GERON CORP
Form 10-K
February 27, 2009

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

FORM 10-K

(Mark One)

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

For the Fiscal Year Ended December 31, 2008

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: 0-20859

GERON CORPORATION

(Exact name of registrant as specified in its charter)

Delaware	**75-2287752**
(State or other jurisdiction of incorporation or organization)	*(I.R.S. Employer Identification No.)*
230 Constitution Drive, Menlo Park, CA	**94025**
(Address of principal executive offices)	*(Zip Code)*

Registrant s telephone number, including area code: (650) 473-7700

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

Title of each class	**Name of each exchange on which registered**
Common Stock, $0.001 par value	Nasdaq Global Market

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes 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 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.

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

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

The aggregate market value of voting and non-voting common equity held by non-affiliates of the registrant was approximately $269,599,481 based upon the closing price of the common stock on June 30, 2008 on the Nasdaq Global Market. Shares of common stock held by each officer, director and holder of five percent or more of the outstanding Common Stock have been excluded in that such persons may be deemed to be affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

As of February 23, 2009, there were 89,009,024 shares of common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE:

Document	Form 10-K Parts
Portions of the Registrant's definitive proxy statement for the 2009 annual meeting of stockholders to be filed pursuant to Regulation 14A within 120 days of the Registrant's fiscal year ended December 31, 2008	II, III

Forward-Looking Statements

This annual report on Form 10-K, including "Management's Discussion and Analysis of Financial Condition and Results of Operations" in Item 7, contains forward-looking statements that involve risks and uncertainties, as well as assumptions that, if they never materialize or prove incorrect, could cause the results of Geron Corporation (Geron) to differ materially from those expressed or implied by such forward-looking statements. All statements other than statements of historical fact are statements that could be deemed forward-looking statements. The risks and uncertainties referred to above include, without limitation, risks inherent in the development and commercialization of Geron's potential products, dependence on collaborative partners, need for additional capital, need for regulatory approvals or clearances, the maintenance of Geron's intellectual property rights and other risks that are described herein and that are otherwise described from time to time in Geron's Securities and Exchange Commission reports including, but not limited to, the factors described in Item 1A, "Risk Factors," of this report. Geron assumes no obligation and does not intend to update these forward-looking statements.

PART I

ITEM 1. BUSINESS

Overview

Geron is a biopharmaceutical company that is developing first-in-class therapeutic products for the treatment of cancer and chronic degenerative diseases, including spinal cord injury, heart failure and diabetes. We are advancing telomerase targeted therapies, including an anti-cancer drug and a cancer vaccine, through multiple clinical trials. We believe we are also the world leader in the development of human embryonic stem cell (hESC)-based therapeutics. We have received FDA clearance to begin the world's first human clinical trial of a hESC-based therapy: GRNOPC1 for acute spinal cord injury.

We were incorporated in 1990 under the laws of Delaware. Our principal executive offices are located at 230 Constitution Drive, Menlo Park, California 94025. Our telephone number is (650) 473-7700.

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.geron.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 230 Constitution Drive, Menlo Park, California, 94025.

Major Technology Platforms

Telomeres and Telomerase: Role in Cellular Aging and Cancer

Cells are the building blocks for all tissues in the human body and cell division plays a critical role in the normal growth, maintenance and repair of human tissue. However, in the human body, most cell division is a limited process. Depending on the tissue type, cells generally divide only 60 to 100 times during the course of their normal lifespan.

We and our collaborators have shown that telomeres, located at the ends of chromosomes, are key genetic elements involved in the regulation of the cellular aging process. Our work has shown that each time a normal cell divides, telomeres shorten. Once telomeres reach a certain short length, cell division halts and the cell enters a state known as replicative senescence or aging. Thus, this shortening of the telomeres effectively serves as a molecular "clock" for cellular aging. We and others have shown that when the enzyme telomerase is introduced into normal cells, it can restore telomere length – reset the "clock" – thereby increasing the functional lifespan of the cells. Importantly, it does this without altering the cells' biology or causing them to become cancerous. Human telomerase, a complex enzyme, is composed of a ribonucleic acid (RNA) component, known as hTR, a protein component, known as hTERT, and other accessory proteins. In 1994, we cloned the gene for hTR, and in 1997, with collaborators, cloned the gene for hTERT.

Our work and that of others has shown that telomerase is not present, or is present at very low levels, in most normal cells and tissues, but that during cancer progression, telomerase is abnormally reactivated in all major cancer types. We have shown that while telomerase does not cause cancer (which is caused by mutations in oncogenes and tumor suppressor genes), the continued presence of telomerase enables cancer cells to maintain telomere length, providing them with indefinite replicative capacity. We and others have shown in various tumor models that inhibiting telomerase activity results in telomere shortening and causes aging or death of the cancer cell.

Although telomerase is expressed in nearly all cancer cells, it is not expressed in most normal cells. That gives telomerase the potential of being both a universal as well as a highly specific cancer target. This specificity means that drugs and biologics that attack cancer cells by targeting telomerase may leave most other cells unaffected, and thus may have fewer side effects than conventional chemotherapeutic agents that typically affect both cancer and non-cancer cells.

We are developing anti-cancer therapies based on telomerase inhibitors and telomerase therapeutic vaccines. Through our licensee, we also intend to develop products using telomerase as a marker for cancer diagnosis, prognosis, patient monitoring and screening.

We are also researching compounds that transiently activate telomerase in senescent cells to restore cell function for the treatment of injuries and chronic diseases.

Human Embryonic Stem Cells: A Potential Source for the Manufacturing of Therapeutic Cells

Stem cells generally are self-renewing primitive cells that can develop into functional, differentiated cells. Human embryonic stem cells (hESCs), which are derived from very early stage embryos called blastocysts, are unique because:

- they are pluripotent, which means they can develop into all cells and tissues in the body, and
- they self-renew indefinitely in the undifferentiated state because they express high levels of telomerase.

The ability of hESCs to divide indefinitely in the undifferentiated state without losing pluripotency is a unique characteristic that distinguishes them from all other stem cells discovered to date in humans. We have demonstrated that hESCs express telomerase continuously, a characteristic of immortal cells. Other stem cells such as blood or gut stem cells express telomerase at very low levels or only periodically; they therefore age, limiting their use in research or therapeutic applications. hESCs can be expanded in culture indefinitely and hence can be banked for scaled product manufacture.

We intend to use human embryonic stem cell technology to enable the development of transplantation therapies by providing standard starting material for the manufacture of therapeutic cells and facilitate pharmaceutical research and development practices by providing cells for disease models and screening, and for assigning function to newly discovered genes.

Commercial Opportunities for Our Major Technology Platforms

Oncology

Cancer is a group of diseases characterized by the uncontrolled growth and spread of abnormal cells. The American Cancer Society estimated that approximately 1.4 million new cancer cases were diagnosed in 2008. Overall annual costs associated with cancer in 2007 were an estimated $219.2 billion in the United States alone. Because telomerase is detectable in more than 30 human cancer types and in the great majority of cancer samples studied, we believe that telomerase-based drugs could overcome the limitations of current cancer therapies and potentially be broadly applicable and highly specific drug treatments for cancer.

We and our licensees are developing a range of anti-cancer therapies, including anti-cancer therapies based on telomerase inhibitors and telomerase therapeutic vaccines, and diagnostics based on telomerase detection. We believe telomerase is an ideal target for cancer therapeutics and diagnostics because it appears to be universal (expressed in all major types of cancers studied to date), specific (not expressed in most normal cells), and critical (required for long-term survival of cancer cells). We believe that we have the dominant patent position in the field of telomerase. Whether it is achieved by us or licensees,

we believe that progress in the development of telomerase-based cancer therapeutics and diagnostics will further validate the importance of telomerase as a cancer target and therefore benefit all of our telomerase cancer programs.

The following table briefly describes the cancer therapeutic and diagnostic products being developed by us or our licensees, and the stage of development of these product candidates.

Product	Product Description	Disease Treatment	Development Stage
GRN163L	Telomerase Inhibitor	Chronic Lymphoproliferative Diseases	Phase I Trial (single agent)
GRN163L	Telomerase Inhibitor	Solid Tumors	Phase I Trial (single agent)
GRN163L	Telomerase Inhibitor	Multiple Myeloma	Phase I Trial (single agent)
GRN163L	Telomerase Inhibitor	Non-Small Cell Lung Cancer	Phase I Trial (combination)
GRN163L	Telomerase Inhibitor	Breast Cancer	Phase I/II Trial (combination)
GRN163L	Telomerase Inhibitor	Multiple Myeloma	Phase I Trial (combination)
GRNVAC1	Telomerase Cancer Vaccine	Acute Myelogenous Leukemia (AML)	Phase II Trial

Licensees	Product Description	Disease Treatment	Development Stage
Merck & Co.	Telomerase Cancer Vaccine	Prostate and Solid Tumors	Phase I Trial
Sienna Cancer Diagnostics	Telomerase Diagnostic	Bladder Cancer	Preclinical Development

Telomerase Inhibition (GRN163L). Upregulation of telomerase is necessary for most cancer cells to replicate indefinitely and thereby enable tumor growth and metastasis. One of our strategies for the development of anti-cancer therapies is to inhibit telomerase activity in cancer cells. Inhibiting telomerase activity should result in telomere shortening which can cause aging and death of cancer cells. Recent data show that telomerase can protect tumor cells from genomic instability and other forms of cellular stress, suggesting that inhibiting telomerase can cause a more rapid suppression of tumor growth than predicted by telomere loss alone. Because telomerase is expressed at very low levels, if at all, in most normal cells, the telomerase inhibition therapies described below are being developed with the goal of being less toxic to normal cells than conventional chemotherapy.

We have designed and synthesized a special class of short-chain nucleic acid molecules, known as oligonucleotides, which target the template region, or active site, of telomerase. Our work has focused on two of these oligonucleotides, called GRN163 and GRN163L, and we have demonstrated that they have highly potent telomerase inhibitory activity at very low concentrations in biochemical assays, various cellular systems and animal studies. These compounds are direct enzyme inhibitors, not antisense compounds. They are smaller (lower molecular weight) than typical antisense compounds or other oligonucleotide drug candidates. Both compounds use a special thiophosphoramidate chemical backbone, for which we acquired key patents in March 2002 from Lynx Therapeutics.

Our lead compound, GRN163L, is identical in structure to GRN163 except that it has a lipid molecule permanently attached to one end of the molecule, which increases potency and improves its pharmacokinetic and pharmacodynamic properties. GRN163L is a 13-mer oligonucleotide N3□-- P5□ thio-phosphoramidate (NPS oligonucleotide) that is covalently attached to a C16 (palmitoyl) lipid moiety. GRN163L binds directly with high affinity to the template region of the RNA component of human telomerase (hTR), which lies in the active or catalytic site of hTERT, the telomerase reverse transcriptase. GRN163L binding to hTR results in direct, competitive inhibition of telomerase enzymatic activity.

After completing a series of animal toxicology and preclinical efficacy studies of GRN163L in 2005, we received clearance from the U.S. Food and Drug Administration (FDA) to begin human clinical trials of GRN163L. Currently, there are six ongoing clinical trials recruiting from 20 U.S. medical centers examining the safety, tolerability, pharmacokinetics and pharmacodynamics of GRN163L, alone or in combination with other standard therapies. Patients with chronic lymphoproliferative diseases, solid tumors, multiple myeloma, non-small cell lung and breast cancer are currently receiving the drug.

At the December 2008 American Society of Hematology meeting, we presented interim data on the ongoing clinical trial of GRN163L in patients with relapsed and refractory multiple myeloma. The preliminary results showed that GRN163L was generally well tolerated and appears to inhibit telomerase in both the bulk myeloma fraction as well as the myeloma stem-cell containing fraction in patients bone marrow. These preliminary results from two patients with evaluable data are the first evidence in man of telomerase inhibition by a telomerase targeting drug and will help us optimize dosing schedules to enable sustained telomerase inhibition that hopefully will translate into clinical activity.

Telomerase Therapeutic Vaccine (GRNVAC1). The goal of therapeutic cancer vaccines is to teach the patients own immune system to attack cancer cells while sparing other cells. This is done by repeatedly exposing the immune system to a substance (antigen) that is specific to cancer cells in a way that subsequently induces an immune response to any cells that express that antigen on their surface. We believe that the characteristics of telomerase make it an ideal antigen for cancer vaccines.

At Duke University Medical Center, a Phase I/II clinical trial in prostate cancer patients concluded in March 2005 and additional Phase I/II optimization trials for patients with hematologic, prostate and renal cancers concluded in 2006. The Duke Phase I/II clinical trials used an *ex vivo* process in which dendritic cells (the bodys most powerful antigen-presenting cells) were isolated from the patients blood, pulsed with RNA for the telomerase protein component, and then injected into the patients skin, where they traveled to the lymph nodes and instructed cytotoxic T-cells to kill tumor cells that express telomerase on their surface.

The first clinical trial at Duke University Medical Center was designed to enroll up to a total of 24 patients with metastatic prostate cancer, up to 12 of whom would receive three weekly vaccinations (low-dose group), and up to 12 of whom would receive six weekly vaccinations (high-dose group). Twenty-three patients were enrolled and treated, and results of this study for 20 patients (12 of the low-dose group and eight of the high-dose group) were published in the *Journal of Immunology* in March 2005. As reported by the investigator, none of the patients in either group had significant treatment-related adverse effects. All but one of the patients in the low-dose group showed a significant cellular immune response specific to telomerase. The eight patients in the high-dose group all showed very robust cellular immune responses to telomerase based on tests assessing the generation of telomerase-specific cytotoxic CD8+ T-lymphocytes, as well as telomerase-specific CD4+ lymphocytes. The immune responses in the high-dose group were strong as well as specific: peak responses were 1-2% of circulating CD8+ T-cells having anti-telomerase activity.

Serum PSA (prostate specific antigen) was measured before, during and multiple times after vaccination to calculate PSA doubling time as a surrogate marker for treatment response. No significant change in PSA doubling time after vaccination was reported in the low-dose group. A highly significant increase in PSA doubling time was reported in the high-dose group, suggestive of a clinical response to vaccination.

Several small additional Phase I/II trials for patients with prostate cancer, hematologic malignancies and renal cell carcinoma were performed at Duke in order to optimize the vaccination process. In the trials, a number of parameters were tested, including (i) the pre-vaccination administration of an approved compound to potentially augment vaccine potency; (ii) the use of a second approved compound applied to the vaccine injection site to potentially enable the use of dendritic cells produced by an alternative manufacturing process and; (iii) the use of boost vaccinations to potentially enhance the durability of the anti-telomerase immune response. Additionally, we brought the vaccine manufacturing process in-house for further optimization and transferred it to a contract manufacturer. In 2006, we filed our own Investigational New Drug (IND) application to initiate a Phase II clinical trial of the telomerase vaccine using the prime/boost vaccination protocol in patients with acute myelogenous leukemia (AML). We received FDA concurrence for that IND in December 2006 and began treating AML patients under this protocol in late 2007. Currently, there are four U.S. medical centers examining the safety and feasibility of a prime-boost vaccination regimen that extends the duration of telomerase immunity. Also we are evaluating the immune response to GRNVAC1 and exploring the effects of vaccination on minimal residual disease and relapse rates.

In 2004, we acquired rights from Argos Therapeutics, Inc. (formerly Merix) to commercialize the *ex vivo* dendritic cell processing technology used in the Duke clinical trials for telomerase and other defined tumor-specific antigens. We own the rights to the telomerase antigen and its use in therapeutic vaccines.

In 2006, we licensed rights from Immunomic Therapeutics, Inc. to the LAMP antigen targeting sequence for use in cancer vaccines. The LAMP sequence causes an antigen to which it is attached to be taken up by the lysosomal subcellular compartment of the cell. This has been shown to increase presentation on MHC class II molecules, which in turn, can produce greater CD4+ T-cell responses against the antigen and a more potent and longer lasting overall immune response.

Also in 2006, we entered into a worldwide exclusive license and collaboration agreement with the University of Oxford to produce dendritic cells from hESCs. The scalable production of dendritic cells from hESCs could serve as an alternative to isolating dendritic cells from each patient, and possibly as a broadly useful vaccine delivery vehicle. In another form, dendritic cells may act to block an immune response against an antigen by teaching the immune system not to attack it a process known as tolerizing the individual to that antigen. Since the same pluripotent hESC line could be used to generate both tolerizing dendritic cells and therapeutic cells, co-administration of these two cell populations could potentially circumvent immune rejection without the need for immunosuppressive drugs.

In July 2005, we entered into a worldwide exclusive research, development and commercialization license agreement with Merck & Co., Inc. for cancer vaccines targeting telomerase by methods other than dendritic cell delivery. In addition, Merck acquired an exclusive option to negotiate a separate agreement for our autologous dendritic cell-based telomerase vaccine. On December 31, 2007, Merck s option to our dendritic cell-based vaccine technology expired and Geron retains all product rights for all indications using both autologous and hESC-derived dendritic cells. In December 2007, Merck filed an IND to initiate a clinical trial for their cancer vaccine candidate that targets telomerase. In 2008, Merck initiated a Phase I clinical trial of V934/V935, a non-dendritic cell-based cancer vaccine candidate targeting telomerase. The trial will assess the safety, tolerability and immunogenicity of the vaccine candidate in patients with solid tumors, including non-small cell lung cancer and prostate carcinoma.

Cancer Diagnostics. Telomerase is a broadly applicable and highly specific marker for cancer because it has been detected in more than 30 human cancer types and in the great majority of cancer samples studied. We believe that the detection of telomerase may have significant clinical utility for cancer diagnosis, prognosis, monitoring and screening. Current cancer diagnostics apply only to a single or limited number of cancer types because they rely on molecules expressed only by particular cancer types. However, telomerase-based diagnostics could potentially address a broad range of cancers.

We have developed several proprietary assays for the detection of telomerase which are based on its activity or the presence of its RNA or protein components. The first-generation assay is the Telomeric Repeat Amplification Protocol (TRAP) assay which can be used to detect telomerase activity in human tissue or cells, including clinical samples. The second-generation assays detect the presence of hTR and hTERT in human tissues and body fluids. We own issued patents for the detection of telomerase activity and the components of telomerase, including patents for the TRAP assay and diagnostic methods based on telomerase detection. Currently, our licensees are selling 11 research-use-only kits that incorporate our technology.

In 2007, we granted a license to Sienna Cancer Diagnostics (Sienna), an Australian company, to develop and commercialize methods other than PCR (polymerase chain reaction) and ELISA (Enzyme-Linked ImmunoSorbent Assay) to detect telomerase for *in vitro* cancer diagnosis. Sienna s lead product in development is a non-invasive assay that utilizes Sienna s proprietary Telomerase Biosensor Technology (TBT) to detect telomerase activity in urine for the diagnosis of bladder cancer. In consideration for the license, we received an equity interest in Sienna and are entitled to receive royalties on future product sales.

Telomerase Activation

We are researching drug candidates to treat various degenerative diseases by the controlled activation of telomerase. Data published by us and others has indicated that cellular aging caused by shortening telomeres, which occurs in numerous tissues throughout the human body, causes or contributes to chronic degenerative diseases and conditions including bone and marrow diseases, pulmonary fibrosis,

HIV/AIDS, liver disease, macular degeneration, cardiovascular diseases, and impaired wound healing. Controlled activation of telomerase in normal cells can restore telomere length or slow the rate of loss, improve functional capacity, and increase the proliferative lifespan of cells.

Our approach to the therapeutic use of telomerase activation has included both small molecule drug discovery and biological methods of restoring telomerase activity. We have applied proprietary gene transfer technologies, gene expression systems and small molecule screening technology to discover therapeutic agents to target, postpone and modulate the destructive genetic changes that occur in senescent cells.

Our majority-owned subsidiary based in Hong Kong, TA Therapeutics, Ltd. (TAT), was established to commercially develop products that utilize telomerase activator drugs to restore the regenerative and functional capacity of cells in various organ systems that have been impacted by senescence, injury or chronic disease. TAT is conducting preclinical research with small molecule development leads. Data from one such lead compound, TAT2, was shown in tissue culture studies to significantly activate telomerase and improve replicative capacity and function, including anti-viral activity, in HIV-specific CD8+ T-cells from HIV/AIDS donors. The data were published in the *Journal of Immunology* in 2008. We own 75% of TAT and Biotechnology Research Corporation (BRC) owns 25%.

Human Embryonic Stem Cell Therapies

The two properties of hESCs, their immortality and pluripotency, enable the development of a potential new economic model for cell-based products and therapeutics, namely the development of "off-the-shelf" products available on demand. We have developed proprietary methods to grow, maintain, and scale the culture of undifferentiated hESCs that use feeder cell-free and serum-free media with chemically defined components. Moreover, we have developed scalable processes to differentiate these cells into therapeutically relevant cells. We have developed cryopreserved formulations of hESC-derived cells to enable our business model of delivering "on demand" cells for therapeutic use. Under our collaboration with Corning Life Sciences, a division of Corning Incorporated, we are working together to develop synthetic growth surfaces to replace the biological surface coatings that are widely used today to grow hESCs.

We and our collaborators are testing six different hESC-derived therapeutic cell types in animal models. In five of these cell types we have demonstrated efficacy, as evidenced by durable engraftment or functional improvements of the treated animals. In January 2009, we received clearance from the FDA to begin a clinical trial of GRNOPC1, our hESC-derived therapy targeted for the treatment of acute spinal cord injury.

Geron's second hESC product, GRNCM1, is a population of cardiomyocytes, the contractile cells of the heart, which is intended for drug screening and the treatment of patients with myocardial disease. Geron also has made substantial progress in deriving pancreatic islet ß cells for diabetes and dendritic cells for two applications, including cancer immunotherapy and graft acceptance (to prevent immune rejection of the other cell types used in therapeutic applications). With our collaborators in the United Kingdom at the University of Edinburgh, we are deriving osteoblasts for osteoporosis, chondrocytes for osteoarthritis and hepatocytes for liver failure and metabolism and toxicity testing of drug compounds. In 2008, the University of Edinburgh received a grant of £3.6 million from the UK Stem Cell Foundation, with funding from the Medical Research Council and Scottish Enterprise to conduct preclinical safety and efficacy studies in our collaboration.

The following table briefly describes the hESC-derived product candidates being developed by us or our collaborators, and the stage of development of these product candidates.

Product	Product Description	Disease Treatment	Development Stage
GRNOPC1	hESC-Derived Oligodendrocytes	Spinal Cord Injury	Phase I Trial
GRNCM1	hESC-Derived Cardiomyocytes	Heart Disease and Screening	Preclinical
GRNIC1	hESC-Derived Islets	Type 1 Diabetes	Research
	Osteoblasts	Osteoporosis	Research
	Chondrocytes	Osteoarthritis	Research
	Hepatocytes	Liver Disease and ADME Drug Screening	Research
	Immature Dendritic Cells	Immune Rejection	Research

GRNVAC2	Mature Dendritic Cells	Cancer Immunotherapy	Product Research

We believe we have a dominant patent position in the field of hESCs. We own or have licenses to intellectual property covering core inventions and enabling technologies in this field.

Oligodendrocyte Progenitor Cells for Spinal Cord Injury (GRNOPC1). The major neural cells of the central nervous system typically do not regenerate after injury. If a nerve cell is damaged due to disease or injury, there is no treatment at present to restore lost function. Patients worldwide suffer from injury to the nervous system or disorders associated with its degeneration. In the case of spinal cord injuries, patients are often left partly or wholly paralyzed because nerve and supporting cells in the spinal cord have been damaged and cannot regenerate. Such patients are permanently disabled, often institutionalized and may require life support.

Embryonic stem cell-derived neural cells have been used by researchers to treat nervous system disorders in animal models. In the case of spinal cord injuries, neural cells derived from animal embryonic stem cells and injected into the spinal cord injury site produced significant recovery of the animal□s ability to move and bear weight.

To apply those observations to humans, we have derived oligodendrocyte progenitor cells (GRNOPC1) from hESCs. Oligodendrocytes are naturally occurring cells in the nervous system that have several functions. Oligodendrocytes produce myelin (insulating layers of cell membrane) that wraps around the axons of neurons to enable them to conduct electrical impulses. Myelin enables efficient conduction of nerve impulses in the same manner as insulation prevents short circuits in an electrical wire. Without myelin, many of the nerves in the brain and spinal cord cannot function properly. Oligodendrocytes also produce neurotrophic factors (biologicals that enhance neuronal survival and function) to support the maintenance of nerve cells. Oligodendrocytes are lost in spinal cord injury, resulting in myelin and neuronal loss that cause paralysis in many patients with spinal cord injuries.

In our collaboration with researchers at the University of California, Irvine, we have shown in animal models that GRNOPC1 can improve functional locomotor behavior after implantation in the injury site seven days after injury. Histological analysis also provided evidence for the engraftment and function of these cells. These data were first published in May 2005 in the *Journal of Neuroscience*. In additional studies, the lesion site of animals nine months after injury and subsequent injection of GRNOPC1 was observed to be essentially filled with GRNOPC1 and myelinated rat axons crossing the lesion. These animal observations serve as the rationale for the use of GRNOPC1 in treating spinal cord injuries in man.

We have developed a functional cryopreserved formulation of GRNOPC1 for use in clinical trials and have initiated current Good Manufacturing Practices (cGMP) production of GRNOPC1 in our qualified manufacturing facilities.

After completion of extensive animal toxicology testing that included 24 separate studies in rats and mice that required more than five billion GRNOPC1 cells, we filed a 21,000 page IND with the FDA containing data from the animal and *in vitro* testing of the cells to ensure the highest possible degree of safety of the product before initiating human clinical trials.

In January 2009, we received clearance from the FDA to begin the world□s first human clinical trial of an embryonic stem cell-based therapy using GRNOPC1 for acute spinal cord injury. The FDA-approved clinical study is a Phase I multi-center trial designed to assess the safety and tolerability of GRNOPC1 in patients with complete ASIA (American Spinal Injury Association) grade A thoracic spinal cord injuries. Up to seven U.S. medical centers will be selected to participate in this study and in the planned protocol extensions. Several additional steps need to be completed prior to initiation of each of the clinical trial sites. These steps include clinical protocol review and approval by the IRB (institutional review board) of each participating medical center. Radiologists and spine surgeons must be trained to ensure uniformity of radiographic interpretation, GRNOPC1 administration and the application of follow-up assessments of safety and efficacy across trial sites.

Cardiomyocytes for Heart Disease (GRNCM1). Heart muscle cells (cardiomyocytes) do not regenerate during adult life. When heart muscle is damaged by injury or decreased blood flow, functional contracting heart muscle is replaced with nonfunctional scar tissue. Congestive heart failure, a common consequence of heart muscle or valve damage, affects approximately 5.7 million people in the United States. This year, it is estimated that about 1.3 million people will have a heart attack, which is the primary cause of heart muscle damage.

We can potentially treat heart disease by using cardiomyocytes derived from hESCs. Researchers have demonstrated proof-of-concept of this approach in mice. Mouse embryonic stem cells have been used to derive mouse cardiomyocytes. When injected into the hearts of recipient adult mice, the cardiomyocytes repopulated the heart tissue and stably integrated into the muscle tissue of the adult mouse heart. In human medicine, it is therefore possible that hESC-derived cardiomyocytes could be developed for cellular transplantation therapy in humans suffering from congestive heart failure and the damage caused by heart attacks. We have derived human cardiomyocytes from hESCs (GRNCM1) using a process that can be scaled for clinical production. GRNCM1 has normal contractile function and responds appropriately to cardiac drugs. We have transplanted these cells into animal models of myocardial infarction in which the cells engraft and improve the left ventricular function compared to those animals receiving injections without cells. These results were published in *Nature Biotechnology* in August 2007. In 2009, we will continue our preclinical large animal studies of GRNCM1.

Islet Cells for Diabetes (GRNIC1). It is estimated that there are as many as 1.2 million Americans suffering from Type 1 Diabetes (Insulin Dependent Diabetes Mellitus). Normally, certain cells in the pancreas, called the islet ß cells, produce insulin which promotes the uptake of the sugar glucose by cells in the human body. Degeneration of pancreatic islet ß cells results in a lack of insulin in the bloodstream which results in diabetes. Although diabetics can be treated with daily injections of insulin, these injections enable only intermittent glucose control. As a result, patients with diabetes suffer chronic degeneration of many organs, including the eye, kidney, nerves and blood vessels. In some cases, patients with diabetes have been treated with islet ß cell transplantation derived from cadavers. However, poor availability of suitable sources for islet ß cell transplantation and the complications of the required co-administration of immunosuppressive drugs make this approach impractical as a treatment for the growing numbers of individuals suffering from diabetes.

We have derived insulin-producing cells (i.e. similar to pancreatic islet ß cells) from hESCs and are working to improve the yield of islet cells and characterize their secretion of insulin in response to glucose. We are transplanting the islets to animal models of diabetes. The derivation method and characterization of our hESC-derived islets was published in *Stem Cells* in August 2007.

In 2008, we published data showing the successful engraftment of hESC-derived pancreatic islet-like clusters (ILCs) in diabetic mice. After transplantation, the ILCs continued to express important pancreatic islet proteins, responded to high levels of glucose in the blood, and extended the survival of recipient animals.

Osteoblasts for Osteoporosis and Non-Union Bone Fractures. Osteoporosis, or loss of bone density, is a common condition associated with aging and hormonal changes in post-menopausal women. In addition to skeletal deformities, back pain and loss of height, the disease causes over 2.0 million fractures per year in the United States alone. These fractures often occur after minimal trauma and if severe, as in hip fracture, carry mortality rates as high as 24% for patients age 50 and over. Nearly one in five hip fracture patients ends up in a nursing home. Total health care costs for osteoporosis and its complications are estimated at $18 billion per year in the United States.

The primary cause of the disease is metabolic bone loss (mediated by osteoclasts - cells which resorb bone) that is incompletely compensated by new bone formation (mediated by osteoblasts - cells which form new bone). Osteoblast activity declines over the human lifespan and fails to keep pace with the increasing activity of osteoclasts, resulting in progressive loss of bone density leading to fracture, pain and deformity.

Our collaborators have made osteoblasts from hESCs and are now conducting tests in animals. If these tests are successful, we may test the cells in patients with non-union fractures (fractures of the long bones of the leg or arm that do not heal) or in patients with severe refractory osteoporosis.

Chondrocytes for Osteoarthritis. Osteoarthritis, or Degenerative Joint Disease, is an extremely common condition characterized by degradation of cartilage in joints, often accompanied by bone remodeling and bone overgrowth at the affected joints. The disease affects an estimated 27 million adults in the United States, mostly after age 45. The disease has many causes, but the end result is a structural degradation of joint cartilage and a failure of chondrocytes (cartilage-forming cells) to repair the degraded cartilage collagen matrix. Our collaborators have derived chondrocytes from hESCs and, if *in vitro* and animal testing results are positive, we may test these cells in patients with osteoarthritis by injecting them directly into the affected joints.

Dendritic Cells for Cancer Immunotherapy and to Enable Therapeutic Graft Acceptance. The hematopoietic system (the circulating cells of blood) is one of the tissues of the human body that can replenish itself throughout life. One of the cell types produced by the hematopoietic system is the dendritic cell. Dendritic cells, depending on their type, can either induce or downmodulate immune responses. Therefore, dendritic cells derived from hESCs can be used for two purposes: (i) to upregulate immune responses to particular antigens such as telomerase for cancer immunotherapy applications; and (ii) to prevent rejection of hESC-derived therapeutic grafts.

We are now developing procedures to differentiate hESCs to dendritic cells which will subsequently be used in both *in vitro* and animal models to assess their immunotherapeutic and immunomodulatory activity.

Products for Research and Development

Immortalized Cells for Research. Scientists study specific cells from targeted tissues in order to understand their biological function. For these studies, cells are usually isolated from tissue and maintained in culture. The progressive changes in biological activity, morphology and proliferation as a result of normal cell aging in tissue culture potentially limit the utility of these cells in serial experiments and long-term research. Because of these limitations, most research laboratories utilize transformed cell lines for their studies. Cells can be transformed by using viruses which ultimately cause the cells to grow indefinitely in culture. However, such immortalized cell lines have abnormal characteristics compared to non-transformed cells. For this reason, they are not good models of normal tissue in the human body.

Telomerase-immortalized cells may be ideal for use in biological research because these cells proliferate indefinitely and function in culture in the same manner as the normal, mortal cells from which they were derived. Moreover, telomerase-immortalized cells can function in the body to form normal tissue and their capacity to differentiate into mature tissue is maintained. The ability of these cells to maintain normal physical and biological characteristics while retaining proliferative capacity allows them to be a constant source of cells for repeat and long-term studies of the function of cells both in culture and in the body. Telomerase-immortalized cells can be used to study any of the normal biological pathways in cells and can be used to screen for factors which influence the appropriate function of those cells. Moreover, cells taken from diseased tissues which are then telomerase-immortalized in culture can be used to explore the mechanism of the disease process and to develop interventions to prevent or treat that disease.

Through our licensees, we make telomerase-immortalized cell lines commercially available to the research market and to companies for basic research and for use in drug discovery and biologics production applications. We have granted royalty-bearing licenses to the American Type Culture Collection and Lonza Walkersville, Inc. (formerly Cambrex BioSciences) under which these organizations will produce and sell telomerase-immortalized cells for both academic research and commercial drug discovery. We have also licensed the telomerase gene to a number of pharmaceutical and biotechnology companies for use in their internal research programs.

hESC-Derived Cells for Drug Screening and Toxicology. Three of the major hurdles of pharmaceutical drug development are: (i) identifying compounds with activity in diseased tissue; (ii) understanding the metabolism and biodistribution of the compound; and (iii) determining the potential toxic side effects of the compound. Undesirable activity of a compound being evaluated as a drug candidate in any one of these areas can impact the development and commercialization of the drug. The earlier in development that a compound is found to have undesirable characteristics, the faster these characteristics can be potentially corrected. This potentially translates into reduced costs and time in drug development, and less harmful patient exposure in clinical trials.

Many prospective new drugs fail in clinical trials because of toxicity or because of poor uptake, distribution or elimination of the active compound in the human body. Much of the efficacy and safety of a drug will depend on how that drug is metabolized into an active or inactive form, and on the toxic metabolites that might be generated in the process. Since hESC-derived cells have the same attributes as their normal counterparts in the body, they could be used to predict many pharmacological characteristics of a drug.

Hepatocytes, the major cells of the liver, metabolize most compounds and therefore can be used to predict the metabolism or toxicity of a drug compound. Currently, rat and mouse metabolism models only approximate human metabolism. The development of several drugs has been terminated late in human

clinical trials because rodent systems utilized early in the development process failed to predict that the drug would be toxic to humans. Human hepatocyte cell lines available today do not have the same attributes as their normal counterparts in the body and must be transformed in order to maintain their proliferative capacity in culture. Access to fresh primary human liver tissue for use in toxicity studies is very limited and substantial variability can be observed depending on the individual donor, the time and process of collection and the culture conditions for the experiments.

The understanding of whether a drug candidate will interrupt normal function of heart muscle cells cardiomyocytes is also a key step in drug development. As with hepatocytes, transformed cell lines are of only limited use for cardiac function tests; access to primary human heart tissue is very limited; and animal models are not fully reliable predictors of human responses.

Derivation of specific, standardized functional cell types from hESCs in particular, hepatocytes and cardiomyocytes could provide a reliable supply of cells to perform metabolism, biodistribution and toxicity testing of drug development candidates. We believe that an unlimited supply of hESC-derived cells which retain normal cellular functions could address bottlenecks in new drug research and accelerate the drug development process. We are examining possible business options for commercializing hESC-derived cells in the drug discovery field.

Nuclear Transfer: Agriculture/Xenotransplantation/Biologics

Nuclear transfer is a method for producing animals whose nuclear genetic material is derived solely from a donor cell from an individual animal (clones). In this process, the nucleus containing the chromosomal DNA is removed from the animal egg cell and subsequently replaced with a nucleus from a donor somatic (non-reproductive) cell. Fusion between the resulting egg cell and the donor somatic nucleus results in a new cell which gains a complete set of chromosomes derived entirely from the donor nucleus. Mitochondrial DNA, providing some of the genes for energy production, resides outside the nucleus and is provided by the egg. After a brief culture period that enables the reconstituted egg cell to initiate embryonic development, the early embryo is implanted into the uterus of a female animal, where it can fully develop and result in the live birth of a cloned offspring animal. The offspring is essentially a genetic clone of (genetically identical to) the animal from which the donor nucleus was obtained.

In early 1997, Dr. Ian Wilmut and his colleagues at the Roslin Institute were the first to demonstrate, with the birth of Dolly the sheep, that the nucleus of an adult cell can be transferred to an enucleated egg to create cloned offspring. The birth of Dolly was significant because it demonstrated the ability of egg cell cytoplasm, the portion of the egg outside of the nucleus, to reprogram an adult somatic nucleus. Reprogramming enables the adult somatic cell nucleus to express all the genes required for the full embryonic development of the animal. In addition to sheep, the technique has been used to clone mice, rats, goats, cattle, rabbits, cats and pigs from donor cells and enucleated eggs from each respective animal species. In 1999, we acquired Roslin Bio-Med Ltd., a commercial subsidiary of the Roslin Institute, and an exclusive license to the use of nuclear transfer technology for multiple applications in animal and human biology.

Agriculture. Our nuclear transfer technology can be used for applications in agriculture that could improve livestock by producing unlimited numbers of genetically identical animals with superior commercial qualities. Such applications can be extended to major agricultural sectors, such as beef, dairy, pork and poultry, to provide large numbers of animals with superior characteristics of disease resistance, longevity, growth rate or product

quality. In January 2008, the FDA issued its final risk assessment concluding that meat and milk from healthy cloned animals and their offspring are as safe as those from ordinary animals, effectively removing the last U.S. regulatory barrier to the marketing of meat and milk from cloned cattle, pigs and goats.

Transgenic Animals. Our nuclear transfer technology can be applied to clone animals that have been genetically engineered to produce proteins for human therapeutic or industrial use. For example, herds which carry the genes to make human antibodies could be cloned, thereby allowing for the large-scale production of therapeutic antibodies or vaccines.

Xenotransplantation. Our nuclear transfer technology can be used for applications in xenotransplantation to create animals whose cells, tissues or organs could be used in human organ transplantation settings. This approach could be used either as a bridge to human organ transplantation or as a long-term therapy.

In previous years, we granted a number of licenses to our nuclear transfer technology to companies who are utilizing it for applications in agriculture and production of biologicals. In 2005, following successes in three patent interference proceedings, we formed a joint venture company, Start Licensing, Inc. (Start), with Exeter Life Sciences, Inc. (Exeter). In August 2008, Start merged with ViaGen, Inc. (ViaGen), a subsidiary of Exeter. The merger of Start and ViaGen, combines the full breadth of intellectual property rights to nuclear transfer cloning technology, including that developed at the Roslin Institute for cloning Dolly the sheep, with in-house state-of-the-art breeding services and expertise in advanced reproductive technologies, particularly in cloning animals, to provide a one-stop licensing and operating company. We have retained all rights for use of nuclear transfer technology in human cells.

Patents and Proprietary Technology

A broad intellectual property portfolio of issued patents and pending patent applications supports our product development and out-licensing activities. We currently own or have licensed over 170 issued or allowed United States patents, 340 granted or accepted foreign patents and 360 patent applications that are pending around the world.

Our policy is to seek appropriate patent protection for inventions in our principal technology platforms telomerase and human embryonic stem cells as well as ancillary technologies that support these platforms or otherwise provide a competitive advantage to us. We achieve this by filing patent applications for discoveries made by our scientists, as well as those that we make in conjunction with our scientific collaborators and strategic partners. Typically, although not always, we file patent applications in the United States and internationally through the Patent Cooperation Treaty. In addition, where appropriate, we try to obtain licenses from other organizations to patent filings that may be useful in advancing our scientific and product development programs.

Our telomerase platform is the mainstay of our oncology program and it serves as the basis for other product opportunities. Our telomerase patent portfolio includes over 110 issued or allowed United States patents, 205 granted or accepted foreign patents and over 120 patent applications pending worldwide relating to our telomerase product opportunities. The foundational patents include those covering the cloned genes that encode the RNA component (hTR) and the catalytic protein component (hTERT) of human telomerase. Related issued and pending patents cover cells that are immortalized by expression of recombinant hTERT, cancer diagnostics based on detecting the expression of telomerase in cancer cells, the use of hTERT as a cancer vaccine, the use of the hTERT promoter to power cancer-killing genes and viruses, and telomerase inhibitors for use as cancer therapeutics. We own issued patents that cover the sequences of GRN163 and GRN163L, as well as patents covering the chemistry that is used to build these oligonucleotides. We have a license to the dendritic cell-loading technology used in our telomerase cancer vaccine. The pending patent applications for the telomerase activating compounds that we discovered in collaboration with our colleagues at the Hong Kong University of Science and Technology have been exclusively licensed to our majority-owned subsidiary, TAT, for therapeutic applications.

Our human embryonic stem cell platform is protected by patents rights that we either own or have licensed. The patents that we have licensed include foundational hESC patents that arose from work that we funded at the University of Wisconsin-Madison. We have also filed patent applications to protect technologies developed by our

scientists in our ongoing efforts to develop products based on hESCs. By way of example, these patent applications cover technologies that we believe will facilitate the commercial-scale production of hESCs, such as methods for growing the cells without the need for cell feeder layers, and novel synthetic growth surfaces that we are developing in conjunction with Corning Life Sciences, a division of Corning Incorporated. Patent applications that we own or have licensed also cover cell types that can be made from hESCs, including hepatocytes (liver cells), cardiomyocytes (heart muscle cells), neural cells (nerve cells, including dopaminergic neurons and oligodendrocytes), chondrocytes (cartilage cells), pancreatic islet ß cells, osteoblasts (bone cells), hematopoietic cells (blood-forming cells) and dendritic cells. Currently our portfolio includes over 220 patent applications pending

around the world covering various aspects of our stem cell technology. Examples of granted stem cell patents in our portfolio include, U.S. Patent Nos. 6,458,589 and 6,506,574 relating to hESC-derived hepatocytes; 7,326,572 relating to hESC-derived islet cells; 7,425,448 and 7,452,718 relating to hESC-derived cardiomyocytes; 7,285,415 relating to hESC-derived oligodendrocytes; 6,800,480 relating to the feeder-free growth of hESCs; and 6,833,269 covering methods of producing neural cells from hESCs.

A third technology platform, nuclear transfer, is protected in part by the patent rights that we purchased in 1999 with the acquisition of the U.K. company Roslin Bio-Med, which we now operate as Geron Bio-Med. 21 United States patents have now been issued or been allowed, and 52 foreign patents have been granted or accepted. In addition, we have 19 pending patent applications worldwide relating to nuclear transfer. As discussed above, these patent rights are now a major asset of Start Licensing, Inc., a wholly owned subsidiary of Viagen, Inc. in which we hold a 27% equity stake. We created Start in 2005 as a joint venture company for the purpose of managing and licensing intellectual property rights for animal cloning.

We endeavor to monitor worldwide patent filings by third parties that are relevant to our business. Based on this monitoring, we may determine that an action is appropriate to protect our business interests. Such actions may include the filing of oppositions against the grant of a patent in overseas jurisdictions, and the filing of a request for the declaration of an interference with a U.S. patent application or issued patent. Similarly, third parties may take similar actions against our patents. By way of example, in 2005 we were involved in interference proceedings that we had initiated at the U.S. Patent and Trademark Office involving patents and patent applications for nuclear transfer technology; judgments in those actions were entered in our favor. We are currently also involved in patent opposition proceedings before the European Patent Office and the Australian Patent Office both as the party holding the opposed patent, and in opposition to patents granted or proposed to be granted to another entity.

Government Regulation

Regulation by governmental authorities in the United States and other countries is a significant factor in the development, manufacture and marketing of our proposed products and in our ongoing research and product development activities. The nature and extent to which such regulation applies to us will vary depending on the nature of any products which may be developed by us. We anticipate that many, if not all, of our proposed products will require regulatory approval by governmental agencies prior to commercialization. In particular, human therapeutic products are subject to rigorous preclinical and clinical testing and other approval procedures of the FDA and similar regulatory authorities in European and other countries. Various governmental statutes and regulations also govern or influence testing, manufacturing, safety, labeling, storage and recordkeeping related to such products and their marketing. The process of obtaining these approvals and the subsequent compliance with appropriate statutes and regulations require the expenditure of substantial time and money, and there can be no guarantee that approvals will be granted.

FDA Approval Process

Prior to commencement of clinical studies involving humans, preclinical testing of new pharmaceutical products is generally conducted on animals in the laboratory to evaluate the potential efficacy and safety of the product candidate. The results of these studies are submitted to the FDA as a part of an IND application, which must become effective before clinical testing in humans can begin. Typically, human clinical evaluation involves a time-consuming and costly three-phase process. In Phase I, clinical trials are conducted with a small number of people to assess safety and to evaluate the pattern of drug distribution and metabolism within the body. In Phase

II, clinical trials are conducted with groups of patients afflicted with a specific disease 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 and patterns of drug metabolism and distribution, in which case it is referred to as a Phase I/II trial.) In Phase III, large-scale, multi-center, comparative trials are conducted with patients afflicted with a target disease 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 testing

based upon the data which has been accumulated to that point and its assessment of the risk/benefit ratio to the patient. All adverse events must be reported to the FDA. Monitoring of all aspects of the study to minimize risks is a continuing process.

The results of the preclinical and clinical testing on non-biologic drugs and certain diagnostic drugs are submitted to the FDA in the form of a New Drug Application (NDA) for approval prior to commencement of commercial sales. In the case of vaccines or gene and cell therapies, the results of clinical trials are submitted as a Biologics License Application (BLA). In responding to an NDA/BLA submission, the FDA may grant marketing approval, may request additional information, may deny the application if it determines that the application does not provide an adequate basis for approval, and may also refuse to review an application that has been submitted if it determines that the application does not provide an adequate basis for filing and review. There can be no assurance that approvals will be granted on a timely basis, if at all, for any of our proposed products.

European and Other Regulatory Approval

Whether or not FDA approval has been obtained, approval of a product by comparable regulatory authorities in Europe and other countries will be necessary prior to commencement of marketing the product in such countries. The regulatory authorities in each country may impose their own requirements and may refuse to grant an approval, or may require additional data before granting it, even though the relevant product has been approved by the FDA or another authority. As with the FDA, the regulatory authorities in the European Union (EU) and other developed countries have lengthy approval processes for pharmaceutical products. The process for gaining approval in particular countries varies, but generally follows a similar sequence to that described for FDA approval. In Europe, the European Committee for Proprietary Medicinal Products provides a mechanism for EU-member states to exchange information on all aspects of product licensing. The EU has established a European agency for the evaluation of medical products, with both a centralized community procedure and a decentralized procedure, the latter being based on the principle of licensing within one member country followed by mutual recognition by the other member countries.

Other Regulations

We are also subject to various United States federal, state, local and international laws, regulations and recommendations relating to safe working conditions, laboratory and manufacturing practices and the use and disposal of hazardous or potentially hazardous substances, including radioactive compounds and infectious disease agents, used in connection with our research work. We cannot accurately predict the extent of government regulation which might result from future legislation or administrative action.

Scientific Consultants

We have consulting agreements with a number of leading academic scientists and clinicians. These individuals serve as key consultants or as members of clinical focus group panels with respect to our product development programs and strategies. They are distinguished scientists and clinicians with expertise in numerous scientific fields, including embryonic stem cells, nuclear transfer and telomere and telomerase biology, as well as developmental biology, cellular biology and molecular biology.

We use consultants to provide us with expert advice and consultation on our scientific programs and strategies, as well as on the ethical aspects of our work. They also serve as important contacts for us throughout the broader scientific community.

We retain each consultant according to the terms of a consulting agreement. Under such agreements, we pay them a consulting fee and reimburse them for out-of-pocket expenses incurred in performing their services for us. In addition, some consultants hold options to purchase our common stock, subject to the vesting requirements contained in the consulting agreements. Our consultants are employed by institutions other than ours, and therefore may have commitments to, or consulting or advisory agreements with, other entities or academic institutions that may limit their availability to us.

Executive Officers of the Company

The following table sets forth certain information with respect to our executive officers:

Name	Age	Position
Thomas B. Okarma, Ph.D., M.D.	63	President, Chief Executive Officer and Director
David L. Greenwood	57	Executive Vice President, Chief Financial Officer, Treasurer and Secretary
Fabio M. Benedetti, M.D.	43	Senior Vice President, Chief Medical Officer Oncology
David J. Earp, Ph.D., J.D.	44	Senior Vice President, Business Development and Chief Patent Counsel
Calvin B. Harley, Ph.D.	56	Chief Scientific Officer, Telomerase Technologies
Melissa A. Kelly Behrs	45	Senior Vice President, Therapeutic Development, Oncology
Jane S. Lebkowski, Ph.D.	53	Senior Vice President, Chief Scientific Officer, Regenerative Medicine
Katharine E. Spink, Ph.D.	34	Vice President Operations, Regenerative Medicine Programs

Thomas B. Okarma, Ph.D., M.D., has served as our President, Chief Executive Officer and a member of our board of directors since July 1999. He is also a director of Geron Bio-Med Limited, a United Kingdom company and Geron's wholly-owned subsidiary, and TA Therapeutics, Ltd., a Hong Kong company and Geron's majority-owned subsidiary. From May 1998 until July 1999, Dr. Okarma was the Vice President of Research and Development. From December 1997 until May 1998, Dr. Okarma was Vice President of Cell Therapies. Dr. Okarma currently serves on the Board of BIO and was Chairman of the Board of Overseers of Dartmouth Medical School from 2000 to 2007. In 1985, Dr. Okarma founded Applied Immune Sciences, Inc. and served initially as Vice President of Research and Development and then as chairman, chief executive officer and a director of Applied Immune Sciences, until 1995 when it was acquired by Rhone-Poulenc Rorer. Dr. Okarma was a Senior Vice President at Rhone-Poulenc Rorer from the time of the acquisition of Applied Immune Sciences until December 1996. From 1980 to 1992, Dr. Okarma was a member of the faculty of the Department of Medicine at Stanford University School of Medicine. Dr. Okarma holds a A.B. from Dartmouth College, a M.D. and Ph.D. from Stanford University and an executive M.B.A. from Stanford Graduate School of Business.

David L. Greenwood has served as our Chief Financial Officer, Treasurer and Secretary since August 1995 and our Executive Vice President since January 2004. He is also a director of our wholly-owned subsidiary, Geron Bio-Med Limited, our majority-owned subsidiary, TA Therapeutics, Ltd., ViaGen, Inc., an Arizona corporation, and Clone International, an Australian company. From August 1999 until January 2004, Mr. Greenwood also served as our Senior Vice President of Corporate Development. From April 1997 until August 1999, Mr. Greenwood served as our Vice President of Corporate Development. He also serves on the Board of Regents for Pacific Lutheran University. From 1979 until joining us, Mr. Greenwood held various positions with J.P. Morgan & Co. Incorporated, an international banking firm. Mr. Greenwood holds a B.A. from Pacific Lutheran University and a M.B.A. from Harvard Business School.

Fabio M. Benedetti, M.D., has served as our Senior Vice President, Chief Medical Officer Oncology since January 2008. From April 2007 to January 2008, he served as Senior Vice President, Clinical Development Oncology. From 2005 to 2006, Dr. Benedetti was the Vice President of Medical Affairs for Onyx Pharmaceuticals

Inc. From 2002 to 2005, he was Vice President of Global Medical Affairs for Millennium Pharmaceuticals. From 1999 to 2002, Dr. Benedetti held various management positions with the Oncology Global Marketing group at Bristol-Myers Squibb. He has been an attending clinical assistant with the division of gastrointestinal oncology at Memorial Sloan-Kettering Cancer Center and an Instructor at Cornell University Medical College. Dr. Benedetti holds a B.A. in biology from Brown University and an M.D. from Brown University Medical School.

David J. Earp, J.D., Ph.D., has served as our Senior Vice President of Business Development and Chief Patent Counsel since May 2004. He is also a director of our majority-owned subsidiary, TA Therapeutics, Ltd. and ViaGen, Inc., an Arizona corporation. From October 1999 until May 2004, Dr. Earp served as our Vice President of Intellectual Property. From 1992 until joining us in June 1999, Dr. Earp was with the intellectual property law firm of Klarquist Sparkman Campbell Leigh and Whinston, LLP. Dr. Earp holds a B.Sc. in microbiology from the University of Leeds, England, a Ph.D. from the biochemistry department of The University of Cambridge, England, and conducted postdoctoral research at the University of California at Berkeley/U.S.D.A. Plant Gene Expression Center. He received his J.D. from the Northwestern School of Law of Lewis and Clark College in Portland, Oregon.

Calvin B. Harley, Ph.D., has served as our Chief Scientific Officer since July 1996. From May 1994 until July 1996, Dr. Harley served as our Vice President of Research. From April 1993 until May 1994, Dr. Harley served as our Director, Cell Biology. From 1989 until joining us, Dr. Harley was an Associate Professor of Biochemistry at McMaster University, and from 1982 to 1989, was an Assistant Professor of Biochemistry at McMaster University. Dr. Harley was also an executive of the Canadian Association on Gerontology, Division of Biological Sciences from 1987 to 1991. Dr. Harley holds a B.S. from the University of Waterloo and a Ph.D. from McMaster University, and conducted postdoctoral work at the University of Sussex and the University of California at San Francisco.

Melissa A. Kelly Behrs has served as our Senior Vice President, Therapeutic Development, Oncology since January 2007. Ms. Behrs served as our Vice President of Oncology from January 2003 until January 2007. From April 2002 until January 2003, Ms. Behrs served as our Vice President of Corporate Development. From April 2001 until April 2002, Ms. Behrs served as our General Manager of Research and Development Technologies. Ms. Behrs joined us in November 1998 as Director of Corporate Development. From 1990 to 1998, Ms. Behrs worked at Genetics Institute, Inc., serving initially as Assistant Treasurer and then as Associate Director of Preclinical Operations where she was responsible for all business development, regulatory, and project management activities for the Preclinical Development function. Ms. Behrs received a B.S. from Boston College and an M.B.A. from Babson College.

Jane S. Lebkowski, Ph.D., has served as our Senior Vice President, Chief Scientific Officer, Regenerative Medicine since 2009 and Senior Vice President of Regenerative Medicine since January 2004. From August 1999 until January 2004, Dr. Lebkowski served as our Vice President of Regenerative Medicine. From April 1998 until August 1999, Dr. Lebkowski served as our Senior Director, Cell and Gene Therapies. From 1986 until joining us in 1998, Dr. Lebkowski served as Vice President, Research and Development at Applied Immune Sciences. In 1995, Applied Immune Sciences was acquired by Rhone-Poulenc Rorer, at which time Dr. Lebkowski was appointed Vice President, Discovery & Product Development. Dr. Lebkowski received a B.S. in chemistry and biology from Syracuse University and received her Ph.D. from Princeton University.

Katharine E. Spink, Ph.D. has served as our Vice President of Operations, Regenerative Medicine Programs since February 2009. From January 2008 until February 2009, Dr. Spink served as our Senior Director of Regenerative Medicine Program Operations. From January 2007 until January 2008, Dr. Spink served as our Program Director for Cardiovascular Disease. Dr. Spink joined Geron in December 2003, and served various roles within our Corporate Development group until January 2007. Prior to Geron, Dr. Spink was with the global management consulting firm McKinsey & Company, where she advised clients in the biotechnology, pharmaceutical, and medical device industries on matters relating to R&D strategy, business development, and marketing. Dr. Spink holds a B.A. in biochemistry from Rice University, and a Ph.D. in cancer biology from Stanford University.

Employees

As of December 31, 2008, we had 159 employees of whom 45 hold Ph.D. degrees and 31 hold other advanced degrees. Of our total workforce, 130 employees were engaged in, or directly support, our research and development activities and 29 employees were engaged in business development, legal, finance and administration. We also retain outside consultants. None of our employees are covered by a collective bargaining agreement, nor have we experienced work stoppages. We consider relations with our employees to be good.

ITEM 1A. RISK FACTORS

Our business is subject to various risks, including those described below. You should carefully consider these risk factors, together with all of the other information included in this Form 10-K. Any of these risks could materially adversely affect our business, operating results and financial condition.

RISKS RELATED TO OUR BUSINESS

Our business is at an early stage of development.

Our business is at an early stage of development, in that we do not yet have product candidates in late-stage clinical trials or on the market. We have begun clinical testing of our lead anti-cancer drug, GRN163L, in patients with chronic lymphoproliferati