BIOTIME INC
Form 10-K
March 15, 2011

SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

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

For the fiscal year ended December 31, 2010

OR

o 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 class Common Shares, no par value

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 o No x

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

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the

Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes x No o

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

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, 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 o	Accelerated filer x
Non-accelerated filer o (Do not check if a smaller reporting company)	Smaller reporting company o

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

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, 2010 was $123,743,749. 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 1, 2011 was 47,357,360

Documents Incorporated by Reference
Portions of Proxy Statement for 2011 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 Note 1 to Financial Statements.

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

Item 1. Business

Overview

We are a biotechnology company engaged in two areas of biomedical research and product development. Initially we developed blood plasma volume expanders and related technology for use in surgery, emergency trauma treatment, and other applications. Currently we are focused on regenerative medicine, an emerging field of therapeutic product development based on recent discoveries in stem cell research.

Our lead blood plasma expander product, Hextend®, is a physiologically balanced intravenous solution used in the treatment of hypovolemia, a condition caused by low blood volume, often from blood loss during surgery or injury. Hextend maintains circulatory system fluid volume and blood pressure, and keeps vital organs perfused during surgery and trauma care.

“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. Historically speaking, this has never been possible in the past, and was made possible by the first isolation of human embryonic stem (“hES”) cells and creation of induced pluripotent stem (“iPS”) cells. These cells are called “pluripotent stem cells” because they have the unique property of being able to branch out into each and every kind of cell in the human body such as 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 simply regenerating the disease cells and tissues, and therefore may have broader applicability in clinical practice.

Our efforts include the development and sale of products designed for therapeutic as well as research applications. In the field of regenerative medicine in particular, we offer advanced human stem cell products that can be used by researchers at universities and at companies in the bioscience and biopharmaceutical industries. Research products generally can be marketed without regulatory approval, and are therefore relatively near-term business opportunities, especially when compared to therapeutic products.

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During 2010, we added three subsidiaries to our corporate family. In May 2010, we acquired ES Cell International Pte. Ltd. ("ESI"), a Singapore-based company at the forefront of advances in human embryonic stem cell technology and one of the earliest distributors of hES cell lines. In June, we formed OrthoCyte Corporation to develop treatments for orthopedic disorders. Through our acquisition of ESI, we also became a minority shareholder in Cell Cure Neurosciences, Ltd., an Israel-based company developing innovative stem cell treatments for neural and retinal diseases. During October 2010, we became the majority shareholder in Cell Cure Neurosciences through an additional equity investment made in conjunction with investments by two other Cell Cure Neurosciences shareholders.

In December 2010, our subsidiary Embryome Sciences, Inc. was renamed ReCyte Therapeutics, Inc. following an equity financing of $4 million, including a $2.5 million investment by private investors and a $1.5 million investment on our part. We retained an ownership interest of approximately 95% of the outstanding shares of ReCyte Therapeutics. The new equity funding will be used to finance the development of cell-based therapeutic products for cardiovascular and blood diseases. The research product business conducted through Embryome Sciences will instead be conducted by BioTime. Our subsidiary, ESI, markets other stem cell research products such as human embryonic stem cell lines produced under good manufacturing practice ("GMP") - compliant conditions.

In January 2011, we acquired the assets of Cell Targeting, Inc. ("CTI"), a biotechnology company - focused on technologies to "paint" molecules on the surface of cells that cause the cells to adhere to particular tissues, such as those afflicted with disease. CTI and its collaborators have produced several such tissue-specific and disease-specific cell modification agents with the potential to raise cell therapy products to a new level of performance. We will initially provide this technology to our majority-owned subsidiary OncoCyte Corporation for use in the development of genetically modified hES-derived vascular progenitors designed to target and destroy malignant tumors.

In February 2011, we signed an agreement to merge Glycosan BioSystems, Inc. (Glycosan), a Salt-Lake City, Utah based biotechnology company, with OrthoCyte Corporation. Glycosan has been a leader in developing, manufacturing, and marketing proprietary biocompatible hydrogels that mimic the extracellular matrix in which cells reside. We intend to initially use the Glycosan technology in the development of therapeutic products for use in the treatment of osteoarthritis. Glycosan's hydrogels may have other applications when combined with the diverse and scalable cell types our scientists have isolated from hES cells. In addition, we may elect to seek regulatory approval for the use of one Glycosan hydrogel, HyStem-Rx, as a stand alone cell delivery device in countries outside of the United States.

Hextend® and PentaLyte® are registered trademarks of BioTime, Inc., and ESpan™, and ESpy™ are trademarks of BioTime, Inc. ReCyte™ is a trademark of ReCyte Therapeutics, Inc. ACTCellerate™ is a trademark licensed to us by Advanced Cell Technology, Inc.

We were 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.

We make available free of charge on or through our Internet website our annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and all amendments to those reports as soon as reasonably practicable after they are electronically filed with, or furnished to, the Securities and Exchange Commission. Our Internet website address is www.biotimeinc.com. Information on our website is not incorporated by reference and does not form a part of this report. Copies of our annual reports on Form 10-K will be furnished without charge to any person who submits a written request directed to the attention of our Secretary, at our offices located at 1301 Harbor Bay Parkway, Alameda, California 94502.

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Business Strategy

One of our aims is to develop cell replacement therapies for age-related degenerative disease. The degenerative diseases of aging are an attractive business opportunity because the elderly comprise a large and growing segment of our population, and 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. This latter characteristic means that age related diseases may be best treated with cell replacement therapies. The restoration of functionality in tissues through cell replacement therapy may eliminate the high costs associated with years of palliative care.

Our effort in regenerative medicine also includes research on more than 140 purified, scalable, and novel human embryonic progenitor cell types produced from hES 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 BioTime 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. We will 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. We believe that having subsidiaries that focus on particular disease applications or research products will facilitate the optimization of scientific and commercial collaborations, thereby improving the probability that a subsidiary company will eventually become an industry leader. Due to the expectation of eventual separation of a subsidiary from the parent company, high-quality executives are likely to be more attracted to managing subsidiary companies than to heading divisions within a larger company. The organization of our regenerative medicine business into subsidiaries has also facilitated our ability to obtain financing for our regenerative medicine programs.

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The following table shows our subsidiaries, their respective principal fields of business, our percentage ownership, and the country where their principal business is located:

Subsidiary	Field of Business	BioTime Ownership	Country
ReCyte Therapeutics, Inc.	Blood and vascular diseases including coronary artery disease iPS cell banking	95.15%	USA
OncoCyte Corporation	Cancer	74%	USA
OrthoCyte Corporation	Orthopedic diseases, including osteoarthritis	100%	USA
ES Cell International Pte. Ltd.	Stem cell products for research, including clinical GMP cell lines	100%	Singapore
BioTime Asia, Ltd.	Ophthalmologic, skin, musculo-skeletal system, and hematologic diseases. Stem cell products for research	81%	Hong Kong
Cell Cure Neurosciences, Ltd.	Age-related macular degeneration Multiple sclerosis Parkinson’s disease	53.6%	Israel

The joint ownership of subsidiaries with other investors will allow us to fund the expensive development costs of therapeutics 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. In some cases, the co-investors in our subsidiaries may include other participants in the pharmaceutical or biotechnology industry and their affiliates. An example of this would be our investment in Cell Cure Neurosciences, which was made in concert with investments from Teva Pharmaceutical Industries, Ltd. and HBL-Hadasit Bio-Holdings, Ltd.

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 than would be possible with the development of therapeutic products alone.

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Stem Cells and Products for Regenerative Medicine Research

Because hES and iPS cells have the ability to transform into any cell type in the human body (a property called pluripotency), 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 lost due to degenerative disease or injury that would benefit those performing research in therapeutic product development. hES and iPS cell-derived lines that display novel cell signaling pathways 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 cell technology from patients with particular degenerative diseases, stem cells are increasingly likely to be utilized in a wide array of future research programs aim 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.

Human Embryonic Stem Cell Lines for Research Use

During November and December 2010, we signed agreements with the California Institute for Regenerative Medicine ("CIRM") and the University of California system to distribute five research-grade and GMP compliant hES cell lines to California-based researchers. We believe that making the GMP-grade cell lines available to researchers may streamline the translation of basic science into therapies.

Initially, we are providing research-grade cell lines free of charge to CIRM-funded and California-based researchers until April 30, 2011. After that date, researchers will purchase the research-grade cells from us at a price of $2,600 per ampoule.

We plan to make the GMP-grade cell lines, along with certain documentation and complete genomic DNA sequence information, available by November 2011. We will charge a price for the GMP-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 GMP cell lines for therapeutic or diagnostic products, or for any other commercial purposes, may do so only after signing commercialization agreements acceptable to us. Commercialization agreements under this program will entitle us to receive royalties on net sales not to exceed 2% of net sales, reducible to 1.5% if the researcher must pay any other royalties in connection with the commercialization of their product.

Human Embryonic Progenitor Cells

Through our subsidiary ReCyte Therapeutics, Inc. we acquired a license from Advanced Cell Technology, Inc. ("ACT") to use ACTCellerate™ technology, and the rights to market more than 140 novel human cell types made using that process. ACTCellerate™ allows the rapid isolation of novel, highly purified human embryonic progenitor cells ("hEPCs"), which are cells that are intermediate in the developmental process between embryonic stem cells and fully differentiated cells. hEPCs are expected to possess the ability to become a wide array of cell types with potential applications in research, drug discovery, and human regenerative stem cell therapies. hEPCs are relatively easy to manufacture on a large scale and in a purified state, which may make it more advantageous to work with these cells than with hES or iPS cells directly.

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- Commercial Distribution of ACTCellerate™ hEPC lines.

In 2009, ReCyte Therapeutics entered into an agreement under which Millipore Corporation became a worldwide distributor of ACTCellerate™ hEPC lines. Millipore's initial offering of our ACTCellerate™ products consists of six novel progenitor cell lines and optimized ESpan™ growth media for the in vitro propagation of each progenitor cell line, which are being marketed and distributed on a worldwide basis. The ACTCellerate™ hEPC lines and ESpan™ growth media products distributed by Millipore may also be purchased directly from us on our website Embryome.com. In addition to the products that we are co-marketing with Millipore, we now offer 92 other ACTCellerate™ hEPC lines for sale on Embryome.com, and we anticipate adding additional cell lines and related ESpan™ growth media and differentiation kits over time. In 2011, BioTime may also undertake new efforts including collaborations with other companies that provide online biomedical database services to increase awareness of the molecular markers and of its diverse cell types and thereby aggressively market is research product portfolio. This effort may include substantially expanding the content and improving the efficiency of our embryome map database that is available at our website, www.embryome.com.

We also plan to market additional cell types manufactured with our proprietary PureStem™ technology. PureStem™ cell lines are produced by the exogenous expression of specific transcription factors that regulate the differentiation of diverse cell types from hES or iPS cells. This technology when combined with ACTCellerate™ is expected to expand our offering of new human cell types for research and potentially therapeutic applications.

In December 2010, our subsidiary BioTime Asia, Limited signed an agreement with Shanghai Genext Medical Technology Co., Ltd. to sell ACTCellerate™ hEPC lines and related ESpan™ growth media to the medical and biological research communities in China, Taiwan, Hong Kong, and Macau on an exclusive basis. The marketing agreement includes provisions for an initial stocking inventory and annual milestones to maintain exclusivity.

- CIRM Grant TR-1276

On April 29, 2009, CIRM awarded us a $4,721,706 grant for a stem cell research project related to our ACTCellerate™ technology. Our grant is titled "Addressing the Cell Purity and Identity Bottleneck through Generation and Expansion of Clonal Human Embryonic Progenitor Cell Lines."

Our CIRM-funded research addresses the need for industrial scale production of purified therapeutic cells. Purity and precise identification of the desired therapeutic cells are essential for cell therapy; because unlike a drug that may persist in the body for a matter of hours or days, a cell can persist in the body for an entire lifetime. Current methodologies for preparing cell therapeutics from hES or iPS cells typically involve complex and difficult derivation processes that result in heterogenous populations of cells, only a portion of which are the intended therapeutic agent. The pluripotency that allows hES cells to differentiate into all types of cells also poses the problem of assuring that all hES cells in a cultured batch differentiate into the desired type of body cell. Contamination of hES or iPS derived cells with the wrong cells could lead to diseases or disorders resulting from normal but inappropriate tissue growth or tumor formation. However, because our hEPCs are clonal, meaning that they are derived from a single cell, they have the potential to grow as a highly purified and identified cell line. For this reason, this CIRM-funded research is of direct benefit to us in manufacturing cell types for both the research markets and potential therapeutic product candidates.

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Our grant-funded research includes three major aims, the first of which is to characterize the commercial scalability and stability of clonal hEPC lines. The production of hEPCs for human therapeutic use will require a means of ascertaining whether the cells being used are capable of large-scale expansion in a manner compatible with current commercial cell culture technologies. We have performed long-term stability studies of hEPCs using commercial-type culture processes, and have documented the phenotypic stability of these lines by demonstrating that, even after extensive expansion, lines such as OTX-CP07, a line with the potential to become cartilage, maintains the ability to fully differentiate, as evidenced by the expression of mRNA and protein markers. Importantly, we have shown that hEPCs generally maintain their genotypic stability during culture expansion. Many cell types, including hES cells, tend to gain or lose chromosomes or parts of chromosomes during extended in vitro culturing. We have evaluated the genetic karytoype of hEPCs during commercial-scale expansion and have generally observed the maintenance of normal chromosomal content. These results are consistent with our premise that hEPCs represent a stable cellular platform for producing cellular therapeutic products.

Our second major objective covered by the CIRM grant is to define hEPC surface markers for which molecular affinity reagents can be developed that will in turn enable us to purify hEPCs from hES or iPS cultures. We are currently performing research to define a molecular signature of cell-surface markers unique to a given hEPC line. This would then allow us to develop antibodies and other affinity reagents for these markers that could be used to purify the target hEPCs intended for therapy. Our initial approach towards identifying cell-surface markers relies on several independent strategies. We have estimated the expression of cell-surface proteins by microarray analysis of mRNA expression levels. Use of this approach to review cell-surface expression across the entire genome will enable the identification of unique combinations of protein markers that would constitute a unique signature for a specific cell line. We have also begun mapping cell-surface protein expression directly on hEPCs using large collections of commercially available antibodies, and we have begun testing these antibodies as affinity reagents for purifying target hEPCs. Finally, we are working with Mandala Biosciences, LLC to identify peptide reagents that exhibit specificity for cell-surface targets on hEPCs and that could be used directly as affinity reagents. This peptide reagent strategy proposes to map the surface markers on hEPC lines such that a molecular signature specific to a given hEPC line can be identified. The molecular signature will be the key to verifying the correct phenotypic identity of cells intended to be used in therapy, and will facilitate purification of hEPCs from any hES or iPS cell line.

The third objective of the CIRM research project is to evaluate the biological potential of hEPCs using medium-throughput differentiation tests and protocols. We believe that hEPCs represent a biological state midway between the pluripotent hES cell and a fully differentiated adult cell. As such, hEPCs often display the ability to differentiate into multiple cell types, depending on exposure to particular culture conditions, biological inducers and protein factors. Working with our collaborators in the lab of Dr. Evan Snyder at the Sanford-Burnham Medical Research Institute in La Jolla, California, we are applying standardized regimens to hEPCs and then measuring the differentiation of these treated hEPC cultures using microarray-based assessment of mRNA. By reviewing the molecular markers that are induced by the treatment, we can deduce the differentiation fate of the cells. When performed on a large-scale, these “fate space screens” are allowing us to define the biological potential of the ACTCellerate™ cell lines and identify new opportunities for developing cell lines with therapeutic potential.

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Ultimately, the overall CIRM funded project is expected to provide well-characterized hEPCs that are precursors of therapeutic cells such as kidney, blood vessel, muscle, cartilage, and skin cells, among other cell types. We are currently in the second year of our CIRM funding for this research project. The CIRM funding for this research project will continue until August 31, 2012. We received the first two quarterly payments from CIRM, totaling $790,192, during the second half of 2009 and four additional quarterly payments, totaling $1,575,523, during the year ended December 31, 2010.

Clinical Grade hES Cell Lines

The development of clinical-grade human therapeutic products requires high standards of quality control. The detailed procedures for all aspects of production and product testing (i.e., aspects that could potentially exert an impact on the safety and quality of a product) are commonly referred to as "Current Good Manufacturing Practice" or "cGMP." The United States Food and Drug Administration ("FDA") enforces cGMP regulations with respect to the manufacturing of human therapeutics for use in the United States, and virtually every country across the globe maintains some analogous standards for quality control in the manufacture of human therapeutic products.

In 2007, ESI announced the world's first hES cell lines derived according to the principles of cGMP. 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 ACTCellerate 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 cell lines- 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.

We are currently offering research-grade ESI hES cell lines in the United States under our agreement with CIRM, and we plan to make the clinical-grade lines available in November 2011.

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hES Cells Carrying Genetic Diseases

ReCyte Therapeutics, has signed an agreement for the Reproductive Genetics Institute of Chicago, Illinois to source an array of hES cell lines carrying inherited genetic diseases such as cystic fibrosis and muscular dystrophy. Study of these cell lines may enable researchers to better understand the mechanisms involved in causing the disease states, which may in turn expedite the search for potential treatments. We intend to sublicense these cell lines from ReCyte Therapeutics to BioTime in order to offer these hES cell lines for sale online at Embryome.com at a future date.

ESpan™ Cell Growth Media

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. Some of our ESpan™ products are currently marketed through Millipore and Genext.

ESpy™ Cell Lines

Additional new products that we have targeted for development are ESpy™ cell lines, which will be derivatives of hES cells and will 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.

Subsidiaries Focused on Stem Cell-Based Therapies for Specific Diseases

OncoCyte: Cell-Based Therapies Targeting Cancer.

Formed in 2009, OncoCyte Corporation is developing cellular therapeutics for cancer therapy that will take advantage of the unique biology of vascular endothelial precursor cells. Vascular biology encompasses many potential therapeutic applications, including those for cancer, peripheral vascular disease, and cardiac disease. The goal of our research efforts in OncoCyte is to derive vascular endothelial cells that can be engineered to deliver a toxic payload to the developing blood vessels of a tumor to specifically remove 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.

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OncoCyte is currently working on the development of reproducible protocols to manufacture vascular progenitor cells from hES and iPS cells. OncoCyte has developed a derivation protocol that can produce populations of vascular progenitor cells with levels of purity and efficiency that appear to surpass any results described to date in the published literature. Importantly, OncoCyte's methods appear to be compliant with commercial manufacturing processes. OncoCyte has expanded and banked large numbers of vascular progenitor cells derived from multiple hES cell lines, including clinical-grade stem cells provided by our subsidiary ESI.

In concert with the protocol development, OncoCyte has established a broad range of support assays to monitor and measure vascular progenitor cell differentiation processes. These tools have allowed OncoCyte to begin in vivo experiments monitoring the incorporation of endothelial cells into developing mouse vasculature, and most recently, incorporation into the developing vasculature of human tumor xenografts. OncoCyte has also performed research on transgenes that may allow the cells to destroy tumors. In this strategy, the engineered vascular progenitor cells will be injected into the circulation of an animal bearing a human tumor graft. The incorporation of the cells into the tumor, and the safety and efficacy of the cells with respect to tumor-specific destruction will be studied with the aim of supporting potential human clinical trials.

On January 28, 2011, we acquired the assets of Cell Targeting, Inc. ("CTI"), including technology that uses peptides selected for their ability to adhere to diseased tissues. By coating or "painting" these peptides onto the surfaces of therapeutic cells using techniques that do not modify the cell physiology, CTI has produced tissue-specific and disease-specific cell modification agents with the potential to elevate cell therapy products to a new level of performance. We will initially provide this technology to OncoCyte for use in the development of genetically modified hES-derived vascular progenitors designed to target and destroy malignant tumors.

OncoCyte has received $4.0 million in equity financing from private investors. We believe that OncoCyte has sufficient capital to carry out its research and development plan during 2011. We may provide additional financing for OncoCyte, or obtain financing from third parties, based on our evaluation of progress made in its research and development program, any changes to or the expansion of the scope and focus of its research, and our projection of future costs.

We presently own 74% 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, 2010, options to purchase 1,000,000 shares of OncoCyte common stock had been granted.

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OrthoCyte: Cartilage Repair Using Embryonic Progenitor Cells

OrthoCyte Corporation is our wholly owned subsidiary developing cellular therapeutics for orthopedic disorders. OrthoCyte's lead project is the development of hEPC lines for cartilage repair, including osteoarthritis. OrthoCyte has identified several ACTCellerate™ 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 safety and efficacy of the cells using in vivo models of articular disease. If our studies in animal models prove successful, we would plan to initiate an IND filing with the FDA for this application.

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 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 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.

During o