lost, the prime pathology of spinal cord injury is loss of glial insulation which prevents transmission of nerve impulses above or below the point of injury.

There are currently no drugs approved by the 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 studies to date, AST-OPC1 cells have been shown to exhibit all three effects, and therefore we believe they have potential to effectively treat acute spinal cord injury.

Geron has performed multiple studies in a validated rat model of spinal cord injury showing that a single injection of AST-OPC1 cells at the site of injury produces durable re-myelination, new blood vessel formation, and new neuronal sprouting, all of which result in sustained and significant improvement in the animal's locomotion within several months after injection. These data provided the rationale to initiate the world's first clinical trial using hES cell-derived glial cells (AST-OPC1) to treat acute spinal cord injury in humans. A large body of evidence derived from this research showed the following observations:

- AST-OPC1 survives for at least 12 months in the spinal cord after injection into animal models of spinal cord injury.

- The injected cells result in sustained and significant improvement in locomotor activity in the spinal cord injured animals in models of both thoracic and cervical injuries.

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- The growth of the AST-OPC1 cells after injection reduces cavities that normally form after injury in both animal models and human spinal cord injury.

- AST-OPC1 cells migrate up to 5 centimeters in both directions from the site of injection in rodent models of spinal cord injury. No toxicity was seen in the animals after injection – no systemic toxicity, nerve pain, benign growths (known as teratomas), or toxicity of any kind other than rare observations of benign cyst-like structures at the point of injection. Extensive in vitro immune assays demonstrated the absence of direct immune recognition of AST-OPC1 by human immune cells.

- The cyst-like structures that appeared in certain rat model studies were microscopic in size, had very few dividing cells, did not grow, and were found exclusively in the spinal cord injury site where the AST-OPC1 cells were injected. Because of the discovery of the cyst-like structures in early animal models, the FDA placed Geron's planned clinical trial on hold. The presence of cyst-like structures was investigated in additional animal studies. In four separate animal studies using the clinical grade AST-OPC1 product, cyst-like structures were found in the frequencies shown in the following table:

Number of Animals Developing Cyst-Like Structures	Number of Animals Studied
5	128
0	62
1	68
1	108

After discussions that Geron had with the FDA, the clinical trial investigators, and the data monitoring safety board, the unanimous opinion was that these cyst-like structures were of low risk to subjects and the clinical trial was permitted to proceed. Nevertheless a plan was developed to monitor subjects in clinical trials for the development of such cyst-like structures. In the completed Phase I safety study in which 5 patients received AST-OPC1 cells in their injured spinal cords, no cyst-like structures were detected in multiple magnetic resonance imaging exams ("MRIs") during a one year follow-up, or in annual long term follow-up MRIs out to 3-4 years in all subjects.

First Phase I Safety Trial

After FDA authorization, Geron began the world's first hES cell trial in patients with acute spinal cord injury in October 2010. The trial was an open label design conducted at seven U.S. neuro-trauma sites. Five subjects were treated in the trial, each of whom had a sub-acute functional complete thoracic (chest) spinal cord lesion. Patients enrolled in the study received a single dose of 2 x 10^6 cells at the injury site between 7 and 14 days after injury. All subjects received temporary low dose immune suppression treatment for 60 days. The primary endpoint of the study was safety, with secondary endpoints of neurologic function assessed by five different validated measures of sensory and motor function. Each subject received a screening MRI, and if treated and entered into the treatment protocol, received 8 follow-up MRIs in the first year and multiple physical exams and laboratory testing. The patients then entered a separate protocol after the first year which will follow them intermittently over a period of 15 years.

As of March 2015, all five patients had completed their three year follow-up data set. No surgical complications during or post-surgery have been observed, and there have been no significant adverse events to date in any patient attributable to the AST-OPC1 product, the surgery to deliver the cells, or the immunosuppressive regimen. 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, nor has there been evidence of adverse changes or cavitation on multiple MRIs. MRI results in four of the five subjects are consistent with prevention of lesion cavity formation. Immune monitoring, conducted in some of the patients, has not detected any evidence of immune responses to AST-OPC1, at time periods of up to one year post-transplant, an important clinical finding that was predicted by extensive in vitro

immune testing of AST-OPC1 prior to initiating the trial.

Phase I/IIa Dose Escalation Study: Subjects with Neurologically Complete Cervical Spinal Cord Injuries

Based on the results of the completed Phase I trial of AST-OPC1 in thoracic spinal cord injury ("SCI"), Asterias obtained permission from the FDA in August 2014 to initiate a Phase I/IIa dose escalation trial in patients with complete cervical injuries. Asterias believes that there are both medical and scientific rationales for the transition to subjects with cervical SCI. Individuals with neurologically complete cervical SCI have an enormous unmet medical need due to the loss of function in all four limbs as well as multiple additional impairments such as impaired bowel and bladder function, reduced sensation, spasticity, sudden changes in blood pressure, deep vein thrombosis, sexual dysfunction, increased infections, skin pressure sores, and chronic pain. These individuals frequently require significant assistance for their care and activities of daily living. One recent published study estimated the lifetime costs of care for a person who suffers a cervical SCI at age 25 to be $4.2 million (Y. C. Cao and M. J. DeVivo (2009)).

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Scientifically, the injured cervical spinal cord is a much better location than the upper or middle thoracic spinal cord to test the safety and potential activity of AST-OPC1. This is partly due to the fact that damaged and demyelinated nerve axons in thoracic injuries need to regrow over several spinal segments in order to restore neural function. In contrast, damaged and demyelinated nerve axons in cervical injuries only need to regrow a short distance to restore neural function. Therefore, in cervical injuries, regeneration and/or repair of damaged axons mediated by AST-OPC1 could result in substantial re-innervation of cervical segments and thereby have a significant impact on upper extremity motor and/or sensory function.

The advantages of conducting clinical trials in patients with neurologically complete cervical SCI was recently further demonstrated by published studies done by J. D. Steeves and others together with the Spinal Cord Outcomes Partnership Endeavor (SCOPE). (Steeves et al, Top Spinal Cord Inj Rehabil 2012). These studies analyzed several large SCI databases and found that only 21% and 26% of people living with C4-C7 cervical sensorimotor complete spinal cord injury recovered two or more upper extremity motor levels at 24 and 48 weeks after injury, respectively. If this rate could be increased by 20 percentage points (i.e. to 41-46% of subjects recovering two or more upper extremity motor levels), the authors calculated that a trial could achieve sufficient statistical power with approximately 200 subjects enrolled. Those studies further showed that an improvement of two or more motor levels led to a statistically significant increase in the Spinal Cord Independence Measure (“SCIM”) self-care subscore, suggestive of a measurable association between improvement in neurological function and a clinically meaningful functional outcome.

Near-Term Product Development Strategy for AST-OPC1

Asterias initiated enrollment of the Phase I/IIa dose escalation trial of AST-OPC1 in patients with complete cervical injuries in March 2015. The trial is designed to assess safety and activity of escalating doses of AST-OPC1 in complete cervical SCI, the first targeted indication for AST-OPC1. The trial is an open-label, single-arm study in patients with sub-acute, C-5 to C-7, neurologically complete cervical SCI. These individuals have lost all sensation and movement below their injury site with severe paralysis of the upper and lower limbs. AST-OPC1 will be administered 14 to 30 days post-injury. Patients will be followed by neurological exams and imaging methods to assess the safety and activity of the product. Asterias is implementing an initiative to accelerate the current timelines for the AST-OPC1 clinical program by approximately six months in order to obtain safety and efficacy readouts more rapidly, and plans to seek FDA concurrence to increase the robustness of the proof of concept in the Phase I/IIa clinical trial by expanding enrollment from 13 patients to up to 40 patients. Asterias believes these changes will increase the statistical confidence of the safety and efficacy readouts, and position the product for potential accelerated regulatory approvals. Asterias has received a Strategic Partnerships Award grant from the California Institute for Regenerative Medicine, which provides $14.3 million of non-dilutive funding for the Phase I/IIa clinical trial and other product development activities for AST-OPC1.

In addition to the ongoing Phase I/IIa study, Asterias is conducting additional research and planning for subsequent trials and for other possible indications for the use of AST-OPC1. Ongoing and intended near term activities in the AST-OPC1 program encompass five main categories of activities: Regulatory; Clinical; Product Development; Quality; and Research, briefly summarized below.

Regulatory: These activities include, but are not limited to, preparing regulatory packages for each clinical site for submission to the FDA, preparing a briefing package to discuss ongoing product development activities with FDA staff, and amending the existing IND to enable expansion of the Phase I/IIa study from 13 to up to 40 patients.

Clinical: The activities include, but are not limited to (i) selecting and engaging clinical sites and vendors for the conduct of the clinical trial, (ii) training and qualifying neurosurgeons and clinical sites to identify and enroll subjects, to prepare the AST-OPC1 drug product at the clinical sites, and to conduct the trial according to the IND protocol, (iii) monitoring conduct of the study to ensure it is performed in accordance with the IND protocol, and (iv) consulting

with investigators and key opinion leaders to further define clinical development plans for subsequent trials. We must also ensure an adequate supply chain of (1) the investigational drug product (AST-OPC1), (2) syringe positioning devices used to inject the AST-OPC1 cells, and (3) dose preparation kits used to thaw and prepare the AST-OPC1 cells for injection.

Product Development: Activities in this category will include work to improve the scale and efficiency of the manufacturing process for AST-OPC1 in preparation for larger future trials if the Phase I/IIa trial is successful.

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Quality: Asterias will be required to test the purity, stability and potency of the AST-OPC1 drug product used in the proposed trial and also to improve the assays currently used to define the product attributes as clinical trials of AST-OPC1 progress to later stage clinical studies.

Research: Asterias plans to try to develop novel methods to measure purity and potency of the AST-OPC1 drug product. Asterias plans to investigate possible improvements to the current methods used to manufacture AST-OPC1 and also to test AST-OPC1 in animal models of other neurodegenerative diseases to identify other potential clinical applications for the product, such as sub-cortical stroke.

AST-OPC1 CIRM Grant

We have been awarded a $14.3 million Strategic Partnership III grant by CIRM to help fund our clinical development of AST-OPC1. The grant will provide funding for the Phase I/IIa dose escalation study of AST-OPC1 in subjects with complete cervical spinal cord injury, and for product development efforts to refine and scale manufacturing methods to support eventual commercialization. CIRM will disburse the grant funds to us over four years in accordance with a quarterly disbursement schedule, subject to our attainment of certain specific progress and safety milestones. As the distributions of the CIRM grant are subject to meeting certain progress and go/no-go milestones, there can be no assurance that we will receive the entire amount granted. In addition, pursuant to the Award, we agreed to notify and report to CIRM information relating to serious adverse events, studies, press releases clinical trial information and routine communications in accordance with an agreed schedule.

As of March 9, 2015 we have received $3,186,069 of payments from CIRM and have achieved the first three clinical trial milestones: executing contracts with our clinical vendors and service providers in the fourth quarter in 2014, completing release of sufficient drug product to supply the trial in the fourth quarter in 2014, and opening our first clinical site in the first quarter of 2015. Future clinical and regulatory milestones that must be timely achieved include enrollment of our first AST-OPC1 patient in the first quarter of 2015, executing contracts with clinical trial sites, initiating and completing enrollment with our remaining intended clinical sites by the end of the third quarter of 2015, and receiving data monitoring committee approval to advance patients to enroll in the second dosing cohort for AST-OPC1 before the end of 2015. We are also required to achieve additional clinical trial milestones through the third quarter of 2017, as well as process development milestones relating to FDA, cGMP, and other manufacturing and technology transfer issues through the third quarter of 2018. Failure to timely achieve milestones or otherwise satisfy CIRM regarding any delay could lead CIRM to suspend payments. The foregoing description of our arrangement with CIRM is a summary only and is qualified by reference to the Notice of Grant Award, dated as of October 16, 2014, and the Amendment to Notice of Grant Award, dated as of November 26, 2014, between us and CIRM.

Asterias will need to raise additional capital in order conduct the Phase I/IIa clinical trial and subsequent clinical trial and product development work. Asterias intends to apply for a supplementary CIRM grant to provide funding for the clinical trial expansion from 13 to up to 40 subjects, and may sell some of its BioTime common shares or additional shares of its own capital stock to finance the clinical trials, including later Phase trials.

AST-OPC1 for the treatment of multiple sclerosis and other diseases

In addition or as an alternative to spinal cord injury, Asterias may test the AST-OPC1 cells in other alternative indications, including multiple sclerosis (“MS”) and stroke. AST-OPC1 may be useful in the treatment of MS focal lesions, especially those in the spinal cord. Because of its functional properties, AST-OPC1 is a candidate for the repair of central nervous system lesions found in subjects with MS. In these lesions, axons are “demyelinated,” meaning that they have lost the sheaths that provide insulation for nerve conduction. In many cases, lesions located in the spinal cord of patients with MS are responsible for progressive clinical deterioration and a loss of ambulatory function. AST-OPC1 may have the potential to repair such spinal cord lesions and to reverse clinical deterioration associated with the lesions. Preclinical studies were conducted by Dr. Jeffrey Kocsis at Yale University. In these studies, Dr. Kocsis’ group created lesions resembling those seen in MS. AST-OPC1 was implanted seven days after induction of

the lesion. Progressive remyelination of the lesion was observed which was durable for at least one year and was not observed in control animals that did not receive AST-OPC1. Asterias believes that research provides support for potential clinical testing of local delivery of AST-OPC1 in the spinal cord of patients with progressive MS, and we are exploring potential development paths to assess the safety and utility of AST-OPC1 in treating MS spinal cord lesions.

Additionally, a growing body of evidence supports the use of AST-OPC1 as a treatment for white matter stroke. Based upon the three documented mechanisms of action of AST-OPC1 – re-myelination, vascularization, and neurotrophin release – Asterias is collaborating with Dr. Thomas Carmichael at the University of California Los Angeles (UCLA) to study AST-OPC1 in animal models of white matter stroke in an attempt to generate proof of concept data for the application of AST-OPC1 in this large, unmet medical need.

AST-VAC2 and AST-VAC1, Technology for Potential New Cancer Vaccines

Asterias acquired from Geron two experimental therapeutic cancer vaccines designed to target cancer cells by targeting the cancer cell's expression of telomerase. Telomerase is a ubiquitous cancer target, expressed at high levels in 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 cells. This may be possible by repeatedly exposing the immune system to a substance (an antigen) that is either specifically expressed or over-expressed by cancer cells in a way that subsequently induces an immune response to any cells that express that antigen on their surface. Asterias believes that the characteristics of telomerase make it an ideal antigen for cancer vaccines.

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AST-VAC2: hES Cell-Derived Dendritic Cells

Dendritic cells can be likened to the quarterback of the immune system. They are antigen processing and presenting cells which are potent initiators of a cellular and humoral (antibody) immune response. Immature dendritic cells initiate an antigen specific suppressive response, such as would be required to terminate an abnormal autoimmune reaction as occurs in diseases like rheumatoid arthritis, and systemic lupus erythematosis. Mature dendritic cells, on the other hand, initiate active cellular and humoral immunity such as is required for immune targeting cancer and infectious disease. AST-VAC2 is a mature dendritic cell population that is produced from hES cells that can be modified with any antigen. There is a significant amount of global clinical literature that describes the use of mature dendritic cells isolated from peripheral blood samples and used to stimulate immune responses to a target antigen in various vaccination schemes, especially in various cancers (see our discussion of AST-VAC1, below). Although effective in generating an antigen specific immune response, and in several cases showing a significant clinical impact, the drawbacks of autologous peripheral blood-derived dendritic cell vaccination schemes such as AST-VAC1 are the limited supply of cells, the high cost of production, the long production time, and high patient to patient variability. As a second generation dendritic cell technology, AST-VAC2 is designed to specifically obviate theses drawbacks. AST-VAC2 can be produced in large quantities, similar to the other hES cell-based therapeutic cells. Additionally, because AST-VAC2 is an allogeneic cell, it is believed to be potentially more potent than an autologous dendritic cell, by means of partial antigen mismatch in the HLA system (Human Leukocyte Antigen - markers of immune system types, akin to blood types) which may have a broad immunostimulatory effect similar to the adjuvants used in many vaccines.

Quality control can be standardized and the product can be shown to have uniform potency. Cost of goods is dramatically lower than autologous approaches, and the multi-dose batch production and cryo-preservation enables “on-demand” availability. It is generally agreed that partial HLA matching between dendritic cell and patient will be required to optimize efficacy and reduce side effects. The H1 hES cell line, qualified for human use by Geron, can provide a single HLA match on HLA-A2 (a specific HLA type) for approximately 47% of North American Caucasians. Addition of dendritic cells manufactured from one additional hES cell line will capture approximately 70% of North American Caucasians. The feasibility of AST-VAC2 differentiation from multiple hES cell lines has been demonstrated.

The differentiation process for AST-VAC2 has been optimized, the protocol is patent protected and clinically compliant (suitable for use in humans), and no serum or animal feeder cells are used. The production protocol is robust, achieving fully matured dendritic cells within 34 days. Four growth factors are used to drive hES cell differentiation to dendritic cells, and they are serially removed during the process: VEGF, SCF, BMP-4 and GMCSF. The hES cell-derived dendritic cells can be irradiated, which may shorten the animal studies required for IND submission, because irradiation prevents cell division of the injected AST-VAC2 dendritic cells, potentially eliminating concerns of growth of non-dendritic cells in the product. Lastly, cryo-preservation in low concentration of DMSO (Dimethyl Sulfoxide – a chemical used to stabilize cells during freezing) is feasible, thereby potentially enabling direct thaw and injection in the clinic.

AST-VAC2 cells have been extensively characterized in vitro and have high migratory and antigen presenting functionality with limited phagocytic activity (ability to engulf other cells – not a characteristic of dendritic cells), as would be expected for mature dendritic cells. They express high levels of all the appropriate surface markers defining them as mature human dendritic cells. AST-VAC2 cells are phenotypically similar to dendritic cells derived from peripheral blood mononuclear cells, further enabling them to be potentially used in lieu of peripheral blood derived dendritic cell vaccination protocols. AST-VAC2 and peripheral blood monocyte derived dendritic cells produce similar cytokine profiles (patterns of biologically active proteins) before and after antigen stimulation. AST-VAC2 has been shown to demonstrate functionality in chemotactic responses (cells are specifically attracted by certain molecules) and T-cell stimulation. AST-VAC2 in-vitro stimulates a TH-1 type cytokine production (T-helper 1 – a subtype of T cells) from lymphocytes in a mixed lymphocyte reaction in vitro (a test in which lymphocytes from two

different individuals are mixed together to determine whether one individual "recognizes" the other's lymphocyte type) resulting in highly activated antigen restricted T-cell populations (lymphocytes that recognizes only one specific substance). In vitro studies have demonstrated that a single HLA match between AST-VAC2 cells and responding lymphocytes is required to stimulate antigen specific T-cell responses. AST-VAC2 has been shown to retain antigen presentation functionally (ability to "present" antigen on its surface to induce an immune response in another cell) after cryo-preservation. Irradiation of AST-VAC2 after introduction of antigen eliminates the proliferative capacity of the dendritic cells and removes any safety concerns due to the presence of any residual undifferentiated embryonic stem cells in the preparation. Irradiated and cryo-preserved AST-VAC2 cells are fully capable of presenting antigen to T-cells, resulting in antigen specific T-cell activation.

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A clinical protocol for the potential first-in-man safety study of AST-VAC2 has been outlined for non-small cell lung cancer (NSCLC) in collaboration with Cancer Research UK, which has agreed to conduct a Phase I/IIa clinical trial. Telomerase, a ubiquitous tumor antigen, would be the first antigen to be used with AST-VAC2. The intended first-in-man trial design includes treatment of both early stage (resected) and advanced stage NSCLC patients. Patients would initially be restricted to HLA-A 2.1. Three cohorts of patients would receive 6 vaccinations each; patients with resected disease would be treated at two different doses (1×10^6 and 1×10^7 cells per vaccination), advanced disease patients would be tested at the 1×10^7 cells per vaccination dose.

The route of the administration would be intradermal. The primary endpoint would be to investigate the safety and toxicity of AST-VAC2, with secondary endpoints of immune response to the telomerase antigen introduced into AST-VAC2. The clinical and immunological monitoring would be achieved with a standard immune test such as ELISPOT and tetramer analysis (a biochemical assay to measure a specific antigen). Clinical responses would be monitored by rates of relapse in the resected disease setting, and by progression-free survival, and overall survival in the advanced disease patients.

In summary, AST-VAC2, a second generation dendritic cell technology, has been demonstrated to exhibit a mature dendritic cell phenotype of reproducibly characterized cellular composition. The cells activate allogenic T-cells and migrate in response to chemokine stimulation. AST-VAC2 stimulates a TH-1 type cytokine production and can present antigen delivered to the cells in either mRNA, or protein form. AST-VAC2 can stimulate Class 1 and Class 2 antigen specific T-cells (two types of antigens - type 1 is within a cell, type 2 is outside the cell) and has been shown to prime and stimulate naive antigen restricted T-cells even with only a single HLA-antigen match. Lastly, the feasibility of cryo-presentation and irradiation without alteration of AST-VAC2 function has been demonstrated. These attributes will potentially allow for a greater margin of safety in clinical studies utilizing AST-VAC2 and reduce the number of additional preclinical studies required for an IND submission. Specifically, long-term cell survival and engraftment studies may not be required for an AST-VAC2 IND submission. The first clinical trials of AST-VAC2 using telomerase as the antigen are planned and if the outcomes of those trials demonstrate safety and activity, Asterias may examine the potential of AST-VAC2 with telomerase in other cancer indications, or the use of AST-VAC2 to deliver other antigens.

Near-term Product Development Strategy for AST-VAC2

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 (“CRT”), a wholly-owned subsidiary of CRUK, pursuant to which CRUK has agreed to fund Phase I/IIa clinical development of Asterias’ AST-VAC2 product candidate. Asterias will, at its own cost, complete process development and manufacturing scale-up of the AST-VAC2 manufacturing process and will transfer the resulting cGMP-compatible process to CRUK. CRUK will, at its own cost, manufacture the clinical grade AST-VAC2 and will carry out the Phase I/IIa 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 it will be obligated to make payments upon the execution of the License Agreement, upon the achievement of various milestones, and then royalties on sales of products, and if Asterias sublicenses product development or commercialization rights to a third party, Asterias would pay CRT a share of any sublicense revenues that Asterias receives from the third party, with CRT’s share varying from a high of 40% in the case of a sublicense entered into prior to commencement of a Phase II clinical trial, to substantially lower rates in the case of a sublicense entered into at various later stages of clinical development but prior to completion of a Phase III clinical trial, and as low as 7.5% in the case of a sublicense entered into after completion of a Phase III clinical trial. 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 Asterias 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.

Asterias is completing scale up and technology transfer of the manufacturing process for the AST-VAC2 drug product to CRUK. Following completion of the technology transfer, CRUK will initiate cGMP production to support the first-in-man clinical study of AST-VAC2 cancer immunotherapy in NSCLC. Asterias is also developing and transferring to CRUK the quality, purity and potency assays needed for release testing of clinical grade AST-VAC2, and the immunological monitoring assays that will be used to measure patient immune responses in the clinical trial. CRUK will bear primary responsibility for performing the cGMP manufacturing of clinical grade AST-VAC2, filing the regulatory dossier, and for conducting the Phase I/IIa study of AST-VAC2 in NSCLC. Asterias will continue to serve in a collaborative and advisory role with CRUK throughout this process. Upon completion of the Phase I/IIa study, Asterias will have an exclusive first option to acquire the data generated in the trial.

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Telomerase Therapeutic Vaccine (AST-VAC1)

Asterias acquired from Geron rights to its immunological cancer therapy product AST-VAC1, including the IND for clinical trials conducted by Geron and the related drug master files. AST-VAC1 is an autologous product (using cells that come from the treated patient) consisting 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; and from there the dendritic cells travel to the lymph nodes and instruct cytotoxic T-cells (T-cells that "kill" other cells) to kill tumor cells that express telomerase on their surface.

A Geron-sponsored Phase I/II clinical trial of AST-VAC1 was conducted at six U.S. medical centers in patients with acute myelogenous leukemia (“AML”) in complete clinical remission. The trial examined the safety and feasibility of a prime-boost vaccination regimen (an initial injection ("prime") followed by multiple additional injections ("boost")) to generate and extend the duration of telomerase immunity. Geron evaluated the immune response to AST-VAC1 and explored the effects of vaccination on minimal residual disease and relapse rates. This trial completed patient enrollment in December 2009.

In the Phase I/II clinical trial, patients with AML entered the study in their first or second complete remission. Prior to or shortly after completing consolidation chemotherapy, patients underwent leukapheresis (collection of white blood cells) to harvest normal peripheral blood mononuclear (white blood) cells for vaccine manufacture. AST-VAC1 was produced at a centralized manufacturing facility from the patient-specific leukapheresis harvests. Patient mononuclear cells were differentiated in culture to immature dendritic cells, which were transfected with messenger RNA encoding hTERT and LAMP. Transfected dendritic cells were matured, aliquoted and cryopreserved. AST-VAC1 was released for patient dosing contingent on several product specifications that included identity of mature dendritic cells, confirmation of positive transfection with hTERT, number of viable cells per dose after thawing, and product sterility.

AST-VAC1 was successfully manufactured and released in 24 out of the 33 patients enrolled in the study. These results reflect the variability of patient derived starting material that is often associated with an autologous, patient-specific product.

Three patients progressed prior to vaccination, therefore only 21 of the 24 patients for whom AST-VAC1 was successfully manufactured and released received vaccine. The 21 patients were vaccinated weekly for six weeks with AST-VAC1 administered intra-dermally, followed by a non-treatment period of four weeks, and then subsequent boost injections every other week for 12 weeks. Monthly extended boost injections were then administered until the vaccine product supply was depleted or the patient relapsed.

Twenty-one patients received AST-VAC1 in the study, including 19 in clinical remission and two in early relapse. Of the 19 patients in clinical remission, eight were considered at intermediate risk for relapse and eleven were at high risk for relapse as predicted by their cytogenetics (gene expression pattern in the AML cells), FAB type (French-American-British classification of AML into 8 subtypes), or because they were in second clinical remission. Thirteen out of 21 patients in the trial remained in clinical remission at a median duration of follow-up from first vaccination of 13.2 months. At 12 months after vaccination with AST-VAC1, estimated disease-free survival was 81% for patients at high-risk of relapse (95% CI: 42-95%). The confidence interval (CI) of 95% means that the true value is between 42 and 95 with a probability of 95%. Previously published data on this patient population suggests that approximately 45% of patients would normally remain free from relapse at this stage. 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. These data from the Phase I/II trial were presented at the December 2010 American Society of Hematology annual

meeting.

Expression of WT-1, a marker of minimal residual disease, was sequentially analyzed by qPCR (quantitative polymerase chain reaction – a method to identify DNA modules) in 21 patients. The 13 patients who remain in clinical remission remain negative for WT-1, while six of seven with clinical relapse were WT-1 positive. One patient was positive for WT-1 prior to vaccination with AST-VAC1 and became WT-1 negative during the course of vaccination. This patient relapsed after 30 months.

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.

Asterias has performed follow-up data collection on the 21 patients treated in the study at the six participating U.S. medical centers to determine the long term effects, if any, of the AST-VAC1 administration on remission duration and disease-free survival. Asterias is in the process of preparing a manuscript describing its findings, and intends to submit an abstract for presentation at the American Society of Clinical Oncology meeting in June.

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Early Study of AST-VAC1 in Prostate Cancer

A prior clinical study using AST-VAC1 in metastatic hormone refectory prostate cancer was published in the Journal of Immunology in 2005. Telomerase loaded autologous monocyte-derived dendritic cells were administered to 20 patients with metastatic prostate cancer. Treatment was well tolerated with no significant adverse reactions. In 19 of 20 subjects, telomerase specific T lymphocytes were generated in the peripheral blood after vaccination. Vaccination was associated with a reduction of prostate-specific antigen velocity (a measure of disease progression), although no clinical responses were observed in this preliminary study. This study provided the rationale for the Phase I/II trial in AML described above.

Asterias Manufacturing and Process Development Technologies

The cGMP banks of undifferentiated hES cells that Asterias acquired from Geron have been well characterized and validated, although they will need to be tested using validated equipment in order to verify their functionality after being stored under cryopreservation protocols. Both the H1 and H7 hES cell lines were routinely expanded under either cGMP (H1) or pilot (H7) conditions at Geron's manufacturing facility. No limit to the expandability of hES cell lines has been observed. Geron's cGMP cell banks of undifferentiated hES cells have been qualified for human biologics production per FDA guidelines. They are free of a long list of potential contaminants or adventitious agents of human or animal origin. They exhibit normal G-banding karyotype (chromosomal structure) and are considered suitable for the production of biologics for human clinical use. All of the therapeutic cells are manufactured according to a shared and standardized three stage procedure. Stage 1 is the expansion of the undifferentiated hES cells, currently performed in standard cell culture vessels coated with extracellular matrix. Stage 2 is the product specific differentiation step in which various factors are added sequentially to drive the differentiation of the hES cell down a desired and specific differentiation lineage. Stage 3 is the harvest, formulation, fill and finish stage in which the differentiated cells are aliquoted and stored frozen in the vapor phase of liquid nitrogen tanks indefinitely. Sensitive assays have been developed to detect the presence of contaminating undifferentiated hES cells in the various product formulations.

Our Ownership of Asterias

As of March 9, 2015, we owned approximately 67.5% of the outstanding Asterias common stock and warrants to purchase additional shares of Asterias common stock that if exercised would increase our ownership of Asterias to 70.42% based on the number of shares of Asterias common stock outstanding. Asterias has adopted a stock option plan under which it may issue up to 4,500,000 shares of its common stock to officers, directors, employees, and consultants. As of December 31, 2014, options to purchase 3,146,666 shares of Asterias common stock had been granted.

OrthoCyte: Osteochondral Progenitor Cells for Orthopedic Indications

OrthoCyte is our wholly owned subsidiary developing cellular therapeutics for orthopedic disorders. OrthoCyte's lead project is the development of hEPC to repair cartilage damaged by injury or disease, including osteoarthritis. OrthoCyte has identified several PureStem® cell lines that display potential to differentiate into diverse types of cartilage, and these lines are showing promising results in animal preclinical testing for effectiveness of cartilage repair. Our current goal is to demonstrate the safety and efficacy of the cells using in vivo models of articular disease. OrthoCyte has compiled proprietary animal preclinical data on two therapeutic product candidates designated as OTX-CP03 and OTX-CP07, which are formulated in our HyStem® hydrogel, and which showed initial evidence of safety and efficacy in animal models of joint disease. If follow on studies in large animal models prove successful, we would plan to initiate an Investigational New Drug ("IND") filing with the FDA for this application.

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Cartilage defects and disease affect our aging population. In particular osteoarthritis and spinal disc degeneration have a significant impact on the mobility and health of an aging population. Current non-surgical treatments tend to target the reduction of pain and inflammation, as opposed to the repair of tissue damage and reversal of deterioration. To date, the development of cell-based therapeutics to treat damaged cartilage has met with mixed success. Autologous chondrocytes have been tested as a means of providing cartilage-producing cells, but this approach is hampered by a multi-step process that first requires the harvesting of chondrocytes from donor tissues, followed by in vitro culture expansion of the harvested cells. Primary chondrocytes have very limited capacity for in vitro expansion and typically lose their biological characteristics within a short period of in vitro culture. Mesenchymal stem cells have also been tested extensively as a source of cellular therapeutics for cartilage treatment, but success has remained limited, partly as a result of the hypertrophy of these cells inducing bone and fibrous tissue instead of permanent cartilage.

Additional in vitro testing suggests a wide range of possible applications for osteochondral PureStem® cells. OrthoCyte is preparing to test the utility of various osteochondral PureStem® cells that display potential to differentiate into bone and other types of cartilage-like tissues such as intervertebral disc tissue. In collaboration with world-renown academic institutes in the field of degenerative disc disease and back pain, PureStem® cells formulated in our HyStem® hydrogel will be tested in spine disease animal models broadly recognized for their translation potential to clinical trial development. This screening phase should allow OrthoCyte to assess and potentially select a PureStem® cell candidate for intervertebral disc repair and bone induction. We anticipate that successful selection of candidates would move our spine program to an optimization phase followed with a pre-IND meeting with FDA to discuss regulatory paths and additional expected pre-clinical requirements.

Chronic back pain is one of the largest unmet health economic burdens in modern society. With more than 85% lifetime prevalence, nearly everyone is affected in their lifetime. In most cases, chronic back pain stems from the progressive degeneration of the avascular intervertebral disc tissue that cushions the vertebrae in the spinal column. This tissue is structurally and functionally similar to other cartilage tissues. Currently there are no treatment options for people suffering from degenerative disc disease other than risky invasive surgery to fuse the affected discs. A therapy that would slow down or reverse disc degeneration to delay or avoid surgery would have a great impact in the largest musculoskeletal unmet need. Various biologic approaches using growth factors or cells from different adult tissues are in various phases of preclinical and early clinical development, but so far none have proven to work effectively. The opportunity for OrthoCyte to screen, and select a candidate with the appropriate attributes to effectively impact the disease process is an important differentiating factor from other competing technologies.

Our Ownership of OrthoCyte

We presently own, directly and through our subsidiary Asterias, 100% of the outstanding common stock of OrthoCyte. We plan to provide additional equity capital to OrthoCyte or seek outside investors. OrthoCyte has adopted a stock option plan under which it may issue up to 4,000,000 shares of its common stock to officers, directors, employees, and consultants of OrthoCyte and BioTime. As of December 31, 2014, options to purchase 2,645,000 shares of OrthoCyte common stock had been granted.

Cell Cure Neurosciences: Therapies for Retinal and Neural Degenerative Diseases

Cell Cure Neurosciences is developing cell therapies for retinal and neural degenerative diseases. Cell Cure Neurosciences is the neurological arm for BioTime’s program for the development of human embryonic stem cell-based therapies.

Cell Cure Neurosciences principal product is OpRegen,® a proprietary formulation of embryonic stem cell-derived retinal pigmented epithelial (“RPE”) cells developed to address the high, unmet medical needs of people suffering from age-related macular degeneration (“dry AMD”). OpRegen® consists of animal product-free RPE cells with high purity and potency that were derived from hESCs using a proprietary directed differentiated method. OpRegen® is

formulated as a suspension of RPE cells. A related product under development is OpRegen®-Plus, a formulation of RPE cells bound to a membrane.

Preclinical studies in mice have shown that following a single subretinal injection of OpRegen® as a suspension of cells, the cells can rapidly organize into their natural monolayer structure and survive throughout the lifetime of the animal. OpRegen® is anticipated to be an “off-the-shelf” allogeneic product provided to retinal surgeons in a final formulation ready for transplantation. Unlike treatments for wet-AMD that require multiple, frequent injections into the eye, it is expected that OpRegen® would be administered in a single procedure.

On February 16, 2015, the first clinical trial of OpRegen® opened at Hadassah University Medical Center in Jerusalem. The clinical trial is entitled “Phase I/IIa Dose Escalation Safety and Efficacy Study of Human Embryonic Stem Cell-Derived Retinal Pigment Epithelium Cells Transplanted Subretinally in Patients with Advanced Dry-Form Age-Related Macular Degeneration with Geographic Atrophy.” Patient enrollment is expected to begin in the second quarter of 2015.

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The Phase I/IIa clinical trial, will evaluate three different dose regimens of OpRegen®. A total of 15 patients will be enrolled. The patients will be 55 years of age and older, with the severe form of dry-AMD called geographic atrophy with absence of additional concomitant ocular disorders. The eye most affected by the disease will be treated with the contralateral eye being the control. Following transplantation, the patients will be followed for 12 months at specified intervals, to evaluate the safety and tolerability of OpRegen®. Following the initial 12 month period, patients will continue to be monitored at longer intervals for an additional period of time. A secondary objective of the clinical trial will be to examine the ability of transplanted OpRegen® to engraft, survive, and moderate disease progression in the patients. In addition to thorough characterization of visual function, a battery of ophthalmic imaging modalities will be used to quantify structural changes and rate of geographic atrophy expansion.

AMD is one of the major diseases of aging and is the leading eye disease responsible for visual impairment of older persons in the US, Europe and Australia. AMD affects the macula, which is the part of the retina responsible for sharp, central vision that is important for facial recognition, reading and driving. There are two forms of AMD. The dry form (dry-AMD) advances slowly and painlessly but may progress to geographic atrophy in which RPE cells and photoreceptors degenerate and are lost. Once the atrophy involves the fovea (the center of the macula), patients lose their central vision and may develop legal blindness. The U.S. Centers for Disease Control and Prevention estimate that about 1.8 million people in the U.S. have advanced-stage AMD, while another 7.3 million have an earlier stage of AMD and are at risk of vision impairment from the disease. Most people are afflicted with the dry form of the disease, for which there is currently no effective treatment. One of the most promising future therapies for age-related AMD is the replacement of the layer of damaged RPE cells that support and nourish the retina.

Cell Cure Neurosciences' second field of interest is cell therapy products for neurodegenerative diseases. Cell Cure Neurosciences' cell therapy products under development for the treatment of neurodegenerative diseases include (a) neural progenitor cells designed to replace the dopamine producing cells destroyed in Parkinson's disease, and (b) Cell Cure Neurosciences' NeurArrest™ neural cells that target and modulate the immune system's self-destruction of the myelin coating of nerve cells in multiple sclerosis.

Parkinson's is an age-related disease caused by the loss of a certain type of cell in the brain. According to the Parkinson's Disease Foundation, Parkinson's disease affects approximately 1 million people in the U.S. and more than 4 million people worldwide. The median age for the onset of all forms of Parkinson's disease is 62, and the number of new cases is rising rapidly with the aging of the baby-boomer population. There is currently no cure for the disease.

While not a classic age-related disease, multiple sclerosis is also on the rise and the National Multiple Sclerosis Society estimates that there are about 400,000 persons with multiple sclerosis in the U.S. Most people are diagnosed with the disease between the ages of 20 and 50.

Cell Cure Neurosciences' research and development is conducted at Hadassah University Hospital, through research and consulting agreements with HBL-Hadasit Bio-Holding's ("HBL") affiliate Hadasit Medical Research Services and Development, Ltd. ("Hadasit"), under the direction of Professor Benjamin E. Reubinoff, Cell Cure Neurosciences' Chief Scientific Officer; Professor Eyal Banin, Cell Cure Neurosciences' Director of Clinical Affairs; and Professor Tamir Ben Hur.

To advance its programs for the development of treatments for neurodegenerative diseases such as Parkinson's disease and multiple sclerosis, Cell Cure Neurosciences has entered into an Additional Research Agreement with Hadasit pursuant to which Hadasit will perform research services for Cell Cure Neurosciences over a period of five years. Cell Cure Neurosciences will pay Hadasit $300,000 per year for the research services over the course of the five-year term of the Additional Research Agreement. Hadasit will be entitled to receive a royalty on the sale of any products developed under the agreement and commercialized by Cell Cure Neurosciences. The amount of the royalty will be determined by future agreement between Hadasit and Cell Cure Neurosciences, taking into consideration their respective contributions to the development of the product, or if they fail to agree, the royalty terms will be

determined by a third-party expert.

Our Ownership of Cell Cure Neurosciences

We presently own, directly and through our subsidiaries Asterias and ESI, approximately 62.5% of the outstanding ordinary shares of Cell Cure Neurosciences. We also hold certain Cell Cure Neurosciences convertible promissory notes which entitle us to acquire additional Cell Cure Neurosciences ordinary shares by converting those notes into ordinary shares. If we were to convert the convertible promissory notes into Cell Cure Neurosciences ordinary shares, and if no other ordinary shares are issued to third parties, our percentage ownership of Cell Cure Neurosciences would increase to 65%, based on the number of ordinary shares outstanding on February 28, 2015. Cell Cure Neurosciences has adopted a stock option plan under which it may issue up to 14,100 of its ordinary shares to officers, directors, employees, and consultants. As of December 31, 2014, options to purchase 12,240 ordinary shares of common stock had been granted.

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We and ESI have entered into a Third Amended and Restated Shareholders Agreement with Cell Cure Neurosciences and its other principal shareholders Teva Pharmaceutical Industries, Ltd. and HBL pertaining to certain corporate governance matters and rights of first refusal among the shareholders to purchase on a pro rata basis any additional shares that Cell Cure Neurosciences may issue. Under the agreement, the shareholders also granted each other a right of first refusal to purchase any Cell Cure Neurosciences shares that they may determine to sell or otherwise transfer in the future. The number of members on the Cell Cure Neurosciences board of directors will be set at seven, whereby we will be entitled to elect four directors, HBL will be entitled to elect two directors, and Teva will be entitled to elect one director. These provisions were also included in an amendment to Cell Cure Neurosciences' Articles of Association.

ReCyte Therapeutics—Treatment of Vascular Disorders

ReCyte Therapeutics focuses on developing treatments for vascular disorders, including both age-related diseases and injuries. The company was founded in January 2011 as a subsidiary of BioTime, Inc. with investments by private shareholders and by us.

The therapeutic indications targeted by ReCyte Therapeutics products include age-related cardiovascular diseases such as coronary artery disease, heart failure, and peripheral artery disease. Therapeutics for age-related vascular disease represent some of the largest, fastest-growing actual and potential markets in the U.S. due to the aging baby boom generation. Cardiovascular disease is among the leading causes of death and disability in the U.S., and they consume a major and every-increasing proportion of health care costs. The National Academy of Sciences has estimated that a potential 58 million Americans are currently afflicted with cardiovascular disease.

ReCyte Therapeutics is working to produce novel first-in-class therapies for the unmet needs of these patients. Its products in development include vascular cells derived from hES and iPS cell sources.

During August 2011, BioTime entered into a License Agreement with Cornell University for the worldwide development and commercialization of technology developed invented by Dr. Shahin Rafii and co-workers at Weill Cornell Medical College for the differentiation of hES cells into vascular endothelial cells. This technology may help to provide an improved means of generating vascular endothelial cells on an industrial scale and with stronger intellectual property protection. This technology could be utilized by ReCyte in diverse products, including those under development at ReCyte Therapeutics to treat age-related vascular diseases and injuries, and in products being developed at OncoCyte targeting the delivery of toxic payloads to cancerous tumors. ReCyte Therapeutics has used the Cornell technology in combination with the PureStem® technology to produce highly purified monoclonal embryonic vascular endothelial progenitor stem cells.

In conjunction with the Cornell License Agreement, during August 2011, we also entered into a three year Sponsored Research Agreement under which scientists at Weill Cornell Medical College, led by Dr. Sina Rabbany, are conducting research with the goals of (1) verifying the ability of progenitor cells, derived by ReCyte Therapeutics, to generate stable populations of vascular endothelial cells, (2) testing the functionality and transplantability of the vascular endothelial cells in animal models to see if the transplanted cells generate new vascular tissue, and (3) using HyStem® hydrogels, produced by our subsidiary OrthoCyte, and other materials as "scaffolds" for the three-dimensional propagation of vascular endothelial cells into vascular tissues suitable for transplantation.

Our Ownership of ReCyte Therapeutics

We presently own 94.8% of the ReCyte Therapeutics common stock outstanding. The other shares of ReCyte Therapeutics common stock outstanding are owned by two private investors. ReCyte Therapeutics has adopted a stock option plan under which it may issue up to 4,000,000 shares of its common stock to officers, directors, employees, and consultants of ReCyte Therapeutics and BioTime. As of December 31, 2014, options to purchase 1,290,000 shares of

ReCyte Therapeutics common stock had been granted.

LifeMap Sciences: Data Bases and Tools for Biomedical, Gene, Stem Cell, and Disease Research

LifeMap Sciences markets GeneCards® the leading human gene database, as part of an integrated database suite that includes LifeMap Discovery® the database of embryonic development, stem cell research and regenerative medicine; and MalaCards™, the human disease database and the analysis tools VarElect™, a powerful, yet easy-to-use application for prioritizing gene variants resulting from next generation sequencing experiments, and GeneAnalytics™, a novel gene set analysis tool. LifeMap Sciences makes its databases and analysis tools available for use by researchers at pharmaceutical and biotechnology companies and other institutions through paid subscriptions or on a fee per use basis. Academic institutions have free access to use the databases. The analysis tools are offered to academic users through paid subscriptions.

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Our Ownership of LifeMap Sciences

We presently own 74.5% of the LifeMap Sciences common stock outstanding and we have entered into a Stock Purchase Agreement pursuant to which we may acquire additional shares of LifeMap Sciences common stock that would increase our total percentage ownership to 85.6% of the shares outstanding if no other shares are issued to third parties. The other shares of LifeMap Sciences common stock outstanding are owned by certain officers and directors of LifeMap Sciences and by other investors. LifeMap Sciences has adopted a stock option plan under which it may issue up to 2,342,269 shares of its common stock to officers, directors, employees, and consultants of LifeMap Sciences and BioTime. As of December 31, 2014, options to purchase 1,870,698 shares of LifeMap Sciences common stock had been granted.

LifeMap Solutions: Mobile health software

Our subsidiary LifeMap Sciences formed a new subsidiary, LifeMap Solutions, to develop the new personal mobile health software products intended to connect users with their complex personal health information and other big data. LifeMap Solutions has entered into a Co-Development and Option Agreement with the Icahn School of Medicine at Mount Sinai, a nonprofit education corporation (“Mount Sinai”), pursuant to which LifeMap Solutions and Mount Sinai have agreed to work cooperatively to develop internet, web-based, mobile user or consumer software products to provide users with information that may potentially aid them in improving lifestyle and healthcare decisions and outcomes. The planned products are envisioned to provide information based on interpretations of one or more components of: clinical, genetic, wearable device, and other data relating to human disease, health or wellness. LifeMap Solutions may develop products with different capabilities directed to different users, such as products for consumer use and products for use by physicians or other medical professionals. The determination to develop and include particular features or capabilities in different versions of the product, and the timing of the release of different product versions to intended markets, may be influenced by the position of the FDA as to whether those features or capabilities would cause a product to be regulated as a medical device.

Ownership of LifeMap Solutions

LifeMap Sciences presently owns 100% of the outstanding common stock of LifeMap Solutions. LifeMap Solutions has adopted a stock option plan under which it may issue up to 18,667 shares of its common stock to officers, directors, employees, and consultants of LifeMap Solutions, LifeMap Sciences, and BioTime. As of December 31, 2014, options to purchase 13,167 shares of LifeMap Sciences common stock had been granted.

Stem Cells and Related Products for Regenerative Medicine Research

We have consolidated the marketing of our existing research products and will be launching all new research products through ESI BIO. During 2014, we began building the ESI BIO brand to create a single well-recognized brand and outlet for our current and future research products. One focus of ESI BIO’s research product offering will be to provide products that can be offered at both a less expensive research grade and also at a “clinical grade” if needed by our customers. This two-tiered grade and price approach will give our customers an easier transition from their therapeutic research to clinical applications and also will provide future therapeutic out-licensing opportunities for our research products and technologies.

Human Embryonic Stem Cell Lines for Research Use

Because hES and iPS cells have the ability to transform into any cell type in the human body, they may provide a means of producing a host of new products of interest to medical researchers. It is likely that hES and iPS cells could be used to develop new cell lines designed to rebuild cell and tissue function otherwise lost due to degenerative disease or injury.

In 2007, ESI announced the world's first hES cell lines derived under cGMP principles, i.e. the detailed procedures for all aspects of production that could potentially exert an impact on the safety and quality of a product. The FDA enforces cGMP regulations with respect to the manufacturing of human therapeutics for use in the U.S., and virtually every country across the globe maintains some analogous standards for quality control in the manufacture of therapeutic products for humans.

ESI and scientists from Sydney IVF, Australia's leading center for infertility and in vitro fertilization ("IVF") treatment, also published a scientific report, “The Generation of Six Clinical-Grade Human Embryonic Stem Cell Lines” (Cell Stem Cell 1: 490-494). The paper outlined the procedures used to document the production of clinical-grade hES cell lines derived on human feeder cells obtained from an FDA approved source, produced in a licensed cGMP facility, with donor consent and medical screening of donors. Combined with our PureStem® technology that allows for the derivation of a wide array of hEPCs with high levels of purity and scalability, and site-specific homeobox gene expression, we believe that ESI's clinical-grade master cell banks may be used to generate clonal clinical-grade embryonic progenitor cells of great interest to the biopharmaceutical industry. We expect that the acquisition of ESI's clinical-grade hES cell bank will save years of development time and thereby accelerate the development of clinical-grade progenitor cells for potential use as research and therapeutic products.

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ESI's six cGMP hES cell lines have been approved by the NIH for inclusion in the Human Embryonic Stem Cell Registry, which renders those cell lines eligible for use in federally funded research.

The ESI hES cell lines are available for purchase through http://bioreagents.lifemapsc.com/collections/human-embryonic-stem-cells and http://esibio.com/products/.

We have derived the complete genome sequence of five of the ESI hES cell lines to facilitate the development of products derived from these cell lines. We have made these cGMP-grade cell lines, along with certain documentation and complete genomic DNA sequence information, available for sale. We will charge a price for the cGMP-grade cell lines that covers our production and delivery costs. Although no royalties will be payable to us by researchers who acquire the cell lines for research use, researchers who desire to use the cGMP cell lines for therapeutic or diagnostic products, or for any other commercial purposes, may do so only after signing commercialization agreements acceptable to us.

PureStem® Human Embryonic Progenitor Cells

We acquired a license from Advanced Cell Technology, now Ocata Therapeutics, Inc. ("Ocata") to make and sell hEPCs using PureStem® technology. This technology allows the rapid isolation of novel, highly purified progenitors, which are cells that are intermediate in the developmental process between embryonic stem cells and fully differentiated cells. Using the PureStem® technology we derived more than 200 progenitors and are marketing a subset of these cells to the research community. Not only do PureStem® hEPCs possess the ability to become a wide array of cell types with potential applications in research, drug discovery, and human regenerative stem cell therapies, they are relatively easy to manufacture on a large scale and in a purified state, which may make it more advantageous to work with them than directly with hES or iPS cells. We now offer 12 PureStem® hEPC for purchase at http://esibio.com/products/.

We have been awarded a SBIR Phase 1 Small Business Grant from the National Institute of General Medical Sciences at the National Institutes of Health (NIH) for a project aimed at developing a simple cell culture additive that will reduce the risk of contamination of therapeutic stem cell formulations by residual pluripotent stem cells. Unlike our PureStem® technology, first generation protocols used in many laboratories to manufacture cell types from pluripotent stem cells can be contaminated with undesired cell types. Under the grant, we will work to develop reagents that selectively identify and kill residual pluripotent cells while leaving the intended therapeutic stem cells unharmed. Any products that may be developed may be marketed to the stem cell research community and to cell therapy companies that are developing pluripotent stem cell derived products without our PureStem® technology, for the treatment of degenerative diseases and injury.

We have also begun the PureStem® grant program which will award a $100,000 grant in 2014 to a winning applicant who offers the most innovative research plan to BioTime that utilizes one of our PureStem® progenitors.

hES Cells Carrying Genetic Diseases

We plan to add to our product line novel muscle progenitor cells produced from five hES cell lines carrying genes for Duchenne muscular dystrophy, Emery-Dreifuss muscular dystrophy, spinal muscular atrophy Type I, facioscapulohumeral muscular dystrophy 1A, and Becker muscular dystrophy. We have a contract to obtain the diseased hES cell lines from Reproductive Genetics Institute ("RGI"). Our goal is to produce highly purified and characterized progenitor cell types useful to the research community for applications such as drug screening for the development of therapies for these devastating diseases.

ESpan™ Cell Growth Media

Cell lines derived from hES and iPS cells that display novel cell signaling pathways (which are cell signals that regulate cell proliferation) may be used in screening assays for the discovery of new drugs. Since embryonic stem cells can now be derived through the use of iPS technology from patients with particular degenerative diseases, stem cells are increasingly likely to be utilized in a wide array of future research programs aimed to model disease processes in the laboratory and to restore the function of organs and tissues damaged by degenerative diseases such as heart failure, stroke, Parkinson’s disease, macular degeneration, and diabetes, as well as many other chronic conditions.

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We are marketing a line of cell-growth media products called ESpan™. These growth media are optimized for the growth of hEPC types. Cells need to be propagated in liquid media, in both the laboratory setting, where basic research on stem cells is performed, and in the commercial sector where stem cells will be scaled up for the manufacture of cell-based therapies or for the discovery of new drugs. We expect that rather than propagating hES cells in large quantities, many end users will instead propagate cells using media optimized for the propagation of hEPCs created from hES cells.

ESpy® Cell Lines

Additional new products that we have targeted for launch in 2015 are ESpy® cell lines, which will be derivatives of hES cells that emit beacons of light. The ability of the ESpy® cells to emit light will allow researchers to track the location and distribution of the cells in both in vitro and in vivo studies.

HyStem® Hydrogels

We offer hydrogel cell culture matrix products for our customers to grow ESI BIO stem cells and differentiated derivatives in a three-dimentional matrix that mimics the environment that is found in a living animal. The market is recognizing the need to culture cells in an environment that is similar to a living model, and since these hydrogel products can be provided at a research grade and at a clinical grade, they fit well within the ESI BIO product family of products that allow an easier transition from the research laboratory into the clinic.

Products for Differentiating and Reprogramming Cells

We plan to develop and launch a new line of research products to reprogram, differentiate, expand and characterize cells. These products will be designed to utilize technologies and materials that are more likely to be compliant with regulatory requirements for translation to the clinic, such as products that do not utilize animal-derived components or viruses. These products will continue our strategy of providing our customers cell based research products that are more likely to translate to therapeutic applications and that provide outlicensing opportunities for use of ESI BIO products in various therapeutic fields.

Licensed Stem Cell Technology and Stem Cell Product Development Agreements

We have obtained the right to use stem cell technology that we believe has great potential in our product development efforts, and that may be useful to other companies that are engaged in the research and development of stem cell products for human therapeutic and diagnostic use.

Wisconsin Alumni Research Foundation—Research Products

We have entered into a Commercial License and Option Agreement with Wisconsin Alumni Research Foundation (“WARF”). The WARF license permits us and our subsidiaries to use certain patented and patent pending technology belonging to WARF, as well as certain stem cell materials, for research and development purposes, and for the production and marketing of “research products” and “related products.” “Research products” are products used as research tools, including in drug discovery and development. “Related products” are products other than research products, diagnostic products, or therapeutic products. “Diagnostic products” are products or services used in the diagnosis, prognosis, screening or detection of disease in humans. “Therapeutic products” are products or services used in the treatment of disease in humans.

Under the WARF license agreement, we paid WARF a license fee of $225,000 in cash and $70,000 worth of our common shares. A maintenance fee of $25,000 is due annually on March 2 of each year during the term of the WARF license beginning March 2, 2010. We also paid WARF $25,000 toward reimbursement of the costs associated with

preparing, filing, and maintaining the licensed WARF patents.

We will pay WARF royalties on the sale of products and services under the WARF license. The royalty is 4% on the sale of research products and services and 2% on the sale of related products. The royalty is payable on sales by us or by any sublicensee. The royalty rate is subject to certain reductions if we also become obligated to pay royalties to a third party in order to sell a product.

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We have an option to negotiate with WARF to obtain a license to manufacture and market therapeutic products, excluding products in certain fields of use. The issuance of a license for therapeutic products would depend upon our submission and WARF's acceptance of a product development plan, and our reaching agreement with WARF on the commercial terms of the license such as a license fee, royalties, patent reimbursement fees, and other contractual matters.

The WARF license shall remain in effect until the expiration of the latest expiration date of the licensed patents. However, we may terminate the WARF license prior to the expiration date by giving WARF at least 90 days written notice, and WARF may terminate the WARF license if we fail to make any payment to WARF, fail to submit any required report to WARF, or commit any breach of any other covenant in the WARF license, and we fail to remedy the breach or default within 90 days after written notice from WARF. The WARF license may also be terminated by WARF if we commit any act of bankruptcy, become insolvent, are unable to pay our debts as they become due, file a petition under any bankruptcy or insolvency act, or have any such petition filed against us which is not dismissed within 60 days, or if we offer our creditors any component of the patents or materials covered by the WARF license.

Wisconsin Alumni Research Foundation License to Asterias—Therapeutic Products, Diagnostic and Research Products

Asterias has entered into a Non-Exclusive License Agreement with 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. The licensed patents include patents covering primate embryonic stem cells as compositions of matter, as well as methods for growth and differentiation of primate embryonic stem cells. The licensed stem cell lines include the H1, H7, H9, H13 and H14 human embryonic stem cell lines.

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.

Asterias 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

PureStem® Technology

ReCyte Therapeutics entered into a license agreement with Ocata that was subsequently assigned to us under which we acquired exclusive world-wide rights to use Ocata's technology for methods to accelerate the isolation of novel cell strains from pluripotent stem cells. The licensed rights include pending patent applications, know-how, and existing cells and cell lines developed using the technology. We market PureStem® cells that were developed using

this technology·

The licensed technology is designed to provide a large-scale and reproducible method of isolating clonally purified hEPC, many of which may be capable of extended propagation in vitro. Initial testing suggests that the technology may be used to isolate at least 200 distinct clones that contain many previously uncharacterized cell types derived from all germ layers that display diverse embryo- and site-specific homeobox gene expression. Despite the expression of many oncofetal genes, none of the hEPC tested led to tumor formation when transplanted into immunocompromised mice. The cells studied appear to have a finite replicative lifespan but have longer telomeres than most fetal- or adult-derived cells, which may facilitate their use in the manufacture of purified lineages for research and human therapy. Information concerning the technology was published in the May 2008 edition of the journal Regenerative Medicine.

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BioTime has the right to use the licensed technology and cell lines for research purpose and for the development of therapeutic and diagnostic products for human and veterinary use, and also has the right to grant sublicenses. We paid Ocata a $250,000 license fee as well as an 8% royalty on sales of products, services, and processes that utilize the licensed technology. Once a total of $1,000,000 of royalties has been paid, no further royalties will be due.

Ocata may reacquire royalty-free, worldwide licenses to use the technology for RPE cells, hemangioblasts, and myocardial cells, on an exclusive basis, and for hepatocytes, on a non-exclusive basis, for human therapeutic use. Ocata will pay us $5,000 for each license that it elects to reacquire.

The term of the licenses from Ocata expire on the later of July 9, 2028 or the expiration of the last to expire of the licensed patents. The patent expiration dates cannot be presently determined with certainty because the patents are pending. Ocata may terminate the license agreement if we commit a breach or default in the performance of our obligations under the agreement and fail to cure the breach or default within the permitted cure periods. BioTime has the right to terminate the license agreement at any time by giving Ocata three months prior notice and paying all amounts due Ocata through the effective date of the termination.

iPS Cell Technology

ReCyte Therapeutics has entered into a license agreement and a sublicense agreement with Ocata under which it acquired worldwide rights to use an array of Ocata technology and technology licensed by Ocata from affiliates of Kirin Pharma Company, Ltd. (“Kirin”). The Ocata license and Kirin sublicense permit the commercialization of products in human therapeutic and diagnostic product markets.

The licensed technology covers iPS methods to transform cells of the human body, such as skin cells, into an embryonic state in which the cells will be pluripotent. Because iPS technology does not involve human embryos or egg cells, and classical cloning techniques are not employed, the use of iPS technology may eliminate some ethical concerns that have been raised in connection with the procurement and use of hES cells in scientific research and product development.

The portfolio of licensed patents and patent applications covers methods to produce iPS cells that do not carry viral vectors or added genes. Other iPS cell technology currently being practiced by other researchers utilizes viruses and genes that are likely incompatible with human therapeutic uses. We believe that technologies that facilitate the reprogramming of human cells to iPS cells without using viruses could be advantageous in the development of human stem cell products for use in medicine.

The Kirin sublicense covers patent application for methods for cloning mammals using reprogrammed donor chromatin or donor cells and methods for altering cell fate. These patent applications are related to technology to alter the state of a cell by exposing the cell’s DNA to the cytoplasm of another reprogramming cell with different properties. ReCyte Therapeutics may use this licensed technology for all human therapeutic and diagnostic applications.

A second series of patent applications licensed non-exclusively from Ocata includes technologies for:

- the use of reprogramming cells that over-express RNAs for the genes OCT4, SOX2, NANOG, and MYC, and other factors known to be useful in iPS technology;
- methods of resetting cell lifespan by extending the length of telomeres;
- the use of the cytoplasm of undifferentiated cells to reprogram human cells;
- the use of a cell bank of hemizygous O-cells;

· methods of screening for differentiation agents; and

· the use of modified stem cell-derived endothelial cells to disrupt tumor angiogenesis.

ReCyte Therapeutics may use this technology in commercializing the patents licensed under the Kirin sublicense.

The Ocata license also includes patent applications for other uses. One licensed patent application covers a method of differentiation of morula or inner cell mass cells and a method of making lineage-defective embryonic stem cells. That technology can be used in producing hEPCs without the utilization of hES cell lines. Another licensed patent application covers novel culture systems for ex vivo development that contains technology for utilizing avian cells in the production of stem cell products free of viruses and bacteria.

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Ocata iPS Cell License Provisions

Under the Ocata license for iPS cell technology, we paid Ocata a $200,000 license fee and ReCyte Therapeutics will pay a 5% royalty on sales of products, services, and processes that utilize the licensed technology, and a 20% royalty on any fees or other payments, other than equity investments, research and development costs, and loans and royalties, received by us from sublicensing the Ocata technology to third parties. Once a total of $600,000 of royalties has been paid, no further royalties will be due.

We may use the licensed technology and cell lines for research purposes and for the development of therapeutic and diagnostic products for human and veterinary use, excluding (a) human and non-human animal cells for commercial research use, including small-molecule and other drug testing and basic research; and (b) human cells for therapeutic and diagnostic use in the treatment of human diabetes, liver diseases, retinal diseases and retinal degenerative diseases, other than applications involving the use of cells in the treatment of tumors where the primary use of the cells is the destruction or reduction of tumors and does not involve regeneration of tissue or organ function. The exclusions from the scope of permitted uses under the Ocata license will lapse if Ocata's license with a third party terminates or if the third party no longer has an exclusive license from Ocata for those uses. Therefore, our cell lines marketed for research use are produced from hES cell lines (and not from iPS cells). In the therapeutic arena, ReCyte Therapeutics' use of the licensed iPS cell technology will be for applications such as its blood and vascular products.

The license to use some of the Ocata iPS technology is non-exclusive, and is limited to use in conjunction with the technology sublicensed from Ocata under the Kirin sublicense, and may not be sublicensed to third parties other than subsidiaries and other affiliated entities. ReCyte Therapeutics has the right to grant sublicenses to the other licensed Ocata technology.

ReCyte Therapeutics will have the right to prosecute the patent applications and to enforce all patents, at our own expense, except that Ocata is responsible for prosecuting patent applications for the non-exclusively licensed technology at its own expense. We will have the right to patent any new inventions arising from the use of the licensed patents and technology.

ReCyte Therapeutics will indemnify Ocata for any products liability claims arising from products made by us and our sublicensees.

The term of the licenses from Ocata expire on the later of August 14, 2028 or the expiration of the last to expire of the licensed patents. The patent expiration dates cannot be presently determined with certainty because certain patents are pending, but the latest expiration date of the licensed patents that have issued is 2025. Ocata may terminate the license agreement if ReCyte Therapeutics commits a breach or default in the performance of its obligations under the agreement and fail to cure the breach or default within the permitted cure periods. ReCyte Therapeutics has the right to terminate the license agreement at any time by giving Ocata three months prior notice and paying all amounts due Ocata through the effective date of the termination.

Kirin Sublicense Provisions

The technology licensed from Kirin relates to methods of reprogramming human and animal cells. Under the Kirin sublicense, we paid Ocata a $50,000 license fee and ReCyte Therapeutics will pay a 3.5% royalty on sales of products, services, and processes that utilize the licensed Ocata technology, and 20% of any fees or other payments, other than equity investments, research and development costs, and loans and royalties that it may receive from sublicensing the Kirin technology to third parties. ReCyte Therapeutics will also pay to Ocata or to an affiliate of Kirin, annually, the amount, if any, by which royalties payable by Ocata under its license agreement with Kirin are less than the $50,000 annual minimum royalty due. Those payments will be credited against other royalties payable to Ocata under the Kirin sublicense.

ReCyte Therapeutics may use the sublicensed technology for the development of therapeutic and diagnostic human cell products, including both products made, in whole or in part, of human cells, and products made from human cells. ReCyte Therapeutics has the right to grant further sublicenses.

ReCyte Therapeutics will indemnify Ocata for any products liability claims arising from products made by it and its sublicensees. The licenses will expire upon the expiration of the last to expire of the licensed patents, or May 9, 2016 if no patents are issued. The patent expiration dates cannot be presently determined with certainty because certain patents are pending, but the latest expiration date of the licensed patents that have issued is 2025. Ocata may terminate the license agreement if ReCyte Therapeutics commits a breach or default in the performance of its obligations under the agreement and fail to cure the breach or default within the permitted cure periods. ReCyte Therapeutics has the right to terminate the license agreement at any time by giving Ocata three months prior notice and paying all amounts due Ocata through the effective date of the termination.

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HyStem® Hydrogel Technology

Through our acquisition of Glycosan, we acquired a license from the University of Utah to use certain patents in the production and sale of hydrogel products. During August 2012, we entered into an amendment to our License Agreement with the University of Utah that expanded the field of use for which we are licensed to produce and market products covered by the core patents underlying our HyStem® technology. We now have a worldwide license for all uses, with the exception of veterinary medicine and animal health. Our licensed field of use includes, but is not limited to, all human pharmaceutical and medical device applications, all tissue engineering and regenerative medicine uses, and all research applications. Previously, our license in the United States was not exclusive and the fields of use of the technology permitted by the license were not as broad.

Under the License Agreement, we will pay a 3% royalty on sales of products and services performed that utilize the licensed patents. We are obligated to pay minimum royalties to the extent that actual royalties on products sales and services utilizing the patents are less than the minimum royalty amount. The minimum royalty amounts are $30,000 per annum during the term of the License Agreement. We will also pay the University of Utah 30% of any sublicense fees or royalties received under any sublicense of the licensed patents.

We will also pay a $225,000 milestone fee within six months after the first sale of a “tissue engineered product” that utilizes a licensed patent. A tissue engineered product is defined as living human tissues or cells on a polymer platform, created at a place other than the point-of-care facility, for transplantation into a human patient.

We agreed to pay and an additional license fee for the additional rights licensed to us during August 2012, and the costs of filing, prosecuting, enforcing and maintaining the patents exclusively licensed to us, and a portion of those costs for patents that have been licensed to a third party for a different field of use.

Commencing in August 2017, we may, under certain circumstances, be obligated to sublicense to one or more third parties, on commercially reasonable terms to be negotiated between us and each prospective sublicensee, or re-grant to the University, rights to use the licensed patents for products and services outside the general industry in which we or any of our affiliates or sublicensees is then developing or commercializing, or has plans to develop or commercialize, a product using the licensed technology.

Telomerase Sublicense

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. The Telomerase Sublicense will expire concurrently with the expiration of Geron’s license. That license will terminate during April 2017 when the licensed patents expire. The Telomerase Sublicense may also be terminated by Asterias by giving Geron 90 days written notice, by Asterias 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 Asterias 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.

Asterias is 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

Asterias or its sublicensees that is covered by the patents sublicensed under the agreement.

License Agreement with 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 human embryonic stem 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.

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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.

Sanford-Burnham Medical Research Institute

Through our acquisition of the assets of Cell Targeting, Inc. ("CTI"), we acquired a royalty-bearing, exclusive, worldwide license from the Sanford-Burnham Medical Research Institute ("SBMRI") permitting us and OncoCyte to use certain patents pertaining to homing peptides for preclinical research investigations of cell therapy treatments, and to enhance cell therapy products for the treatment and prevention of disease and injury in conjunction with our own proprietary technology or that of a third party. We have the right to grant sublicenses with notice to SBMRI.

OncoCyte will pay SBMRI a royalty of 4% on the sale of pharmaceutical products, and 10% on the sale of any research-use products that we develop using or incorporating the licensed technology; and 20% of any payments we receive for sublicensing the patents to third parties. The royalties payable to SBMRI may be reduced by 50% if royalties or other fees must be paid to third parties in connection with the sale of any products. An annual license maintenance fee is payable each year during the term of the license, and after commercial sales of royalty bearing products commence, the annual fee will be credited towards our royalty payment obligations for the applicable year.

OncoCyte will reimburse SBMRI for its costs incurred in filing, prosecuting, and maintaining patent protection, subject to our approval of the costs. The reimbursement rate ranges from 33-100% of the prosecution and maintenance costs. OncoCyte has assumed in house primary responsibility for the prosecution of some of the SBMRI licensed patents. OncoCyte will indemnify SBMRI against liabilities that may arise from our use of the licensed patents in the development, manufacture, and sale of products, including any product liability and similar claims that may arise from the use of any therapeutic products that we develop using the SBMRI patents.

The license will terminate on a product-by-product and country-by-country basis, when the last-to-expire patent expires. The patent expiration dates cannot be presently determined with certainty because certain patents are pending, but the latest expiration date of the licensed patents that have issued is 2025. OncoCyte may terminate the license agreement by giving SBMRI 60-day notice. SBMRI may terminate the license agreement if OncoCyte fails to make license or royalty payments or to perform our reporting obligations after applicable cure periods.

Hadasit Research and License Agreement

In October 2010, Cell Cure Neurosciences entered into an Amended and Restated Research and License Agreement under which it received an exclusive license to use certain of Hadasit's patented technologies for the development and commercialization for hES cell-derived cell replacement therapies for retinal degenerative diseases. Cell Cure Neurosciences paid Hadasit 249,058 New Israeli Shekels as a reimbursement for patent expenses incurred by Hadasit, and pays Hadasit quarterly fees for research and product development services under a related Product Development Agreement.

If Cell Cure Neurosciences commercializes OpRegen® or OpRegen®-Plus itself or sublicenses the Hadasit patents to a third party for the completion of development or commercialization of OpRegen® or OpRegen®-Plus, Cell Cure Neurosciences will pay Hadasit a 5% royalty on sales of products that utilize the licensed technology. Cell Cure Neurosciences will also pay sublicensing fees ranging from 10% to 30% of any payments Cell Cure Neurosciences receives from sublicensing the Hadasit patents. Commencing in January 2017, Hadasit will be entitled to receive an annual minimum royalty payment of $100,000 that will be credited toward the payment of royalties and sublicense fees otherwise payable to Hadasit during the calendar year. If Cell Cure Neurosciences or a sublicensee paid royalties during the previous year, Cell Cure Neurosciences may defer making the minimum royalty payment until December

and will be obligated to make the minimum annual payment to the extent that royalties and sublicensing fee payments made during that year are less than $100,000.

If Cell Cure Neurosciences or a sublicensee conducts clinical trials of OpRegen® or OpRegen®-Plus, Hadasit will be entitled to receive certain payments from Cell Cure Neurosciences upon the first attainment of certain clinical trial milestones in the process of seeking regulatory approval to market a product developed by Cell Cure Neurosciences using the licensed patents. Hadasit will receive $250,000 upon the enrollment of patients in the first Phase I clinical trial, $250,000 upon the submission of Phase II clinical trial data to a regulatory agency as part of the approval process, and $1 million upon the enrollment of the first patient in the first Phase III clinical trial.

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The Hadasit license agreement will automatically expire on a country-by-country and product-by-product basis upon the later of the expiration of all of the licensed patents or 15 years following the first sale of a product developed using a licensed patent. The patent expiration dates cannot be presently determined with certainty because the patents are pending. After expiration of the license agreement, Cell Cure Neurosciences will have the right to exploit the Hadasit licensed patents without having to pay Hadasit any royalties or sublicensing fees. Either party may terminate the license agreement if the other party commits a breach or default in the performance of its obligations under the agreement and fails to cure the breach or default within the permitted cure periods.

Cornell University

During August, 2011, we entered into a License Agreement with Cornell University for the worldwide development and commercialization of technology developed at Weill Cornell Medical College for the differentiation of hES cells into vascular endothelial cells. The technology may provide an improved means of generating vascular endothelial cells on an industrial scale, and will be utilized by us in diverse products, including those under development at our subsidiary ReCyte Therapeutics to treat age-related vascular disease.

Our license to use the technology and patent rights is worldwide and exclusive and permits us to use the licensed technology and patents rights for the fields of cell therapy for age- and diabetes-related vascular diseases and cancer therapy. The license also covers (i) products utilizing human vascular or vascular forming cells for the purpose of enhancing the viability of the graft of other human cells, and (ii) cell-based research products. We also have a non-exclusive right to use any related technology provided by Cornell within the same fields of use, and non-exclusive rights with respect to any non-cell-based products for the research market not covered by the licensed patent rights.

We have the right to permit our subsidiaries and other affiliates to use the licensed patent rights and technology, and we have the right to grant sublicenses to others.

Cornell will be entitled to receive an initial license fee and annual license maintenance fees. The obligation to pay annual license maintenance fees will end when the first human therapeutic license product is sold by us or by any of our affiliates or sublicensees. A “licensed product” includes any service, composition or product that uses the licensed technology, or is claimed in the licensed patent rights, or that is produced or enabled by any licensed method, or the manufacture, use, sale, offer for sale, or importation of which would constitute an infringement, an inducement to infringe, or contributory infringement of any pending or issued claim within the patent rights licensed to us. A “licensed method” means any method that uses the licensed technology, or is claimed in the patent rights licensed to us, the use of which would constitute an infringement, an inducement to infringe, or contributory infringement of any pending or issued claim within the patent rights licensed to us.

We will pay Cornell a milestone payment upon the achievement of a research product sales milestone amount, and we will make milestone payments upon the attainment of certain FDA approval milestones, including (i) the first Phase II clinical trial dosing of a human therapeutic licensed product, (ii) the first Phase III clinical trial dosing of a human therapeutic licensed product, (iii) FDA approval of first human therapeutic licensed product for age-related vascular disease, and (iv) FDA approval of the first human therapeutic licensed product for cancer.

We will pay Cornell royalties on sales of licensed products by ourselves and our affiliates and sublicensees, and we will share with Cornell a portion of any cash payments, other than royalties, that we receive for the grant of sublicenses to non-affiliates. We will also reimburse Cornell for costs related to the patent applications and any patents that may issue that are covered by our license.

We will provide Cornell with periodic reports of progress made in our research and development and product commercialization programs, and in those programs conducted by our affiliates and sublicensees, using the licensed

patents and technology. We and our affiliates and sublicensees will be required to keep accurate records of the use, manufacture and sale of licensed products, and of sublicense fees received. Cornell has the right to audit those records that we and our affiliates maintain.

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The license will expire on the later of (i) the expiration date of the longest-lived licensed patent, or (ii) on a country-by-country basis, on the twenty-first anniversary of the first commercial sale of a licensed product. We have the right to terminate the License Agreement at any time and for any reason upon ninety (90) days written notice to Cornell. Cornell may terminate our license if we fail to perform, or if we violate, any term of the License Agreement, and we fail to cure that default within thirty (30) days after written notice from Cornell.

Cornell also may terminate the license or convert the exclusive license to a non-exclusive license if we fail to meet any of the following requirements: (i) diligently proceed with the development, manufacture and sale of licensed products; (ii) annually spend certain specified dollar amounts for the development of licensed products; (iii) submit an investigational new drug application covering at least one licensed product to the FDA within eight (8) years after the effective date of the License Agreement; (iv) initiate preclinical toxicology studies for at least one licensed product within six (6) years after the effective date of the License Agreement; (v) market at least one therapeutic licensed product in the U.S. within twelve (12) months after receiving regulatory approval to market the licensed product; or (vi) market at least one cell-based licensed product for the research market in the U.S. within twelve (12) months after the effective date of the License Agreement. We may fulfill the obligations described in (i) through (vi) through our own efforts or through the efforts of our affiliates and sublicensees.

Termination of the License Agreement by us or by Cornell or upon expiration will not relieve us of our obligations the make payments of fees owed at the time of termination, and certain provisions of the License Agreement, including the indemnification and confidentiality provisions, will survive termination. We may continue to sell all previously made or partially made licensed product for a period of one hundred and twenty (120) days after the License Agreement terminates, provided that the reporting and royalty payment provisions of the License Agreement will continue to apply to those sales.

We have agreed to indemnify Cornell; Cornell Research Foundation, Inc.; Howard Hughes Medical Institute; and their officers, trustees, employees, and agents, the sponsors of the research that led to the licensed patent rights; and the inventors and their employers, against any and all claims, suits, losses, damage, costs, fees, and expenses resulting from or arising out of exercise of the licenses and any sublicenses under the License Agreement. The indemnification will include, but not be limited to, patent infringement and product liability. We have also agreement to provide certain liability insurance coverage for Cornell and Howard Hughes Medical Institute.

Cornell and Howard Hughes Medical Institute will retain the right to use the licensed technology and patent rights for their own educational and research purposes. Cornell may also permit other nonprofit institutions to use the technology and patent rights for educational and research purposes.

In conjunction with the License Agreement, we also entered into a Sponsored Research Agreement under which scientists at Weill Cornell Medical College, led by Sina Y. Rabbany, PhD, will engage in research with the goals of (1) verifying the ability of progenitor cells, derived by ReCyte Therapeutics, to generate stable populations of vascular endothelial cells; (2) testing the functionality and transplantability of the vascular endothelial cells in animal models to see if the transplanted cells generate new vascular tissue; and (3) using HyStem® hydrogels and other materials as scaffolds for the three-dimensional propagation of vascular endothelial cells into vascular tissues suitable for transplantation. The Sponsored Research Agreement will have a term of three years, but we or Cornell can elect to terminate the agreement earlier by giving the other party thirty (30) days written notice.

If the researchers make any patentable discoveries or inventions in the course of the sponsored research program, we will have an option to negotiate an exclusive, royalty-bearing license to use the invention. If we do license the invention, Cornell would retain a right to use it on a non-exclusive royalty-free basis for its own internal research and teaching purposes.

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Icahn School of Medicine at Mount Sinai

During May 2014, LifeMap Solutions entered into a Co-Development and Option Agreement (the "Mt. Sinai Agreement") with the Icahn School of Medicine at Mount Sinai, a nonprofit education corporation ("Mount Sinai"), pursuant to which LifeMap Solutions and Mount Sinai have agreed to work cooperatively to develop internet, web-based, mobile user or consumer software products to provide users with information that may potentially aid them in improving lifestyle and healthcare decisions and outcomes.

LifeMap Solutions and Mount Sinai will license to each other, on a non-exclusive, royalty free basis, certain "background" intellectual property for joint use in product development. LifeMap Solutions will pay Mount Sinai for the use of Mount Sinai personnel based on their direct salaries plus an overhead charge, but Mount Sinai has agreed to waive collection of the first $1,000,000 of overhead charges. LifeMap Solutions will have an option to acquire a world-wide license to use Mount Sinai's background intellectual property and other intellectual property developed by Mount Sinai alone or jointly with LifeMap Solutions in the joint development project for the purpose of developing and commercializing the product.

License Terms

The terms of the license agreement that will be executed if LifeMap Solutions exercises its option under the Mt. Sinai Agreement (the "Mt. Sinai License Agreement") are subject to negotiation by the parties, but will include certain provisions specified in the Mt. Sinai Agreement.

The license will be exclusive with respect to intellectual property developed by Mount Sinai alone or jointly with LifeMap Solutions as part of the project, but will be non-exclusive as to Mount Sinai's (a) background technology and know-how relating to development of software, algorithms, and databases capable of analyzing complex data sets and generating predictive models, (b) software code that pertains to analysis of genetic data sets or compiling data sets, (c) electronic medical record data, and (d) algorithms and data bases that incorporate certain genetic information, clinical data and other information of individuals relating to human disease, health or wellness.

LifeMap Solutions will pay Mount Sinai a royalty on Net Sales of the product or "Licensed Services" by LifeMap Solutions and its affiliates and sublicensees. Net Sales means the gross amount, prior to any discounts or other list price reductions, invoiced by LifeMap Solutions and its affiliates and sublicensees for sales of the product or Licensed Services for end use or consumption by third parties, less (a) normal and customary quantity and/or cash discounts and sales returns and allowances, including, without limitation, those granted on account of price adjustments, billing errors, rejected goods, damaged goods, returns, rebates actually allowed and taken, administrative or other fees or reimbursements of similar payments to wholesalers or other distributors, buying groups, or other institutions; (b) rebates or similar payments made with respect to sales paid for by any governmental or regulatory authority, (c) customs or excise duties or other duties directly imposed and related to the sales making up the gross invoice amount; (d) sales and other taxes and duties directly related to the sale, to the extent that such items are included in the gross invoice price; and (e) freight, postage, shipping, and insurance expenses separately identified in the invoice.

"Licensed Service" means any service, including without limitation database access, provided by LifeMap Solutions, its distributors, or sublicensees to a third party in exchange for consideration where the service makes use of the product or otherwise exploits or monetizes certain intellectual property licensed by Mount Sinai.

LifeMap Solutions' obligation to pay royalties will expire on a product-by-product or Licensed Service-by-Licensed Service and country-by-country basis, from first commercial sale or commercial license, whichever comes first, until the later of: (a) expiration of the last patent rights covering the product or Licensed Service in a country; (b) expiration of any market exclusivity period granted by a regulatory agency with respect to the product or Licensed Service in a country; or (c) LifeMap Solutions' final discontinuation of sale or commercial licensing of a product or Licensed

Service in a country.

In addition to royalties on Net Sales, LifeMap Solutions will pay Mount Sinai a percentage of any consideration received by LifeMap Solutions from its sublicensees and distributors of the product. Any non-cash consideration received by LifeMap Solutions will be valued at its fair market value as of the date of receipt. The percentage of the consideration to be paid to Mount Sinai will depend upon the stage of development of the product at the time the applicable sublicense or distributor agreement is signed.

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LifeMap Solutions will pay Mount Sinai up to 5% of the then current equity value of LifeMap Solutions at the time of a "Significant Transaction." The percentage to be paid is subject to dilution based on future investment in LifeMap Solutions and the amount of personnel cost overhead charges waived by Mount Sinai under the Mt. Sinai Agreement. The term "Significant Transaction" will mean the first to occur of a single transaction, or series of related transactions, consisting of or resulting in any of the following: (i) an assignment, other than to LifeMap Sciences, of the definitive license agreement; (ii) an initial public offering of securities by LifeMap Solutions (or its successor) or other transaction resulting in any of LifeMap Solutions' securities being traded on a nationally recognized stock exchange or automated quotation system; (iii) a sale, license or other disposition of all or substantially all of LifeMap Solutions' assets; or (iv) a reorganization, consolidation or merger of LifeMap Solutions, or sale or transfer of the securities of LifeMap Solutions, where the holders of LifeMap Solutions' outstanding voting securities before the transaction beneficially own less than fifty percent (50%) of the outstanding voting securities, or hold less than fifty percent (50%) of the voting power of the voting security holders of the surviving entity after the transaction. A Significant Transaction shall not be deemed to occur as a result of a bona fide, arm's-length equity financing for cash in which LifeMap Solutions issues securities (other than through an initial public offering described in clause (ii) above) representing more than fifty percent (50%) of the voting power of its security holders to venture capital or other similar professional investors who do not actively manage day-to-day operations of LifeMap Solutions.

The Mt. Sinai License Agreement will require LifeMap Solutions to use reasonable commercial efforts to develop and commercialize the products and to meet certain diligence milestones and timelines, which are expected to include (a) demonstrating a specified level of capital investment to fund product development, (b) production of a product prototype, (c) launch of a beta stage version of the product, and (c) commercial launch of the product to the public. If LifeMap Solutions fails to attain an agreed diligence milestone by the applicable deadline, Mount Sinai will be entitled to convert the exclusive license to a non-exclusive license, provided that any delays caused by Mount Sinai will extend the milestone achievement deadline.

LifeMap Solutions will reimburse Mount Sinai for all reasonable patent and licensing costs incurred prior to the effective date of the definitive license agreement in connection with the licensed patent rights and certain other Mount Sinai technology and background intellectual property. LifeMap Solutions will also pay all reasonable attorney's fees, expenses, official fees, and other charges incident to the preparation, prosecution, and maintenance of licensed patent rights.

Termination of the Agreement

Either party may terminate the Mt. Sinai Agreement if the services of the principal investigator become unavailable to Mount Sinai for any reason and a member of Mount Sinai's faculty acceptable to both Mount Sinai and LifeMap Solutions is not designated as the replacement principal investigated within the time allotted by the Mt. Sinai Agreement.

Either party may terminate the Mt. Sinai Agreement at any time after the second anniversary of the signing of the agreement, upon ninety (90) days' prior written notice. LifeMap Solutions may terminate the Mt. Sinai Agreement, at any time after the first anniversary of the agreement, upon ninety (90) days' prior written notice to Mount Sinai if LifeMap Solutions determines that the product is not a commercially viable product.

Either LifeMap Solutions or Mount Sinai may terminate the Mt. Sinai Agreement upon written notice to the other party if the other party breaches any of the material terms or conditions of the agreement and fails to cure the breach within ninety (90) days after receiving written notice of the breach, except that in a breach is incurable, the non-breaching party may terminate the agreement upon fifteen (15) days' written notice to the breaching party.

Mount Sinai may terminate the Mt. Sinai Agreement upon thirty (30) days' written notice to LifeMap Solutions should any federal law require regulatory controls, compliance, or other protections for direct-to-consumer genetic testing

that Mount Sinai is unable to reasonably comply with; provided that, if reasonable, Mount Sinai shall first cease the noncompliant services and/or activities; and if LifeMap Solutions in its sole discretion, determines that ceasing the non-compliant activity would materially impact the Mt. Sinai Agreement, LifeMap Solutions may terminate the agreement upon ten (10) days' notice to Mount Sinai. If any state requires regulatory controls, compliance, or other protections for direct-to-consumer genetic testing that Mount Sinai is unable to reasonably comply with, Mount Sinai may terminate services and activities with respect to that state.

Either party may terminate the Mt. Sinai Agreement if it receives a notice from a third party claiming that the party's activities under the agreement infringe the third party's intellectual property rights; and, after investigation of the claim of infringement, the party determines that there exists a likely infringement and that it cannot cure the infringement within ninety (90) days or perform its obligations under the agreement without engaging in infringing activities.

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Asterias Royalty Agreement with Geron

In connection with its acquisition of stem cell assets from Geron, Asterias entered into a Royalty Agreement with Geron 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 commercialize 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 it 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. We estimate that the latest patent expiration date will be 2029.

Clinical Trial and Option Agreement with Cancer Research United Kingdom

During September 2014, Asterias entered into the CRUK Agreement with CRUK and CRT, a wholly-owned subsidiary of CRUK, pursuant to which CRUK has agreed to fund Phase I/IIa clinical development of AST-VAC2. Asterias will, at their own cost, complete process development and manufacturing scale-up of the AST-VAC2 manufacturing process and will transfer the resulting cGMP-compatible process to CRUK. CRUK will, at its own cost, manufacture clinical grade AST-VAC2 and will carry out the Phase I/IIa clinical trial of AST-VAC2 in cancer patients in 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 Asterias will be obligated to make payments upon the execution of the License Agreement, upon the achievement of various milestones, and then royalties on sales of products, and, if Asterias sublicenses product development or commercialization rights to a third party, Asterias would pay CRT a share of any sublicense revenues we receive from the third party, with CRT's share varying from a high of 40% in the case of a sublicense entered into prior to commencement of a Phase II clinical trial, to substantially lower rates in the case of a sublicense entered into at various later stages of clinical development but prior to completion of a Phase III clinical trial, and as low as 7.5% in the case of a sublicense entered into after completion of a Phase III clinical trial. 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 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.

If Asterias declines to exercise its option, CRT will then have an option to obtain a license to use Asterias' intellectual property relating to AST-VAC2 to continue the development and commercialization of AST-VAC2 and related products for which Asterias will be entitled to receive a share of the revenue relating to development and partnering proceeds. The CRT's option will be exercisable by CRT for four months from when the Asterias' option expires.

The CRUK Agreement will expire upon the earliest of (i) the date Asterias obtains a license to use the clinical data pursuant to an exercise of its option, (ii) the date CRT obtains a license to continue the development and commercialization of AST-VAC2 pursuant to an exercise of its option and (iii) the expiration of both the Asterias' option and the CRT's option. Notwithstanding the foregoing, any party may terminate the CRUK Agreement prior to its expiration for events including (i) a party materially breaches the agreement and such breach is not cured within 60 days after the non-breaching party delivers written notice, (ii) any party is insolvent or liquidated or (iii) if regulatory approval of the clinical trial is not obtained within two years after the parties complete the technology transfer phase of the agreement, or if regulatory approval is revoked, withdrawn or otherwise terminated, or if a regulatory authority orders a halt or hold on the clinical trial for more than 18 months. In addition, CRUK will have the right to terminate the CRUK Agreement under certain other circumstances.

The CRUK Agreement contains customary representations, warranties and covenants from Asterias and CRUK, as well as customary provisions relating to indemnity, confidentiality and other matters.

Plasma Volume Expanders and Related Products

Our business was initially focused on blood plasma volume expanders and related technology for use in surgery, emergency trauma treatment, and other applications. Our first product, Hextend®, is a physiologically balanced blood plasma volume expander used for the treatment of hypovolemia, a condition caused by low blood volume, often due to blood loss during surgery or injury. Hextend® maintains circulatory system fluid volume and blood pressure and helps sustain vital organs during surgery. Hextend®, approved for use in major surgery, is the only blood plasma volume expander that contains lactate, multiple electrolytes, glucose, and a medically approved form of starch called hetastarch. Hextend® is sterile and thus its use avoids the risk of infection. Health insurance reimbursements and HMO coverage now include the cost of Hextend® used in surgical procedures.

Uses and Benefits of Hextend®

Hextend® has been formulated to maintain the patient's tissue and organ function by sustaining the patient's fluid volume and physiological balance. Hextend® is composed of a hydroxyethyl starch, electrolytes, sugar, and lactate in an aqueous base. Certain clinical test results indicate that Hextend® is effective at maintaining blood calcium levels when it is used to replace lost blood volume. Calcium can be a significant factor in regulating blood clotting and cardiac function. Clinical studies have also shown that Hextend® is better at maintaining the acid-base balance than are saline-based surgical fluids.

The Market for Plasma Volume Expanders

Blood transfusions are often necessary during surgical procedures and are sometimes required to treat patients suffering severe blood loss due to traumatic injury. Many surgical and trauma cases do not require blood transfusions but do involve significant bleeding that can place a patient at risk of suffering from shock caused by the loss of fluid volume (or hypovolemia) and physiological balance. Whole blood and packed red cells generally cannot be administered to a patient until the patient's blood has been typed and sufficient units of compatible blood or red cells can be located. Periodic shortages of supply of donated human blood are not uncommon, and rare blood types are often difficult to locate. The use of human blood products also poses the risk of exposing the patient to blood-borne diseases such as AIDS and hepatitis.

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Due to the risks and cost of using human blood products, even when a sufficient supply of compatible blood is available, physicians treating patients suffering blood loss are generally not permitted to transfuse red blood cells until the patient's level of red blood cells has fallen to a level known as the "transfusion trigger." During the course of surgery, while blood volume is being lost, the patient is infused with plasma volume expanders to maintain adequate blood circulation. During the surgical procedure, red blood cells are not generally replaced until the patient has lost approximately 45% to 50% of his or her red blood cells, thus reaching the transfusion trigger, at which point the transfusion of red blood cells may be required. After the transfusion of red blood cells, the patient may continue to experience blood volume loss, which will be treated with plasma volume expanders. Even in those patients who do not require a transfusion, physicians routinely administer plasma volume expanders to maintain sufficient fluid volume to permit the available red blood cells to circulate throughout the body and to maintain the patient's physiological balance.

Several units of fluid replacement products are often administered during surgery. The number of units will vary depending upon the amount of blood loss and the kind of plasma volume expander administered. Crystalloid products must be used in larger volumes than those required with colloid products such as Hextend®.

Licensing and Sale of Plasma Volume Expander Products

Hospira

Hospira, Inc. ("Hospira") has the exclusive right to manufacture and sell Hextend® in the U.S. and Canada under a license agreement with us. Hospira is presently marketing Hextend® in the U.S. Hospira's license applies to all therapeutic uses other than those involving hypothermic surgery, during which the patient's body temperature reaches temperatures lower than 12°C ("Hypothermic Use"), or those involving the replacement of substantially all of a patient's circulating blood volume ("Total Body Washout").

Hospira pays us a royalty on total annual net sales of Hextend®. The royalty rate is 5% plus an additional 0.22% for each $1,000,000 of annual net sales, up to a maximum royalty rate of 36%. The royalty rate for each year is applied on a total net sales basis. Hospira's obligation to pay royalties on sales of Hextend® will expire on a country-by-country basis when all patents protecting Hextend® in the applicable country expire and any third party obtains certain regulatory approvals to market a generic equivalent product in that country. The relevant composition patents begin to expire in 2014 and the relevant methods of use patents expire in 2019.

We have the right to convert Hospira's exclusive license to a non-exclusive license or to terminate the license outright if certain minimum sales and royalty payments are not met. In order to terminate the license outright, we would pay a termination fee in an amount ranging from the milestone payments we received to an amount equal to three times the prior year's net sales, depending upon when termination occurs. Hospira has agreed to manufacture Hextend® for sale by us in the event that the exclusive license is terminated.

Hospira has certain rights to acquire additional licenses to manufacture and sell our other plasma expander products in their market territory. If Hospira exercises these rights to acquire a license to sell such products for uses other than Hypothermic Use or Total Body Washout, in addition to paying royalties, Hospira will be obligated to pay a license fee based upon our direct and indirect research, development, and other costs allocable to the new product. If Hospira desires to acquire a license to sell any of our products for use in Hypothermic Surgery or Total Body Washout, the license fees and other terms of the license will be subject to negotiation between the parties. For the purpose of determining the applicable royalty rates, net sales of any such new products licensed by Hospira will be aggregated with sales of Hextend®. If Hospira does not exercise its right to acquire a new product license, we may manufacture and sell the product ourselves or we may license others to do so.

CJ Health

CJ HealthCare Corporation ("CJ Health"), a subsidiary of CheilJedang Corporation markets Hextend® in South Korea under an exclusive license from us. CJ Health paid us a license fee to acquire their right to market Hextend®. CJ Health also pays us a royalty on sales of Hextend®. The royalty will range from $1.30 to $2.60 per 500 ml unit of product sold, depending upon the price approved by Korea's National Health Insurance. CJ Health is also responsible for obtaining the regulatory approvals required to manufacture and market PentaLyte®, including conducting any clinical trials that may be required, and will bear all related costs and expenses.

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Major Customers

During 2014, 2013, and 2012, most of our royalty revenues was generated through sales of Hextend® by Hospira in the U.S. During 2014, we also received royalty revenues from product sales under a non-exclusive license agreement between Asterias and Stem Cell Technologies, Inc. We also earned license fees from CJ Health and, during 2013 and 2012, from Summit Pharmaceuticals International Corporation ("Summit"). We received the license fees from CJ Health and Summit during the years 2003 -2005. Full recognition of the revenues derived from those license fees was deferred and revenues have been recognized over the lives of the respective contracts, which had been estimated to last until approximately 2019 based on the current expected life of the governing patent covering our products in Korea and Japan. However, we recognized the unamortized balance of the Summit license fees during the fourth quarter of 2013 as a result of the termination of our license agreements with Summit. The following table shows revenues paid by customers that were recognized during the past three fiscal years and that accounted for 5% or more of our total annual revenues.

	% of Total Revenues for the Year Ending December 31,		
Licensee	2014	2013	2012
Hospira	10%	11%	30%
CJ Health	3 %	3 %	8 %
Stemcell Technologies	9 %	- %	- %
Summit	- %	35%	10%

Royalty Revenues and License Fees by Geographic Area

The following table shows the source of our 2014, 2013, and 2012 royalty and license fee revenues by geographic areas, based on the country of domicile of the licensee:

	Revenues for Year Ending December 31,		
Geographic Area	2014	2013	2012
Domestic	$1,519,387	$1,606,945	$1,183,638
Asia	51,224	978,004	258,041
Total Revenues	$1,570,611	$2,584,949	$1,441,679

Manufacturing

Facilities Required—Stem Cell Products

We lease a 19,000 square-foot building in Alameda, California. The building is cGMP-capable and has previously been certified as Class 1,000 and Class 10,000 laboratory space, and includes cell culture and manufacturing equipment previously validated for use in the cGMP of cell-based products. Our subsidiaries, OncoCyte, OrthoCyte, and ReCyte Therapeutics are also conducting their research and development activities at our Alameda facility.

ESI lease ended February 28, 2014. ESI will continue to pursue our ongoing plans to establish new laboratory facilities in Singapore for manufacturing and distribution of ESI BIO research products in Asia.

Cell Cure Neurosciences leases approximately 290 square meters of office and laboratory space located at Hadassah Ein Kerem, in Jerusalem, Israel.

We have leased an office and research facility located in Menlo Park, California for use by Asterias. The building on the leased premises contains approximately 24,080 square feet of space. The lease is for a term of three years. Asterias has also entered into a new lease for a 44,000 square foot facility in Fremont, California at which it plans to construct a cGMP compliant facility for the production of its product candidates, using a $4,400,000 tenant improvement allowance from the landlord. Asterias anticipates initiating construction at the Fremont facility during the first quarter of 2015.

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Facilities Required—Plasma Volume Expanders

Any products that are used in clinical trials for regulatory approval in the U.S. or abroad, or that are approved by the FDA or foreign regulatory authorities for marketing have to be manufactured according to cGMP at a facility that has passed regulatory inspection. In addition, products that are approved for sale will have to be manufactured in commercial quantities, and with sufficient stability to withstand the distribution process, and in compliance with such domestic and foreign regulatory requirements as may be applicable. The active ingredients and component parts of the products must be of medical grade or themselves be manufactured according to FDA-acceptable cGMP.

Hospira manufactures Hextend® for use in the North American market, and CJ Health manufactures Hextend® for use in South Korea. Hospira and CJ Health have the facilities to manufacture Hextend® and our other products in commercial quantities. If Hospira and CJ Health choose not to manufacture and market other BioTime products, other manufacturers will have to be identified that would be willing to manufacture products for us or any licensee of our products as we do not have facilities to manufacture our plasma volume expander products in commercial quantities, or under cGMP. Acquiring a manufacturing facility would involve significant expenditure of time and money for design and construction of the facility, purchasing equipment, hiring and training a production staff, purchasing raw material, and attaining an efficient level of production. Although we have not determined the cost of constructing production facilities that meet FDA requirements, we expect that the cost would be substantial, and that we would need to raise additional capital in the future for that purpose. To avoid the incurrence of those expenses and delays, we are relying on Hospira and CJ Health for the production of Hextend® but there can be no assurance that satisfactory arrangements will be made for any new products that we may develop.

Raw Materials—Plasma Volume Expanders

Although most ingredients in the products we are developing are readily obtainable from multiple sources, we know of only a few manufacturers of the hydroxyethyl starches that serve as the primary drug substance in Hextend®. Hospira and CJ Health presently have a source of supply of the hydroxyethyl starch used in Hextend® and have agreed to maintain a supply sufficient to meet market demand for Hextend® in the countries in which they market the product. We believe that we will be able to obtain a sufficient supply of starch for our needs in the foreseeable future, although we do not have supply agreements in place. If for any reason a sufficient supply of hydroxyethyl starch could not be obtained, we or a licensee would have to acquire a manufacturing facility and the technology to produce the hydroxyethyl starch according to cGMP. We would have to raise additional capital to participate in the development and acquisition of the necessary production technology and facilities, which may not be feasible. The use of a different hydroxyethyl starch could require us or a licensee to conduct additional clinical trials for FDA or foreign regulatory approval to market Hextend® with the new starch.

If arrangements cannot be made for a source of supply of hydroxyethyl starch, we would have to reformulate our solutions to use one or more other starches that are more readily available. In order to reformulate our products, we would have to perform new laboratory and clinical testing to determine whether the alternative starches could be used in a safe and effective synthetic plasma volume expander, low-temperature blood substitute, or organ preservation solution. We or our licensees would also have to obtain new regulatory approvals from the FDA and foreign regulatory agencies to market the reformulated product. If needed, such testing and regulatory approvals would require the incurrence of substantial cost and delay, and there is no certainty that any such testing would demonstrate that an alternative ingredient, even if chemically similar to the one currently used, would be safe or effective.

Marketing

Stem Cell Research Products

Our products for use in stem cell research are being offered through our ESI BIO division, and our marketing of existing sub-brands PureStem® embryonic progenitors, HyStem® hydrogel matrix products, ESI cGMP hES cell lines, and our new differentiation and stem cell reprogramming products have been consolidated under our ESI BIO branding program. These research products are being offered to researchers at universities and other institutions, at companies in the bioscience and biopharmaceutical industries, and at other companies that provide research products to companies in those industries. We are focusing our branding program on our product features and strengths of being “translatable” to the clinic, extending to our customers the benefit of an easier transition of their research into clinical applications. We expect our products and technologies for the research market to provide us with a source of revenues more quickly, and with the expenditure of less capital, than our therapeutic products, and to generate therapeutic out-licensing opportunities as well.

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LifeMap Sciences sells subscriptions to its database products to biotech and pharmaceutical companies worldwide. The LifeMap Discovery® data base provides access to available cell-related information and resources necessary to improve stem cell research and development of therapeutics based on regenerative medicine and may promote the sale of our PureStem® progenitors by permitting data base users to follow the development of hES cell lines to the purified progenitors state.

The market for our stem cell products may be impacted by the amount of government funding available for research in the development of stem cell therapies.

Plasma Volume Expanders

Hextend® is being distributed in the U.S. by Hospira and in South Korea by CJ Health under exclusive licenses from us. Hospira also has the right to obtain licenses to manufacture and sell our other plasma volume expander products.

Because Hextend® is a surgical product, sales efforts must be directed to physicians and hospitals. The Hextend® marketing strategy is designed to reach its target customer base through sales calls, through an advertising campaign focused on the use of a plasma-like substance to replace lost blood volume, and on the ability of Hextend® to support vital physiological processes.

Hextend® competes with other products used to treat or prevent hypovolemia, including albumin, generic 6% hetastarch solutions, and crystalloid solutions. The competing products have been commonly used in surgery and trauma care for many years, and in order to sell Hextend®, physicians must be convinced to change their product loyalties. The market price of albumin has declined and generic 6% hetastarch solutions sell at low prices, which has caused Hospira and CJ Health to lower the prices at which they sell Hextend®.

In addition to price competition, sales of Hextend® have been adversely affected if certain safety labeling changes required by the FDA for the entire class of hydroxyethyl starch products, including Hextend®. The labeling changes were approved by the FDA in November 2013 and include a boxed warning stating that the use of hydroxyethyl starch products, including Hextend®, increases the risk of mortality and renal injury requiring renal replacement therapy in critically ill adult patients, including patients with sepsis, and that Hextend® should not be used in critically ill adult patients, including patients with sepsis. New warning and precaution information is also required along with new information about contraindications, adverse reactions, and information about certain recent studies. The new warning and precautions include statements to the effect that the use of Hextend® should be avoided in patients with pre-existing renal dysfunction, and the coagulation status of patients undergoing open heart surgery in association with cardiopulmonary bypass should be monitored as excess bleeding has been reported with hydroxyethyl starch solutions in that population and use of Hextend® should be discontinued at the first sign of coagulopathy. The liver function of patients receiving hydroxyethyl starch products, including Hextend® should also be monitored.

Therapeutic Products and Medical Devices

Because our planned therapeutic products and medical devices are still in the research and development stage, we and our subsidiaries will not initially need to have our own marketing personnel. If we or our subsidiaries are successful in developing marketable therapeutic products and medical devices we will need to build our own marketing and distribution capability for those products, which would require the investment of significant financial and management resources, or we and our subsidiaries will need to find collaborative marketing partners, independent sales representatives, or wholesale distributors for the commercial sale of those products.

If we market products through arrangements with third parties, we may pay sales commissions to sales representatives or we may sell or consign products to distributors at wholesale prices. This means that our gross profit from product sales may be less than would be the case if we were to sell our products directly to end users at retail prices through

our own sales force. On the other hand, selling to distributors or through independent sales representatives would allow us to avoid the cost of hiring and training our own sales employees. There can be no assurance we or any of our subsidiaries will be able to negotiate distribution or sales agreements with third parties on favorable terms to justify our investment in our products or achieve sufficient revenues to support our operations.

Patents and Trade Secrets

We rely primarily on patents and contractual obligations with employees and third parties to protect our proprietary rights. We have sought, and intend to continue to seek, appropriate patent protection for important and strategic components of our proprietary technologies by filing patent applications in the U.S. and certain foreign countries. There can be no assurance that any of our patents will guarantee protection or market exclusivity for our products and product candidates. We also use license agreements both to access technologies developed by other companies and universities and to convey certain intellectual property rights to others. Our financial success will be dependent in part on our ability to obtain commercially valuable patent claims and to protect our intellectual property rights and to operate without infringing upon the proprietary rights of others.

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As of March 8, 2015, we owned or controlled or licensed directly or through our subsidiaries approximately 800 patents and pending patent applications worldwide including more than 240 issued or pending U.S. patents or patent applications. We also licensed over 140 patents and applications from WARF.

Our patents and patent applications are directed to compositions of matter, formulations, methods of use and/or methods of manufacturing, as appropriate. In addition to patenting our own technology and that of our subsidiaries, we and our subsidiaries have licensed patents and patent applications for certain stem cell technology, hEPC, and hES cell lines from other companies. See “Licensed Stem Cell Technologies and Stem Cell Product Development Agreements.”

The patent positions of pharmaceutical and biotechnology companies, including ours, are generally uncertain and involve complex legal and factual questions. Our business could be negatively impacted by any of the following:

- 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;
- our patents may be challenged by third parties;
- 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;
- the pending patent applications to which we have rights may not result in issued patents;
- we may not be successful in developing additional proprietary technologies that are patentable.

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. Moreover, we could incur substantial costs in litigation if we have to defend ourselves in patent lawsuits brought by third parties or if we initiate such lawsuits

In Europe, the European Patent Convention prohibits the granting of European patents for inventions that concern "uses of human embryos for industrial or commercial purposes." The European Patent Office is presently interpreting this prohibition broadly, and is applying it to reject patent claims that pertain to hES cells. However, this broad interpretation is being challenged through the European Patent Office appeals system. As a result, we do not yet know whether or to what extent we will be able to obtain patent protection for our hES cell technologies in Europe.

The recent Supreme Court decisions in Mayo Collaborative Services v. Prometheus Laboratories, Inc., and Molecular Pathology v. Myriad Genetics will need to be considered in determining whether certain diagnostic methods can be patented, since the Court denied patent protection for the use of a mathematical correlation of the presence of a well-known naturally occurring metabolite as a means of determining proper drug dosage, and found that DNA sequences isolated from humans were not patent eligible. Our subsidiary OncoCyte is developing PanC-Dx™ as a cancer diagnostic test, based on the presence of certain genetic markers for a variety of cancers. Because PanC-Dx™ combines an innovative methodology with newly discovered compositions of matter, we are hopeful that this Supreme Court decision will not preclude the availability of patent protection for OncoCyte’s new product. However, like other developers of diagnostic products, we are evaluating this new Supreme Court decisions and new guidelines issued by the USPTO for the patenting of products that test for biological substances. The USPTO has issued interim guidelines in light of the Supreme Court decisions indicating that process claims having a natural principle as a limiting step will be evaluated to determine if the claim includes additional steps that practically apply the natural principle such that the claim amounts to significantly more than the natural principle itself.

Patents Used in Our Stem Cell Business

The patents Asterias acquired from Geron and that have been licensed to Asterias by assignment of third party licenses have been issued in certain key countries and will expire at various times.

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Oligodendrocyte progenitor cells: The patent rights relevant to oligodendrocyte progenitor cells include rights licensed from the University of California and various developed patent families covering the growth of hES cells and their differentiation into neural cells. There are issued patents in the United States, Australia, Canada, China, United Kingdom, Japan, Singapore and Israel. The expiration dates of these patents range from 2023 to 2029.

Cardiomyocytes: The patent rights relevant to cardiomyocytes include various patent families covering the growth of hES cells and their differentiation into cardiomyocytes. There are issued patents in the United States, Australia, Canada, China, United Kingdom, Hong Kong, Korea, Japan, India, Singapore and Israel. The expiration dates of these patents range from 2022 to 2029.

Pancreatic islet cells: The patent rights relevant to pancreatic islet cells include various patent families covering the growth of hES cells and their differentiation into pancreatic islet cells. There are issued patents in the United States, Australia, Canada, United Kingdom, Hong Kong, Korea, Japan, China, Singapore and Israel. The expiration dates of these patents are in 2022 to 2028.

Hepatocytes: The patent rights relevant to hepatocytes include various patent families covering the growth of hES cells and their differentiation into hepatocytes. There are issued patents in the United States, Australia, Canada, United Kingdom, Korea, India, Singapore and Israel. The expiration dates of these patents are in 2021 to 2029.

Neural cells: The patent rights relevant to neural cells include various patent families covering the growth of hES cells and their differentiation into neural cells. There are issued patents in the United States, Australia, Canada, United Kingdom, Japan, China, Hong Kong, India, Korea, Singapore and Israel. The expiration dates of these patents are in 2020 to 2023.

Hematopoietic cells: The patent rights relevant to hematopoietic cells include rights licensed from certain third parties and various patent families covering the growth of hES cells and their differentiation into hematopoietic cells. There are issued patents in the United States, Australia, United Kingdom, Singapore and Israel. The expiration dates of these patents are in 2022 to 2029.

Osteoblasts: The patent rights relevant to osteoblasts include various patent families covering the growth of hES cells and their differentiation into osteoblasts. There are issued patents in the Australia, United Kingdom, India, Singapore and Israel. The expiration dates of these patents are in 2022.

Chondrocytes: The patent rights relevant to chondrocytes include various patent families covering the growth of hES cells and their differentiation into chondrocytes. There are issued patents in the United States, Australia, Canada, Korea, Singapore and Israel. The expiration dates of these patents are in 2022 to 2023.

Dendritic cells: The patent rights relevant to dendritic cells include rights licensed from third parties and various patent families covering the growth of hES cells and their differentiation into dendritic cells. There are issued patents in the United States, Australia, Europe, Canada, China, Hong Kong and Japan. The expiration dates of these patents range from 2019 to 2029.

Platform patents: The platform patent rights include various patent families covering the growth of hES cells. There are issued patents in the United States, Australia, Canada, United Kingdom, Hong Kong, China, India, Japan, Singapore and Israel. The expiration dates of these patents range from 2018 to 2030.

ViaCyte Patent Interference Proceedings

During May 2014, Asterias entered into a settlement agreement with ViaCyte, Inc. (“ViaCyte”) concerning certain litigation in the United States District Court for the Northern District of California (Civil Action No. C12-04813)

seeking the reversal of two adverse determinations by the United States Patent and Trademark Office with respect to two patent applications in U.S. Patent Interference 105,734, involving U.S. patent 7,510,876 (ViaCyte) and U.S. patent application 11/960,477 (Geron), and U.S. Patent Interference 105,827 involving U.S. patent 7,510,876 (ViaCyte) and U.S. patent application 12/543,875 (Geron), along with four Opposition Proceedings pending before the Australian Patent Office pertaining to priority rights and the validity of each party's patents relating to endodermal precursor cells. Under the terms of the settlement agreement, the parties granted to each other a royalty free, fully paid license to each other's technology relating to endoderm lineage cells including definitive endoderm and gut endoderm cells, only to the extent necessary to allow the licensee to make, use, sell, offer for sale, or import endodermal lineage cells. The Asterias patents that were licensed to ViaCyte in the settlement include US Patent Application No 11/161,633. The ViaCyte patents that were licensed to us in the settlement included US Patent Application Nos. 11/021,618, 11/093,590, 10/584,338, 11/165,305, 11/317,387, and 11/860,494.

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Patents Used in Our Plasma Volume Expander Business

We currently hold 7 issued U. S. patents with composition and methods-of-use claims covering Hextend®. The most recent U.S. patents were issued during May 2011. Some of our allowed claims in the U.S., which include the composition and methods-of-use of Hextend®, are expected to remain in force until 2015 in the case of the composition patents, and 2017-2019 in the case of the methods-of-use patents. Patents covering certain proprietary solutions have also been issued in several countries of the EU, Canada, Australia, Israel, Russia, South Africa, South Korea, Japan, China, Hong Kong, Taiwan, and Singapore, and we have filed patent applications in other foreign countries for certain products, including Hextend®. There is no assurance that any additional patents will be issued. Furthermore, the enforcement of patent rights often requires litigation against third party infringers, and such litigation can be costly to pursue.

General Risks Related to Obtaining and Enforcing Patent Protection

There is a risk that any patent applications that we file and any patents that we hold or later obtain could be challenged by third parties and be declared invalid or infringing on third party claims. A patent interference proceeding may be instituted with the 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. In addition to interference proceedings, the USPTO can re-examine issued patents at the request of a third party seeking to have the patent invalidated. After March 16, 2013 an inter partes review proceeding will allow third parties to challenge the validity of an issued patent where there is a reasonable likelihood of invalidity. This means that patents owned or licensed by us may be subject to re-examination and may be lost if the outcome of the re-examination is unfavorable to us.

Post Grant Review under the new America Invents Act now makes available opposition-like proceedings in the United States. As with the USPTO interference proceedings, Post Grant Review proceedings will be very expensive to contest and can result in significant delays in obtaining patent protection or can result in a denial of a patent application. Also, a derivation proceeding may be instituted by the USPTO or an inventor alleging that a patent or application was derived from the work of another inventor.

Oppositions to the issuance of patents may be filed under European patent law and the patent laws of certain other countries. As with the USPTO interference proceedings, 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.

The enforcement of patent rights often requires litigation against third-party infringers, and such litigation can be costly to pursue. Even if we succeed in having new patents issued or in defending any challenge to issued patents, there is no assurance that our patents will be comprehensive enough to provide us with meaningful patent protection against our competitors.

In addition to relying on patents, we rely on trade secrets, know-how, and continuing technological advancement to maintain our competitive position. We have entered into intellectual property, invention, and non-disclosure agreements with our employees, and it is our practice to enter into confidentiality agreements with our consultants. There can be no assurance, however, that these measures will prevent the unauthorized disclosure or use of our trade secrets and know-how, or that others may not independently develop similar trade secrets and know-how or obtain

access to our trade secrets, know-how, or proprietary technology.

Competition

We and our subsidiaries face substantial competition in both our blood plasma expander business and our regenerative medicine and stem cell business. That competition is likely to intensify as new products and technologies reach the market. Superior new products are likely to sell for higher prices and generate higher profit margins once acceptance by the medical community is achieved. Those companies that are successful at being the first to introduce new products and technologies to the market may gain significant economic advantages over their competitors in the establishment of a customer base and track record for the performance of their products and technologies. Such companies will also benefit from revenues from sales that could be used to strengthen their research and development, production, and marketing resources. All companies engaged in the medical products industry face the risk of obsolescence of their products and technologies as more advanced or cost-effective products and technologies are developed by their competitors. As the industry matures, companies will compete based upon the performance and cost-effectiveness of their products.

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Products for Regenerative Medicine

The stem cell industry 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 the smaller companies' potential research and development as well as 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.

We believe that some of our competitors are trying to develop hES cell-, iPS cell-, and hEPC-based technologies and products that may compete with our stem cell products based on efficacy, safety, cost, and intellectual property positions. We are aware that Ocata has obtained approval from the FDA to commence clinical trials of a hES cell product designed to treat age-related macular degeneration. If the Ocata product is proven to be safe and effective, it may reach the market ahead of Cell Cure Neuroscience's OpRegen®.

We may also face competition from companies that have filed patent applications relating to the cloning or differentiation of stem cells. Those companies include Ocata, which has had claims allowed on a patent for RPE cells. We may be required to seek licenses from these competitors in order to commercialize certain products proposed by us, and such licenses may not be granted.

Plasma Volume Expanders

Our plasma volume expander solution, Hextend®, competes with products currently used to treat or prevent hypovolemia, including albumin, other colloid solutions, and crystalloid solutions presently manufactured by established pharmaceutical companies, and with human blood products. To compete with new and existing plasma expanders, we have developed products that contain constituents that may prevent or reduce the physiological imbalances, bleeding, fluid overload, edema, poor oxygenation, and organ failure that can occur when competing products are used.

Hextend® competes with products that are commonly used in surgery and trauma care, and some, especially crystalloids, sell at low prices. The competing products are being manufactured and marketed by established pharmaceutical companies with large research facilities, technical staffs, and financial and marketing resources. B. Braun presently markets Hespan®, an artificial plasma volume expander containing 6% hetastarch in saline solution. Hospira and Teva sell a generic equivalent of Hespan®. Hospira, also markets Voluven®, a plasma volume expander containing a 6% low molecular weight hydroxyethyl starch in saline solution. Sanofi-Aventis, Baxter International, and Alpha Therapeutics sell albumin, and Hospira, Baxter International, and B. Braun sell crystalloid solutions. As a result of the introduction of generic plasma expanders and new proprietary products, competition in the plasma expander market has intensified, and wholesale prices of both hetastarch products and albumin have declined which has forced Hospira and CJ Health to make reduce the price at which they sell Hextend® in order to maintain their share of the market.

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

The FDA and foreign regulatory authorities will regulate our proposed products as drugs, biologicals, or medical devices, depending upon such factors as the use to which the product will be put, the chemical composition, and the interaction of the product with the human body. In the United States, the FDA regulates drugs and biologicals under the Federal Food, Drug and Cosmetic Act or FDCA, the Public Health Service Act, or PHSA, and 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 Asterias' 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.

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Our domestic human drug and biological products will be subject to rigorous FDA review and approval procedures. After testing in animals to evaluate the potential efficacy and safety of the product candidate, an 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 a hospital or medical center to demonstrate optimal use, safety, and efficacy of each product in humans. Each clinical study is conducted under the auspices of an independent Institutional Review Board ("IRB"). The IRB will consider, among other things, ethical factors, the safety of human subjects, and the possible liability of the institution.

Clinical trials are generally conducted in three "phases." Phase I clinical trials are conducted in a small number of healthy volunteers or volunteers with the target disease or condition to assess safety. Phase II clinical trials are conducted with groups of patients afflicted with the target disease or condition in order to determine preliminary efficacy, optimal dosages and expanded evidence of safety. In some cases, an initial trial is conducted in diseased patients to assess both preliminary efficacy and preliminary safety, in which case it is referred to as a Phase I/II trial. Phase III trials are large-scale, multi-center, comparative trials and are conducted with patients afflicted with the target disease or condition in order to provide enough data to demonstrate the efficacy and safety required by the FDA. 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 continuing process. The time and expense required to perform this clinical testing can far exceed the time and expense of the research and development initially required to create the product

No action can be taken to market any therapeutic product in the U.S. until an appropriate New Drug Application ("NDA") or Biologics License Application (BLA) has been approved by the FDA. Submission of the application is no guarantee that the FDA will find it complete and accept it for filing. If an application is accepted for filing, following the FDA's review, the FDA may grant marketing approval, request additional information or deny the application if it determines that the application does not provide an adequate basis for approval. FDA regulations also restrict the export of therapeutic products for clinical use prior to FDA 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 biologicals derived from other technologies.

The FDA offers several programs to expedite development of products that treat serious or life-threatening illnesses and that provide meaningful therapeutic benefits to patients over existing treatments. A product may be eligible for breakthrough therapy designation if it treats a serious or life-threatening disease or condition and preliminary clinical evidence indicates it may demonstrate substantial improvement over existing therapies on one or more clinically significant endpoints. Features of breakthrough therapy designation include intensive guidance from the FDA on an efficient development program, intensive involvement of FDA staff in a proactive, collaborative review process, and rolling review of marketing applications. Under its accelerated approval regulations, the FDA may approve a product based on a surrogate endpoint that is reasonably likely to predict clinical benefits or based on an effect on a clinical endpoint other than survival or irreversible morbidity. The applicant will then be required to conduct additional, post-approval confirmatory trials to verify and describe clinical benefit, and the product may have certain post-marketing restrictions as necessary to assure safe use. The FDA may withdraw approval granted under the traditional route or under an accelerated approval, if it is warranted. The FDA may also consider ways to use the accelerated approval pathway for rare or very rare diseases, and a new review designation has been created to help foster the innovation of promising new therapies with the potential to shorten the timeframe for conducting pivotal trials and speed up patient access to the approved product. There is no assurance that the FDA will grant breakthrough therapy or accelerated approval status to any of our product candidates

Certain Medical Devices

Obtaining regulatory approval of Renevia™ or a similar implantable matrix for tissue transplant or stem cell therapy in Europe will require the preparation of a design dossier containing details on the product manufacturing and production methods, analytical controls to assure that the product meets its release specification, data from analytical assay and process validations, ISO 10993 biocompatibility testing, as well as pre-clinical and clinical safety and efficacy data. Completion of the manufacturing, analytical, biocompatibility, and clinical trials represents a majority of the expenses associated with the regulatory application process in Europe. The procedures for obtaining FDA approval to sell products in the U.S. are likely to be more stringent, and the cost greater, than would be the case in an application for approval in Europe.

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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. For example, our HyStem® hydrogel products such as Renevia™ may be used to administer one or more hES cell-based therapy products. When regulated independently, biologics and devices each have their own regulatory requirements. However, 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. There is an Office of Combination Products at the FDA that coordinates the review of such products and determines the primary mode of action of a combination product. The definition and regulatory requirements for combination products may differ significantly among other countries in which we may seek approval of our product candidates.

Post-Approval Matters

Even after initial FDA or foreign regulatory agency 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. Use of a product during testing and after marketing could reveal side effects that could delay, impede, or prevent marketing approval, result in a regulatory agency-ordered product recall, or in regulatory agency-imposed limitations on permissible uses or in withdrawal of approval. For example, if the FDA or foreign regulatory agency becomes aware of new safety information after approval of a product, it may require us to conduct further clinical trials to assess a known or potential serious risk and to assure that the benefit of the product outweigh the risks. If we are required to conduct such a post-approval study, periodic status reports must be submitted to the FDA or foreign regulatory agency. Failure to conduct such post-approval studies in a timely manner may result in substantial civil or criminal penalties. Data resulting from these clinical trials may result in expansions or restrictions to the labeled indications for which a product has already been approved.

FDA Regulation of Manufacturing

The FDA regulates the manufacturing process of pharmaceutical products, human tissue and cell products, and medical devices, requiring that they be produced in compliance with cGMP. See “Manufacturing.” The FDA regulates and inspects equipment, facilities, laboratories, processes used in the manufacturing and testing of products prior to providing approval to market products. If after receiving approval from the FDA, a material change is made to manufacturing equipment or to the location or manufacturing process, additional regulatory review may be required. The FDA also conducts regular, periodic visits to re-inspect the equipment, facilities, laboratories and processes of manufacturers following an initial approval. If, as a result of those inspections, the FDA determines that that equipment, facilities, laboratories or processes do not comply with applicable FDA regulations and conditions of product approval, the FDA may seek civil, criminal or administrative sanctions and/or remedies against the manufacturer, including suspension of manufacturing operations. Issues pertaining to manufacturing equipment, facilities or processes may also delay the approval of new products undergoing FDA review.

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 an NDA, a BLA, or a pre-market notification or pre-market approval application for a medical device (“PMA”), or an amendment to an NDA, a BLA or a pre-market notification or PMA, and must be consistent with the FDA approved labeling and dosage information for that product.

Foreign Regulation

Sales of pharmaceutical products outside the U.S. 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.

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Federal Funding of Research

The United States government and its agencies have until recently refused to fund research which involves the use of human embryonic tissue. President Bush issued Executive Orders on August 9, 2001 and June 20, 2007 that permitted federal funding of research on hES cells using only the limited number of hES cell lines that had already been created as of August 9, 2001. On March 9, 2009, President Obama issued an Executive Order rescinding President Bush's August 9, 2001 and June 20, 2007 Executive Orders. President Obama's Executive Order also instructed the NIH to review existing guidance on human stem cell research and to issue new guidance on the use of hES cells in federally funded research, consistent with President's new Executive Order and existing law. The NIH has adopted new guidelines that went into effect July 7, 2009. The central focus of the new 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. Those 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 addition to President Obama's Executive Order, a bipartisan bill has been introduced in the U.S. Senate that would allow Federal funding of hES research. The Senate bill is identical to one that was previously approved by both Houses of Congress but vetoed by President Bush. The Senate Bill provides that hES cells will be eligible for use in research conducted or supported by federal funding if the cells meet each of the following guidelines: (1) the stem cells were derived from human embryos that have been donated from IVF clinics, were created for the purposes of fertility treatment, and were in excess of the clinical need of the individuals seeking such treatment, (2) prior to the consideration of embryo donation and through consultation with the individuals seeking fertility treatment, it was determined that the embryos would never be implanted in a woman and would otherwise be discarded, and (3) the individuals seeking fertility treatment donated the embryos with written informed consent and without receiving any financial or other inducements to make the donation. The Senate Bill authorizes the NIH to adopt further guidelines consistent with the legislation.

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. Advance notice, but not approval by the SCRO Committee, is required in the case of in vitro research that does not derive new stem cell lines. Research that derives new stem cell lines or that involves fertilized human oocytes or blastocysts, or that involves clinical trials or the introduction of stem cells into humans, or that involves introducing stem cells into animals, requires advanced approval by the SCRO Committee. Clinical trials may also entail approvals from IRB at the medical center at which the study is conducted, and animal studies may require approval by an Institutional Animal Care and Use Committee.

All hES cell lines that will be used in our research must be acceptably derived. To be acceptably derived, the pluripotent stem cell line must have either:

- Been listed on the National Institutes of Health Human Embryonic Stem Cell Registry; or

- Been deposited in the United Kingdom Stem Cell Bank; or

- Been derived by, or approved for use by, a licensee of the United Kingdom Human Fertilisation and Embryology Authority; or

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Been derived in accordance with the Canadian Institutes of Health Research Guidelines for Human Stem Cell Research under an application approved by the National Stem Cell Oversight Committee; or

· Been approved by CIRM in accordance with California Code of Regulation Title 17, Section 100081; or

· Been derived under the following conditions:

(a) Donors of gametes, embryos, somatic cells, or human tissue gave voluntary and informed consent,

(b) Donors of gametes, embryos, somatic cells, or human tissue did not receive valuable consideration. This provision does not prohibit reimbursement for permissible expenses as determined by an IRB,

(c) Donation of gametes, embryos, somatic cells, or human tissue was overseen by an IRB (or, in the case of foreign sources, an IRB equivalent), and

(d) Individuals who consented to donate stored gametes, embryos, somatic cells, or human tissue were not reimbursed for the cost of storage prior to the decision to donate.

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Other hES lines may be deemed acceptably derived if they were derived in accordance with (a), (b), and (d) above and the hES line was derived prior to the publication of the National Academy of Sciences guidelines on April 26, 2005 and a SCRO Committee has determined that the investigator has provided sufficient scientific rationale for the need for use of the line, which should include establishing that the proposed research cannot reasonably be carried out with covered lines that did have IRB approval.

California regulations also require that certain records be maintained with respect to stem cell research and the materials used, including:

· A registry of all human stem cell research conducted, and the source(s) of funding for this research; and

· A registry of human pluripotent stem cell lines derived or imported, to include, but not necessarily limited to:

(a) The methods utilized to characterize and screen the materials for safety;

(b) The conditions under which the materials have been maintained and stored;

(c) A record of every gamete donation, somatic cell donation, embryo donation, or product of somatic cell nuclear transfer that has been donated, created, or used;

(d) A record of each review and approval conducted by the SCRO Committee.

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 million 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.

Medicare, Medicaid, and Similar Reimbursement Programs

Sales of our products will depend, in part, on the extent to which the costs of our products will be covered by third-party payors, such as government health programs, commercial insurance and managed healthcare organizations. These third-party payors are increasingly challenging the prices charged for medical products and services. Additionally, the containment of healthcare costs has become a priority of federal and state governments and the prices of drugs have been a focus in this effort. The U.S. government, state legislatures and foreign governments have shown significant interest in implementing cost-containment programs, including price controls, restrictions on reimbursement and requirements for substitution of generic products. Adoption of price controls and cost-containment measures, and adoption of more restrictive policies in jurisdictions with existing controls and measures, could further limit our net revenue and results. If these third-party payors do not consider our products to be cost-effective compared to other therapies, they may not cover our products after approved as a benefit under their plans or, if they do, the level of payment may not be sufficient to allow us to sell our products on a profitable basis.

The Patient Protection and Affordable Care Act, as amended by the Health Care and Education Affordability Reconciliation Act of 2010, collectively referred to as the ACA, enacted in March 2010, is expected to have a significant impact on the health care industry. ACA is expected to expand coverage for the uninsured while at the same time containing overall healthcare costs. With regard to pharmaceutical products, among other things, ACA is expected to expand and increase industry rebates for drugs covered under Medicaid programs and make changes to the

coverage requirements under the Medicare Part D program. We cannot predict the impact of ACA on pharmaceutical companies, as many of the ACA reforms require the promulgation of detailed regulations implementing the statutory provisions which has not yet occurred. In addition, although the United States Supreme Court upheld the constitutionality of most of the ACA, some states have indicated that they intend to not implement certain sections of the ACA, and some members of the U.S. Congress are still working to repeal parts of the ACA. These challenges add to the uncertainty of the legislative changes enacted as part of ACA.

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In addition, in some non-U.S. jurisdictions, the proposed pricing for a drug must be approved before it may be lawfully marketed. The requirements governing drug pricing vary widely from country to country. For example, the UE provides options for its member states to restrict the range of medicinal products for which their national health insurance systems provide reimbursement and to control the prices of medicinal products for human use. A member state may approve a specific price for the medicinal product or it may instead adopt a system of direct or indirect controls on the profitability of the company placing the medicinal product on the market. There can be no assurance that any country that has price controls or reimbursement limitations for pharmaceutical products will allow favorable reimbursement and pricing arrangements for any of our products. Historically, products launched in the EU do not follow price structures of the United States and generally tend to be significantly lower.

Employees

As of December 31, 2014, we employed 117 persons on a full-time basis and three persons on a part-time basis. Fifty-one full-time employees and two part-time employees hold Ph.D. degrees in one or more fields of science. None of our employees are covered by a collective bargaining agreement.

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 incurred operating losses since inception and we do not know if we will attain profitability

Our total comprehensive net losses for the fiscal years ended December 31, 2014, 2013, and 2012 were $36,288,724, $43,760,366, and $21,362,524, respectively, and we had an accumulated deficit of $182,190,207, $145,778,547, and $101,895,712, as of December 31, 2014, 2013, and 2012, respectively. We primarily finance our operations through the sale of equity securities, licensing fees, royalties on product sales by our licensees, research grants, and subscription fees and advertising revenue from database products. Ultimately, our ability to generate sufficient operating revenue to earn a profit depends upon our success in developing and marketing or licensing our products and technology.

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

- We are attempting to develop new medical products and technologies.

- Many of our experimental products and technologies have not been applied in human medicine and have only been used in laboratory studies in vitro or in animals. These new products and technologies might not prove to be safe and efficacious in the human medical applications for which they were developed.

- The experimentation we are doing is costly, time consuming, and uncertain as to its results. We incurred research and development expenses amounting to $37,532,624, $26,609,423, and $18,116,688 during the fiscal years ended December 31, 2014, 2013, and 2012, respectively, excluding $17,458,766 charged as in process research and development expenses during 2013 in accordance with ASC 805-50 on account of Asterias' acquisition of certain assets from Geron. See Notes 2 and 14 to the Consolidated Financial Statements.

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. Future clinical trials of new therapeutic products, particularly those products that are regulated as drugs or biological, will be very expensive and will take years to complete. We may not have the financial resources to fund clinical trials on our own and we may have to enter into licensing or collaborative arrangements with larger, well-capitalized pharmaceutical companies in order to bear the cost. Any such arrangements may be dilutive to our ownership or economic interest in the products we develop, and we might have to accept a royalty payment on the sale of the product rather than receiving the gross revenues from product sales.

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Asterias' operations will result in an increase in our operating expenses and losses on a consolidated basis

- Asterias will use the stem cell assets that it has acquired from Geron for the research and development of products for regenerative medicine. Asterias' research and development efforts will involve substantial expense, including but not limited to hiring additional research and management personnel, and possibly the rent of additional research or manufacturing space that will add to our losses on a consolidated basis for the near future.

- Asterias has become a public company. As a public company, Asterias will incur costs associated with audits of its financial statements, filing annual, quarterly, and other periodic reports with the Securities and Exchange Commission (the "SEC"), holding annual shareholder meetings, listing its common shares for trading, and public relations and investor relations. These costs will be in addition to those incurred by BioTime for similar purposes.

- As a developer of therapeutic products derived from hES or iPS cells, Asterias will face substantially the same kind of risks that affect our business, as well as the risks related to our industry generally.

Our success depends in part on the uncertain growth of the stem cell industry, which is still in its infancy

- The success of our business of selling products for use in stem cell research depends on the growth of stem cell research, without which there may be no market or only a very small market for our products and technology. The likelihood that stem cell research will grow depends upon the successful development of stem cell products that can be used to treat disease or injuries in people or that can be used to facilitate the development of other therapeutic products. The growth in stem cell research also depends upon the availability of funding through private investment and government research grants. In the event of a failed trial of a proposed stem cell product by us or by another company, for reasons of efficacy or safety, it could be increasingly difficult to secure funding or have future INDs cleared by the FDA.

- There can be no assurance that any safe and efficacious human medical applications will be developed using stem cells or related technology.

- Government-imposed bans, restrictions and religious, moral, and ethical concerns with respect to use of embryos or hES cells in research and development could have a material adverse effect on the growth of the stem cell industry, even if research proves that useful medical products can be developed using hES cells.

We are providing funding to LifeMap Sciences for the development of new software products

Our subsidiary LifeMap Sciences has formed a new subsidiary, LifeMap Solutions, Inc., to develop new personal mobile health software products intended to connect users with their complex personal health information and other big data. We have agreed to invest at least $5,000,000 in LifeMap Sciences to provide funding for the project, and unless additional financing can be obtained from third parties, we may need to increase our investment significantly during the next few calendar years to fund the development and commercialization of the planned products.

The field of mobile health products, including both hardware and software products, is new, and there is no certainty that LifeMap Solutions will be successful in developing its planned new products or that it will be successful in commercializing any products that it does develop.

The field of mobile health products is subject to increasing competition, including from large computer and internet technology companies that have much greater financial and marketing resources than we and LifeMap Solutions have.

The FDA has also taken an interest in the field of on-line or mobile health products and there is a risk that the FDA could determine that LifeMap Solutions' products should be regulated as medical devices under existing laws and

regulations, or the FDA could promulgate new regulations that might subject LifeMap Solutions' products to FDA clinical trial and approval procedures, as a prerequisite for permission to use and market the new mobile health products in the United States. Foreign regulatory authorities could make similar determinations or could adopt their own rules regulating the use and marketing of LifeMap Solution's products.

Sales of our products to date have not been sufficient to generate an amount of revenue sufficient to cover our operating expenses

- The revenues that we have received from sales of our products have not been sufficient to pay our operating expenses. This means that we need to successfully develop and market or license additional products and earn additional revenues in sufficient amounts to meet our operating expenses.

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- We are also beginning to bring our first stem cell research products to the market, but there is no assurance that we will succeed in generating significant revenues from the sale of those products.

Sales of the products we may develop will be adversely impacted by the availability of competing products

- Sales of Hextend® have already been adversely impacted by the availability of other products that are commonly used in surgery and trauma care and sell at low prices.

- In order to compete with other products, particularly those that sell at lower prices, our products will have to provide medically significant advantages.

- Physicians and hospitals may be reluctant to try a new product due to the high degree of risk associated with the application of new technologies and products in the field of human medicine.

- Competing products are being manufactured and marketed by established pharmaceutical companies. For example, B. Braun presently markets Hespan®, an artificial plasma volume expander, and Hospira and Teva sell a generic equivalent of Hespan®. Hospira also markets Voluven®, a plasma volume expander containing a 6% low molecular weight hydroxyethyl starch in saline solution.

- Competing products for the diagnosis and treatment of cancer are being manufactured and marketed by established pharmaceutical companies, and more cancer diagnostics and therapeutics are being developed by those companies and by other smaller biotechnology companies. Other companies, both large and small, are also working on the development of stem cell based therapies for the same diseases and disorders that are the focus of the research and development programs of our subsidiaries.

- There also is a risk that our competitors may succeed at developing safer or more effective products that could render our products and technologies obsolete or noncompetitive.

Sales of Hextend® have been adversely affected by safety and use labeling changes required by the FDA

Sales of Hextend® have been adversely affected by certain safety labeling changes required by the FDA for the entire class of hydroxyethyl starch products, including Hextend®. The labeling changes were approved by the FDA in November 2013 and include a boxed warning stating that the use of hydroxyethyl starch products, including Hextend®, increases the risk of mortality and renal injury requiring renal replacement therapy in critically ill adult patients, including patients with sepsis, and that Hextend® should not be used in critically ill adult patients, including patients with sepsis. New warning and precaution information is also required along with new information about contraindications, adverse reactions, and information about certain recent studies. The new warning and precautions include statements to the effect that the use of Hextend® should be avoided in patients with pre-existing renal dysfunction, and the coagulation status of patients undergoing open heart surgery in association with cardiopulmonary bypass should be monitored as excess bleeding has been reported with hydroxyethyl starch solutions in that population and use of Hextend® should be discontinued at the first sign of coagulopathy. The liver function of patients receiving hydroxyethyl starch products, including Hextend® should also be monitored. The approved revised label may adversely affect Hextend® sales since some users of plasma volume expanders might elect to abandon the use of all hydroxyethyl starch products, including Hextend®.

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

- We plan to continue to incur substantial research and product development expenses, largely through our subsidiaries, and we and our subsidiaries 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.

- It is likely that additional sales of equity or debt securities will be required to meet our short-term capital needs, unless we receive substantial revenues from the sale of our new products or we are successful at licensing or sublicensing the technology that we develop or acquire from others and we receive substantial licensing fees and royalties.

- Sales of additional equity securities by us or our subsidiaries could result in the dilution of the interests of present shareholders.

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The amount and pace of research and development work that we and our subsidiaries can do or sponsor, and our ability to commence and complete clinical trials required to obtain regulatory approval to market our therapeutic and medical device products, depends upon the amount of money we have

- At December 31, 2014, we had $29,486,909 of cash and cash equivalents on hand, of which $4,447,521 was held by Asterias and other subsidiaries. Although Asterias raised an additional $5,500,000 of equity capital during February 2015, there can be no assurance that we or our subsidiaries will be able to raise additional funds on favorable terms or at all, or that any funds raised will be sufficient to permit us or our subsidiaries to develop and market our products and technology. Unless we and our subsidiaries 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 may have to postpone or limit the pace of our research and development work and planned clinical trials of our product candidates unless our cash resources increase through a growth in revenues or additional equity investment or borrowing.

The condition of the cells, cell lines and other biological materials that Asterias acquired from Geron could impact the time and cost of commencing Asterias' research and product development programs

The cells, cell lines and other biological materials that Asterias acquired are being stored under cryopreservation protocols intended to preserve their functionality. Asterias has successfully completed the verification of the viability of three lots of AST-OPC1 cells that it intends to use in clinical trials. However, the functional condition of the other materials cannot be certified until they are tested in an appropriate laboratory setting by qualified scientific personnel using validated equipment. Asterias intends to perform that testing on the cells that it intends to use in its research and development programs as the need arises.

To the extent that cells are not sufficiently functional for Asterias' purposes, Asterias would need to incur the time and expense of regenerating cell lines from cell banks, or regenerating cell banks from cell stocks, which could delay and increase the cost of its research and development work using those cells.

Any cell-based 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 and our subsidiaries 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 or our subsidiaries that conduct clinical trials of product candidates face the risk of incurring liabilities to patients if they incur any injuries as a result of their participation in the clinical trials. We or our subsidiaries will also be obligated to obtain information and prepare reports about the health of the clinical trial patients. In addition, Asterias has assumed Geron's obligations to obtain information and prepare reports about the health of patients, and has 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 our clinical trials or the Geron clinical trials, but if any claims are made and if liability can be established, the amount of any liability that we or our subsidiaries may incur, depending upon the nature and extent of any provable injuries, could exceed any insurance coverage that we or our subsidiaries may obtain, and the amount of the liability could be material to our financial condition.

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

BioTime stem cell research programs, and to a lesser extent, the programs of BioTime's subsidiaries, are directed primarily by our Chief Executive Officer, Dr. Michael West. BioTime's subsidiaries are directed by their respective management teams. The loss of the services of Dr. West or members of senior management of our subsidiaries could have a material adverse effect on us.

If we make strategic acquisitions, we will incur a variety of costs and might never realize the anticipated benefits

We have made several strategic acquisitions during the past few years, including ESI in 2010, Glycosan BioSystems, Inc. and Cell Targeting, Inc. in 2011, and XenneX, Inc. in 2012. In addition, Asterias acquired stem cell related assets from Geron during 2013. If appropriate opportunities become available, we might attempt to acquire approved products, additional drug candidates, technologies or businesses that we believe are a strategic fit with our business. If we pursue any transaction of that sort, the process of negotiating the acquisition and integrating an acquired product, drug candidate, technology or business might result in operating difficulties and expenditures and might require significant management attention that would otherwise be available for ongoing development of our business, whether or not any such transaction is ever consummated. Moreover, we might never realize the anticipated benefits of any acquisition. Future acquisitions could result in potentially dilutive issuances of equity securities, the incurrence of debt, contingent liabilities, or impairment expenses related to goodwill, and impairment or amortization expenses related to other intangible assets, which could harm our financial condition.

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 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 the 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 our 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.

Operating our business through subsidiaries, some of which are located in foreign countries, also adds to the complexity of our internal control over financial reporting and adds to the risk of a system failure, an undetected improper use or expenditure of funds or other resources by a subsidiary, or a failure to properly report a transaction or financial results of a subsidiary. We allocate certain expenses among BioTime itself and one or more of our subsidiaries, which creates a risk that the allocations we make may not accurately reflect the benefit of an expenditure or use of financial or other resources by BioTime as the parent company and the subsidiaries among which the allocations are made. An inaccurate allocation may impact our consolidated financial results, particularly in the case of subsidiaries that we do not wholly own since our financial statements include adjustments to reflect the minority ownership interests in our subsidiaries held by others.

Our business and operations could suffer in the event of computer 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.

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 biotechnology and pharmaceutical 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 is the case with larger companies possessing substantial income and available capital.

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If we do not receive regulatory approvals we will not be permitted to sell our therapeutic and medical device products

The therapeutic and medical device products that we and our subsidiaries develop cannot be sold until the FDA and 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 pharmaceutical or 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 product may be encountered as a result of changes in regulatory agency policy.

- Because the therapeutic products we are developing with hES and iPS 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 biologicals derived from other technologies.

- A product that is approved may be subject to restrictions on use.

- The FDA can recall or withdraw approval of a product if problems arise.

- 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 product candidates

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 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 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 product candidates and possibly resulting in the FDA or other regulatory authorities denying approval of our 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;

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- 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 supplies.

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

Government-imposed bans or restrictions on the use of embryos or hES cells in research and development in the United States and abroad could generally constrain stem cell research, thereby limiting the market and demand for our products. During March 2009, President 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. The 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.

California law requires that stem cell research be conducted under the oversight of a SCRO. 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. A SCRO could prohibit or impose restrictions on the research that 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 our products.

If we are unable to obtain and enforce patents and to protect our trade secrets, others could use our technology to compete with us, which could limit opportunities for us to generate revenues by licensing our technology and selling products

- Our success will depend in part on our ability to obtain and enforce patents and maintain trade secrets in the United States and in other countries. If we are unsuccessful at obtaining and enforcing patents, our competitors could use our technology and create products that compete with our products, without paying license fees or royalties to us.

- The preparation, filing, and prosecution of patent applications can be costly and time consuming. Our limited financial resources may not permit us to pursue patent protection of all of our technology and products throughout the world.

- Even if we are able to obtain issued patents covering our technology or products, we may have to incur substantial legal fees and other expenses to enforce our patent rights in order to protect our technology and products from infringing uses. We may not have the financial resources to finance the litigation required to preserve our patent and trade secret rights.

There is no certainty that our pending or future patent applications will result in the issuance of patents

We have filed patent applications for technology that we have developed, and we have obtained licenses for a number of patent applications covering technology developed by others, that we believe will be useful in producing new products, and which we believe may be of commercial interest to other companies that may be willing to sublicense the technology for fees or royalty payments. In the future, we may also file additional new patent applications seeking patent protection for new technology or products that we develop ourselves or jointly with others. However, there is no assurance that any of our licensed patent applications, or any patent applications that we have filed or that we may file in the future covering our own technology, either in the United States or abroad, will result in the issuance of patents.

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In Europe, the European Patent Convention prohibits the granting of European patents for inventions that concern "uses of human embryos for industrial or commercial purposes." The European Patent Office is presently interpreting this prohibition broadly, and is applying it to reject patent claims that pertain to human embryonic stem cells. However, this broad interpretation is being challenged through the European Patent Office appeals system. As a result, we do not yet know whether or to what extent we will be able to obtain patent protection for our human embryonic stem cell technologies in Europe.

The Supreme Court decisions in Mayo Collaborative Services v. Prometheus Laboratories, Inc. and Association for Molecular Pathology v. Myriad Genetics will need to be considered in determining whether certain diagnostic methods and reagents can be patented, since the Court denied patent protection for the use of a mathematical correlation of the presence of a well-known naturally occurring metabolite as a means of determining proper drug dosage, and found that DNA sequences isolated from humans were not patent eligible. Our subsidiary OncoCyte is developing PanC-Dx™ as a cancer diagnostic test, based on the presence of certain genetic markers for a variety of cancers. Because PanC-Dx™ combines an innovative methodology with newly discovered compositions of matter, we are hopeful that this Supreme Court decision will not preclude the availability of patent protection for OncoCyte's new product. However, like other developers of diagnostic products, we are evaluating this new Supreme Court decision and new guidelines issued by the USPTO for the patenting of products that test for biological substances.

The process of applying for and obtaining patents can be expensive and slow

- The preparation and filing of patent applications, and the maintenance of patents that are issued, may require substantial time and money.

- A patent interference proceeding may be instituted with the USPTO for patents or applications filed before March 16, 2013 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. At the completion of the interference proceeding, the USPTO may 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.

- A derivation proceeding may be instituted by the USPTO or an inventor alleging that a patent or application was derived from the work of another inventor.

- Post Grant Review under the new America Invents Act will make available after March 16, 2013 opposition-like proceedings in the United States. As with the USPTO interference proceedings, Post Grant Review proceedings will be very expensive to contest and can result in significant delays in obtaining patent protection or can result in a denial of a patent application.

- Oppositions to the issuance of patents may be filed under European patent law and the patent laws of certain other countries. As with the USPTO interference proceedings, 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

Our patents may not protect our products from competition

We or our subsidiaries have patents in the United States and several foreign countries and have filed patent applications in the United States and abroad for our plasma volume expander, stem cell products, HyStem® and other hydrogels, certain genes related to the development of cancer, and other technologies.

- We might not be able to obtain any additional patents, and any patents that we do obtain might not be comprehensive enough to provide us with meaningful patent protection.

- There will always be a risk that our competitors might be able to successfully challenge the validity or enforceability of any patent issued to us.

- In addition to interference proceedings, the USPTO can re-examine issued patents at the request of a third party seeking to have the patent invalidated. This means that patents owned or licensed by us may be subject to re-examination and may be lost if the outcome of the re-examination is unfavorable to us. As of September 16, 2012 our patents may be subject to inter partes review (replacing the inter partes reexamination proceeding), a proceeding in which a third party can challenge the validity of one of our patents.

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We may be subject to patent infringement claims that could be costly to defend, which may limit our ability to use disputed technologies, and which could prevent us from pursuing research and development or commercialization of some of our products, require us to pay licensing fees to have freedom to operate, and/or result in monetary damages or other liability for us

The success of our business depends significantly on our ability to operate without infringing patents and other proprietary rights of others. If the technology that we use infringes a patent held by others, we could be sued for monetary damages by the patent holder or its licensee, or we could be prevented from continuing research, development, and commercialization of products that rely on that technology, unless we are able to obtain a license to use the patent. The cost and availability of a license to a patent cannot be predicted, and the likelihood of obtaining a license at an acceptable cost would be lower if the patent holder or any of its licensees is using the patent to develop or market a product with which our product would compete. If we could not obtain a necessary license, we would need to develop or obtain rights to alternative technologies, which could prove costly and could cause delays in product development, or we could be forced to discontinue the development or marketing of any products that were developed using the technology covered by the patent.

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 depends on several critical technologies that are based in part on technology licensed from third parties. 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 any capital that we might then need, 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 our products may be limited by health insurance coverage and government regulation

Success in selling our pharmaceutical and cell-based products and medical devices 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. Presently, most health insurance plans and HMOs will pay for Hextend® when it is used in a surgical procedure that is covered by the plan. However, until we actually introduce a new product into the medical marketplace, 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, and new proposals are likely to be made in the future.

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The implementation of the ACA in the United States may adversely affect our business.

As a result of the March 2010 adoption of the ACA in the United States, substantial changes are being made to the current system for paying for healthcare in the United States, including programs to extend medical benefits to millions of individuals who currently lack insurance coverage. The changes contemplated by the ACA are subject to rule-making and implementation timelines that extend for several years, as well as initiatives in Congress to amend or repeal the law, and this uncertainty limits our ability to forecast changes that may occur in the future. However, implementation of the ACA has already begun with respect to certain significant cost-saving measures, including changes to several government healthcare programs that may cover the cost of our future products, including Medicaid, Medicare Parts B and D, and these efforts could have a materially adverse impact on our future financial prospects and performance. For example, with respect to Medicaid, in order for a manufacturer's products to be reimbursed by federal funding under Medicaid, the manufacturer must enter into a Medicaid rebate agreement with the Secretary of the United States Department of Health and Human Services, and must pay certain rebates to the states based on utilization data provided by each state to the manufacturer and to CMS, and based on pricing data provided by the manufacturer to the federal government. The states share this savings with the federal government, and sometimes implement their own additional supplemental rebate programs. Under the Medicaid drug rebate program, the rebate amount for most branded drug products was previously equal to a minimum of 15.1% of the Average Manufacturer Price, or AMP, or the AMP less Best Price, whichever is greater. Effective January 1, 2010, the ACA generally increases the size of the Medicaid rebates paid by manufacturers for single source and innovator multiple source (brand name) drug product from a minimum of 15.1% to a minimum of 23.1% of the AMP, subject to certain exceptions, for example, for certain clotting factors, the increase is limited to a minimum of 17.1% of the AMP. For non-innovator multiple source (generic) products, the rebate percentage is increased from a minimum of 11.0% to a minimum of 13.0% of AMP. In 2010, the ACA also newly extended this rebate obligation to prescription drugs covered by Medicaid managed care organizations. These increases in required rebates may adversely affect our future financial prospects and performance. The ACA also creates new rebate obligations for products under Medicare Part D, a partial, voluntary prescription drug benefit created by the United States federal government primarily for persons 65 years old and over. The Part D drug program is administered through private insurers that contract with CMS. Beginning in 2011, the healthcare reform law generally requires that in order for a drug manufacturer's products to be reimbursed under Medicare Part D, the manufacturer must enter into a Medicare Coverage Gap Discount Program agreement with the Secretary of the United States Department of Health and Human Services, and reimburse each Medicare Part D plan sponsor an amount equal to 50% savings for the manufacturer's brand name drugs and biologics which the Part D plan sponsor has provided to its Medicare Part D beneficiaries who are in the "donut hole" (or a gap in Medicare Part D coverage for beneficiaries who have expended certain amounts for drugs). The Part D plan sponsor is responsible for calculating and providing the discount directly to its beneficiaries and for reporting these amounts paid to CMS's contractor, which notifies drug manufacturers of the rebate amounts it must pay to each Part D plan sponsor. The rebate requirement could adversely affect our future financial performance, particularly if contracts with Part D plans cannot be favorably renegotiated or the Part D plan sponsors fail to accurately calculate payments due in a manner that overstates our rebate obligation. The ACA also introduced a biosimilar pathway that will permit companies to obtain FDA approval of generic versions of existing biologics based upon reduced documentation and data requirements deemed sufficient to demonstrate safety and efficacy than are required for the pioneer biologics. The new law provides that a biosimilar application may be submitted as soon as four years after the reference product is first licensed, and that the FDA may not make approval of an application effective until 12 years after the reference product was first licensed. With the likely introduction of biosimilars in the United States, we expect in the future to face greater competition from biosimilar products, including a possible increase in patent challenges. The FDA has reported meeting with sponsors who are interested in developing biosimilar products, and is developing regulations to implement the abbreviated regulatory review pathway. Regarding access to our products, the ACA established and provided significant funding for a Patient-Centered Outcomes Research Institute to coordinate and fund Comparative Effectiveness Research, or CER. While the stated intent of CER is to develop information to guide providers to the most efficacious therapies, outcomes of CER could influence the reimbursement or coverage for therapies that are determined to be less cost-effective than others. Should any of our products be

determined to be less cost effective than alternative therapies, the levels of reimbursement for these products, or the willingness to reimburse at all, could be impacted, which could materially impact our future financial prospects and results.

Risks Related to our Dependence on Third Parties

Asterias could lose its CIRM grant if Asterias fails to meet the clinical trial milestones that are a condition to CIRM's obligation to provide funding

Asterias is depending upon its grant from CIRM as a source of financing for the costs of conducting its Phase I/IIa clinical trial and process development of AST-OPC1. Under the terms of the CIRM grant, Asterias must meet certain efficacy and progress milestones pertaining to the clinical trial. If Asterias fails to meet any of the milestones within the specified time frame, CIRM may discontinue providing grant funds to Asterias, which could force Asterias to postpone, delay, or discontinue the clinical trial and development work for the product.

If we fail to enter into and maintain successful strategic alliances for our therapeutic product candidates, we may have to reduce or delay our product development or increase our expenditures

An important element of our 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 we fail to create and maintain suitable alliances, we may have to limit the size or scope of, or delay, one or more of our product development or research programs, or we will have to increase our expenditures and will 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.

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We may become dependent on possible future collaborations to develop and commercialize many of our product candidates and to provide the 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 and product marketing agreements to develop and commercialize our products. The expected 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 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, 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 such development and commercialization on our own.

We have very limited experience in marketing, selling or distributing our products, and we may need to rely on marketing partners or contract sales companies

Even if we are able to develop our products and obtain necessary regulatory approvals, we have very limited experience or capabilities in marketing, selling or distributing our products. We rely entirely on Hospira and CJ Health for the sale of Hextend®. We currently have only limited sales, marketing and distribution resources for selling our stem cell research products, and no marketing or distribution resources for selling any of the medical devices or therapeutic products that we are developing. Accordingly, we will be dependent on our ability to build our own marketing and distribution capability for our new products, which would require the investment of significant financial and management resources, or we will need to find collaborative marketing partners or sales representatives, or wholesale distributors for the commercial sale of our products.

If we market products through arrangements with third parties, we may pay sales commissions to sales representatives or we may sell or consign products to distributors at wholesale prices. As a result, our gross profit from product sales may be lower than it would be if we were to sell our products directly to end users at retail prices through our own sales force. There can be no assurance we will able to negotiate distribution or sales agreements with third parties on favorable terms to justify our investment in our products or achieve sufficient revenues to support our operations.

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

We will need to rely on third parties, such as 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 product candidates. If we outsource clinical trial 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 our 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 product candidates.

Risks Related to the Asset Contribution Agreement With Geron

We could be liable to indemnify Geron from certain liabilities

Under the Asset Contribution Agreement through which Asterias acquired Geron's stem cell assets (the “Asset Contribution Agreement”), we and Asterias have agreed to indemnify Geron from and against certain liabilities relating to (a) the distribution of shares of Asterias Series A common stock to Geron stockholders, (b) Asterias’ distribution of certain BioTime warrants to the holders of Asterias Series A common stock, and (c) any distribution of securities by Asterias to the holders of the Asterias Series A common stock within one year following Asterias’ acquisition of Geron’s stem cell assets. That indemnification obligation will last through the fifth anniversary of the earliest to occur of the date on which all of the BioTime warrants have either expired, or been exercised, cancelled or sold.

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We and Asterias have also agreed to indemnify Geron, from and against certain expenses, losses, and liabilities arising from, among other things, breaches of our or Asterias' representations, warranties and covenants under the Asset Contribution Agreement. The maximum damages that may be recovered by either party for a loss under this indemnification related to representations, warranties and covenants, with certain exceptions, is limited to $2,000,000.

Asterias' operations may divert our management's attention away from ongoing operations and could adversely affect ongoing operations and business relationships

Now that Asterias has acquired Geron's stem cell assets and is conducting its own research and development programs, our management will be required to provide more management attention to Asterias. The diversion of our management's attention away from our other operations could adversely affect our operations and business relationships that do not relate to Asterias.

Risks Pertaining to Our Common Shares

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

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

Because we are engaged in the development of pharmaceutical and stem cell research products, the price of our common shares and warrants may rise and fall rapidly

- The market price of our common shares, like that of the shares of many biotechnology companies, has been highly volatile.

- The price of our common shares may rise rapidly in response to certain events, such as the commencement of clinical trials of an experimental new drug, even though the outcome of those trials and the likelihood of ultimate FDA approval remain uncertain.

- Similarly, prices of our common shares may fall rapidly in response to certain events such as unfavorable results of clinical trials or a delay or failure to obtain FDA approval.

- The failure of our earnings to meet analysts' expectations could result in a significant rapid decline in the market price of our common shares.

- Changes in the price of our common shares will affect the price at which or warrants may trade.

Current economic and stock market conditions may adversely affect the price of our common shares and warrants

The stock market has 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 general economic and political conditions, may adversely affect the market price of our common shares and warrants.

Because we do not pay dividends, our common shares may not be a suitable investment for anyone who needs to earn dividend income

We do not pay cash dividends on our common shares. For the foreseeable future, we anticipate that any earnings generated in our business will be used to finance the growth of our business and, except for semi-annual dividends on our Series A Convertible Preferred Stock, will not be paid out as dividends to our shareholders. This means that our common shares may not be a suitable investment for anyone who needs to earn income from their investments.

Securities analysts may not initiate coverage or continue to cover our common shares and this may have a negative impact on the market price of our common shares and warrants

The trading market for our common shares and warrants will depend, in part, on the research and reports that securities analysts publish about our business and our common shares. We do not have any control over these analysts. There is no guarantee that securities analysts will cover our common shares. If securities analysts do not cover our common shares, the lack of research coverage may adversely affect the market price of those shares and our warrants. If securities analysts do cover our common shares, they could issue reports or recommendations that are unfavorable to the price of our common shares and warrants, and they could downgrade a previously favorable report or recommendation, and in either case our share and warrant prices could decline as a result of the report. If one or more of these analysts does not initiate coverage, ceases to cover our common shares or fails to publish regular reports on our business, we could lose visibility in the financial markets, which could cause our share and warrant prices or trading volume to decline.

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You may experience dilution of your ownership interests because of the future issuance of additional common shares and preferred shares by us and our subsidiaries

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 are currently authorized to issue an aggregate of 127,000,000 shares of capital stock consisting of 125,000,000 common shares and 2,000,000 “blank check” preferred shares. As of March 9, 2015, there were 83,154,787 common shares and 70,000 shares of Series A Convertible Preferred Stock, convertible into 875,000 common shares, outstanding, 3,974,326 common shares reserved for issuance upon the exercise of outstanding options under our employee stock option plans; and 9,194,679 shares reserved for issuance upon the exercise of common share purchase warrants, including the 8,000,000 publicly traded warrants.

The operation of some of our subsidiaries has been financed in part through the sale of capital stock in those subsidiaries to private investors. Sales of additional subsidiary shares could reduce our ownership interest in the subsidiaries, and correspondingly dilute our shareholder’s ownership interests in our consolidated enterprise. Our subsidiaries also have their own stock option plans and the exercise of subsidiary stock options or the sale of restricted stock under those plans would also reduce our ownership interest in the subsidiaries, with a resulting dilutive effect on the ownership interest of our shareholders in our consolidated enterprise.

We and our subsidiaries may issue additional common shares or other securities that are convertible into or exercisable for common shares 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, or in connection with future business acquisitions, or for other business purposes. The future issuance of any such additional common shares or other securities may create downward pressure on the trading price of our common shares and warrants.

We may also issue preferred shares having rights, preferences, and privileges senior to the rights of our common shares with respect to dividends, rights to share in distributions of our assets if we liquidate our company, or voting rights. Any preferred shares may also be convertible into common shares on terms that would be dilutive to holders of common shares. Our subsidiaries may also issue their own preferred shares with a similar dilutive impact on our ownership of the subsidiaries.

The market price of our common shares and warrants could be impacted by prices at which we sell shares in our subsidiaries

The operation of some our subsidiaries has been financed in part through the sale of capital stock in those subsidiaries, and our subsidiaries may sell shares of their capital stock in the future for financing purposes. The prices at which our subsidiaries may sell shares of their capital stock could impact the value of our company as a whole and could impact the price at which our common shares and warrants trade in the market. A sale of capital stock of one of our subsidiaries at a price that the market perceives as low could adversely impact the market price of our common shares and warrants. Even if our subsidiaries sell their capital stock at prices that reflect arm’s length negotiation with investors, there is no assurance that those prices will reflect a true fair market value or that the ascribed value of the subsidiaries based on those share prices will be fully reflected in the market value of our common shares and warrants.

Item 1B. Unresolved Staff Comments

None

Item 2. Properties

BioTime Facilities

Our offices and laboratory facilities are located at 1301 Harbor Bay Parkway, in Alameda, California, where we occupy approximately 19,000 square feet of office and research laboratory space. The facility is cGMP-capable and has previously been certified as Class 1,000 and Class 10,000 laboratory space, and includes cell culture and manufacturing equipment previously validated for use in cGMP manufacture of cell-based products. We will use the laboratory facility for the production of hEPCs, and products derived from them.

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Base monthly rent for this facility is $31,675 from December 2014 and will increase by three percent each year. In addition to the base rent, we pay a pro rata share of real property taxes and certain costs associated to the operation and maintenance of the building in which the leased premises are located.

We also lease an office and research facility located in La Jolla, California. The building on the leased premises contains approximately 1,519 square feet of space. The lease term will end on July 31, 2015. BioTime will pay base rent of $4,527 per month, plus operational costs of maintaining the leased premises. This facility is utilized for the development of our new differentiation and cellular reprogramming research products and for small-scale manufacture.

We also currently pay $5,050 per month for the use of approximately 900 square feet of office space in New York City, which is made available to us by one of our directors at his cost for use in conducting meetings and other business affairs.

Asterias Facilities

We have entered into a lease for an office and research facility located in Menlo Park, California that we are making available for use by Asterias. The building on the leased premises contains approximately 24,080 square feet of space. The lease is for a term of three years commencing January 7, 2013. We pay base rent of $31,786 per month, plus real estate taxes and certain costs of maintaining the leased premises. As additional consideration for the lease, we issued to the landlord BioTime common shares having a market value of $242,726, determined based upon the average closing price of our common shares on the NYSE MKT for a designated period of time prior to the signing of the lease. We have subleased this facility to Asterias under terms that require Asterias to pay all rent and other amounts due, and to perform all of our other obligations as a tenant, under the 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 will be used by Asterias primarily as a laboratory and production facility that can be used to produce human embryonic stem cells and related products under current good manufacturing procedures (cGMP). Asterias plans to construct certain tenant improvements for its use, which it expects will cost approximately $5.5 million, of which a maximum $4.4 million will be paid by the landlord. The landlord’s obligation to fund the tenant improvements expires on June 30, 2015 with respect to any portion of the allowance not expended by then. Asterias expects to substantially complete construction of the built-to-suit facility during the third quarter of 2015.

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 by Asterias. During the first 15 months of the lease term, from October 1, 2014 through December 31, 2015, Asterias will pay monthly base rent of $50,985 representing 22,000 square feet rather than 44,000 square feet provided that Asterias is not in default in performing its obligations under the lease beyond any notice and cure periods. Beginning on January 1, 2016, base rent will increase to $105,142 per month and increase by approximately 3% annually on every October 1 thereafter.

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 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.

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Asterias also currently pays $3,512 per month for the use of approximately 120 square feet of the office space in New York City that is used to conduct meetings and other business affairs. The lease is for a term of one year commencing July 1, 2014.

ESI Lease

ESI had leased approximately 125 square meters of laboratory space in Singapore under a lease that expired on February 28, 2014. Base monthly rent under the Singapore laboratory lease was S$11,000 (approximately US$8,300). In addition to base rent, ESI paid a pro rata share of real property taxes and certain costs related to the operation and maintenance of the building in which the leased premises were located. ESI plans to establish new laboratory facilities in Singapore for manufacturing and distribution of ESI BIO research products in Asia.

Cell Cure Neurosciences Facilities

Cell Cure Neurosciences leases approximately 350 square meters of office and laboratory space in Hadassah Ein Kerem, in Jerusalem, Israel under a lease that expires on November 30, 2016. Base monthly rent for that facility is approximately ILS 21,930 (approximately US$5,600). In addition to base rent, Cell Cure Neurosciences pays a pro rata share of real property taxes and certain costs related to the operation and maintenance of the building in which the leased premises are located. As of December 31, 2014 Cell Cure Neurosciences has a liability of ILS 328,000 (approximately US$84,000) in improvement costs. This amount is spread over 2.5 years.

LifeMap Facilities

LifeMap Sciences leases approximately 320 square meters of office space in Tel Aviv, Israel under a lease expiring on May 31, 2015. Base monthly rent under the lease is ILS 25,889 (approximately US$6,600) per month. In addition to base rent, LifeMap Sciences pays a pro rata share of real property taxes and certain costs related to the operation and maintenance of the building in which the leased premises are located. LifeMap Sciences also leases several parking spots.

LifeMap Sciences leases approximately 120 square meters of office space in Hong Kong under a lease that commenced on December 1, 2013 and expires on November 30, 2015. Base monthly rent under the lease is HK$7,500 (approximately US $970) per month. In addition to base rent, LifeMap pays certain costs related to the operation of the building in which the leased premises are located.

LifeMap Sciences leases approximately 750 square feet of office space in Marshfield, Massachusetts under a lease that expires on September 30, 2015. Base monthly rent under the lease is $1,169.85 per month.

LifeMap Sciences also leases approximately 200 square feet of office space in Hoboken, New Jersey under a lease that expires on February 28, 2018. The lease is cancelable at any time prior to expiration date with a 60 days' advanced notice in writing. Base monthly rent under the lease is $1,150.00 per month.

LifeMap Solutions leases approximately 269 square feet of office space in San Jose, California under a lease that expires on November 30, 2015. Base monthly rent under the lease is $1,769 per month.

Item 3. Legal Proceedings

From time to time, we and our subsidiaries may be involved in routine litigation incidental to the conduct of our business. We are not presently a party to any pending litigation.

Item 4. Mine Safety Disclosures

Not applicable

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PART II

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

Our common shares are traded on the NYSE MKT under the ticker symbol BTX. The following table sets forth the range of high and low closing prices for our common shares for the fiscal years ended December 31, 2013 and 2014 as reported by the NYSE MKT:

Quarter Ended	High	Low
March 31, 2013	$4.99	$3.20
June 30, 2013	$4.82	$3.39
September 30, 2013	$4.29	$3.64
December 31, 2013	$4.12	$3.28
March 31, 2014	$4.13	$3.11
June 30, 2014	$3.29	$2.29
September 30, 2014	$3.79	$2.35
December 31, 2014	$3.78	$2.95

As of March 5, 2015, there were 14,279 holders of the common shares based on the share position listing.

The following table shows certain information concerning the options outstanding and available for issuance under all of our compensation plans and agreements as of December 31, 2014:

Plan Category	Number of Shares to be Issued upon Exercise of Outstanding Options, Warrants, and Rights	Weighted Average Exercise Price of the Outstanding Options, Warrants, and Rights	Number of Shares Remaining Available for Future Issuance under Equity Compensation Plans
BioTime Equity Compensation Plans Approved by Shareholders	3,974,326	$ 4.04	667,918

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The following table shows certain information concerning the options outstanding and available for issuance under all of the compensation plans and agreements for our subsidiary companies as of December 31, 2014:

	Number of Shares to be Issued upon Exercise of Outstanding Options, Warrants, and Rights	Weighted Average Exercise Price of the Outstanding Options, Warrants, and Rights	Number of Shares Remaining Available for Future Issuance under Equity Compensation Plans
Asterias Equity Compensation Plans Approved by Shareholders[1][2]	3,346,666	$ 2.42	1,150,001
OrthoCyte Equity Compensation Plans Approved by Shareholders[1]	2,645,000	$ 0.08	1,355,000
OncoCyte Equity Compensation Plans Approved by Shareholders[1]	2,722,500	$ 0.76	1,277,500
ReCyte Therapeutics Equity Compensation Plans Approved by Shareholders[1]	1,290,000	$ 2.05	2,710,000
BioTime Asia Equity Compensation Plans Approved by Shareholders[1]	400	$ 0.01	1,200
Cell Cure Neurosciences Compensation Plans Approved by Shareholders[1]	23,978	$ 27.89	1,860
LifeMap Sciences Equity Compensation Plans Approved by Shareholders[1]	1,870,698	$ 1.48	471,571
LifeMap Solutions Compensation Plans Approved by Shareholders[1]	13,167	$ 500.00	13,167

(1) BioTime is, directly or through one or more subsidiaries, the majority shareholder.

(2) Includes 200,000 shares of restricted stock granted to Pedro Lichtinger, President and Chief Executive Officer of Asterias on June 9, 2014, which are subject to restrictions on transfer and to forfeiture until the restricted stock vests. The restricted stock vests at the rate of 16,667 shares per month while Mr. Lichtinger remains employed by Asterias.

Additional information concerning our stock option plan and the stock options of our subsidiaries may be found in Note 10 to the Consolidated Financial Statements.

Dividend Policy

We have never paid cash dividends on our capital stock and, except for semi-annual dividends on our Series A Convertible Preferred Stock, 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 on our capital stock, other than our Series A Convertible Preferred Stock, 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 the Board of Directors deems relevant.

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Performance Measurement Comparison[1]

The following graph compares total stockholder returns of BioTime, Inc. for the last five fiscal years beginning December 31, 2009 to two indices: the NYSE Amex Market Value – U.S. Companies ("Amex Market Value") and the NYSE Arca Biotechnology Index. The total return for our common shares and for each index assumes the reinvestment of dividends, although we have never declared dividends on BioTime common shares, and is based on the returns of the component companies weighted according to their capitalizations as of the end of each quarterly period. The 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). BioTime common stock trades on the NYSE MKT and is a component of the NYSE Amex Market Value – US Companies.

Comparison of Five-Year Cumulative Total Return on Investment

		2009	2010	2011	2012	2013	2014
BioTime, Inc.	Return %		96.93	-30.24	-45.96	14.65	3.61
	Cum $	100.00	196.93	137.35	74.23	85.11	88.18
AMEX Market Value (US Companies)	Return %		26.92	-8.85	9.84	10.23	5.09
	Cum $	100.00	126.92	115.79	127.19	140.20	147.34
NYSE Arca Biotechnology Index	Return %		45.23	-15.85	41.88	50.80	47.91
	Cum $	100.00	145.23	122.22	173.40	261.49	386.77

BioTime, Inc., the Amex Market Value and NYSE Arca 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 BioTime 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 BioTime, Inc., the Amex Market Value and the NYSE Arca Biotechnology Index on December 31, 2009. The cumulative total return on BioTime common shares has been computed based on a price of $4.23 per share, the price at which BioTime's common shares closed on December 31, 2009.

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Item 6. Selected Financial Data

	Year Ended December 31,				
	2014	2013	2012	2011	2010
Consolidated Statements of Operations and Comprehensive Loss Data:					
REVENUES:					
License fees	$1,172,860	$2,218,174	$899,998	$263,757	$292,904
Royalties from product sales	397,751	366,775	541,681	756,950	945,521
Grant income	3,296,832	1,573,329	2,222,458	2,767,181	2,336,325
Sales of research products and services	375,761	276,058	251,190	646,271	133,268
Total revenues	5,243,204	4,434,336	3,915,327	4,434,159	3,708,018
Cost of sales	(837,052)	(792,659)	(434,271)	(79,397)	(27,718)
Gross Profit	4,406,152	3,641,677	3,481,056	4,354,762	3,680,300
OPERATING EXPENSES:					
Research and development	(37,532,624)	(26,609,423)	(18,116,688)	(13,699,691)	(8,191,314)
Acquired in-process research and development[1]	-	(17,458,766)	-	-	-
General and administrative	(17,556,102)	(15,558,674)	(10,365,045)	(9,341,502)	(5,341,119)
Total operating expenses	(55,088,726)	(59,626,863)	(28,481,733)	(23,041,193)	(13,532,433)
Loss from operations	(50,682,574)	(55,985,186)	(25,000,677)	(18,686,431)	(9,852,133)
OTHER (EXPENSES) INCOME:					
Interest (expense)/income	(88,496)	(578)	19,383	29,727	(124,300)
(Loss)/gain on sale or write off of fixed assets	(8,926)	5,120	(6,856)	(6,246)	-
Modification cost of warrants	-	-	-	-	(2,142,201)
Other (expense)/income, net	(374,715)	(209,177)	(317,710)	219,067	(68,573)
Total other (expenses)/income, net	(472,137)	(204,635)	(305,183)	242,548	(2,335,074)
LOSS BEFORE INCOME TAX BENEFITS	(51,154,711)	(56,189,821)	(25,305,860)	(18,443,883)	(12,187,207)
Deferred income tax benefit	7,375,611	3,280,695	-	-	-
NET LOSS	(43,779,100)	(52,909,126)	(25,305,860)	(18,443,883)	(12,187,207)
Net loss attributable to non-controlling interest	(7,367,440)	9,026,291	3,880,157	1,928,383	1,002,589
Net loss attributable to BioTime, Inc.	(36,411,660)	(43,882,835)	(21,425,703)	(16,515,500)	(11,184,618)
Dividends on preferred shares	(86,827)	-	-	-	-
Net loss attributable to BioTime, Inc. common shareholders	(36,498,487)	(43,882,835)	(21,425,703)	(16,515,500)	(11,184,618)
Foreign currency translation gain/(loss)	124,949	119,469	63,179	(1,020,087)	897,338
Unrealized (loss)/gain on available-for-sale securities	(2,013)	3,000	-	-	-
COMPREHENSIVE LOSS ATTRIBUTABLE TO BIOTIME, INC. COMMON SHAREHOLDERS BEFORE PREFERRED STOCK	$(36,288,724)	$(43,760,366)	$(21,362,524)	$(17,535,587)	$(10,287,280)

DIVIDEND					
BASIC AND DILUTED NET LOSS PER COMMON SHARE	$(0.55)	$(0.81)	$(0.44)	$(0.35)	$(0.28)
WEIGHTED AVERAGE NUMBER OF COMMON STOCK OUTSTANDING:BASIC AND DILUTED	66,466,714	54,226,219	49,213,687	47,053,518	40,266,311

(1) Represents the value of incomplete research and development projects acquired by Asterias from Geron under the Asset Contribution Agreement which Asterias intends to continue. See Notes 2 and 14 to the Consolidated Financial Statements.

	December 31, 2014	2013	2012	2011	2010
Consolidated Balance Sheet Data:					
Cash and cash equivalents	$29,486,909	$5,495,478	$4,349,967	$22,211,897	$33,324,924
Total assets	74,900,906	57,729,750	29,748,593	45,829,695	53,272,659
Total liabilities	12,178,141	15,467,429	5,454,220	4,371,514	3,847,002
Accumulated deficit	(182,190,207)	(145,778,547)	(101,895,712)	(80,470,009)	(63,954,509)
Total shareholder's equity	$62,722,765	$42,262,321	$24,294,373	$41,458,181	$49,425,657

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Our consolidated statement of operations data and balance sheet data for the year ended December 31, 2013 reflects the commencement of Asterias' business operations and its acquisition of stem cell assets from Geron. See Note 14 to Consolidated Financial Statements.

Our consolidated statement of operations data and balance sheet data for the year ended December 31, 2012 reflect our merger with XenneX during the year.

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 consolidated financial statements for the two-year period ended December 31, 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, 2014 as compared to the year ended December 31, 2013, and during the year ended December 31, 2013 as compared to the year ended December 31, 2012. This discussion should be read in conjunction with our consolidated financial statements for the two-year period ended December 31, 2014 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."

Plasma Volume Expander Products

Royalties and licensing fees related to our plasma volume expander products, primarily Hextend®, comprise a significant part of our operating revenues. Under our license agreements, Hospira and CJ Health will report sales of Hextend® and pay us the royalties and license fees due on account of such sales after the end of each calendar quarter. We recognize revenues in the quarter in which the sales report is received, rather than the quarter in which the sales took place. Royalties on sales of Hextend® that occurred during the fourth quarter of 2012 through the third quarter of 2013 are reflected in our financial statements for the year ended December 31, 2013 and royalties on sales of Hextend® during the fourth quarter of 2013 through the third quarter of 2014 are reflected in our financial statements for the year ended December 31, 2014.

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Research and Development Programs in Regenerative Medicine and Stem Cell Research

The following table summarizes the most significant achievements in our primary research and development programs in stem cell research and regenerative medicine during the last fiscal year.

Therapeutic Area	Program or Product	Status	Development Company
Cervical Spinal Cord Injury	AST-OPC-1: Glial Cells	Phase I/IIa dose escalation trial underway in cervical spinal cord injury. $14.3 million grant from California Institute for Regenerative Medicine to provide matching funds for AST-OPC1 clinical trial and process development. Proof of concept established in multiple in vitro systems.	Asterias
Non-Small Cell Lung Cancer	AST-VAC2 Allogeneic Dendritic Cells Loaded with Telomerase antigen	Agreement by Cancer Research UK to conduct Phase I/IIa clinical trial of AST-VAC2 in subjects with non-small cell lung cancer. Manufacturing process being developed for transfer to Cancer Research UK for clinical trials.	Asterias
Age Related Macular Degeneration (AMD)	OpRegen® and OpRegen®-Plus	Received approval from Israel ministry of health and US FDA to begin a Phase I/IIa clinical trial to determine safety and effective dose for OpRegen® in patients with geographic atrophy stage of dry AMD. The trial will enroll at least 15 patients beginning in the second quarter of 2015. We expect this phase to take several months and then will follow each patient for a minimum of 12 months.	Cell Cure Neurosciences
Bone Repair	Bone repair using embryonic-derived progenitor cells (Spinal fusion, trauma and cranial maxillo-facial)	Initiated in vitro optimization of bone differentiation and induction using progenitor cells.	OrthoCyte
Age Related Vascular Disease, including Cardiovascular Disorders	Therapeutic products for age related vascular disease, including cardiovascular disorders utilizing proprietary ReCyte™ technology and human pluripotent stem cell derived cells.	Evaluating progenitor stem cell-based and cell-derived therapeutics. Conducting ongoing collaboration with researchers at Cornell Weill Medical College for derivation and preclinical testing of endothelial progenitor cells for the treatment of age-related vascular disease.	ReCyte Therapeutics

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Nearer-Term Commercial Opportunities	Program or Product	Status	Development Company
HIV-related Lipoatrophy	Renevia™ (the trade name for HyStem® used in lipotransfer)	Commenced a pivotal trial for Renevia™ in Europe to show effectiveness of Renevia™ in lipotransfer for patients suffering from HIV related lipoatrophy of the face. Completed first human clinical safety trial for Renevia™ Results confirmed that Renevia™ was safe in humans at the proposed dosage concentration for this particular use.	BioTime
Other Clinical Areas	Biocompatible hydrogels that mimic the human extracellular matrix	Received ISO13485:2003 Certification from BSI (British Standards Institution) for design, development, manufacture, and distribution of BioTime HyStem® hydrogels for cell delivery applications. ISO certification is a prerequisite for CE marking of medical devices within the European Union and will be needed in order to market Renevia™ in Europe. Entrance into License Agreement with Cornell University through which Weill Cornell Medical College will provide blood samples derived from healthy people and lung cancer patients for comparative analysis using OncoCyte's proprietary PanC-Dx™ diagnostic tests.	BioTime
Diagnostic Tests for Lung Cancer, Bladder Cancer; and Breast Cancer	PanC-Dx™	Completion by collaborators at The Wistar Institute of a large, multi-site study involving 600 patients evaluating a blood-based lung cancer diagnostic test; Completion of enrollment in the initial clinical study, which involved 100 patients, of a urine-based bladder cancer diagnostic test conducted in collaboration with investigators in the Department of Pathology, Division of Cytopathology, at a leading medical institution with an international reputation for excellence and discovery; Expansion of the clinical development of a urine-based bladder cancer diagnostic test by initiating a multi-site clinical trial which will involve up to 1,200 patient samples obtained from at least four large urology clinics located throughout the United States; and Expansion of the clinical development of a blood-based breast cancer diagnostic test through collaboration with Abcodia, a UK-based company focusing on the early detection of cancer that has exclusive commercial access to a unique longitudinal biobank of over 5,000,000 serum samples collected through the UK Collaborative Trial for Ovarian Cancer Screening.	OncoCyte
Marketing On-Line Searchable Data Bases	GeneCards®	A database of human genes that provides concise genomic, transcriptomic, genetic, proteomic, functional and disease related information, on all known and predicted human	LifeMap Sciences

		genes.	
	MalaCards™	A database of human diseases that is based on the GeneCards® platform and contains computerized “cards” classifying information relating to a wide array of human diseases.	
	LifeMap Discovery®	A database of embryonic development, stem cell research and regenerative medicine.	
	VarElect™	A powerful, yet easy-to-use application for prioritizing gene variants resulting from next generation sequencing experiments.	
	GeneAnalytics™	A novel gene set analysis tool.	
Mobile Health	Mobile health software development	Developing mobile health software products in conjunction with the Icahn School of Medicine at Mount Sinai.	LifeMap Solutions

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The inherent uncertainties of developing new products for stem cell research and for medical use make it impossible to predict the amount of time and expense that will be required to complete the development and commence commercialization of new products. There is no assurance that we or any of our subsidiaries will be successful in developing new technologies or stem cell products, or that any technology or products that may be developed will be proven safe and effective for treating diseases in humans, or will be successfully commercialized. Most of our potential therapeutic products are at a very early stage of preclinical development. Before any clinical trials can be conducted by us or any of our subsidiaries, the company seeking to conduct the trials would have to compile sufficient laboratory test data substantiating the characteristics and purity of the stem cells, conduct animal studies, and then obtain all necessary regulatory and clinical trial site approvals, after which a team of physicians and statisticians would need to be assembled to perform the trials. Clinical trials will be costly to undertake and will take years to complete. See our discussion of the risks inherent in our business and the impact of government regulation on our business in the “Risk Factors” section and “Business” section of this report.

We believe each of our operating subsidiaries has sufficient capital to carry out its current research and development plan during 2014. We may provide additional financing for our subsidiaries, or obtain financing from third parties, based on the following: our evaluation of progress made in their respective research and development programs, any changes to or the expansion of the scope and focus of their research, and our projection of future costs. See “Liquidity and Capital Resources” for a discussion of our available capital resources, our potential need for future financing, and possible sources of capital.

Critical Accounting Policies

Revenue recognition – We comply with ASC 605-10 and recognize 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 and the sale of research products and services are recognized as revenue when earned. Revenues from the sale of research products and services are primarily derived from the sale of hydrogels and stem cell products. Royalty revenues consist of product royalty payments. License fee revenues consist of fees under license agreements and are recognized when earned and reasonably estimable and also include subscription and advertising revenue from our online databases based upon respective subscription or advertising periods. 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 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.

Patent costs – Costs associated with obtaining patents on products or technology developed are expensed as general and administrative expenses when incurred.

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Intangible assets, net – Intangible assets with finite useful lives are amortized over estimated useful lives and intangible assets with indefinite lives are not amortized but rather are tested at least annually for impairment. Acquired in-process research and development intangible assets are accounted depending on whether they were acquired as part of an acquisition of a business, or assets that do not constitute a business. When acquired in conjunction with acquisition of a business, these assets are considered to be indefinite-lived until the completion or abandonment of the associated research and development efforts and are capitalized as an asset. If and when development is complete, the associated assets would be deemed finite-lived and would then be amortized based on their respective estimated useful lives at that point in time. However, when acquired in conjunction with an acquisition of assets that do not constitute a business (such as Asterias' acquisition of assets from Geron), in accordance with the accounting rules in ASC 805-50, such intangible assets related to IPR&D are expensed upon acquisition.

Research and development – Research and development costs are expensed when incurred, and consist principally of salaries, payroll taxes, consulting fees, research and laboratory fees, and license fees paid to acquire patents or licenses to use patents and other technology from third parties.

Stock-based compensation – We have adopted accounting standards governing share-based payments, 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. 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 an option-pricing model is affected by our stock price as well as assumptions regarding a number of highly complex and subjective variables. These variables include, but are not limited to, expected stock price volatility over the term of the awards, and actual and projected employee stock option exercise behaviors. The expected term of options granted is derived from historical data on employee exercises and post-vesting employment termination behavior. The risk-free rate is based on the U.S. Treasury rates in effect during the corresponding period of grant. Although the fair value of employee stock options is determined in accordance with recent FASB guidance, changes in the subjective assumptions can materially affect the estimated value. In management's opinion, the existing valuation models may not provide an accurate measure of the fair value of employee stock options because the option-pricing model value may not be indicative of the fair value that would be established in a willing buyer/willing seller market transaction.

Treasury stock – We account for BioTime common shares issued to subsidiaries for future potential working capital needs as treasury stock on the consolidated balance sheet. We have the intent and ability to register any unregistered shares to support the marketability of the shares.

Impairment of long-lived assets – Our long-lived assets, including intangible assets, are 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, we evaluate 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 recognized is measured by the amount by which the carrying amount exceeds the estimated fair value of the assets.

Deferred license and consulting fees – Deferred license and consulting fees consist of the value of warrants issued to third parties for services, and deferred license fees paid to acquire rights to use the proprietary technologies of third parties. The value of the warrants is being amortized over the lives of the warrants, and deferred license fees over the estimated useful lives of the licensed technologies or licensed research products. We are applying a 10 year estimated useful life to the technologies and products that we are currently licensing. The estimation of the useful life any technology or product involves a significant degree of inherent uncertainty, since the outcome of research and development or the commercial life of a new product cannot be known with certainty at the time that the right to use the technology or product is acquired. We will review the continued appropriateness of the 10 year estimated useful life for impairments that might occur earlier than the original expected useful lives.

Royalty Obligation and Deferred license fees – Deferred license and consulting fees consist of the value of warrants issued to third parties for services, and deferred license fees paid to acquire rights to use the proprietary technologies of third parties. The value of the warrants is being amortized over the lives of the warrants, and deferred license fees over the estimated useful lives of the licensed technologies or licensed research products. We are applying a 10 year estimated useful life to the technologies and products that we are currently licensing. The estimation of the useful life of any technology or product involves a significant degree of inherent uncertainty, since the outcome of research and development or the commercial life of a new product cannot be known with certainty at the time that the right to use the technology or product is acquired. We will review the continued appropriateness of the 10 year estimated useful life for impairments that might occur earlier than the original expected useful lives.

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Principles of consolidation – Our consolidated financial statements include the accounts of our wholly-owned subsidiary ESI, and the accounts of our majority owned subsidiaries, Asterias, ReCyte Therapeutics, OncoCyte, OrthoCyte, BioTime Asia, Cell Cure Neurosciences, and LifeMap Sciences. All material intercompany accounts and transactions have been eliminated in consolidation. The consolidated financial statements are presented in accordance with accounting principles generally accepted in the U.S. and with the accounting and reporting requirements of SEC Regulation S-X.

Results of Operations

Comparison of Years Ended December 31, 2014 and 2013

Revenues

	Year Ended December 31,		$ Increase/ Decrease	% Increase/ Decrease
	2014	2013		
License fees	$1,172,860	$2,218,174	$-1,045,314	-47.1%
Royalty from product sales	397,751	366,775	+30,976	+8.4%
Grant income	3,296,832	1,573,329	+1,723,503	+109.5%
Sales of research products and services	375,761	276,058	+99,703	+36.1%
Total revenues	5,243,204	4,434,336	+808,868	+18.2%
Cost of sales	(837,052)	(792,659)	+44,393	+5.6%
Gross Profit	4,406,152	3,641,677	+764,475	+21.0%

	Three Months Ended December 31,		$ Increase/ Decrease	% Increase/ Decrease
	2014	2013		
License fees	$292,120	$1,123,331	$-831,211	-74.0%
Royalty from product sales	75,945	75,270	+675	+0.9%
Grant income	1,443,331	632,103	+811,228	+128.3%
Sales of research products and services	76,139	61,781	+14,358	+23.2%
Total revenues	1,887,535	1,892,485	-4,950	-*
Cost of sales	(222,972)	(222,422)	+550	-*
Gross Profit	1,664,563	1,670,063	-5,500	-*

* Less than 0.1%

License fee revenues for the years ended December 31, 2014 and 2013 include subscription and advertising revenues of $1,172,680 and $1,317,008, respectively, from LifeMap Science's online database business primarily related to its GeneCards® database. License fee revenue of $2,218,174 for the year ended December 31, 2013 included accelerated amortization of all remaining upfront license fees from certain licenses related to the development of our blood plasma volume expander products Hextend® and PentaLyte® in certain foreign countries, which terminated in 2013.

Our royalty revenues from product sales for the years ended December 31, 2014 and 2013 include $208,238 and $366,492 respectively, of royalties on sales of Hextend® made by Hospira and CJ Health and $189,215 and nil, respectively, of royalties earned by Asterias. Royalties on sales of Hextend® have been decreasing as hospitals have shifted their purchases of blood volume expanders to albumin products, leading to a decline in the number of units sold and the price per unit. Sales of Hextend® also declined following the implementation of certain new safety labeling changes mandated by the FDA during November 2013 for the entire class of hydroxyethyl starch products, including Hextend®. In addition, during June 2014, we entered into an amendment of our license agreement with CJ

Health that extended the term of the license and CJ Health's royalty payment obligation beyond the expiration date of our Korean patents but reduced the royalty rate by 50%. We expect royalty revenues from sales of Hextend® to continue to decline as a percentage of total revenue. Under our license agreements with Hospira and CJ Health, our licensees report sales of Hextend® and pay us the royalties due on account of such sales within 90 days after the end of each calendar quarter. We recognize such revenues in the quarter in which the sales report is received, rather than the quarter in which the sales took place. For example, royalties on sales made during the first quarter 2014 were not recognized until the second quarter of fiscal year 2014.

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Total grant revenue in 2014 increased by approximately 110% primarily due to recognition of $1,034,456 of the $14.3M CIRM grant awarded to Asterias in 2014. Grant revenue for the years ended December 31, 2014 and 2013 also include $656,125 and $221,594, respectively from various grants awarded to us by the National Institutes of Health ("NIH") and $1,606,251 and $1,333,901, respectively recognized through Cell Cure Neurosciences. Two of the five NIH grants expired in September 2014 while the other three more recently awarded grants will expire on various dates in 2015.

Revenues from the sale of research products and services are primarily derived from the sale of hydrogels and stem cell products.

While revenues increased by 18% during the year ended December 31, 2014, cost of sales increased by only 6%, reflecting the fact that grant and amortization of upfront license fee revenues, which do not give rise to costs of sales, increased by $822,337.

Expenses

	Year Ended December 31, 2014	2013	$ Increase/ Decrease	% Increase/ Decrease
Research and development expenses	$(37,532,624)	$(26,609,423)	$+10,923,201	+41.1%
Acquired in-process research and development expenses	-	(17,458,766)	-17,458,766	-100.0%
General and administrative expenses	(17,556,102)	(15,558,674)	+1,997,428	+12.8%
Interest expense, net	(88,496)	(578)	+87,918	+15,210.7%
Other expense, net	(374,715)	(209,177)	+165,538	+79.1%

	Three Months Ended December 31, 2014	2013	$ Increase/ Decrease	% Increase/ Decrease
Research and development expenses	$(11,277,256)	$(9,220,014)	$+2,057,242	+22.3%
Acquired in-process research and development expenses	-	(17,458,766)	-17,458,766	-100.0%
General and administrative expenses	(4,791,898)	(4,284,726)	+507,172	+11.8%
Interest expense, net	(57,939)	(2,611)	+55,328	+2119.0%
Other expense, net	(513,505)	(39,665)	+473,840	+1194.6%

Research and development expenses – Research and development expenses increased by $10,923,201. The increase is largely due to the amortization of intangible assets acquired by Asterias from Geron and BioTime in October 2013 and the ramp-up of the Asterias and LifeMap Solutions product development programs. OncoCyte's clinical trial work to develop its PanC-Dx™ cancer diagnostics and our continued clinical development of Renevia™ also contributed to the increase in research and development expense. Amortization of intangible assets increased by $4,063,974, employee compensation, including stock-based compensation and related costs allocated to research and development expenses increased by $3,638,783, contract manufacturing related expenses increased by $1,083,697, patent, license, and trademark related fees increased by $949,431, outside research and services primarily related to our regulatory, preclinical and clinical trials of Renevia™, AST-OPC1, and PanC-Dx™ cancer diagnostics increased by $726,977, rent and facilities maintenance related expenses allocated to research and development increased by $533,668, depreciation expenses allocated to research and development increased by $365,517, laboratory and supplies expenses increased by $390,063, insurance premiums allocated to research and development expenses increased by $171,911, and travel and entertainment related expenses increased by $112,354. These increases are in part offset by a decrease of $1,119, 352 in Cell Cure related expenses and a decrease of $161,303 in ESI related expenses.

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The following table shows the approximate amounts and percentages of our total research and development expenses of $37,532,624 and $26,609,423 allocated to our primary research and development projects during the years ended December 31, 2014 and 2013, respectively.

		Amount[1]		Percent	
Company	Program	2014	2013	2014	2013
Asterias Biotherapeutics[2]	hESC-based cell therapy programs	$13,310,421	$4,319,494	35.5%	16.2%
BioTime Asia	Stem cell products for research	$-	$31,288	-%	0.1%
BioTime	PureStem® technology	$-	$227,429	-%	0.9%
BioTime	Hextend®	$71,427	$90,379	0.2%	0.3%
BioTime	3D Culture	$100,014	$49,825	0.3%	0.2%
BioTime and ESI	PureStem® hEPCs, cGMP hES cell lines, and related research products	$4,089,310	$2,763,879	10.9%	10.4%
BioTime	Hydrogel products and HyStem® research	$5,176,876	$5,229,278	13.8%	19.6%
Cell Cure Neurosciences	OpRegen®, OpRegen®-Plus, and neurological disease therapies	$5,311,472	$6,401,884	14.1%	24.1%
LifeMap Sciences	Database development and sales	$3,566,530	$2,663,066	9.5%	10.0%
OncoCyte	Cancer therapy and diagnostics and therapy	$3,872,500	$2,760,810	10.3%	10.4%
OrthoCyte	Orthopedic therapy	$692,530	$1,029,989	1.8%	3.9%
ReCyte Therapeutics	Cardiovascular therapy	$1,341,544	$1,042,102	3.6%	3.9%
Total		$37,532,624	$26,609,423	100.0%	100.0%

(1) Amount also includes research and development expenses incurred directly by the subsidiary and certain general research and development expenses, such as lab supplies, lab expenses, rent allocated, and insurance allocated to research and development expenses, incurred directly by BioTime on behalf of the subsidiary and allocated to the subsidiary.

(2) Excludes IPR&D expenses related to intangible assets acquired from Geron. IPR&D represents the value of incomplete research and development projects which Asterias intends to continue. See Notes 2 and 14 to the Consolidated Financial Statements.

General and administrative expenses – General and administrative expenses for the years ended December 31, 2014 and 2013 were $17,556,102 and $15,558,674, respectively. The increase of $1,997,428 in total general and administrative costs on a consolidated basis for the year ended December 31, 2014 is primarily attributable to an increase of $1,802,661 in employee compensation, including employee bonus accruals, stock-based compensation and related costs allocated to general and administrative expenses, an increase of $309,002 in general consulting expenses, an increase of $262,443 in marketing and advertisement related expenses, an increase of $303,741 in accounting, audit and tax related expense, an increase of $172,036 in Asterias' state corporation and franchise taxes, an increase of $116,614 in rent and facilities maintenance related expenses allocated to general and administrative expenses, an increase of $116,750 in outside directors compensation expenses, an increase in $111,155 in investor and public relations related expenses and an increase of $95,873 in travel, lodging and meals allocated to general and administrative expenses. These increases are in part offset by decreases of $711,108 in legal fees generally reflecting non-recurring expenses that we incurred in 2013 related to the Asset Contribution Agreement transactions, including preparing registration statements for filing with the SEC and a proxy statement for a special meeting of our shareholders, a decrease of $346,951 in stock-based compensation to consultants and our independent directors, a decrease of $142,087 in office expenses and supplies and computer supplies, and a decrease of $70,291 in ESI related expenses .

General and administrative expenses include employee and director compensation allocated to general and administrative expenses, consulting fees other than those paid for science-related consulting, insurance costs allocated

to general and administrative expenses, stock exchange-related costs, depreciation expense, shipping expenses, marketing costs, legal and accounting costs, and other miscellaneous expenses which are allocated to general and administrative expense.

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The following table shows the amount and approximate percentages of our total general and administrative expenses of $17,556,102 and $15,558,674 allocated to BioTime and our subsidiaries during the years ended December 31, 2014 and 2013, respectively.

	Amount[1]		Percent	
Company	2014	2013	2014	2013
BioTime	$7,129,931	$7,366,234	40.6%	47.3%
Asterias Biotherapeutics	$5,279,859	$3,883,185	30.1%	25.0%
BioTime Asia	$12,164	$164,432	0.1%	1.1%
Cell Cure Neurosciences	$723,233	$675,970	4.1%	4.3%
ESI	$199,207	$305,931	1.1%	2.0%
LifeMap Sciences	$2,553,408	$1,995,215	14.5%	12.8%
OncoCyte	$870,073	$408,470	5.0%	2.6%
OrthoCyte	$382,917	$380,903	2.2%	2.5%
ReCyte Therapeutics	$405,310	$378,334	2.3%	2.4%
Total	$17,556,102	$15,558,674	100.0%	100.0%

(1) Amount includes general and administrative expenses incurred directly by the subsidiary and allocations from BioTime for certain general overhead expenses.

Interest income/(expense) – During 2014, we earned $2,551 of interest income, net of $91,047 of interest expense. During 2013, we earned $2,512 of interest income, net of $3,090 of interest expense. Interest income is primarily attributed to interest earned on cash balances held in interest bearing accounts during their respective years.

Other income/(expense) – Other expenses in 2014 consists primarily of amortization of discount on convertible loan of $56,320, charitable donations of $36,261, $24,124 in income tax provision for LifeMap Sciences, Ltd, one of our majority owned subsidiaries, and $338,076 of foreign currency transaction loss. Other expenses in 2013 consists primarily of charitable donations of $42,500, $45,461 in income tax provision for LifeMap Sciences, Ltd, one of our majority owned subsidiaries, and $133,479 of foreign currency transaction loss.

Comparison of Years Ended December 31, 2013 and 2012

Revenues

	Year Ended December 31,		$ Increase/	% Increase/
	2013	2012	Decrease	Decrease
License fees	$2,218,174	$899,998	$+1,318,176	+146.5%
Royalty from product sales	366,775	541,681	-174,906	-32.3%
Grant income	1,573,329	2,222,458	-649,129	-29.2%
Sales of research products and services	276,058	251,190	+24,868	+9.9%
Total revenues	4,434,336	3,915,327	+519,009	+13.3%
Cost of sales	(792,659)	(434,271)	+358,388	+82.5%
Gross Profit	3,641,677	3,481,056	+160,621	+4.6%

	Three Months Ended December 31,		$ Increase/	% Increase/
	2013	2012	Decrease	Decrease
License fees	$1,123,331	$350,477	$+772,854	+220.5%
Royalty from product sales	75,270	133,878	-58,608	-43.8%

Grant income	632,103	704,372	-72,269	-10.3%
Sales of research products and services	61,781	33,810	+27,971	+82.7%
Total revenues	1,892,485	1,222,537	+669,948	+54.8%
Cost of sales	(222,422)	(160,355)	+62,067	+38.7%
Gross Profit	1,670,063	1,062,182	+607,881	+57.2%

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Our license fee revenues amounted to $2,218,174 and $899,998 for the years ended December 31, 2013 and 2012, respectively. The 146.5% increase in license fee revenue in 2013 is partially attributed $1,317,008 and $752,896 in subscription and advertising revenues as of December 31, 2013 and 2012, respectively from LifeMap Science's online database business primarily related to its GeneCards® database which LifeMap Sciences began marketing after its acquisition of XenneX during 2012. License fee revenues also include $899,551 and $145,873 from Summit, for the years ended December 31, 2013 and 2012, respectively. We received the license fees from Summit during the years 2005 -2008. Full recognition of the revenues derived from those license fees was deferred and revenues have been recognized over the lives of the respective contracts, which had been estimated to last until approximately 2019 based on the current expected life of the governing patent covering our products in Korea and Japan. However, we recognized all of the unamortized balance of the Summit license fees during the fourth quarter of 2013 upon termination of our license agreements with Summit. See Note 1 to the Consolidated Financial Statements.

Under our license agreements with Hospira and CJ Health, our licensees report sales of Hextend® and pay us the royalties and license fees due on account of such sales within 90 days after the end of each calendar quarter. We recognize such revenues in the quarter in which the sales report is received, rather than the quarter in which the sales took place. For example, royalties on sales made during the fourth quarter of 2012 were not recognized until the first quarter of fiscal year 2013.

Our royalty revenues from product sales for the year ended December 31, 2013 primarily consist of royalties on sales of Hextend® made by Hospira and CJ Health during the period beginning October 1, 2012 and ending September 30, 2013. Royalty revenues recognized from Hospira and CJ Health for that period were $366,492 compared with $541,293 recognized for the year ended December 31, 2012. This 32% decrease in royalties is attributable to a decrease in Hextend® sales in the U.S. and in the Republic of Korea. The decrease in royalties received from Hospira is primarily due to the decline in the price of hetastarch-based products in the market. The blood volume expander marketing continues to contract and hospitals continue to shift their purchases to albumin products. Hospira has reported that they have seen a rapid decline in the price of hetastarch-based plasma expanders in the market which could continue to have a negative impact on revenues from the sale of Hextend®. Hospira implemented further price reductions for Hextend® during 2012 in an attempt to maintain market share. We expect royalty revenues from product sales to continue to decline as a percentage of total revenue.

Total grant revenue in 2013 decreased by approximately 29% as a result of the completion of a CIRM grant in August 31, 2012. Grant revenue in 2013 includes $150,239 of a $335,900 grant awarded to us by the NIH, $71,355 under a $285,423 grant awarded by the NIH, $1,333,901 recognized through Cell Cure Neurosciences, $13,838 recognized through LifeMap Sciences, Ltd., and $3,996 recognized through ES Cell International. Grant revenue in 2012 included $1,047,106 from CIRM, $1,109,699 recognized through Cell Cure Neurosciences, $18,145 recognized through Life Map Sciences, Ltd., and $47,507 of a $335,900 grant awarded to us by the NIH. The grant period for the $335,900 grant expired on September 29, 2014. The grant period for the $285,423 NIH grant expired on June 13, 2014.

Expenses

	Year Ended December 31, 2013	2012	$ Increase/ Decrease	% Increase/ Decrease
Research and development expenses	$(26,609,423)	$(18,116,688)	$+8,492,735	+46.9%
Acquired in-process research and development expenses	(17,458,766)	-	+17,458,766	-%
General and administrative expenses	(15,558,674)	(10,365,045)	+5,193,629	+50.1%
Interest income/(expense)	(578)	19,383	-19,961	-103.0%
Other expense, net	(209,177)	(317,710)	-108,533	-34.2%

	Three Months Ended December 31,		$ Increase/ Decrease	% Increase/ Decrease
	2013	2012		
Research and development expenses	$(9,220,014)	$(4,793,278)	$+4,426,736	+92.4%
Acquired in-process research and development expenses	(17,458,766)	-	+17,458,766	-%
General and administrative expenses	(4,284,726)	(3,327,238)	+957,488	+28.8%
Interest income/(expense)	(2,611)	2,062	-4,673	-226.6%
Other expense, net	(39,665)	(93,811)	-54,146	-57.7%

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Research and development expenses – Research and development expenses increased by $8,492,735 or approximately 46.9% to $26,609,423 for the year ended December 31, 2013, from $18,116,688 for the year ended December 31, 2012. In addition, during 2013 Asterias recognized $17,458,766 of IPR&D in connection with the consummation of its acquisition of assets from Geron. IPR&D represents the value allocated by management to incomplete research and development projects which Asterias acquired from Geron and intends to continue. That value was expensed under applicable accounting rules rather than capitalized for future amortization because the acquisition was accounted for as an acquisition of assets rather than an acquisition of a business. See Notes 2 and 14 to the Consolidated Financial Statements. The increase in research and development expenses other than IPR&D during 2013 is attributable to an increase of $2,304,195 in employee compensation and related costs allocated to research and development expenses, including costs of new employees added by Asterias, an increase of $584,423 in HyStem® program expenses including those related to the clinical safety trial of Renevia,™ an increase of $428,490 in rent and facilities maintenance related expenses allocated to research and development expenses primarily attributed to Asterias' office and research facility, an increase of $354,644 in laboratory expenses and supplies, an increase of $269,385 in stock based compensation allocated to research and development expenses, an increase of $211,819 in depreciation expenses allocated to research and development expenses, an increase of $112,234 in travel, lodging, and meals allocated to research and development expenses, an increase of $87,827 in patent related litigation fees related primarily to the ViaCyte proceedings that Asterias assumed from Geron, and an increase of $3,328,812 in Cell Cure Neurosciences research and development expenses related to its development of OpRegen®. These increases were offset in part by a decrease $149,932 in ESI research and development expenses. Research and development expenses for 2013 and 2012 also include $3,295,716 and $2,446,975, respectively, of amortization of our cost of acquiring patents and technology. The increase of $848,741 in amortization expense reflects, in part, a full year of amortization related to the acquisition of XenneX, Inc. by LifeMap Sciences during May 2012, and Asterias' acquisition of Geron's stem cell assets during October 2013.

Research and development expenses include IPR&D expense related to acquired assets, laboratory study expenses, patent and technology license fees, employee compensation, rent, insurance, and science-related consultants' fees and amortization allocated to research and development expense.

The following table shows the approximate amounts and percentages of our total research and development expenses of $26,609,423 and $18,116,688 allocated to our primary research and development programs during the years ended December 31, 2013 and 2012, respectively.

		Amount[1]		Percent	
Company	Program	2013	2012	2013	2012
Asterias Biotherapeutics[2]	hESC-based cell therapy programs	$4,319,494	$-	16.2%	-%
BioTime Asia	Stem cell products for research	$31,288	$153,031	0.1%	0.8%
BioTime	PureStem® technology	$227,429	$794,632	0.9%	4.4%
BioTime	Hextend®	$90,379	$291,580	0.3%	1.6%
BioTime	3D Culture	$49,825	$-	0.2%	-%
BioTime and ESI	PureStem® hEPCs, cGMP hES cell lines, and related research products	$2,763,879	$2,826,558	10.4%	15.6%
BioTime	Hydrogel products and HyStem® research	$5,229,278	$3,681,893	19.6%	20.3%
Cell Cure Neurosciences	OpRegen®, OpRegen®-Plus, and neurological disease therapies	$6,401,884	$3,185,490	24.1%	17.6%
LifeMap Sciences	Database development and sales	$2,663,066	$3,129,885	10.0%	17.3%
OncoCyte	Cancer therapy and diagnostics and therapy	$2,760,810	$1,735,369	10.4%	9.6%
OrthoCyte	Orthopedic therapy	$1,029,989	$950,956	3.9%	5.2%
ReCyte Therapeutics	Cardiovascular therapy	$1,042,102	$1,367,294	3.9%	7.6%
Total		$26,609,423	$18,116,688	100.0%	100.0%

(1) Amount also includes research and development expenses incurred directly by the subsidiary and certain general research and development expenses, such as lab supplies, lab expenses, rent allocated, and insurance allocated to research and development expenses, incurred directly by BioTime on behalf of the subsidiary and allocated to the subsidiary.

(2) Excludes IPR&D expenses related to intangible assets acquired from Geron. IPR&D represents the value of incomplete research and development projects which Asterias intends to continue. See Notes 2 and 17 to the Consolidated Financial Statements.

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General and administrative expenses – General and administrative expenses increased by approximately 50.1% to $15,558,674 for the year ended December 31, 2013 from $10,365,045 for the year ended December 31, 2012. The increase in general and administrative expenses was $5,193,629 in 2013 of which $3,124,622 is attributable to Asterias. The principal components of the $5,193,629 increase in total general and administrative costs on a consolidated basis were: $1,344,324 in employee compensation and related costs allocated to general and administrative expenses; an increase of $532,425 in legal fees; an increase of $825,679 in stock-based compensation to employees, consultants and independent directors; an increase of $488,890 in investor and public relations expenses, transfer agent, stock listing and registration fees; an increase of $470,856 in accounting and tax services; an increase of $338,741 in rent and facilities maintenance related expenses allocated to general and administrative expenses; an increase of $266,359 in general office supplies and expenses; an increase of $234,250 in cash compensation paid to our independent directors; an increase of $285,270 in marketing and advertisement related expenses; an increase of $131,727 in recruiting service expenses; an increase of $184,900 in travel, lodging and meals allocated to general and administrative expenses; an increase of $126,106 in general consulting expenses; and an increase of $63,366 in telephone and on-line fees allocated to general and administrative expenses. These increases were in part offset by a decrease of $112,675 in ESI general and administrative expenses due to a reduction in ESI staffing.

The increase in legal and accounting expenses was primarily due to start-up and transaction expenses related to Asterias and its acquisition of Geron’s stem cell assets, and the fees incurred in connection with the preparation and filing of certain registration statements under the Securities Act of 1933, as amended, with the Securities and Exchange Commission related to the issuance of Asterias and BioTime securities under the Asset Contribution Agreement, and costs associated with the special meeting of our shareholders held during May 2013 to approve certain matters related that asset contribution transaction.

General and administrative expenses include employee and director compensation allocated to general and administrative expenses, consulting fees other than those paid for science-related consulting, insurance costs allocated to general and administrative expenses, stock exchange-related costs, depreciation expense, shipping expenses, marketing costs, legal and accounting costs, and other miscellaneous expenses which are allocated to general and administrative expense.

The following table shows the amount of our general and administrative expenses and those related to our subsidiaries during the years ended December 31, 2013 and 2012.

	Amount[1]		Percent	
Company	2013	2012	2013	2012
BioTime	$7,366,234	$4,757,477	47.3%	45.9%
Asterias Biotherapeutics	$3,883,185	$758,563	25.0%	7.3%
BioTime Asia	$164,432	$869,730	1.1%	8.4%
Cell Cure Neurosciences	$675,970	$722,575	4.3%	7.0%
ESI	$305,931	$546,485	2.0%	5.3%
LifeMap Sciences	$1,995,215	$1,292,898	12.8%	12.5%
OncoCyte	$408,470	$606,987	2.6%	5.8%
OrthoCyte	$380,903	$403,694	2.5%	3.9%
ReCyte Therapeutics	$378,334	$406,636	2.4%	3.9%
Total	$15,558,674	$10,365,045	100.0%	100.0%

Other income/(expense) – Other expenses in 2013 consisted primarily of charitable donations of $42,500, $45,461 in income tax provision for LifeMap Sciences, Ltd, one of our majority owned subsidiaries, and $133,479 of foreign currency transaction loss. Other expenses in 2012 included reversal of $207,425 in revenues recognized by ESI.

Taxes

Income Taxes – A deferred income tax benefit of approximately $7,376,000 was recorded for the year ended December 31, 2014, of which approximately $5,155,000 of the benefit was related to federal and $2,221,000 was related to state taxes. A deferred income tax benefit of approximately $3,280,000 was recorded for the year ended December 31, 2013, of which approximately $2,800,000 was related to federal and $480,000 was related to state taxes. As disclosed in Note 14 to the Consolidated Financial Statements, Asterias established deferred tax liabilities primarily related to its acquisition of certain intellectual property. It is more likely than not that the Asterias deferred tax assets are fully realizable since these income tax benefits are expected to be available to offset such Asterias deferred tax liabilities. As BioTime and Asterias file separate tax returns, they may not use each other's tax attributes. Accordingly, BioTime has established a valuation allowance only pertaining to its deferred tax assets presented in the consolidated balance sheet as of December 31, 2014 and 2013.

In June 2014, Asterias sold a portion of the BioTime common shares it held, resulting in a taxable gain of approximately $10.3 million and a tax payable of $3.6 million. This payable, however, is expected to be fully offset by available net operating losses of Asterias. This transaction was treated as a deemed distribution by Asterias and recorded against equity. BioTime’s net operating losses may not be used to offset Asterias’ gains for federal income tax purposes as the companies file separate federal tax returns and may not use each other's tax attributes.

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Liquidity and Capital Resources

At December 31, 2014, we had $29,486,909 of cash and cash equivalents on hand of which $4,447,521 was held by Asterias and other subsidiaries. During February 2015, Asterias raised an additional $5,500,000 through a public offering and a private placement of shares of its Series A common stock.

We have outstanding warrants to purchase 9,194,679 shares of our common stock at an exercise price of $5.00 per share that will expire on dates ranging from January 13, 2016 through September 30, 2018. We will receive $45,975,395 if all of the warrants are exercised. There can be no assurance that the warrants will be exercised.

Asterias has outstanding warrants to purchase 3,500,000 shares of Asterias' common stock at an exercise price of $5.00 per share that will expire on September 30, 2016, and warrants to purchase 5,000,000 shares of Asterias' common stock at an exercise price of $2.34 per share that will expire on June 15, 2015. Asterias will receive $29,200,000 if all of the warrants are exercised. There can be no assurance that the warrants will be exercised.

Asterias has been awarded a $14.3 million Strategic Partnership III grant by CIRM to help fund its clinical development of AST-OPC1. The grant will provide funding for Asterias to conduct a Phase I/IIa clinical trial of AST-OPC1 in subjects with complete cervical spinal cord injury, to expand clinical testing of escalating doses in the target population intended for future pivotal trials, and for product development efforts to refine and scale manufacturing methods to support eventual commercialization. CIRM will disburse the grant funds to Asterias over four years in accordance with a quarterly disbursement schedule, subject to Asterias attaining certain progress and safety milestones. Asterias received the first payment during October 2014 in the amount of $916,554. In January 2015, Asterias received the second payment from CIRM in the amount of $2,269,515. As the balance of the distributions of the CIRM grant are subject to meeting certain progress and go/no-go milestones, there can be no assurance that Asterias will receive the entire amount granted.

During September 2014, Asterias entered into the CRUK Agreement with CRUK and CRT pursuant to which CRUK has agreed to fund Phase I/IIa clinical development of the AST-VAC2 product candidate. Asterias will, at its own cost, complete process development and manufacturing scale-up of the AST-VAC2 manufacturing process and will transfer the resulting cGMP-compatible process to the United Kingdom organization. CRUK will, at its own cost, manufacture the clinical grade AST-VAC2 and will carry out the Phase I/IIa clinical trial of AST-VAC2 in cancer patients both resected early-stage and advanced forms of lung cancer.

Since inception, BioTime has incurred significant net losses and has funded its operations primarily through the issuance of equity securities, payments from research grants, royalties from product sales and sales of research products and services. At December 31, 2014, we had an accumulated deficit of $182,190,207, working capital of $25,275,290 and shareholders’ equity of $62,722,765. BioTime has evaluated its projected cash flows for it and its subsidiaries and believes that its cash and cash equivalents of $29,486,909 as of December 31, 2014, will be sufficient to fund its operations at least through 2015. However, clinical trials being conducted by Asterias and Cell Cure Neurosciences will be funded in part with funds from grants and not from cash on hand. If Asterias or Cell Cure Neurosciences were to lose its grant funding 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 unless it is able to obtain from another source of adequate financing that could be used for its clinical trial.

Cash generated by operations

During the year ended December 31, 2014, we received $3,915,518 of cash in our operations. Our sources of cash during 2014 primarily consisted of $1,167,425 from the sale of research products and subscription and advertisement revenues, research grants payments of $1,819,773 to Cell Cure Neurosciences, $916,554 to Asterias from CIRM, and $530,868 from the NIH. We also received $397,453 in royalty revenues on product sales by licensees. During 2013,

we received $3,857,181 of cash in our operations. Our sources of cash during 2013 primarily consisted of research grants payments of $1,521,722 to Cell Cure Neurosciences, the final payment of $392,664 to BioTime from a research grant from CIRM relating to our PureStem® technology, and a $183,046 research grant payment from the NIH. We also received $1,393,256 from the sale of research products and services and subscription and advertisement revenues, and $366,493 of royalty revenues from sales of Hextend®.

Cash used in operations

During 2014, our total research and development expenditures were $37,532,624 and our general and administrative expenditures were $17,556,102. Net loss attributable to BioTime for the year ended December 31, 2014 amounted to $36,411,660. Net cash used in operating activities during this period amounted to $38,854,200. The difference between the net loss and net cash used in operating activities during 2014 was primarily attributable to amortization of $7,359,690 in intangible assets, $4,455,420 in stock-based compensation paid to employees and consultants, $1,050,651 in depreciation expense, $810,147 of amortization of deferred rent expense, $109,500 of amortization of deferred license fees, and $84,586 of amortization of stock-based prepaid rent. This overall difference was offset to some extent by $7,375,611 in deferred income tax benefit, changes of $469,755 in accounts payable and accrued liabilities, $160,250 in other long term liabilities, $87,328 in inventory, $86,427 in prepaid expenses and other current assets, $73,784 in accounts receivables, and net loss of $7,367,440 allocable to non-controlling interest in our subsidiaries.

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Cash flows from investing activities

During the year ended December 31, 2014, $1,007,804 was used for investing activities. The primary components of this cash were approximately $483,097 used in the purchase of equipment, $219,443 used in leasehold improvements for Asterias' Fremont facility and $319,194 used to pay security deposits on new leases.

Cash generated by financing activities

During October 2014, BioTime sold 9,431,398 common shares for $29,425,962 in a transaction registered under the Securities Act of 1933, as amended (the "Securities Act"). The $3.12 price per share was the closing price of BioTime common shares on the NYSE MKT on October 2, 2014, the date on which BioTime and the investors agreed upon the purchase price. BioTime paid no fees or commissions to broker-dealers or any finder's fees, and did not issue any stock purchase warrants, in connection with the offer and sale of the shares. Broadwood Partners, L.P., purchased 4,040,523 shares, and three of BioTime's current directors also purchased 96,150 shares in the offering.

During the year ended December 31, 2014, we and our subsidiaries raised gross proceeds of $17,380,668 from the sale of 5,545,160 BioTime common shares at a weighted average price of $3.13 per share in "at-the-market" transactions through Cantor Fitzgerald & Co. ("Cantor"), as the sales agent. Offers and sales of our common shares for our account through Cantor were made under a Controlled Equity Offering ^{SM} Sales Agreement and have been registered under the Securities Act. Under the sales agreement, Cantor sold our common shares in transactions that constituted an "at-the-market" offering as defined in Rule 415 under the Securities Act, including, but not limited to, sales made directly on NYSE MKT, and in privately negotiated transactions. Cantor has also acted as a sales agent for our subsidiaries Asterias, LifeMap Sciences, OncoCyte, and Cell Cure Neurosciences that have sold BioTime common shares to raise capital for their operations. The offer and sale of those shares has also been registered under the Securities Act. We contributed the BioTime common shares to the subsidiaries in exchange for subsidiary capital stock. The proceeds of the sale of BioTime shares by our subsidiaries belong to those subsidiaries. There is no assurance that we or our subsidiaries will be able to sell additional common shares through Cantor at prices acceptable to us.

On March 4, 2014, BioTime received $3,500,000 from the sale of 70,000 shares of a newly authorized Series A Convertible Preferred Stock ("Series A Preferred Stock"). The Series A Preferred Stock carries a cumulative annual 3% preferred dividend or $1.50 per share, in preference to BioTime common shares. Each share of Series A Preferred Stock is convertible, at the election of the holder, into BioTime common shares at a conversion price of $4.00 per share, a current conversion ratio of 12.5 common shares for each share of Series A Preferred Stock. See Note 9 to the Consolidated Financial Statements.

BioTime also received $219,500 in cash from the exercise of options by an employee and three directors at a weighted average exercise price of $1.91 per share.

During June 2014 Asterias sold 5,000,000 of its BioTime common shares with warrants to purchase 5,000,000 shares of Asterias' common stock to two private investors for $12,500,000 in cash. The warrants are exercisable until June 15, 2015 at an exercise price of $2.34 per share. The exercise price of the warrants and the number of shares issuable upon the exercise of the warrants are subject to adjustment in the case of stock splits, stock dividends, or certain other transactions. See Notes 8, 9 and 11 to the Consolidated Financial Statements. During June 2014, Asterias al