International Stem Cell Corporation
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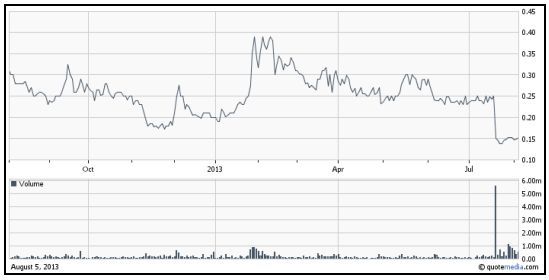
Ticker (Exchange)	ISCO (OTC.QB)
Recent Price (08/05/2013)	$0.15
52-week Range	$0.14 - $0.41
Shares Outstanding	~112.4 million
Market Capitalization	~$16.9 million
Average 3-month Volume	258,856
Insider Ownership +>5%	43.49%
Institutional Ownership	18.65%
EPS (Qtr. ended 03/31/2013)	($0.02)
Employees	44



Specialized Cell Product from ISCO's Subsidiary Lifeline Cell Technology

Company Description

International Stem Cell Corporation ("ISCO" or "the Company") is a biotechnology company focused on therapeutic applications of **human parthenogenetic stem cells (hpSCs)†** to treat diseases of the brain, liver, and eye, as well as on the development and commercialization of biomedical products. According to the Company, hpSC is the only **histocompatible stem cell** platform capable of generating stem cell lines that can immune-match millions of people. ISCO has focused its therapeutic efforts in three markets where cell therapy has been clinically proven, but where there is a shortage of safe cells or tissue: (1) **Parkinson's disease (PD)**; (2) **inherited metabolic liver diseases**; and (3) **corneal blindness**. The Company believes these markets may have a combined revenue potential of over $5 billion. ISCO is also developing a **stem cell bank**, UniStemCell™, which already contains enough histocompatible stem cell lines to immune-match over 75 million people. In addition, the Company produces and markets specialized cells and growth media for therapeutic research through its subsidiary Lifeline Cell Technology, and stem cell-based skin care products through its subsidiary Lifeline Skin Care. Revenue generated from ISCO's subsidiaries—which totaled $4.6 million in 2012—supports the development of the Company's therapeutic programs. ISCO believes that its proprietary technology platform and business model result in three key competitive advantages: immune-matching stem cells, proven cell therapy targets, and substantial revenue from commercial operations.

Key Points

- To date, ISCO has created 15 hpSC lines, including the first clinical-grade hpSC lines believed to meet FDA regulations.
- ISCO has demonstrated the therapeutic benefit of stem cell-derived neuronal cells in its PD program. Data was presented at an American Academy of Neurology meeting in March 2013.
- The Company has published and patented methods to generate pure, well-characterized populations of both **neural cells** and **hepatocyte**-like cells as well as the differentiation of 3D corneal constructs.
- The global market for therapeutic stem cell products was $3.8 billion in 2011, projected to reach $6.6 billion by 2016.
- ISCO has a broad intellectual property portfolio, including 130 patents and licenses and over 90 patent applications covering many types of stem cells, including **parthenogenesis** and **induced pluripotent stem (iPS) cells**.
- The Company's management brings extensive experience in key areas, including stem cell biology and pharmaceutical research, human cell production, and international business.
- At March 31, 2013, ISCO had cash and cash equivalents of roughly $1.9 million. In addition, in July 2013, the Company announced a public offering, detailed on page 45.

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Executive Overview

International Stem Cell Corporation ("ISCO" or "the Company") is a biotechnology company focused on the therapeutic applications of human parthenogenetic stem cells (hpSCs) to treat diseases of the brain, liver, and the eye, as well as on the development and commercialization of cell-based research and cosmetic products. ISCO's core proprietary technology, parthenogenesis, refers to a form of asexual reproduction in which an egg develops without being fertilized by a male **gamete**. The creation of hpSCs involves the stimulation of a human **oocyte** (egg) to start the cell division process without actual fertilization. Since the eggs are not fertilized, no viable human **embryo** is created nor destroyed for the generation of ISCO's stem cell (SC) lines. In addition, according to the Company, the histocompatibility profile of hpSCs makes this the only SC platform capable of generating SC lines that can immune-match millions of people. The Company's therapeutic efforts are concentrated in three markets where cell therapy has been clinically proven, but where there is a shortage of safe cells or tissue: (1) Parkinson's disease (PD); (2) inherited metabolic liver disease; and (3) corneal blindness. ISCO believes these markets could have a combined revenue potential of over $5 billion. ISCO is also employing its proprietary SC technology to develop an SC bank, UniStemCell™, which already contains enough histocompatible SC lines to immune-match over 75 million people.

In addition, the Company produces and markets specialized cells and growth media for therapeutic research through its subsidiary Lifeline Cell Technology (www.lifelinecelltech.com) and SC-based skin care products through its subsidiary Lifeline Skin Care (www.lifelineskincare.com). During 2012, these companies generated approximately $4.6 million in sales. Figure 1 depicts ISCO's corporate structure and areas of operation.

Figure 1

CORPORATE STRUCTURE

Therapeutic Applications		Commercial Applications
Therapeutic Programs	Stem Cell Bank	Lifeline Cell Technology
Parkinson's Disease Metabolic Liver Disease Corneal Blindness		Lifeline Skin Care

Source: International Stem Cell Corporation.

ISCO utilizes its proprietary platform technology to operate under a novel business model, combining the revenue-generating commercial operations of its subsidiary business units—Lifeline Cell Technology and Lifeline Skin Care—to financially support the Company's scientific research as well as the development of its therapeutic programs.

Stem Cell Overview

SCs are the body's raw materials—cells from which all other cells are generated. Under specific conditions, undifferentiated SCs can be induced to become the many different tissue- or organ-specific cells in the body. In addition, SCs are capable of renewing themselves, thereby serving as an internal repair system that replaces bodily cells as they are lost through normal wear and tear, injury, or disease. One of the most important therapeutic applications of SCs is as a cell-based therapy—also known as regenerative or reparative medicine—which consists of the replacement of diseased or injured cells with SCs. **Differentiated** (specialized) SCs could provide a renewable source of replacement cells to treat illnesses, including neurological conditions, metabolic diseases, heart disease, and autoimmune diseases, among others. The global market for therapeutic SC products was $3.8 billion in 2011, and is expected to reach nearly $6.6 billion by 2016 (Source: BCC Research's *Global Markets for Stem Cells,* July

2012). Many **adult SC**-based therapies are currently in use in the form of bone marrow transplants to treat leukemia, lymphoma, and inherited blood disorders. The success of these procedures has validated the use of SC transplantation as a therapeutic concept.

Types of Stem Cells

The most commonly used SCs for research purposes are **embryonic stem cells (ESCs)**, adult (or **somatic**) stem cells, and induced pluripotent stem (iPS) cells—noting that ISCO is pioneering an alternative approach designed to avoid the complications of each of these cell lines by using a novel class of SCs.

Embryonic Stem Cells

The first **pluripotent** SCs to be studied were ESCs. Most human ESCs are derived from oocytes that have been fertilized *in vitro* at fertilization clinics, but never implanted in a woman's uterus. Once the SCs are extracted and a cell line is established, the original cells can yield millions of ESCs. The creation of SC banks allows researchers to access new SCs for experimentation without being dependent on a continued supply of eggs. Eventually, scientists can induce the ESCs to differentiate into specific cell or tissue types.

Due to their pluripotent nature, ESCs have potential for use as a cell-based therapy. However, therapeutic applications of human ESCs have been limited to date due to their immune-compatibility profile. A patient's immune system might recognize the transplanted ESCs as foreign and attack them, requiring the use of immune-suppressing drugs. The degree of risk is proportional to the degree of disparity between donor and recipient **Human Leukocyte Antigen (HLA) haplotype**. For instance, when the donor and recipient share the same HLA proteins on their white blood cells, they are considered to be a good match for transplant purposes. However, a poor match can cause the recipient to reject the transplanted cells. HLA haplotypes are inherited and even siblings only have a 1 in 4 chance of being an identical match (Source: Stanford University's *Kidney Transplantation: Past, Present, and Future*). In addition, ESC research has been hindered by funding and regulatory restrictions derived from its perceived ethical concerns, mainly due to the fact that when used for SC generation, the fertilized egg no longer has the potential to become a fully developed human being. ISCO has overcome these concerns by using a novel class of SCs that is not composed of ESCs.

Adult (Somatic) Stem Cells

An adult (or somatic) SC is an undifferentiated cell found in the body's tissues and organs that can renew itself and differentiate into specialized cell types. Unlike ESCs, adult SCs are already partially specialized, thus they can only differentiate into certain types of cells. However, recent research suggests that adult SCs might be able to produce a wider variety of cell types than initially thought.

The use of adult SCs in research and therapy is not as controversial as the use of ESCs because the production of adult SCs does not require the destruction of an embryo. However, adult cells are difficult to grow in culture and are present in small amounts. As a result, isolating them is not only challenging but could cause considerable tissue or organ damage, especially in sensitive regions such as the brain or heart. Another limitation of adult cells is that they are not optimal for the treatment of genetic diseases, as the adult cell contains the damaged genetic information. ISCO does not require adult SCs in its new, innovative SC technology.

Induced Pluripotent Stem Cells

Induced pluripotent stem (iPS) cells are cells created artificially in the laboratory by genetically "reprogramming" adult SCs to display an ESC-like state. Like ESCs, iPS cells can be differentiated into any cell in the body. This technology has attracted attention because it may help researchers avoid the ethical controversies that come with ESCs, while holding potential utility for multiple applications. However, despite successes in animal models, iPS cell technology is not yet ready for use in humans. In addition, the required reprogramming of the cell's **genes**, as well as the virus or **deoxyribonucleic acid (DNA)** constructs currently used to insert the genetic material into the cell, have raised safety concerns in developing treatments. ISCO does not require iPS cells in its proprietary SC approach, as described on the next page.

ISCO's Technology—Human Parthenogenetic Stem Cells

ISCO is developing a new class of SCs—called human parthenogenetic stem cells (hpSCs)—that the Company believes display the characteristics required for the development of therapeutic applications while avoiding the safety and ethical concerns inherent with existing SC technologies. The creation of hpSCs starts by stimulating a human egg into reacting as if it has been fertilized and subsequently starting the cell division process. ISCO has shown that hpSCs can expand indefinitely in their undifferentiated state and differentiate into all major cell types, which are the two most important properties of SCs.

The Company believes that its proprietary technology provides medical, economic, and ethical advantages versus other SC technologies. On the medical front, since hpSCs are created without male fertilization, they express a lower number of parental histocompatibility **antigens**, believed to result in a superior immune-compatibility profile. This could address the immune-matching concerns of ES therapy. Since hpSCs do not need to originate from their intended recipient, hpSCs also offer the potential to treat genetic diseases. In addition, unlike methods requiring the use of viruses or DNA constructs that may integrate into the **genome**, ISCO's method does not alter the nature of the genes in the cells, reducing safety concerns.

The immune-matching capabilities of hpSCs also provide economic benefits. Since the immune profile of hpSCs allows the cells to immune-match a larger percent of people with fewer SC lines, the Company's SC line requirements to expand its therapeutic treatments among the general population could be reduced. Furthermore, since no viable embryo is destroyed, hpSCs avoid the primary ethical issues associated with SC research. To date, ISCO has derived 15 hpSC lines. In addition, the Company has made hpSC technology available to academic and corporate research worldwide for studies on a wide range of disease targets.

Therapeutic Programs

ISCO is currently focusing on three areas with significant medical need and sizeable market potential: (1) Parkinson's disease; (2) inherited metabolic liver disease; and (3) corneal implants. Cell and tissue therapy has already been validated in each of these three indications; however, there are limitations to existing therapies, including an insufficient supply of safe and efficacious cells.

In November 2012, the Company announced the generation of what, to its knowledge, are the world's first human clinical-grade hpSCs lines. The new SC lines were derived under U.S. and California regulatory frameworks and were designed to meet U.S. Food and Drug Administration (FDA) regulations. ISCO's existing research-grade parthenogenetic SC lines are currently used to support its preclinical programs and trials. The new clinical-grade SC lines position ISCO to transition into a clinical-stage company.

Parkinson's Disease

The Company's work on PD focuses on the replacement of **dopaminergic** neurons, the loss of which is known to be the cause of the disease. ISCO has developed a new method to derive high-purity populations of neural stem cells (NSCs) from hpSCs and further differentiate them into dopaminergic neurons suitable for implantation. This work has recently been published in *Scientific Reports*, a research journal from publishers of *Nature* (Source: *Scientific Reports* 3, Article Number 1463, March 2013).

Through its *in vitro* research, the Company was able to show the creation of pure, well-characterized populations of NSCs, as well as demonstrate their functional capacity in terms of signaling and **dopamine** release. Furthermore, results of the Company's *in vivo* studies, which involved injecting the hpSC-generated human neuronal cells into the center of rats' brains, showed that the human cells survived in the rat brains for over four months after transplant while displaying neural functionality. In addition, preliminary results of an additional preclinical *in vivo* study showed that a single injection of hpSC-derived neuronal cells into the **striatum** of rats can lead to a significant slowdown in the progression of the disease, with the rats in the treatment group showing gradual improvements in motor symptoms consistent with cells' survival, engraftment, and dopamine release. The positive results from the initial *in vivo* rodent studies led to the commencement of a series of non-human placebo controlled primate studies, which ISCO designed to measure the safety, viability, and functional efficacy of implanted neuronal cells in African green monkeys, the most widely used model of Parkinson's disease.

The first primate study employed eight African green monkeys with low levels of dopamine induced by bilateral injections of the neurotoxin MPTP. Subsequent to implantation of the neuronal cells, all monkeys in the treatment group had higher levels of dopamine in the brain compared with the control group. Additionally, no adverse events, including **dyskinesia**, deformations, tumors, or overgrowth, were observed. The Company believes that the results of both rodent and primate studies, which were presented at the 65th American Academy of Neurology Annual Meeting on March 20, 2013, provide evidence of the safe and disease-modifying effects that implantation of hpSC-derived neuronal cells can provide.

Building on the positive results, on May 30, 2013, ISCO announced the initiation of an Investigational New Drug (IND)-enabling non-human primate pharmacology and toxicology study for its PD program under the direction of Yale School of Medicine Professor D. Eugene Redmond Jr., M.D. The study uses non-human primates with moderate to severe PD symptoms to assess the safety and functional efficacy of ISCO's proprietary SC-derived neuronal cells. The Company believes that this study represents the foundation for filing an IND application in 2014. The initial interim results are expected at the end of 2013, with the final results expected in the second quarter 2014.

Inherited Metabolic Liver Disease

ISCO's metabolic liver disease program covers the Company's research on both the liver and pancreas, as these organs have a common cellular origin. The initial emphasis is on the creation of pure populations of hpSC-derived hepatocytes. Disease targets include **Crigler-Najjar syndrome (CNS)** and **Alpha-1-Antitrypsin deficiency (Alpha-1)**, both of which fall under the FDA's **Orphan Drug Designation program**.

The Company has been able to characterize hpSC-derived hepatocyte-like cells (HLCs) both *in vivo* and *in vitro*. Positive top-line efficacy results of the Company's *in vivo* studies, consisting of the implantation of hpSC-derived HLCs into Gunn rats (a well-established and validated animal model for CNS), demonstrate the ability of these cells to engraft, mature, and express liver-specific proteins in rodents. Furthermore, results of the study showed that the implanted cells behaved in a manner similar to primary human hepatocytes, suggesting the therapeutic equivalence of the HLCs to adult liver cells.

Cornea Tissue Implants

The Company's corneal program is focused on the differentiation of hpSCs and ESCs into cornea-like constructs for use in transplantation therapy. ISCO developed a proprietary method for the *in vitro* differentiation and generation of 3D human corneal constructs, which demonstrated a range of structural, biochemical, and refractory properties characteristic of human cornea, including the basic anatomic layering, gene, and protein expression patterns, rapid permeability to ophthalmic drugs, and no opacity.

ISCO believes that this 3D structure represents a significant advancement in SC therapy research since the process not only differentiated SCs into the appropriate types of specialized cells, but was also able to accomplish the generation of functional mini-organs with the appropriate structural complexity. The Company plans to initially commercialize this program through ISCO's subsidiary in India, in partnership with key Indian biomedical organizations, including the Sankara Nethralaya Eye Hospital and the All-India Institute for Medical Sciences.

UniStemCell™ Stem Cell Bank

ISCO's SC bank, UniStemCell™, is believed to be the life science industry's first collection of non-embryonic, histocompatible human SCs available for research and commercial use. The bank offers the ability to create therapeutic cells with all of the benefits of hpSCs, including immune-matching millions of individuals of differing genders, ages, and racial backgrounds.

ISCO's SC bank currently contains 15 parthenogenetic SC lines, including three cGMP grade lines. One of the lines carries the most common immune type (haplotype) and immune-matches approximately 70 million people worldwide. According to the Company, 25 lines of the appropriate haplotypes could immune-match 35% of the U.S. population.

Commercial Operations

Lifeline Cell Technology (LCT) is a business-to-business research products company that commercializes purified primary human cells, media, and reagents for cell culture and therapeutic research. LCT's portfolio of biomedical offerings includes over 130 products. In 2012, LCT generated $2.4 million in sales, a 35% growth over 2010. ISCO markets its products domestically and internationally through its in-house sales force, strategic alliances, international distributors, and original equipment manufacturer (OEM) partners.

Lifeline Skin Care (LSC) is a company that develops, manufactures, and markets advanced anti-aging skin care products based on growth factors and peptides extracted from hpSCs. LSC's products were introduced in November 2010, and generated sales of $2.2 million in 2012.

Corporate Information

ISCO was incorporated in June 2006 for the purpose of restructuring the LCT business, which was organized in August 2001, with LCT becoming ISCO's wholly owned subsidiary. On December 28, 2006, ISCO performed a reverse merger with BTHC III, Inc. Today, the Company is headquartered in Carlsbad, California, with **current Good Manufacturing Practice (cGMP)** cell manufacturing facilities in Oceanside, California, and Frederick, Maryland. In addition to its three executive officers, ISCO has 41 full-time staff members.

In the past 12 months, the Company executed two major equity funding activities. In January 2013, ISCO announced that the Company's chief executive officer (CEO), Dr. Andrey Semechkin, and its executive vice president (EVP), Dr. Simon Craw (biographies provided on page 12), purchased a total of 10,125,000 shares of common stock, generating over $2 million for the Company. In March 2013, the Company raised an additional $1 million through a transaction with a small number of existing shareholders.

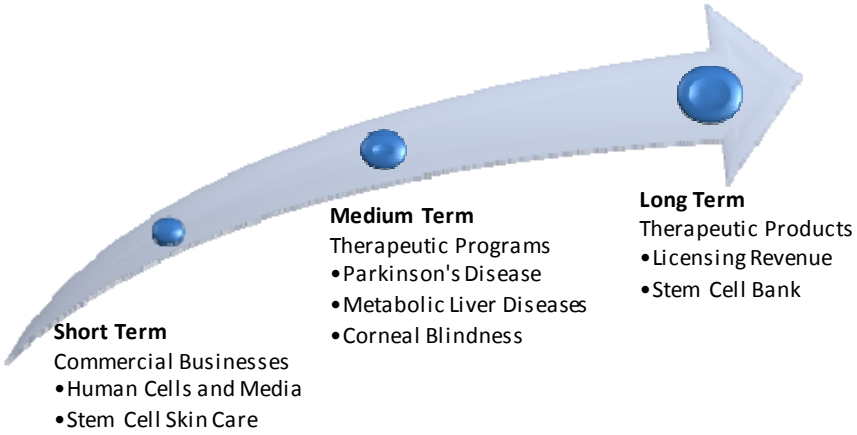
Furthermore, on July 19, 2013, the Company announced a public offering of 20 million units, with each unit consisting of one share of ISCO's common stock and one Series A Warrant to purchase one share of its common stock, at a price of $0.15 per share, in addition to up to 20 million Series B Warrants, exercisable at a price of $0.15 for one share of ISCO's common stock and one Series A Warrant to purchase one share of common stock. The Company intends to use the net proceeds from this offering to fund its research and development activities and for general working capital needs. More information about the Company's public offering can be found on page 45 under Historical Financial Results as well as in the Company's recently filed prospectus at:
http://www.sec.gov/Archives/edgar/data/1355790/000119312513295805/d418224d424b4.htm.

Growth Strategy

ISCO uses its proprietary platform technology to operate under a novel business model for the biotechnology industry. This model builds off of the revenue-generating commercial operation of its subsidiary businesses for the development of the Company's therapeutic programs and licensing opportunities, as depicted in Figure 2.

Figure 2

BUSINESS MODEL



Source: International Stem Cell Corporation.

ISCO's revenue-generating commercial operations are conducted through the operations of its subsidiary business units—Lifeline Cell Technology and Lifeline Skin Care. The subsidiaries develop and market products based on ISCO's scientific discoveries. This model not only provides practical, short-term applications of the Company's core technologies, but also generates financial resources to support further scientific research and development of ISCO's therapeutic programs.

The Company's medium- and long-term strategy relies on ISCO's proprietary technology platform. The Company is involved in the clinical development of its SC platform for the creation of therapeutic options for a number of human diseases, with an initial focus on PD, metabolic liver disease, and corneal blindness. In addition, ISCO's plans include the creation of an SC bank and, once it has proven the technology platform by developing the therapeutic treatments, the licensing of its technologies to third parties for the development of third-party treatments.

In terms of geographic expansion, the Company's focus is on its expansion into Asian markets, fueled by its strategic partnerships for the development and commercialization of SC-derived cornea tissue in India along with an international distribution network for the sale of LCT's media and cellular products.

Intellectual Property

ISCO protects its technology worldwide by filing patent applications covering specific pluripotent hpSC lines, methods to produce new hpSC lines, and various differentiation methods for research, therapeutic, and commercial uses. In addition, the Company's intellectual property portfolio also covers some patents related to iPS and **nuclear transfer** techniques.

ISCO has a broad intellectual property portfolio, covering the creation and differentiation of many types of stem cells, including parthenogenesis and iPS. As of April 2012, the Company had approximately 130 patents and licenses across 30 patent families, 90 pending patent applications across eight patent families, and 3 pending patents related to its skin care products. Figure 3 highlights some of the patents owned by the Company, noting that most of ISCO's intellectual property is licensed from Advanced Cell Technology Inc. (ACTC-OTC.BB) through an Option to License Intellectual Property Agreement signed in December 2003. The agreement granted ISCO access to a range of ACTC's patents and patent applications for the use of various technologies in a limited set of human tissues. In February 2013, the Company announced an amendment to the agreement, which expanded ISCO's existing rights in the area of parthenogenesis and in the therapeutic use of parthenogenetically derived SCs for treating human disease. Pursuant to the amended agreement, ISCO has an exclusive worldwide license to ACTC's patents and applications covering the uses of parthenogenetically derived SCs in generating human tissue.

Figure 3

SNAPSHOT OF ISCO'S OWNED IP

Patent #	Name	Issue Date
8,268,621	Methods of deriving definitive endoderm cells from pluripotent parthenogenetic stem cells	September 18, 2012
7,935,100	Cell culture medium container assembly	May 3, 2011
7,732,202	Oxygen tension for the parthenogenic activation of human oocytes for the production of human embryonic stem cells	June 8, 2010

Source: International Stem Cell Corporation.

Recent Milestones

In the past 12 months, the Company has achieved the following milestones, as listed below.

General Research

- Expanded its SC bank to a total of 15 human cell lines, including the world's first clinical-grade hpSC lines, produced following guidelines designed to meet FDA regulations.
- Developed a new method of producing iPS cells by using engineered proteins, called transducible transcription factors (TTFs). According to the Company, this method not only solves some of the safety concerns of current approaches, but also allows ISCO to establish a patent position in this growing SC platform.

Parkinson's Disease Program

- Conducted a series of preclinical rodent studies to measure the efficacy and therapeutic ability of candidate neuronal cells, and announced positive results demonstrating that a single injection of hpSC-derived neuronal cells into the striatum of rats can lead to a significant slowdown in the progression of the disease.
- Completed its first non-human primate study to evaluate cell survival and efficacy of implanted neuronal cells derived from hpSCs.
- Initiated an Investigational New Drug (IND)-enabling toxicology, biodistribution, and pharmacology study in non-human primates.

Metabolic Liver Disease Program

- Announced the conclusions of its preclinical *in vivo* study demonstrating the efficacy and safety of the hpSC-derived HLCs in animal models; the data indicated that implanting HLC in rodents produced both a significant initial decrease and the long-term stabilization of **bilirubin** levels in blood serum.
- Granted a patent for the liver disease program that covers a new method of creating pure populations of definitive endoderm, precursor cells to liver and pancreas cells, from human pluripotent SCs.

Cornea Blindness Program

- Developed a new method to derive corneal endothelium-like cells and 3D corneal constructs from human pluripotent SCs, a key step toward the creation of complete cornea tissue that can be used for transplantation.

Subsidiaries

- Announced the inclusion of Lifeline Cell Technology's primary human cell and optimized media products in Fisher Scientific's online catalog (part of Thermo Fisher Scientific Inc.), one of the world's largest suppliers to the life science industry.
- Signed distribution agreements for Lifeline Skin Care products with Sinopharm Group (China), My Son IEI (Vietnam), and Advanced Skincare Technologies Co., Ltd. (Thailand).
- Introduced the newest product from Lifeline Skin Care—an Eye Firming Complex—supported by sales and multimedia marketing campaigns.

Company Operations

- Announced the expansion of its Scientific Advisory Board: (1) Dr. Evan Snyder, director of Sanford-Burnham's SC program and research center and a pioneer in using SCs to treat PD; and (2) Dr. Rosario Sánchez-Pernaute, a Harvard-trained scientist who has shown how parthenogenetic SCs can be used to treat the symptoms of PD.
- Performed two key equity financing operations totaling over $3 million, and announced a public offering in July 2013.

Potential Milestones

In the next 12 months, the Company expects to complete and receive results from multiple preclinical studies as well as initiate the preclinical safety studies necessary for filing an Investigational New Drug (IND) application in one or both of its primary therapeutic programs.

Parkinson's Disease Program

- Complete an IND-enabling toxicology, biodistribution, and pharmacology study in primates in support of an IND application in 2014.

Metabolic Liver Disease Program

- Initiate preclinical safety studies in 2014 in support of IND preparation.

Company Leadership

Executive Management

Figure 4 summarizes the Company's executive leadership team, followed by brief biographies.

Figure 4
MANAGEMENT

Andrey Semechkin, Ph.D.	Chief Executive Officer and Co-Chairman of the Board
Simon Craw, Ph.D.	Executive Vice President of Business Development
Ruslan Semechkin, Ph.D.	Vice President of Research and Development, Board Member
Donna Queen	President of Lifeline Skin Care Inc.
Francisco Bustamante	President of Lifeline Cell Technology, LLC
Glenn Sherman, Ph.D.	Director of Chemistry Manufacturing and Controls (CMC)
Jay Novak	Interim Chief Financial Officer

Source: International Stem Cell Corporation.

Andrey Semechkin, Ph.D., Chief Executive Officer and Co-Chairman of the Board

Dr. Semechkin is a specialist in system analysis, strategic planning, and corporate management. He is a member of the Russian Academy of Sciences and has been deputy director of Institute of System Analysis since 2004. Professor Semechkin was awarded the Russian Government Award in Science and Technology in 2006 and has written several scientific books. He has over 20 years of experience in creating and managing businesses across different industries and scientific sectors.

Simon Craw, Ph.D., Executive Vice President of Business Development

Dr. Craw obtained a Ph.D. in chemistry from the University of Manchester and began his academic career at the University of Rio de Janeiro followed by positions at the University of Sydney and the University of Manchester. He has over 18 years of experience in research and development as well as operations and information technology at Merck & Co., Inc. (MRK-NYSE), AstraZeneca PLC (AZN-NYSE), and Novartis AG (NVS-NYSE) and as head of research and development informatics and regulatory operations at ACADIA Pharmaceuticals Inc. (ACAD-NASDAQ). Dr. Craw has numerous scientific publications and frequently speaks at international conferences.

Ruslan Semechkin, Ph.D., Vice President of Research and Development, Board Member

Dr. Semechkin was trained in medical genetics, SC biology, and international business administration and holds an M.S. from the Faculty of Fundamental Medicine of Moscow State University. He earned a Ph.D. in physiology from Anokhin Research Institute of Normal Physiology, Russian Academy of Medical Sciences. Dr. Semechkin is a well-known speaker on SC biology, including the use of SC for neurology and skin regeneration. He has publications in the field of clinical and molecular biology, and is an author of various patent applications.

Donna Queen, President of Lifeline Skin Care Inc.

Ms. Queen has over 20 years of experience as a marketing executive. Prior to joining ISCO, Ms. Queen was president and CEO of ZO SKIN HEALTH® by Zein Obagi, M.D. Dr. Obagi is the dermatologist who created the original Obagi Nu-Derm skin care system, which has since become a leading physician-dispensed brand of anti-aging skincare. Earlier, Ms. Queen founded and led one of Virginia's largest advertising and marketing agencies, specializing in aesthetic and dermatological marketing and brand development.

Francisco Bustamante, President of Lifeline Cell Technology, LLC

Mr. Bustamante has over 18 years of experience in the operations of biotechnology companies. His experience includes senior management positions in the areas of manufacturing, procurement, planning, warehousing, distribution, and project management. Mr. Bustamante has an understanding of the manufacture and logistics of cell-culture products, biological instruments, and molecular biology kits and diagnostics. He has led key projects in the areas of manufacturing resource planning (MRP) systems implementation, International Organization for Standardization (ISO) compliance, and product development. His industry experience includes work with Clonetics, BioWhittaker Inc. (now part of Cambrex Corporation [CBM-NYSE]), Digene Corporation (now part of Qiagen [QGEN-NASDAQ]), and Meso Scale Diagnostics LLC. Mr. Bustamante received a B.S. in biology from the University of San Diego and an MBA from Frostburg State University. He has been with Lifeline Cell Technology since 2007.

Glenn Sherman, Ph.D., Director of Chemistry Manufacturing and Controls (CMC)

Dr. Sherman has over 20 years of experience in regulatory affairs. He worked as a primary microbiology reviewer at the FDA, where he led pre-IND reviews in the Division of Antiviral Drug Products. After leaving the FDA, Dr. Sherman held regulatory positions at Pfizer Inc. (PFE-NYSE) and Johnson & Johnson (JNJ-NYSE), where he was CMC regulatory lead for biologics products and successfully managed IND-related activities for the biologics clinical, nonclinical, and CMC teams. Dr. Sherman holds a Ph.D. in microbiology and immunology from the University of North Carolina, Chapel Hill.

Jay Novak, Interim Chief Financial Officer

Mr. Novak has over 18 years of experience in finance and accounting. He has served as director of finance since May 2012. From July 2011 to May 2012, he was senior manager, financial reporting. Prior to joining the Company, Mr. Novak has served in various finance and accounting roles at several publicly traded companies. His experience includes serving as associate director of finance at Nanogen, Inc. (NGNE-OTC), associate director of finance at Elan Corporation, Plc (ELN-NYSE), and assistant director of finance at Isis Pharmaceuticals, Inc. (ISIS-NASDAQ). Mr. Novak is a certified public accountant, and began his career with Deloitte & Touche, LLP. He has received a B.S. in accountancy from California State University, Long Beach and an MBA from the University of California, Irvine.

Board of Directors

The Board of Directors oversees the conduct of and supervises the Company's management. Figure 5 provides a summary of Board members, followed by detailed biographies on page 14.

Figure 5
BOARD OF DIRECTORS

Donald Wright	Independent Director, Co-Chairman of the Board
Andrey Semechkin, Ph.D.	Chief Executive Officer and Co-Chairman of the Board
James Berglund, O.D.	Independent Director
Paul Maier	Independent Director
Charles J. Casamento	Independent Director
Ruslan Semechkin, Ph.D.	Vice President of Research and Development, Board Member

Source: International Stem Cell Corporation.

Donald Wright, Independent Director, Co-Chairman of the Board

Mr. Wright, a director since 2007, brings over 30 years of experience in starting and nurturing emerging growth companies, both public and private. He is president and founder of Everett, Washington-based Confluence Capital Group Inc. (www.confluencecap.com), which provides consulting services to institutional investors, debt holders, and public and private companies. Prior to Confluence Capital, Mr. Wright was president and CEO of Pacific Aerospace & Electronics, Inc. (PFAE-OTC), a company he founded in 1990, took public, and led until 2006. Under his leadership, Pacific Aerospace grew from sales of approximately $3 million in 1994 to over $112 million in 2000. He is the recipient of numerous business and community awards, and his company was named one of the 50 fastest-growing companies in Washington State and one of the 500 fastest growing companies in the U.S. for 1998, 1999, and 2000 by Deloitte & Touche. Mr. Wright served as an advisory board member for Central Washington University's School of Business for six years and completed the UCLA Director Training and Certification Program.

Andrey Semechkin, Ph.D. Chief Executive Officer and Co-Chairman of the Board

Biography on page 12.

James Berglund, O.D., Independent Director

Dr. Berglund, a director since 2012, is the co-founder of Enterprise Partners Venture Capital, which is a venture capital firm in the field of healthcare technology. Dr. Berglund has extensive professional experience and is an active participant in the biotechnology and healthcare industries.

Paul Maier, Independent Director

Mr. Maier, a director since 2007, has over 20 years of experience as a senior executive in biotechnology and pharmaceutical companies. Mr. Maier is currently an independent financial consultant. Previously, he was senior vice president and CFO of Ligand Pharmaceuticals, Inc. (LGND-NASDAQ), a commercial-stage biopharmaceutical company, from 1992 to 2007. From 1990 to 1992, Mr. Maier served as vice president, finance of DFS West, a division of DFS Group, LP, a private multinational retailer. From 1984 to 1990, he was employed by ICN Pharmaceuticals (now Valeant Pharmaceuticals International, Inc. [VRX-NYSE]), a pharmaceutical and biotechnology research products company, where he held executive positions in finance and general management in ICN as well as in its subsidiary SPI Pharmaceuticals. Mr. Maier has served on the Boards of public and private companies. He received an MBA from Harvard Business School and a B.S. from Pennsylvania State University.

Charles J. Casamento, Independent Director

Mr. Casamento, a director since 2010, is currently executive director and principal of The Sage Group, a healthcare advisory group specializing in mergers, acquisitions, and partnerships between biotechnology companies and pharmaceutical companies. He was the president and CEO of Osteologix, Inc. (OLGFX-OTC), a biopharmaceutical company developing products for treating osteoporosis, from 2004 through 2007. From 1999 through 2004, he served as chairman of the Board, president, and CEO of Questcor Pharmaceuticals, Inc. (QCOR-NASDAQ). Mr. Casamento formerly served as RiboGene, Inc.'s president, CEO, and chairman from 1993 through 1999 until it merged with Cypros to form Questcor. He was co-founder, president, and CEO of Interneuron Pharmaceuticals, Inc. (Indevus), a biopharmaceutical company, from 1989 until 1993. Mr. Casamento has also held senior management positions at Genzyme Corporation (a Sanofi company [SNY-NYSE]), where he was senior vice president, pharmaceuticals and biochemicals; American Hospital Supply, where he was vice president of business development and strategic planning for the Critical Care Division; Johnson & Johnson (JNJ-NYSE); Hoffmann-LaRoche, Inc.; and Sandoz Inc. (part of Novartis). Mr. Casamento also serves on the Boards of CORTEX Pharmaceuticals, Inc. (CORX-OTC), SuperGen, Inc. (now Astex Pharmaceuticals, Inc. [ASTX-NASDAQ]), and VIVUS, Inc. (VVUS-NASDAQ). He holds a Bachelor's degree in pharmacy from Fordham University and an MBA from Iona College, and was originally licensed to practice pharmacy in the states of New York and New Jersey.

Ruslan Semechkin, Ph.D., Vice President of Research and Development, Board Member

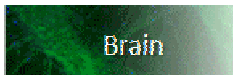
Biography on page 12.

Core Story

International Stem Cell Corporation ("ISCO" or "the Company") is a biotechnology company focused on the therapeutic applications of human parthenogenetic stem cells (hpSCs), a histocompatible stem cell (SC) platform capable of generating SC lines that can immune-match millions of people to treat diseases of the brain, liver, and eye. ISCO's core proprietary technology, parthenogenesis, creates pluripotent human SCs from unfertilized oocytes (eggs) in a manner believed to avoid the ethical issues associated with the use or destruction of viable human embryos. The Company focuses its therapeutic efforts on three markets with unmet medical needs: (1) Parkinson's disease (PD); (2) inherited metabolic liver diseases; and (3) corneal blindness. ISCO believes these markets could have a combined revenue potential of over $5 billion. Cell and tissue therapy has already been validated in each of these three indications; however, there are limitations to existing therapies, including an insufficient supply of safe and efficacious cells. Figure 6 summarizes the Company's therapeutic programs. ISCO is also employing its proprietary SC technology to develop an SC bank, UniStemCell™.

Figure 6

THERAPEUTIC PROGRAMS

Target	Goal	Market	Stage
	Treatment of Parkinson's Disease	$3.0 billion	Preclinical
	Treatment of Liver Damage	$1.0 billion	Preclinical
	Production of Cornea Implants	$1.0 billion	Preclinical

Source: International Stem Cell Corporation.

In addition, ISCO produces and markets specialized cells and growth media for therapeutic research through its subsidiary Lifeline Cell Technology (www.lifelinecelltech.com), and SC-based skin care products through its subsidiary Lifeline Skin Care (www.lifelineskincare.com).

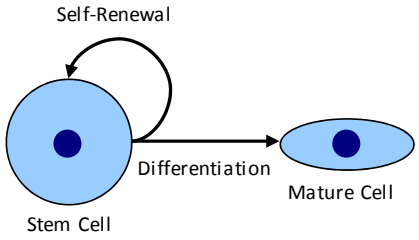
STEM CELLS OVERVIEW

SCs are the body's raw materials—cells that possess the ability to generate all the other cells in an organism, including specialized cell types such as heart, lung, skin, sperm, eggs, and other tissues. In addition, they are capable of renewing themselves almost indefinitely, serving as an internal repair system by dividing to provide replacement cells for those that are lost through normal wear and tear, injury, or disease. SCs differ from other kinds of cells in the body by demonstrating three unique and general properties: (1) they are unspecialized; (2) they are capable of dividing and renewing themselves; and (3) they can change (differentiate) into specialized cell types (Source: National Institutes of Health [NIH]).

Under proper conditions, SCs divide to form more cells, called daughter cells. As illustrated in Figure 7, when an SC divides, each new cell has the potential to either remain an SC (self-renewal) or become another type of cell with a more specialized function (differentiation), such as a liver cell, red blood cell, or brain cell. Under specific physiologic or experimental conditions, SCs can be induced to become tissue- or organ-specific cells. SCs can be classified by their ability to become all cell types or just a specific set of related cells: (1) totipotent cells can develop into all cell types, including the embryonic membranes; (2) pluripotent cells can give rise to any mature cell type; and (3) multipotent, bipotent, or unipotent cells are named depending on their ability to develop into few, two, or one other cell type, respectively.

Figure 7

STEM CELL CAPABILITIES



Source: All Things Stem Cell.

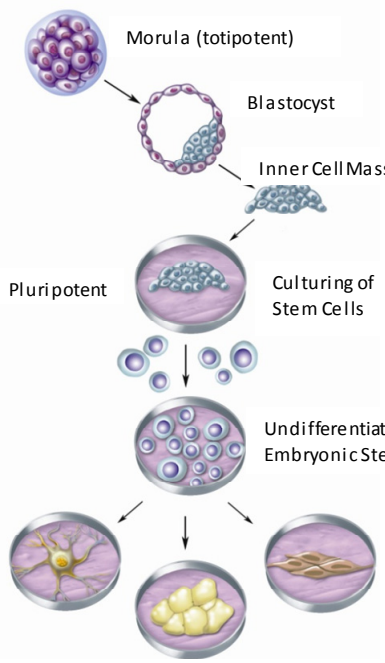
Stem Cell Research Market

The global market for therapeutic SC products was $3.8 billion in 2011, projected to reach nearly $4.3 billion in 2012 and $6.6 billion by 2016 (Source: BCC Research's *Global Markets for Stem Cells,* July 2012). The growth is expected to be driven by the technology's ability to address unmet medical needs, increased federal and private investment, and a supportive regulatory environment (Source: GBI Research's *Stem Cell Research Market to 2017—Strong Pipeline, High Unmet Needs in Chronic Diseases and Favorable Government Policies to Boost Stem Cell R&D,* November 2011).

Most major pharmaceutical companies are looking into new technologies—including SC research—as a way to increase the likelihood of the successful development of new therapies. There has been a recent interest from pharmaceutical companies to create strategic partnerships with SC research companies, with many major pharmaceutical companies planning to enter the SC market within the next five years if they have not already done so. Pharmaceutical companies are also exploring the use of SCs to accelerate the discovery of novel therapeutic molecules (Source: GBI Research).

Stem Cell Research

Figure 8
EMBRYONIC STEM CELL



Source: National Academy of Sciences.

The first pluripotent SCs to be studied were embryonic stem cells (ESCs). Most human ESCs are derived from embryos that develop from eggs that have been fertilized *in vitro* at fertilization clinics, but never implanted into a woman's uterus because they were no longer wanted or needed. The excess eggs can be frozen and voluntarily donated for research with the consent of the donors. They are not derived from eggs fertilized in a woman's body. Despite this, some find ESC research to be morally objectionable, because when used for research purposes, the fertilized egg no longer has the potential to become a fully developed human being (Source: NIH). After a sperm fertilizes an egg, the resulting cell begins to divide, and within five days it forms a mostly hollow sphere called a **blastocyst**, or a pre-implantation embryo. In its interior is the **inner cell mass (ICM)**, which is composed of 30 to 34 pluripotent cells. Figure 8 illustrates the process to develop ESCs.

In normal development, the blastocyst would implant in the wall of the uterus to become the embryo and continue developing into a mature organism. When the blastocyst is used for SC research, scientists remove the ICM and place these cells in a culture dish with a nutrient-rich medium. Scientists can induce ESCs to replicate themselves in an undifferentiated state for long periods of time before stimulating them to create specialized cells (Source: National Academy of Sciences).

Once the cell line is established, the original cells yield millions of ESCs. Ideally, cells in an SC line keep dividing free of genetic defects, but do not differentiate into specialized cells. Clusters of cells can be taken from a SC line and frozen for storage or shared with other researchers. The creation of SC banks, consisting of multiple SC lines, allow researchers access to SCs for experimentation without being dependent on a continued supply of eggs or the generation of a new batch of SCs (Source: Mayo Clinic).

However, the use of undifferentiated SCs for therapeutic applications can cause a type of tumor called a **teratoma**. To be effectively used for therapies, ESCs first need to be differentiated into specific types of cells. To accomplish this, researchers manipulate SCs by, among other methods, changing the chemical composition of the culture medium, altering the surface of the culture dish, or modifying the cells by inserting specific genes.

Stem Cell Therapeutic Applications

There are many applications of SC research, both in clinical and therapeutic areas. A key need to advance SC bioengineering is the ability to understand and control SC differentiation. Some of the most serious medical conditions, such as cancer and birth defects, are due to abnormal cell division and differentiation. A better understanding of the genetic controls of these processes may yield information about how diseases arise and suggest new therapeutic options. In general, SC medical research can provide benefits in three areas: (1) new cell-based therapeutic applications; (2) a better understanding of the cause of disease; and (3) new methods of *in vitro* drug testing (Source: NIH).

Perhaps the most important potential application of human SCs is the generation of cells and tissues for cell-based therapies, also referred to as regenerative or reparative medicine. SC therapy consists of the replacement of diseased, dysfunctional, or injured cells with SCs or their derivatives. SCs that are directed to differentiate into specific cell types could provide a renewable source of replacement cells and tissues to treat diseases such as Alzheimer's disease, PD, liver disease, spinal cord injury, heart disease, Type 1 diabetes, rheumatoid arthritis, and multiple sclerosis. Researchers have already shown that adult bone marrow cells guided to become heart-like cells can repair heart tissue in mice (Source: Mayo Clinic). Figure 9 provides a list of potential SC applications.

Figure 9

POTENTIAL APPLICATIONS FOR STEM CELLS

Neurological	Pancreatic and Blood	Other
Parkinson's disease	Childhood and adult leukemia	Burns
Spinal cord injury (paralysis)	Sickle-cell anemia	Ovarian cancer
Neuroblastoma	Immunodeficiency	Heart muscle loss following heart attack
Multiple sclerosis	Lymphomas	Aneurysms
Retinal disease	Hodgkin's Disease	Breast cancer
Stroke	Lupus	Liver disease including hepatitis
Traumatic brain injury	Arthritis	Sports injuries
	Bone marrow failure	Bone injuries
	Type 1 diabetes	

Source: Tellmeaboutstemcells.org.

Adult SC-based therapies are already in clinical use, and have been for over 40 years in the form of bone marrow transplants to treat leukemia, lymphoma, and inherited blood disorders. The success of these procedures demonstrates the validity of SC transplantation as a therapeutic option. New clinical applications are being explored, with human clinical trials in progress to expand the application of other SC therapies. Furthermore, human SCs could also be used to test new drugs for safety and efficacy, lessening the need for drug testing in animals and humans. Tests could show whether the new drug had any effect on the cells and whether the cells were harmed. Other kinds of cell lines are already used in this way. Cancer cell lines, for example, are used to screen potential anti-tumor drugs (Source: Mayo Clinic).

Although ESC research has elucidated considerable potential for these cells, the field is still relatively new. Moreover, in the U.S. and some other countries, progress has been slowed by funding and regulatory restrictions derived from perceived ethical concerns.

Medical and Ethical (Legislative) Concerns of Stem Cell Research

Medical Issues

Researchers have found that, in addition to the onset of teratomas, ESCs could grow irregularly—an event that has been reported in animal experiments—or could travel to a part of the body where they are not intended to go. In addition, SCs could simply fail to function normally, with unknown consequences (Source: Mayo Clinic).

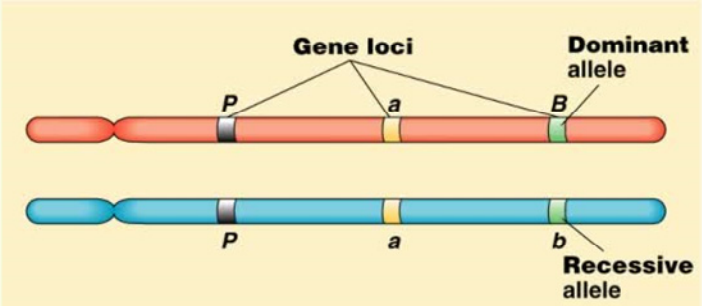
However, one of the main limitations of SC therapy is the potential trigger of an immune response in which the recipient's body attacks the SCs as foreign invaders, requiring the use of immunosuppressant drugs to prevent the rejection of the implanted tissue or cells. Immunosuppressants are powerful drugs in themselves and not all patients who could benefit from an SC-based therapy will be able to tolerate it, significantly reducing the target population size.

Compatibility between a donor and recipient is determined by the degree of disparity between donor and recipient Human Leukocyte Antigen (HLA) haplotype. The HLA complex is a collection of closely related genes that control the expression of particular proteins on a cell surface and provide an individual histocompatibility profile. The more HLA antigens shared between a recipient and donor, the better the potential outcome of the transplantation.

The probability of a successful transplant increases significantly if the donor cells are HLA **homozygous**, meaning they contain identical **alleles** for each antigen-presenting protein. Alleles are the two or more different forms of a gene, and are classified as either recessive or dominant. As illustrated in Figure 10, for genes with two alleles, where the dominant and recessive alleles are denoted by capital and lowercase letters, respectively, there are three different allele couplets that could occur: PP (homozygous-dominant), aa (homozygous-recessive), or Bb (**heterozygous**) (Source: the British Science Association).

Figure 10

HOMOZYGOUS AND HETEROZYGOUS



Genotype	
PP	Homozygous for the dominant allele
aa	Homozygous for the recessive allele
Bb	Heterozygous

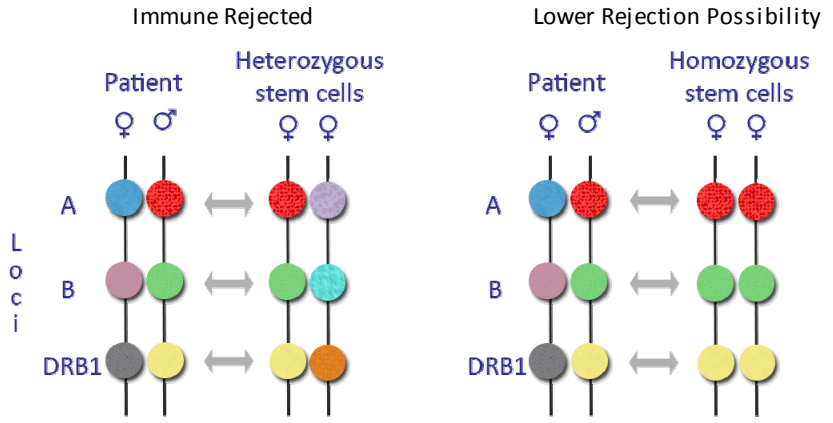
Source: Addison Wesley Longman, Inc.

As shown in Figure 11 (page 19), heterozygous SCs and the patients' HLA haplotype must be a match for both sets of alleles—displayed as circles of different colors—for immune rejection to be avoided. In this case, despite a perfect match for one set, the differences with the second set of genes would result in possible rejection.

Cells inheriting a duplicate set of HLA genes (i.e., HLA homozygous) provide a better immune-matching profile. When a SC displays two identical set of genes, only one of the patient's HLA haplotypes sets must be matched with the cell for compatibility, as seen in the right side of Figure 11. Furthermore, if homozygous donor cells have a haplotype found with high frequency in a population, these cells may have application in transplantation-based SC therapies for a large number of individuals.

Figure 11

HOMOZYGOUS MATCHING



Source: International Stem Cell Corporation.

Ethical Issues and Federal Legislation

On the ethical front, opponents of SC research argue that a human embryo is already a human life that is entitled to protection. The debate showcases the social and ethical challenge of SC research, and has prompted authorities around the world to enact legislation to regulate SC research.

In the U.S., the Federal Government allocates billions of dollars each year to biomedical research, mostly through the National Institutes of Health (NIH), which is the main source of funds for most academic laboratories in the U.S. Legislators have the unique challenge of deciding whether taxpayer dollars should be used to fund research that some believe to be unethical. Current laws prohibit the creation of embryos for research purposes. Scientists instead receive "leftover" embryos from fertility clinics with consent from donors. However, disagreements arise regarding additional restrictions of government funding for SC research.

For example, in 2001, former U.S. President George W. Bush limited federal funding to research using human ESC lines created before August 9, 2001, a step that many believe set back the progress of SC research in the U.S. However, in March 2009, President Barack Obama issued Executive Order (EO) 13505, entitled "Removing Barriers to Responsible Scientific Research Involving Human Stem Cells," which overturned President Bush's SC policy, allowing federal grants to support studies using existing ESCs regardless of when they were created, and on new cell lines if they are created from embryos left over from *in vitro* fertilization (IVF). However, some restrictions on the funding of ES cell research continues, as the new order stipulates that only discarded IVF embryos may be used, and not new embryos provided by donors (Source: Harvard Stem Cell Institute).

In addition, policy makers are grappling with whether these restrictions should be applied to SCs created using new technologies that do not involve the destruction of an embryo, such as induced pluripotent stem (iPS) cells or ISCO's parthenogenesis process (Source: the University of Utah's Genetic Science Learning Center). For example, NIH guidelines and U.S. federal laws define **parthenotes** as embryos, which means that deriving new hpSC lines is off-limits to all laboratories receiving federal funding. Thus, the development of these technologies needs to be spearheaded by private firms with intellectual property positions in the iPS and hpSC field (Source: *Scientific American's* "You Say Embryo, I Say Parthenote," November 4, 2011).

The official position is different in international markets. The German Federal Court of Justice, in its ruling on the Greenpeace vs. Brüstle patent case, upheld patent restrictions on SC technologies, including ESCs, which require the destruction of human embryos. According to the Company, since its hpSC technology falls outside of this restriction, the ruling strengthens ISCO's position in the European markets, as the Company is able to receive patent protection in the EU.

The inherent ethical issues of SC research may provide added value to technologies that can circumvent the ethical barriers. In 2012, the Nobel Prize in Physiology or Medicine was awarded jointly to Sir John B. Gurdon and Shinya Yamanaka for their work discovering that mature cells can be reprogrammed to become pluripotent SCs. Specifically, Dr. Yamanaka showed in a series of experiments that adult mouse cells could be reprogrammed into pluripotent SCs by modifying their genetic information, leading to the creation of iPS cells. An overview of iPS is provided on the following pages, along with a description of the different kinds of SCs and SC technology.

TYPES OF STEM CELL TECHNOLOGIES

The most common classes of SCs used for research are ESCs, adult (or somatic) stem cells, iPS, and hpSC (the technology used by ISCO). Figure 12 provides an overview of these technologies, as compared by ISCO, followed by a detailed description, including potential, limitations, and ethical considerations.

Figure 12

TYPES OF STEM CELLS, AS COMPARED BY ISCO

	Embryonic SC	Adult SC	iPS	hpSC
Immune Matching Economic Source	Impractical - each line is unique	Individual Only	Individual Only	Yes
Pluripotency	Yes	No	Maybe	Yes
Proliferation	Strong	Weak	Varies	Strong
Genetic Manipulation Use of Viruses	No	No	Yes	No
Use in Genetic Diseases	Superior	Deficient - carries damaged gene	Deficient - carries damaged gene	Superior

ISCO's Stem Cell Technology

Source: International Stem Cell Corporation.

Embryonic Stem Cells

Human ESCs are generated by transferring cells from a pre-implantation-stage embryo into a plastic laboratory culture dish. As the process of generating an ESC line is somewhat inefficient, lines are not produced each time cells from the pre-implantation-stage embryo are placed into a culture dish (Source: NIH).

Potential and Limitations

Due to their pluripotent nature, ESCs have potential for use regenerating or repairing diseased tissue and organs as well as can be a source of cell-based therapy for treating many diseases. However, the ability to control the differentiation process is crucial for the therapeutic potential of ESCs. Although experimentation has resulted in some basic protocols or "recipes" for the directed differentiation of ESCs, further understanding and research needs to be performed for the full potential of this technology to be achieved (Source: International Society for Stem Cell Research).

Another issue that arises with the use of ESCs is the immune compatibility. A patient's immune system might recognize the transplanted ESCs as foreign and attack them, requiring the use of immunosuppressant drugs to avoid complications, such as transplant rejection and ineffective therapeutic outcome. However, because the first Phase I clinical trials testing the safety of human ES-derived cells have only recently been approved by the U.S. Food and Drug Administration (FDA), researchers are unsure of the likelihood and severity of immune complications while using tissues derived from ESCs (Source: NIH).

Ethical Considerations

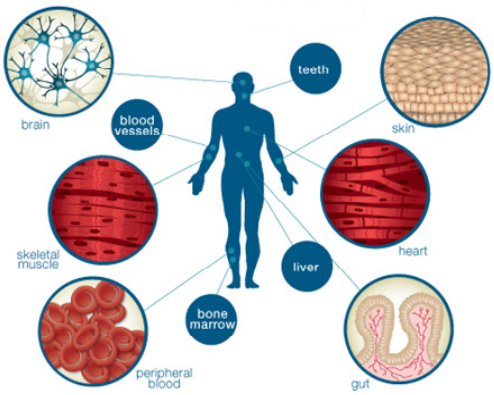
When scientists isolate human ESCs in the lab, they destroy a viable embryo. The ethical and legal implications of this have made some reluctant to support research involving ESCs.

Adult Stem Cells

An adult (or somatic) SC is an undifferentiated cell found in the body's tissues and organs that can renew itself and can differentiate into some or all of the major specialized cell types within that tissue. Adult SCs exist naturally in the body surrounded by normal cells, and their main role is the growth, maintenance, and replacement of cells that are lost through daily wear and tear. Figure 13 illustrates some of the most common places where adult SCs can be found.

However, most types of adult SCs are present in low quantities, so isolating these cells from adult tissue is not only challenging but for some specific types of adult SCs, such as those found in the heart and brain, isolation could cause considerable tissue or organ damage. In addition, adult cells are difficult to grow in culture, and once isolated, their capacity to divide is limited, making generation of large quantities of SCs difficult.

Figure 13
LOCATION OF ADULT STEM CELLS



Source: Univeristy of Utah's Genetic Science Learning Center.

Unlike ESCs, adult SCs are somewhat specialized. Under natural circumstances, adult SCs can become only a subset of related cell types. For example, bone marrow SCs differentiate primarily into blood cells, and nerve SCs can only make the various types of brain cells. However, recent research suggests that adult SCs might be more flexible than previously thought. For example, a number of experiments have reported that certain adult SCs can differentiate into cell types seen in organs or tissues other than those expected from the cells' lineage, a phenomenon called transdifferentiation (Source: NIH).

Potential and Limitations

Although the partial differentiation of adult SCs can be a disadvantage when trying to produce an unrelated cell type, their specialized nature can be an advantage when cells within the lineage of the original adult SCs are required. Some adult SCs are currently being used in treatments. Specifically, adult SCs collected from the blood and bone marrow are used as a treatment for blood-related diseases as well as transplants.

In addition, adult SCs enable the use of a patient's own cells for expansion and differentiation into a specific cell type, and then transplanted back into the patient (known as auto-grafting). Auto-grafting or **autologous** transplants reduce the likelihood of immune rejection (Source: NIH). However, one limitation of auto-grafts is that they are not optimal for the treatment of genetic diseases, as the adult cell originally taken from the patient contains the damaged genetic information. Although adult SCs can also be transplanted from an unrelated donor to the patient, this may eliminate the immune-tolerance benefit.

Ethical Considerations

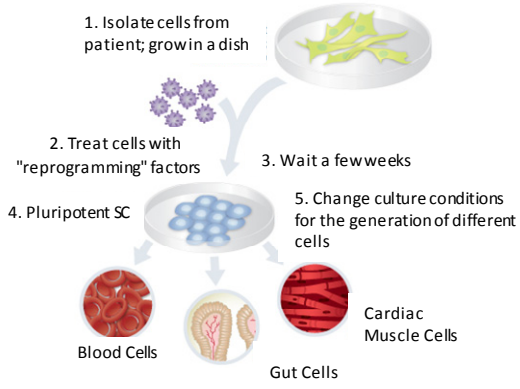
The use of adult SCs in research and therapy is not as controversial as the use of ESCs, because the production of adult SCs does not require the destruction of an embryo.

Induced Pluripotent Stem Cells

Induced pluripotent stem (iPS) cells are cells created artificially in the laboratory by altering the genes of adult SCs through a process called **nuclear reprogramming**, which genetically "reprograms" the adult SC to display an ES cell-like state. Like ESCs, iPS cells can differentiate into any cell in the body, and are therefore considered pluripotent (Source: *Genes & Development*, Vol. 24: 2239-2263; 2010).

Although different approaches have been established to reprogram adult SCs, the use of **transcription factors** was first reported by Dr. Shinya Yamanaka in 2006. Dr. Yamanaka demonstrated the viability of this process and termed the resulting cells iPS, a discovery that led to Dr. Yamanaka being the co-recipient of the 2012 Nobel Prize in Physiology or Medicine.

Figure 14
CREATION OF iPS CELLS



Source: University of Utah's Genetic Science Learning Center.

Lineage-associated transcription factors help establish cellular identity during development by driving the expression of specific genes while suppressing lineage-inappropriate genes. Through nuclear reprogramming, which involves the introduction of a combination of three to four genes for transcription factors delivered by **retroviruses** into the adult cell, researchers are able to force the expression of selected embryonic transcription factors, changing the differentiation process of a cell (Source: *Genes & Development*, Vol. 24: 2239-2263; 2010). The generation process of iPS cells is illustrated in Figure 14. More recent methods have replaced and reduced the number of genes required for the transformation, used alternative delivery methods to get the genes into the cell, or sought to replace the genes with chemical factors (Source: Harvard Stem Cell Institute).

Potential and Limitations

Since iPS cells could be used to provide the desired cell types that would already be genetically matched with the patient, this technology might circumvent common problems associated with ES cell-therapy and organ transplantation, such as the limited availability of matched tissues and the possibility of immune rejection.

Ultimately, iPS cells may overcome two major factors encountered in the study and treatment of degenerative diseases: (1) the limited accessibility of affected tissues; and (2) the ability to collect beneficial cell material from patients with advanced stages of disease. For example, by deriving iPS cells from patients' skin cells and then differentiating them *in vitro* into the affected cell types, researchers could allow the derived cells to go through the same steps *in vitro* as patients' cells went through as they became sick, thus recreating the disease. This could provide further understanding and information on the causes and progression of disease (Source: *Genes & Development*, Vol. 24: 2239-2263; 2010).

However, significant concerns still exist over current iterations of iPS technology. Despite successes in animal models, iPS cell technology is not yet ready for transplant into humans. These cells, like ESCs, tend to form teratomas. In addition, the artificial nature of iPS cells raises safety concerns. Several of the genes used to induce transformation from an adult cell to an embryonic-like state are linked to cancer (Source: Harvard Stem Cell Institute). In addition, the reprogramming could also affect the functionality and characteristics of the iPS cells. Substantial differences between iPS and blastocyst-derived ES cell types have been reported, with one study identifying 271 genes that were expressed differently between iPS and ESCs (Source: Harvard Stem Cell Institute).

Ethical Considerations

Similar to adult SCs, the use of iPS cells in research and therapy is not as controversial as it does not require the destruction of an embryo. These cells can be made from readily available cells including fat, skin, and fibroblasts.

ISCO'S TECHNOLOGY—HUMAN PARTHENOGENETIC STEM CELLS

ISCO is pioneering the development of a new class of SCs—known as human parthenogenetic stem cells (hpSCs)—that the Company believes results in therapeutic SCs that avoid the safety, economic, and ethical concerns inherent with existing SC technologies. The term parthenogenesis refers to a form of asexual reproduction naturally occurring among some insects, birds, and lizards, in which an unfertilized egg develops without being fertilized by a male gamete.

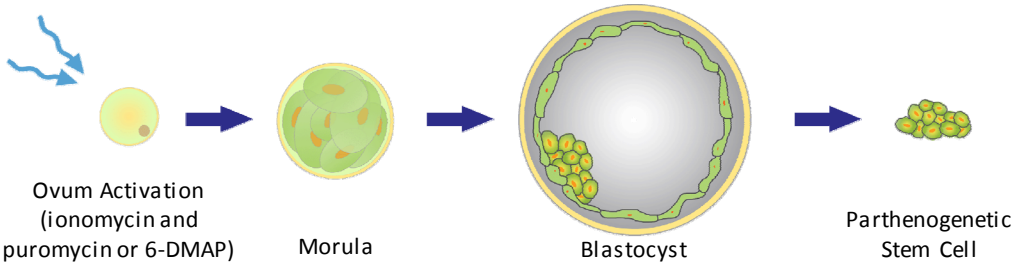
The creation of hpSCs involves methods to stimulate a human egg (oocyte) into believing that it has been fertilized, and allowing it to start the cell division process. The process does not require any contribution of sperm, and since the eggs are not fertilized, the developing oocyte does not go through an embryonic phase and no viable embryo is created, thereby avoiding the ethical controversy associated with the destruction of a human embryo (Source: the Memorial Sloan-Kettering Cancer Center). In addition, unlike methods requiring the use of viruses or DNA constructs that may integrate into the genome, ISCO's method does not alter the nature of the genes in the cells, reducing safety concerns.

According to ISCO, the Company's platform technology is capable of producing populations of SCs and therapeutic derivatives, not only to a higher level of purity, but also requiring less time and labor, in addition to using fewer costly materials than traditional methods (Source: ISCO Press Release, May 10, 2012).

ISCO's Parthenogenetic Stem Cell Platform

In 2007, the Company's scientists achieved the first successful creation of human SC lines from unfertilized eggs. The process for the creation of hpSCs begins by chemically stimulating an unfertilized ovum to begin division, as illustrated in Figure 15. The egg—called a parthenote—behaves like an embryo in the early stages of division. Similar to the generation of ESCs, once the parthenote develops into a blastocyst, the inner cell mass (ICM) is removed and placed in a culture dish, leading to the creation of hpSCs (Source: *Scientific American's* "You Say Embryo, I Say Parthenote," November 4, 2011). Like ESCs, parthenogenetic SCs are pluripotent and can be differentiated into a range of human cells or tissue for transplant into diseased areas of the body.

Figure 15
PARTHENOGENETIC STEM CELL



Source: International Stem Cell Corporation.

Different activation techniques applied to human oocytes enable the creation of either HLA-heterozygous hpSC, which are HLA-matched and histocompatible with the oocyte donor, or HLA homozygous hpSCs, which may be histocompatible with significant segments of the human population.

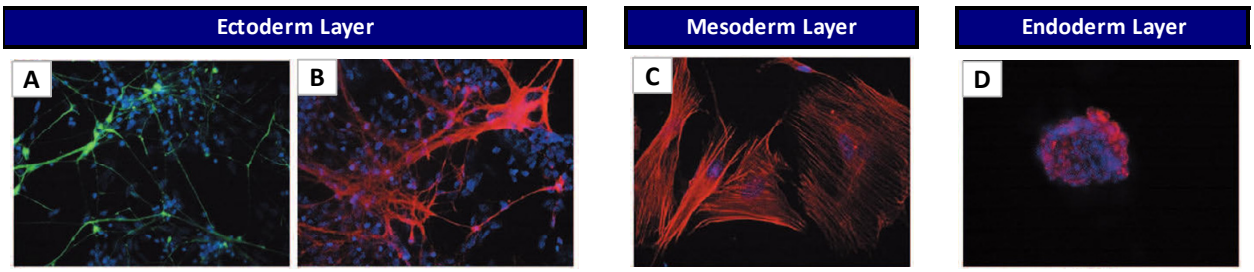
First Generation of Heterozygous hpSC Lines

In research conducted in 2007 and led by Dr. Elena Revazova—ISCO co-founder and current scientific advisor—scientists reported the first successful derivation of pluripotent hpSC lines (Source: *Cloning and Stem Cells,* Vol. 9 (3):432-450, 2007). Following parthenogenetic activation of normal oocytes with a combination of the activating agents **ionomycin** and **6-DMAP**, researchers were able to generate six hpSC lines. DNA profiling of all six lines, performed to confirm genetic similarity to the donor's somatic cells, demonstrated that they were a match with the donors. These cells can be transplanted into the oocyte donor without fear of rejection (representing a source of histocompatible tissues for transplantation). The hpSC cells demonstrate typical human ESC morphology and functionality, including the ability to provide differentiated derivatives of all three **germ layers**—mesoderm, ectoderm, and endoderm—that lead to all of the cell types found in the human body.

As illustrated in Figure 16, through the use of immunofluorescence staining, researchers were able to detect markers of the three germ layers. For the ectoderm layer, neural differentiated cells of ectoderm origin were detected as shown in picture A and B. For the mesoderm layer, as shown in picture C, muscle specific alpha-actinin, a mesodermal cell marker, was identified. Lastly, for the endoderm, alpha-fetoprotein, an immature endoderm marker, was detected, as depicted in picture D.

Figure 16

DIFFERENTIATION OF hpSC CELLS INTO DIFFERENT CELL TYPES



Source: Cloning and Stem Cells, Vol. 9 (3):432-450, 2007.

Generation of Homozygous hpSC Lines

However, the histocompatibility advantages of hpSCs are not limited to heterozygous cells. In a follow-up study, researchers were able to successfully derive HLA homozygous hpSC lines from both HLA homozygous and HLA heterozygous donors. Activation of oocytes with a combination of ionomycin and **puromycin** results in the formation of homozygous HLA genotypes. The cells derived from homozygous hpSCs express only one of two sets of parental histocompatibility antigens, which could allow for the cells to be more readily matched to patients (Source: *Cloning and Stem Cells*, Vol. 10 (1):11-24, 2008).

Establishing an HLA-matched tissue bank through the proper selection of oocyte donors could provide compatible cells and tissue for a large segment of the population while using significantly fewer cell lines. In particular, one line derived by ISCO researchers—denominated hpSC-Hhom-4—carries the most common haplotype found across racial groups within the U.S. population, potentially providing a match for nearly 5% of individuals in the U.S.

According to the Company, the ethical advantage of derivation from unfertilized oocytes, combined with an immune-matching advantage, makes hpSCs a promising source for cell-based therapy. To date, ISCO has successfully derived and characterized 15 hpSC lines. In addition, the Company continues to make hpSC technology available to academic and corporate research offices for the exploration of additional disease targets. ISCO's hpSC technology platform can also be used to reprogram adult cells to become SCs, or to transform SCs into adult cells. The Company believes that this technology provides an alternative to existing cellular reprogramming methods and represents an opportunity for ISCO to become a leader in the iPS field.

Benefit of the hpSC Platform

ISCO has shown how hpSCs can be expanded indefinitely in their undifferentiated state and differentiate into all major cell types, which are two key properties of SCs. In addition, the Company believes that its hpSC platform technology provides medical, economical, and ethical advantages over existing SC technologies, as described in Figure 17.

Figure 17
BENEFITS OF hpSCs

Medical Benefits	Economic Benefits	Ethical Benefits
Reduced immune rejection	One stem cell line matches 70 million people 25 lines immune-match 35% of U.S. population	No viable embryo created or destroyed

Source: International Stem Cell Corporation.

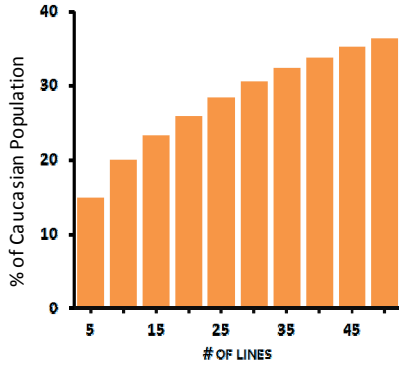
Medical Benefits

The use of SCs in cell-based therapies raises the same HLA matching issues that limit solid organ transplants. Matching donor and recipient tissue for HLA antigens greatly increases the likelihood of transplant survival. ISCO's parthenogenetic platform can produce heterozygous hpSCs that are genetically matched to the specific donor, or homozygous hpSCs, which express a lower number of parental histocompatibility antigens, and thus might lessen the risk of immune rejection. By selecting donors that are naturally homozygous or using the puromycin-based method to create HLA-homozygous SCs, a relatively small number of hpSC lines could provide sufficient immune-matched cells to cover large parts of the world's population.

Economic Benefits

The histocompatibility advantages of ISCO's technology include the need for fewer cell lines to match larger segments of the population and a reduced need for immunosuppressant co-therapy, which may offer economic benefits for both the Company and its potential patients. ISCO believes that by choosing the right donor with a haplotype common in specific populations, one SC line could match 70 million people globally, while 25 lines could immune-match 35% of the U.S. population, as illustrated in Figure 18.

Figure 18
IMMUNE BENEFITS OF hpSCs



Source: International Stem Cell Corporation.

Ethical Benefits

The blastocysts used in hpSC technology cannot form a viable human embryo and cannot become an individual. This may allow hpSC technologies to avoid the ethical controversy associated with embryos and SCs.

Additional Benefits

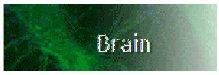
ISCO's hpSC technology also avoids the need for other technologies, such as iPS, to perform genetic manipulations (which have safety concerns). In addition, since hpSCs do not necessarily need to originate from the intended patient, they are more likely to benefit the treatment of genetic diseases. In autologous treatments, the cells taken from the donor carry the same genetic defect that started the disease. The histocompatibility advantages of hpSCs allow for treatment of genetic disease using cell lines from a third party instead of the individual.

Therapeutic Programs

ISCO is currently focusing on the use of its technology for the treatment of three areas with significant medical need and large market potential, where cell and tissue therapy is already proven but where limitations include an insufficient supply of safe and efficacious cells: (1) Parkinson's disease (PD); (2) metabolic liver disease; and (3) corneal implants. The Company believes that its proprietary SC technology provides a technical and competitive advantage when developing therapeutic options for these indications. Figure 19 provides an overview of the Company's programs and target indications.

Figure 19

THERAPEUTIC PROGRAMS OVERVIEW

Target	Goal	Highlights
	Parkinson's Disease	More than 1 million sufferers in the U.S. $3.0 billion market No pluripotent stem cell-based competition
	Liver/Metabolic Disease	30K deaths/year; 15K waiting transplant $1.0 billion market Orphan disease status offers potential for accelerated path to market
	Cornea Implants	10 million blind or partially sighted people worldwide $1.0 billion market Simple procedure, limited only by tissue availability

Source: International Stem Cell Corporation.

In November 2012, the Company announced the generation of the first clinical-grade hpSCs lines created using its proprietary technology. The new SC lines were derived under U.S. and California regulatory frameworks and were designed to meet FDA regulations. The new lines have been confirmed by independent third-party testing to be homozygous, meaning that they have a simple genetic profile in the critical areas that define immune rejection probability, increasing their compatibility profile.

ISCO's existing research-grade hpSC lines are currently used to support its preclinical programs and trials. The new clinical-grade SC lines position the Company to transition into a clinical-stage company with the ability to conduct clinical trials in the U.S.

The Company believes that its focus on the economics of cell production and efficiency from the early stages of its programs provides a competitive advantage over some of its competitors, which do not focus on economic issues until their programs reach clinical status, at which time it is often difficult and costly to alter the method of generating cells.

PARKINSON'S DISEASE (PD) PROGRAM

The Company's work on PD focuses on the generation of dopaminergic neuron cells, the loss of which is known to be the cause of the disease. ISCO's research team has developed a new method to derive high-purity populations of neural stem cells (NSCs) from hpSCs and further differentiate them into dopaminergic neurons suitable for implantation. ISCO's proprietary technology allows for the creation of billions of neuronal cells necessary for conducting preclinical and clinical studies from a small batch of SCs. This work has recently been published in *Scientific Reports*, a primary research journal of the *Nature* publishing group (Source: *Scientific Reports* 3, Article number 1463, March 2013). ISCO believes that utilizing its proprietary technology—rather than in-licensing the intellectual property—delivers the advantages listed on page 27:

- requires less time, labor, and costly materials than traditional methods; and
- generates neuronal populations of cells with a higher level of purity than conventionally available.

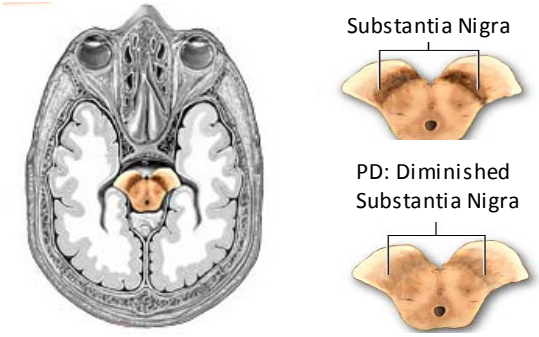
Overview of Parkinson's Disease (PD)

PD, a progressive disorder of the nervous system that affects movement, belongs to a group of conditions called motor system disorders. These disorders result from the loss of dopamine-producing cells in the **substantia nigra** area of the brain, as illustrated in Figure 20. Dopamine is a neurotransmitter that enables the smooth and coordinated movements of the body's muscle. The four primary symptoms of PD are tremors in the extremities and face; rigidity or stiffness of the limbs and trunk; bradykinesia (slowness of movement); and postural instability (Source: the National Institute of Neurological Disorders and Stroke).

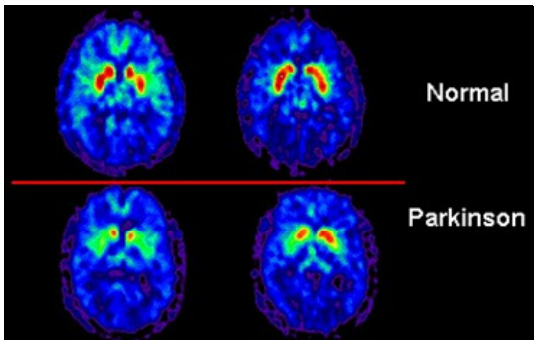
Figure 20

PARKINSON'S DISEASE

Cross-section of the Midbrain



Brain PET Scan Showing Decreased Dopamine Activity



Sources: A.D.A.M., Inc. and Brown University.

In the U.S., 50,000 to 60,000 new cases of PD are diagnosed each year, adding to the one million people who currently suffer from the disease. The U.S. Centers for Disease Control and Prevention (CDC) rated complications from PD as the 14th leading cause of death in the U.S. Worldwide, it is estimated that four million to six million people suffer from the condition (Source: National Parkinson Foundation). PD ranks among the most common late-life neurodegenerative diseases, affecting approximately 1.5% to 2.0% of people older than age 60 (Source: Cleveland Clinic).

The global PD therapeutics market reached nearly $3 billion in 2011 and is growing at a 5.8% compound annual growth rate, driven by both an increase in prevalence and the increasing cost of therapy. Notably, the U.S. represents 35% of the global market, with an estimated value of over $1 billion (Source: Global Data's *Parkinson's Disease Therapeutics - Global Drug Forecasts and Treatment Analysis to 2020,* 2012).

At present, there is no cure for PD, but a variety of medications provide relief from the symptoms by increasing the brain's supply of dopamine or mimicking dopamine's effect. **Levodopa (L-dopa)** is considered the most effective PD medication. L-dopa is a small molecule administered orally, which passes to the patient's brain and is converted to dopamine. However, L-dopa's side effects include dyskinesia (involuntary movements). After years of treatment, the benefits might diminish or become less stable as patients develop a tolerance to the dopamine, resulting in on/off phases (Source: Mayo Clinic).

Other drugs, such as dopamine antagonists, which mimic the role of dopamine in the brain, or therapies that might help prevent the breakdown of dopamine are not as effective in treating symptoms as L-dopa, but might last longer and may be used in combination with L-dopa to prevent the off and on effects. In some cases, surgery may be appropriate if the disease does not respond to medication.

ISCO's Parkinson's Disease Studies and Research

ISCO believes that the etiology of PD and the relative localization in the brain make this condition an attractive target for SC therapy. The Company aims to create and implant hpSC-derived NSCs. NSCs are self-renewing multipotent SCs of the nervous system, which have the capacity to differentiate into all three main types of neural cells. NSCs are considered to be a prospective therapy for neurodegenerative diseases, such as Alzheimer's disease, PD, Huntington's disease, and immobility caused by spinal cord injuries. The potential efficacy of this therapy has been shown in experiments using animal models (Source: *Regenerative Medicine,* Vol. 7(1):37-45, January 2012), as well as in clinical trials where fetal-derived neuronal tissue implanted into PD patients was shown to reverse the disease's symptoms (Source: *NeuroRx*; Vol. 1(4) 382-393, October 2004).

However, NSCs are normally collected in homogenized tissue from aborted fetuses or adult brain SCs, which not only brings ethical issues, but makes the source of tissues difficult to secure. In addition, logistical issues—such as the need to have the patient in the hospital as the tissue is being prepared—and the immune-matching requirements limit the usefulness and applicability of this procedure. ISCO believes that through the use of its proprietary technique of generating dopaminergic neurons by deriving them from hpSCs, it could capitalize on the demonstrated effectiveness of the NSC technique while avoiding the technology's conventional limitations.

In Vitro Research

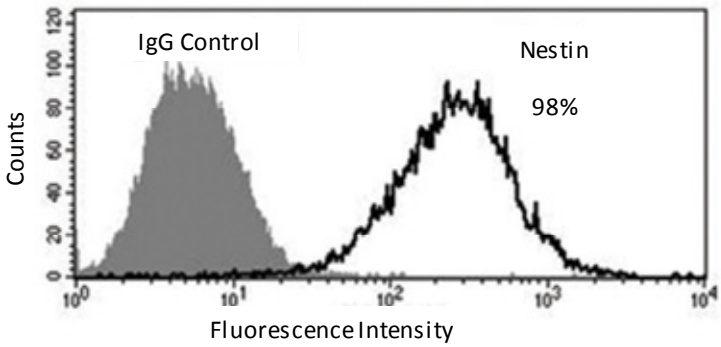
The overall objective of the research was to develop an efficient, low-cost method for generating homogeneous populations of NSCs from hpSCs, and their subsequent *in vitro* differentiation into dopaminergic neurons. Through its *in vitro* research, the Company has demonstrated the creation of pure, well-characterized populations of NSCs, as well as their functional capacity to become dopaminergic neurons and their ability to release neuroprotective cytokines.

Researchers reported for the first time that NSCs derived from hpSCs (hpNSCs) were able to maintain proliferative and differentiation potential during cultivation and expansion, as well as their neurogenic potential. Researchers were able to further differentiate the hpNSCs into dopaminergic neural cells, with a high degree of purity and neural functional ability (Source: *Regenerative Medicine,* Vol. 7(1):37-45, January 2012).

The pureness of the cells is a key criteria for FDA approval as any cells injected into patients need to be free of undifferentiated SCs in order to avoid tumor formation. Researchers were able to generate cell populations with 98% pureness, as shown in Figure 21 (where nestin is a marker for NSCs). In addition, electrophysiology testing confirmed that the generated cells maintained neural functionality, as they displayed fired **action potential**, a key step in the process that occurs during the firing of a neuron, similar to primary neurons.

Figure 21

CELL PURENESS



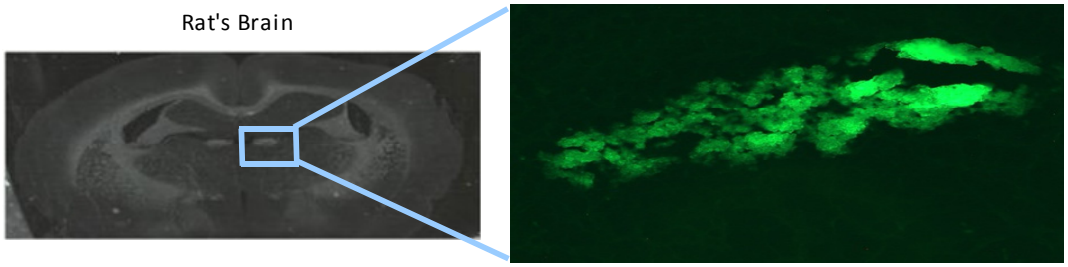
Source: Nature Publishing Group's Scientific Report.

In Vivo Studies

The Company commenced rodent studies to measure the efficacy of the two candidate neuronal cells for the treatment of PD. These studies involved injecting the hpSC-generated neuronal cells into the center of rat brains, and observing at how they engraft, survive, and produce dopamine. Results demonstrated that the human cells survived in the rat brains for over four months after transplantation, as seen in Figure 22, where green staining represents the human neural cells.

Figure 22

HUMAN NEURONS IN RATS



Source: International Stem Cell Corporation.

In addition, the implanted cells displayed neural functionality, producing measurable quantities of dopamine in the brain and blood. Figure 23 shows the measured levels of human dopamine in both transplanted rats and control rats, while Figure 24 illustrates actual dopamine release by the transplanted cells (dark gray) compared with published protocols (the control group [light gray]).

Figure 23

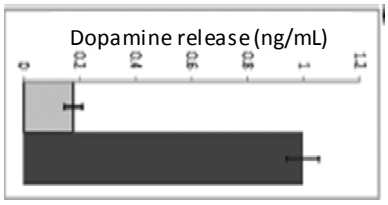
HUMAN DOPAMINE LEVELS

	Brain	Blood Serum
Transplanted Rats	0.57 ng/ml	4 ng/ml
Control rats	0 ng/ml	0 ng/ml

Source: International Stem Cell Corporation.

Figure 24

DOPAMINE RELEASE



Source: International Stem Cell Corporation.

On February 4, 2013, the Company announced positive 12-week results from its preclinical *in vivo* PD study designed to demonstrate the therapeutic benefits of hpSC-derived neuronal cells in rats with 6-OHDA lesions, a well-established and validated model of PD. The parthenogenetically-derived NSCs can become neurons once they are implanted into the brain. As such, they hold significant therapeutic potential not only because they can differentiate into dopamine-producing neurons, but also because these cells can deliver trophic factors that may be able to provide a level of protection to existing neurons affected by the disease. Results indicated that a single injection of hpSC-derived neuronal cells into the striatum of rats with induced PD symptoms can lead to a significant slowdown in the progression of the disease. The rats in the treatment group showed gradual improvements in motor symptoms consistent with cells survival, engraftment, and dopamine release. No adverse events, including dyskinesia, deformations, tumors, or overgrowth, were observed in the treatment groups.

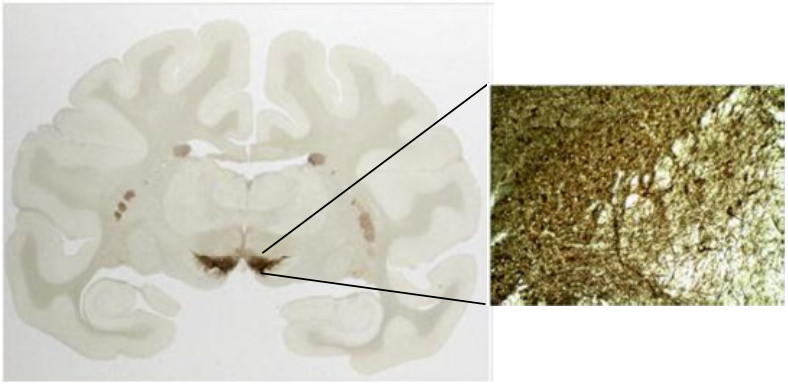
The positive results on the *in vivo* studies led to a series of non-human primate studies intended to measure safety and efficacy of the therapy by replicating the basis of the previous studies, but doing so in primate brains, which better represent the human physiology and are more predictive of efficacy in humans.

In the studies, hpSC-derived neuronal cells were transplanted into MPTP-induced African green monkeys with low levels of dopamine, a non-human primate model of PD. The placebo-controlled studies were designed to demonstrate the viability and functional efficacy of the implanted hpSC-derived neural cells, including their capacity to integrate in the host tissue as well as to lead to functional improvement in tested animals.

Results demonstrated the hpSC-derived neuronal cells' ability to survive, engraft, and release dopamine upon transplantation. Immunohistochemistry analysis confirmed the presence of dopaminergic neurons in the substantia nigra, as illustrated in Figure 25. Subsequent to implantation of the neuronal cells, all monkeys in the treatment group had higher levels of dopamine in the brain compared with the control group, as shown in Figure 26, where "DA" is dopamine. In addition, no visible tumors or presence of undifferentiated cells were detected in the treated subjects.

Figure 25

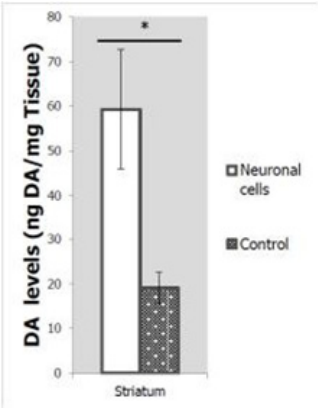
PRESENCE OF DOPAMINE NEURONS



Source: International Stem Cell Corporation.

Figure 26

DOPAMINE LEVELS



Source: International Stem Cell Corporation.

The primate study was performed in collaboration with Professor Evan Snyder, the Director of Stem Cell and Regenerative Medicine at the Sanford Burnham Medical Research Institute and the head of the FDA's Cellular, Tissue, and Gene Therapy Advisory Committee. ISCO believes that Professor Snyder's position in the FDA may allow for the Company to receive feedback and advice on the requirements for a successful FDA approval process.

According to ISCO, the results of both rodent and primate studies, which were presented at the 65th American Academy of Neurology Annual meeting on March 20, 2013, provide evidence of the safe and disease-modifying effects that implantation of hpSC-derived neuronal cells can provide.

Building on the positive results, ISCO announced on May 30, 2013, the initiation of an Investigational New Drug (IND)-enabling non-human primate pharmacology and toxicology study for its PD program under the direction of Yale School of Medicine Professor D. Eugene Redmond Jr., M.D. The study is expected to use non-human primates with moderate to severe PD symptoms to assess the safety and functional efficacy of ISCO's proprietary SC-derived neuronal cells. The endpoints of the study include assessing cell fate, biodistribution, and behavioral evaluations to determine possible side effects associated with the cell engraftment.

The Company believes that this study represents the foundation for filing an IND application in 2014. The initial interim results are expected at the end of 2013, with the final results expected in the second quarter 2014.

METABOLIC LIVER DISEASE PROGRAM

ISCO's metabolic liver disease program includes research on both the liver and pancreas, as these organs have a common cellular origin. The initial focus is the development of methods for the creation of pure populations of hpSC-derived hepatocytes to be used in transplantation to treat individuals with metabolic liver disease.

The first two diseases targeted by the Company are Crigler-Najjar syndrome (CNS) and Alpha-1-Antitrypsin deficiency (Alpha-1), two rare inherited metabolic disorders affecting the liver. Both conditions fall under the FDA's Office of Orphan Drug Designation program, which provides incentives to encourage the evaluation and development of treatments for the diagnosis and/or treatment of rare diseases or conditions.

Overview of Metabolic Liver Disease

Metabolic disorders occur when some organs, including the liver and pancreas, do not function normally or become diseased. In particular, there are a number of inherited metabolic liver diseases, where the liver does not function properly due to a genetic defect. Metabolic diseases are one of the main causes of liver transplants, with 4% of adult and 20% of pediatric liver transplants occurring as a result of these conditions. However, transplants are limited by the availability of matching organs.

Cell-based therapies, where SC-derived hepatocytes could be implanted to treat the underlying disease or repair the function of a liver that has been damaged by disease, is an alternative to full liver transplants. However, functioning liver tissue and cells are hard to procure. Human fetal hepatocyte transplantation is already practiced in select pediatric populations and is under clinical evaluation for chronic liver diseases in adults (Source: *Cell Transplantation*, Vol. 21: 217 234, 2012).

Crigler-Najjar Syndrome (CNS)

CNS is a rare inherited disorder in which bilirubin cannot be broken down by the liver. The build-up of this compound can lead to damage to the brain, muscles, and nerves and eventually cause death. Two distinct forms of the disease have been described: (1) Type 1, which starts early in life, normally in neonatal patients; and (2) Type 2 (Arias syndrome), which starts later in life.

CNS is extremely rare, with an incidence of less than 1 case per 1,000,000 births. However, if left untreated, severe cases of the Type I condition could lead to death (Source: WebMD). Current treatment options for CNS include phototherapy and blood transfusions, but these do not treat the underlying cause of the disease. Hepatocyte transplantation has emerged as a therapeutic possibility, and has been successfully applied to treat patients with CNS. However, the extremely limited availability of human livers and therefore of donated primary hepatocytes provides a barrier to this therapy. The use of hpSC-derived hepatocytes could circumvent the shortage of primary cells, as they can be produced and expanded *in vitro*.

Alpha-1-Antitrypsin Deficiency

Alpha-1 is a hereditary genetic disorder that may lead to the development of lung and/or liver disease. It is the most common genetic cause of liver disease in children. Adults can also be affected by Alpha-1 and may develop lung conditions such as emphysema as well as liver problems. Alpha-1 antitrypsin is a protein made in the liver that has an important role in preventing the breakdown of enzymes in various organs. Individuals with Alpha-1 have a genetic disorder that prevents their body from creating enough of this protein.

Worldwide, approximately 1 in 2,500 individuals has Alpha-1, for which there is no cure. Treatment focuses on proper nutrition to provide the liver and the body with essential nutrients, and identifying complications early in order to provide better treatment. In advanced liver disease, the only available approach is liver transplantation. Alpha-1 is the most common inherited disorder requiring liver transplants in children.

ISCO's Metabolic/Liver Disease Studies and Research

ISCO is aiming to develop a technology for deriving high-purity populations of hepatocytes from any type of pluripotent SCs, including its hpSCs. The Company has been able to characterize immature hpSC-derived hepatocytes both *in vivo* and *in vitro* as well as demonstrate the ability of these cells to engraft, mature, and express liver-specific proteins in rodents.

The global market for liver disease treatments was expected to increase to more than $9.7 billion by 2014, including $1.15 billion for chronic liver disease—the second-largest segment of this market (Source: BCC Research's *Liver Disease Treatments: the Global Market*, 2009). Once the clinical effectiveness of its SC-derived hepatocytes is established, ISCO expects to implement this technology into larger therapeutic areas, including inherited liver diseases and other forms of liver damage.

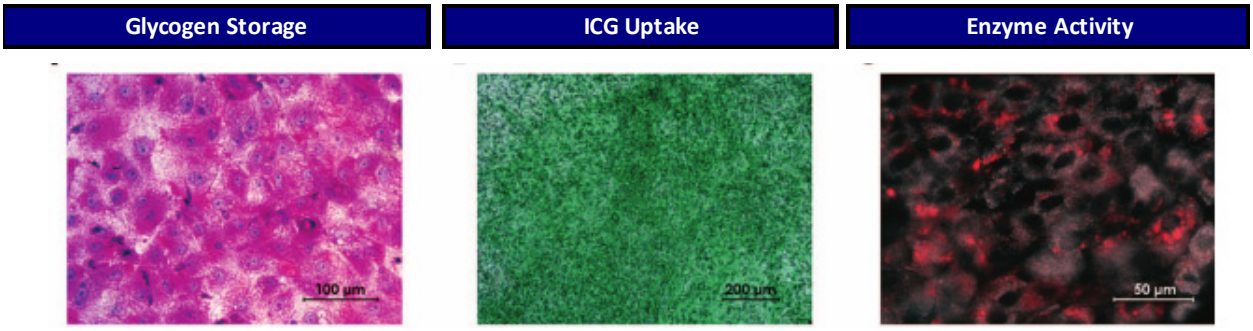
In Vitro and In Vivo Studies

SC therapies depend on the ability to generate differentiated cell products that are not contaminated with undifferentiated cells. In particular, production of high-purity **definitive endoderm (DE)** is a critical first step in the generation of therapeutic cells of the DE lineage, including hepatocytes and pancreatic endocrine cells. Researchers have been able to design a method to accomplish the derivation of high-purity DE from hpSC (Source: *Cell Transplantation,* Vol. 21: 217-234, 2012). Furthermore, the functional properties of the DE were preserved by the process, allowing the further differentiation of the DE into a population of hepatocyte-like cells (HLCs).

Further directed differentiation of DE cells produced HLCs that display hepatocyte-like behavior. Figure 27 shows the derived HLCs' ability to store **glycogen** (stained pink), store and eliminate indocyanine green (ICG) (a marker of hepatocyte maturity), and express active CYP2B liver enzyme. The cells also assumed the characteristic **cuboidal** morphology of mature hepatocytes.

Figure 27

hpSC-DERIVED HEPATOCYTES' BEHAVIOR



Source: Cell Transplantation, Vol. 21: 217-234, 2012.

Additionally, to assess the ability of the derived HLCs to survive *in vivo*, researchers injected HLC-derived cells into the spleen of severe immune-deficient beige female mice. Results indicated that the HLCs derived from high-purity DE were able to migrate from the spleen, into the liver, proliferate, and survive for at least 42 days.

In Vivo Studies

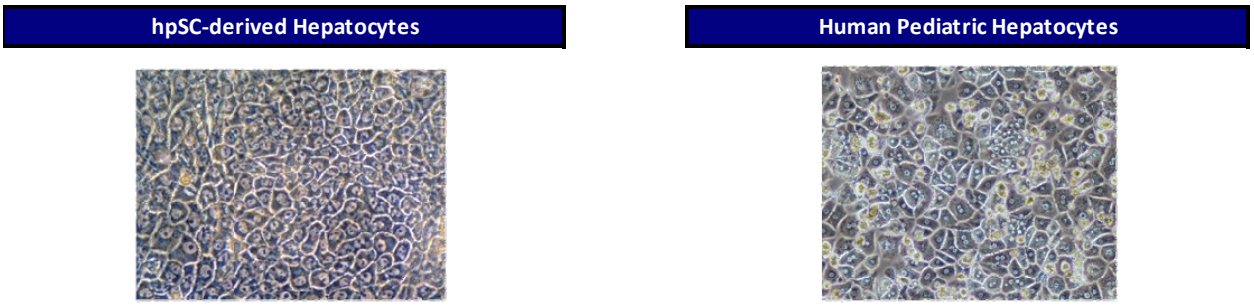
The primary goal of the efficacy study was to demonstrate the therapeutic equivalence of hpSC-derived hepatocytes to adult liver cells. The study consisted of the generation and implantation of hpSC-derived human hepatocytes into Gunn rats, a well-known animal model for CNS and a model that has been used extensively to study bilirubin toxicity and hepatocyte transplantation.

Since liver cells are sensitive to the environment, generating HLCs with morphology equivalent to actual human hepatocytes is a key step for the use of the Company's cells in cell-transplant therapy. As shown in Figure 28, the Company was able to generate HLCs displaying a similar morphology to human pediatric hepatocytes.

Positive top-line efficacy results delivered during the first quarter 2013 demonstrated the derived hepatocytes' ability to engraft in the liver of Gunn rats, with detection of viable human liver cells two months after transplant. Moreover, no adverse safety issues were detected after implantation, and no apparent inflammation, tumorigenicity, or cell rejection was observed.

Figure 28

hpSC-DERIVED HEPATOCYTE COMPARISON



Source: International Stem Cell Corporation.

Additionally, the study indicated the equivalent efficacy of hpSC-derived hepatocytes and donor-derived (primary) hepatocytes to metabolize bilirubin. The data from this preclinical study indicates that implanting HLC in rodents produced both a significant initial decrease and long-term stabilization of bilirubin levels in blood serum. A single intra-splenic injection of hpSC-derived hepatocytes resulted in a change in the plasma indirect bilirubin level equivalent to that achieved by injecting primary hepatocytes. ISCO believes these results support the use of hpSC-derived hepatocytes as a therapeutic substitute for donated primary liver cells in clinical applications, including the treatment of CNS.

CORNEA TISSUE IMPLANTS

The Company's cornea program is focused on the differentiation of hpSC and ESCs into cornea-like constructs for use in transplantation therapy to treat blindness and the *in vitro* study of ocular drug absorption. ISCO has been able to develop a proprietary method for the generation of human corneal tissue from hpSCs, which has demonstrated a range of structural, biochemical, and refractory properties characteristic of human cornea. The Company believes that its proprietary method not only provides therapeutic utility but also expands its licensing opportunities for its technology. According to ISCO, most of the market demand for corneal tissue is in developing countries, such as India and China, where eye and corneal donations are not as widespread as in the U.S. and Europe.

ISCO plans to commercialize this program through its subsidiary in India via the creation of strategic alliances. The Company is partnering with key Indian biomedical organizations, including the Sankara Nethralaya Eye Hospital (as shown in Figure 29) and the All-India Institute for Medical Sciences, in order to develop ISCO's "CytoCor™", an SC-derived corneal tissue that could be commercialized for the local market.

Development and commercialization of ISCO's SC-derived cornea tissue, along with manufacturing of Lifeline Cell Technology's media and cellular products (as described on pages 37-38), are the foundation for the Company's expansion into the Asian markets.

Figure 29

SANKARA NETHRALAYA-TEMPLE OF THE EYE

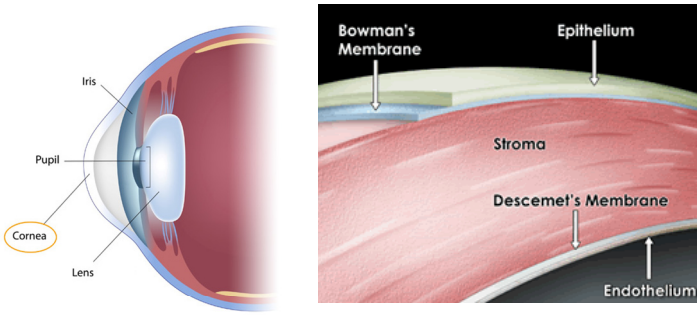
Source: International Stem Cell Corporation.

Corneal Blindness Overview

The cornea—the eye's outermost layer—is a clear dome-shaped surface that covers the iris, pupil, and lens. The structural composition of the cornea, as illustrated in Figure 30, consists of groups of cells organized in three main layers: (1) the epithelium; (2) the stroma; and (3) the endothelium. The cornea not only acts as a protective shield, it also serves as an external lens that controls the entry of light into the eye. The cornea accounts for approximately 65% to 75% of the eye's total focusing power, and is therefore critical for normal vision. Thus, the cornea must remain transparent to refract light properly, and the presence of any cloudy or opaque areas can interfere with proper vision (Source: the U.S. National Eye Institute).

Figure 30

STRUCTURAL COMPOSITION OF THE CORNEA



Sources: Fiftylives.org and Jirehdesigns.com.

Corneal disease is the fourth leading cause of global blindness—after cataract, glaucoma, and age-related macular degeneration—affecting an estimated 7.6 million people worldwide (Source: the World Health Organization's *Global Data on Visual Impairments 2010*, 2012). Corneal transplants have been shown to be an effective method for the treatment of corneal disease or injury. In developed countries, corneas are the most common organ transplants, but a significant unmet medical need for corneal grafts persists in developing countries (Source: *Journal of Stem Cell Research and Therapy*, 2011, S2).

Fully artificial corneal transplants have helped a number of patients with severe corneal disease or injury. SC-derived corneas represent an effective and safe alternative to cadaveric grafts, provided they can be generated cost effectively and with equivalent functionality. Generating human corneas from a pluripotent SC source could increase the availability of donor tissue, even in the absence of suitable tissue from eye banks. In addition, SC-derived corneal tissue could represent a viable alternative to the use of live and extracted animal eyes in the market for safety testing of drugs, chemicals, and consumer products.

ISCO's Cornea Program Studies and Research

The Company is focused on the development of a method to derive corneal endothelium-like cells from human pluripotent SCs in general, and hpSCs in particular. ISCO has achieved *in vitro* differentiation of 3D corneal constructs with several equivalent features of normal cornea, including the basic anatomic layering, gene and protein expression patterns, rapid permeability to ophthalmic drugs, and no obvious opacity. Researchers believe that this 3D structure represents a significant advancement in SC therapy research, since the study not only differentiated SC into the appropriate types of cells, but accomplished the generation of functional mini-organs with the appropriate structural complexity.

Though the generation of a 3D cornea from a single cell source rather than via multiple differentiation procedures is promising for clinical manufacture, the Company's SC-derived corneas require further manipulation to optimize them for preclinical studies, particularly to perfect the alignment of collagen in the stromal layer to assure optimal refractive properties.

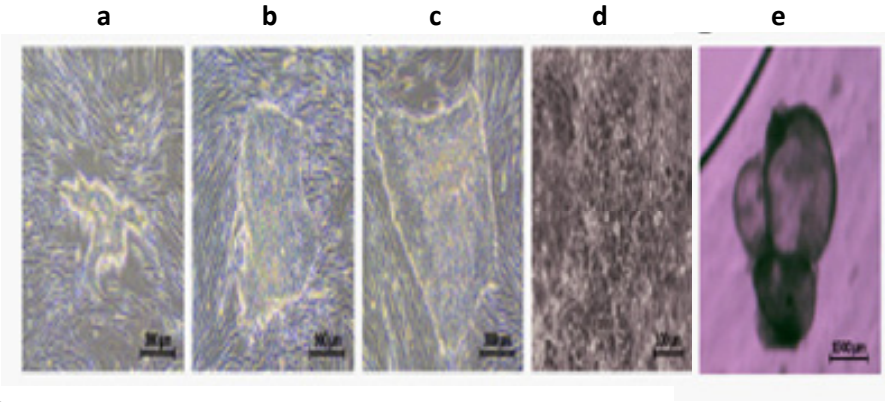
In Vitro Studies

Researchers were able to establish a proprietary method for the *in vitro* differentiation of corneal orbs from human ESCs and smaller orbs from hpSCs, with these corneas differentiating into a 3D layered structure similar to that of normal human corneas (Source: *Journal of Stem Cell Research and Therapy,* 2011, S2).

As shown in Figure 31, the differentiation process began with small, tightly packed colonies of round cells (a), which became flattened cells with epithelial morphology (b and c). After an additional five to seven days, the colonies became multilayered, dense clusters. In some colonies, a distinct, clear, spherical (orb-shaped) dome was observed, indicating the formation of a more mature, cornea-like structure (d). In the following five to seven weeks, freely floating spheres (corneal orbs) could be observed under a dissecting microscope. The orbs could be seen by eye at approximately the 50-day mark, having diameters of 1 mm to 2 mm (e).

Figure 31

CORNEAL ORB DIFFERENTIATION PROCESS

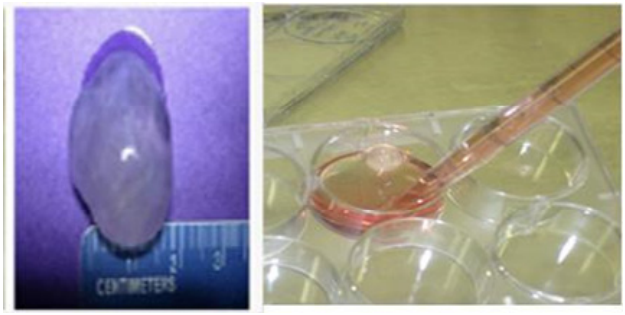


Source: Journal of Stem Cell Research and Therapy.

Spheres with diameters from 9 mm to 15 mm developed over 120 days, as shown in Figure 32. However, the orbs generated from hpSCs were significantly smaller and reached diameters of only 4 mm to 7 mm. Orbs were generally very fragile until they reached 8 mm to 10 mm in diameter, when they could be manipulated without obvious damage. All orbs were translucent and fluid-filled.

Figure 32

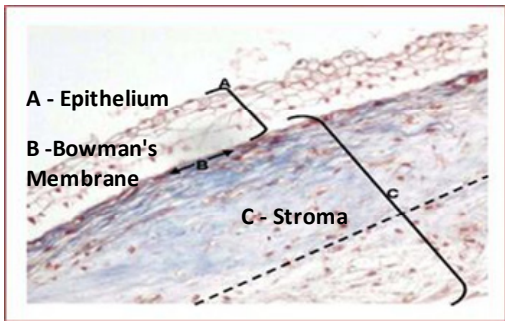
hpSC-DERIVED CORNEAL ORB



Sources: International Stem Cell Corporation and Journal of Stem Cell Research and Therapy.

Figure 33

DERIVED CORNEAL ORB HISTOLOGY



Source: International Stem Cell Corporation.

Histological analysis demonstrated that the spheres have interior and outer layers similar in arrangement to normal human cornea, with the presence of an epithelium, Bowman's membrane, and stroma, as depicted in Figure 33. However, a distinct endothelium could not be identified, despite the presence in some corneal orbs of cells that were appropriately localized and shaped for endothelial cells. Some optimization is likely required for the endothelial layer, which may require longer differentiation (or an added differentiation step) to develop.

Since corneal disease is often treated with topical drugs, permeability and transcorneal transport of drugs are critical processes. To evaluate these functions, researchers applied two drugs normally delivered topically to the eye: beta-blocker atenolol and antipyrine. The **permeability coefficient (Papp)** measurements indicated that both drugs were transported as expected relative to each other by the SC-derived corneas.

According to researchers, continued preclinical development of these corneas hinges on the generation of engineering approaches to improve stromal collagen organization and on developing variances in culture protocols aimed at increasing the size of hpSC-generated orbs and the formation of an endothelial layer.

STEM CELL BANK – UniStemCell™

To the Company's knowledge, its UniStemCell™ SC bank may be the life science industry's first collection of non-embryonic, histocompatible human SCs available for research and commercial use. HpSCs allow ISCO to create therapeutic cells that could immune-match millions of individuals of differing genders, ages, and racial backgrounds with only a small number of cell lines.

ISCO's SC bank currently contains 15 parthenogenetic SC lines, three of which are clinical-grade cGMP lines and one of which carries the most common immune type and immune-matches approximately 70 million people worldwide. In addition, ISCO established a program to expand its existing collection by partnering with *in vitro* fertilization (IVF) clinics in the U.S. with the goal of producing new clinical-grade hpSC lines.

The banking program is not only important because the lines serve as the source of cells for ISCO's therapeutic programs, but also because licensing the cell lines may produce a revenue stream for the Company in the future. Revenue could be generated from universal SC bank franchises serving multiple populations and scientists. In addition, the use of these SCs could further validate the hpSC technology as it is tested and developed by others across a range of potential applications. Ultimately, third-party use of ISCO's cells could provide the Company with royalties from sales of each successful, hpSC-derived cellular therapeutic.

Commercial Operations

ISCO's subsidiaries—Lifeline Cell Technology (LCT) and Lifeline Skin Care (LSC)—utilize the Company's proprietary methods and scientific discoveries for the development and commercialization of products. The revenues are designed to support the Company's therapeutic programs and scientific research, while providing practical short-term applications of the core technologies.

Lifeline Cell Technology (LCT)

LCT is a business-to-business research products company that specializes in the development, manufacture, and commercialization of purified primary human cells, media, and reagents for cell culture and therapeutic research. In 2012, LCT generated $2.4 million in sales—a 35% growth rate over 2010. The Company markets its products domestically through its in-house direct sales force, internationally through strategic alliances and distributors, and through OEM partners.

The Company's line of biomedical products, as listed in Figure 34, includes over 130 products in four distinct categories: (1) human cells; (2) human tissues; (3) cell culture media; and (4) additional products such as reagents and SC differentiation kits. LCT's products are used primarily for application in the field of regenerative medicine, safety and toxicology testing, and basic cell biology.

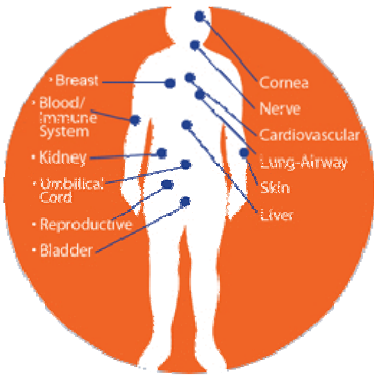
Figure 34

A SELECTION OF LCT'S BIOMEDICAL PRODUCTS

Human Cells	
Endothelial	Mononuclear
Epithelial	Neuronal
Fibroblast	Smooth muscle
Hepatocytes	Stem cells, human
Melanocytes	Stem cells, non-human

Cell Culture Media	
Epithelial	Neuronal
Fibroblast	Smooth muscle
Hepatocytes	Stem cells, human
Blood Immune System	
Endothelial-Large Vessel	
Endothelial-Small Vessel	

LIFELINE CELL TECHNOLOGY



Human Tissues	
Adipose	Liver
Bladder	Lung-airway
Kidney	Neuronal
Breast	Prostate
Cardiovascular	Reproductive
Cornea	Skin
Umbilical cord	Blood Immune System

Additional Products
Reagents, supplements and growth factors
Skin models
Stem Cell Differentiation Kits

Source: International Stem Cell Corporation.

Over the last 12 months, LCT has launched more than 20 new products, including a new technology to modify human SCs by using engineered proteins, called transducible transcription factors (TTFs). TTFs are designed to pass into SCs and direct them to change into specific cell types. In contrast to more traditional cell therapy methods, this technology does not require the use of viruses or chemicals. Rather, it employs proteins that are naturally eliminated by the cells when no longer required—a characteristic that improves safety. Since the technology also has broad application in research and therapy, it is intended to provide ISCO with future out-licensing opportunities to the biotechnology and pharmaceutical industries.

In addition to the safety advantages, the majority of the intellectual property around iPS cells is controlled by a few organizations to ISCO's knowledge, likely making it difficult and costly to commercialize a therapeutic product based on that technology. Since the Company's technology does not rely on other people's intellectual property, it allows ISCO to establish a patent position in this growing SC market.

On October 25, 2012, ISCO announced that Fisher Scientific began selling LCT's cells and media products through its online catalog as an Encompass Preferred Supplier. Fisher Scientific, one of the world's largest suppliers to the life science industry, had 2011 sales of approximately $12 billion, $424 million of which came from the e-catalog. According to the Company, the inclusion of its product in Fisher's online catalog as a preferred supplier represents a promising new distribution channel, as it allows for LCT's products to be purchased by pharmaceutical companies that normally only purchase research supplies using preferred supplier agreements.

In addition, ISCO continues to expand its network of distributors with a specific emphasis in the Asian market, opening new distribution channels in China, India, Indonesia, South Korea, Malaysia, and Singapore. A select list of LCT's international distributors is depicted in Figure 35.

Figure 35
LIFELINE CELL TECHNOLOGY INTERNATIONAL DISTRIBUTORS

Source: International Stem Cell Corporation.

The Company has two good manufacturing practices (GMP) facilities: (1) in Frederick, Maryland—which houses administrative facilities and the production of human cell culture products and custom media manufacturing, as well as the manufacturing of the clinical-grade cells for the ISCO's therapeutic research; and (2) in Ocean Side, California—which conducts human cell *in vitro* research, development, and manufacturing.

Lifeline Skin Care

LSC is a company that develops, manufactures, and markets advanced anti-aging skin care products based on growth factors and peptides extracted from hpSCs. During development of its technology for therapeutic programs, ISCO scientists discovered that extracts from some SCs had a beneficial effect on the health of skin cells. After additional experiments and collaborations with skin care experts in order to optimize the SC extract and formulation, the LSC products were introduced in November 2010 and generated sales of $2.2 million in 2012.

ISCO's products rely on patented non-embryonic cell extracts (HSC-X™) that include vitamin and antioxidant agents to stimulate the skin's ability to protect and replace damaged collagen fibers. In laboratory studies, LSC's SC extracts were proven to increase elastin levels by 46%, **collagen A1** levels by 42%, and **collagen A2** levels by 55%. Furthermore, as illustrated in Figure 36, an independent clinical study designed to measure the percentage of people experiencing skin care benefits found the following results: (1) 93% felt it improved skin hydration; (2) 73% felt it increased skin elasticity; (3) 67% felt it decreased the appearance of wrinkles; and (4) 63% felt it improved skin tone and brightness.

Figure 36

LIFELINE SKIN CARE INDEPENDENT SURVEY - KEY RESULTS

Source: International Stem Cell Corporation.

LSC products have been designed to reach the middle layer of skin—where collagen and elastin are created—by encapsulating the proteins microscopically to help them be absorbed through the skin. According to the Company, this provides an advantage over many other products that have molecules too large to be effectively absorbed.

LSC's product line includes the Defensive Day Moisture Serum and the Recovery Night Moisture Serum—the original products introduced during 2010—as well as the new Lifeline Eye Firming complex, an eye cream introduced in November 2012. The full product line is shown in Figure 37.

Figure 37

LIFELINE SKIN CARE PRODUCTS

Source: International Stem Cell Corporation.

The Company markets and distributes its products through the use of three distinct sales channels: consumer (online) sales, the professionals market, and through international distributors. The consumer market was supported in 2012 by efforts covering online, newspapers, and magazines advertising, as well as through direct mailing campaigns. In addition, the Company continues to enhance the credibility and exposure of its brands, through strategic partnerships with key opinion leaders, authors, and media personalities, who have agreed to endorse LSC to their social networks, as well as through personal and radio appearances.

LSC's professional campaigns are focused on providing information to skin care professionals, including dermatologists and plastic surgeons, with the objective of illustrating the significance and value of SC extracts for skin rejuvenation. The Company believes that the proprietary SC-based science behind the creation of its skin products provides an advantage in the professional community in terms of believability and willingness to endorse. The Company markets its products through qualified professionals, including the following:

- dermatologists;
- plastic surgeons; and
- destination, resort, and day spa specialists.

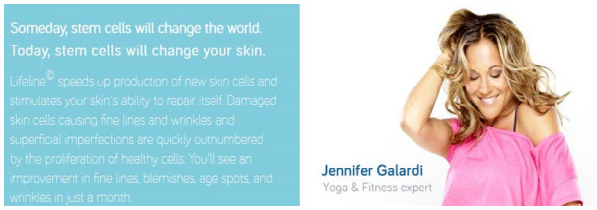
A select list of LSC's professional and celebrity endorsements and a sample of destination spas offering LSC's products are shown in Figures 38 and 39, respectively.

Figure 38

SELECT LIFELINE SKIN CARE ENDORSEMENTS

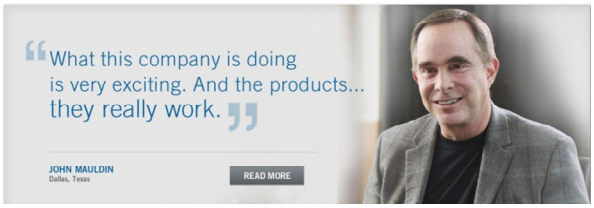
Emme - Supermodel, Woman of the year *(Glamour* Magazine), One of the 50 most beautiful people *(People)*

Jen Galardi - Hollywood Fitness Guru and Yoga Instructor



Paul Chasan, M.D.

John Mauldin - Economist and Best Selling Author



Source: International Stem Cell Corporation.

Figure 39

LIFELINE SKIN CARE AVAILABLE AT SELECT DESTINATION SPA'S RETAIL LOCATIONS

Four Seasons Resort Maui at Wailea Hawaii

Marriot Palm Beach Palm Beach, Florida

Rosewoods Tucker's Point Bermuda

Source: International Stem Cell Corporation.

In the past 12 months, LSC has announced several international initiatives designed to expand the sales of its products to foreign markets: (1) a strategic relationship with facial plastic surgeon, Dr. Gregory S. Keller, M.D. of Los Angeles and Santa Barbara, California, to distribute the LSC product line in the United Arab Emirates; (2) the engagement of Dr. K. McIsaac, who is expected to distribute LSC's products in Australia and New Zealand; (3) an agreement with the Sinopharm Group to distribute LSC's anti-aging skin care products in China; (4) an agreement with My Son IEI to distribute LSC's products in Vietnam; and (5) an agreement with Advanced Skincare Technologies Co., Ltd. to distribute LSC's product line in Thailand.

The distribution agreements for China, Vietnam, and Thailand, together with ongoing negotiations with distributors in Hong Kong, Korea, and Singapore, demonstrate the Company's commitment to capitalize on opportunities in the Asian market.

Competition

The market for therapeutic SC products is highly competitive. The Company's competition for its therapeutic programs could consist of pharmaceutical and biotechnology companies, as well as research and higher learning institutions involved in SC research and development. In addition, since ISCO's therapeutic approach represents a substantial departure from established treatment methods, it could also compete against more conventional therapies currently on the market or being developed by other pharmaceutical companies.

However, the Company believes that its proprietary technology provides competitive advantages compared to other SC-based alternatives. ISCO's hpSCs allow for the production of SCs without the destruction of a viable human embryo, which could allow it to circumvent the ethical issues surrounding SC research. Furthermore, the Company's technology platform was designed to efficiently generate the large quantities of cells necessary for clinical studies and medical applications. According to ISCO, some of its competitors do not focus on the economics of cell production until clinical trials, at which time it is difficult and costly to alter the manufacturing method.

In addition to biotechnology firms actively involved in the development of cell-based therapies that directly compete with ISCO's, the Company also could compete against other SC companies that, despite following a similar business model, currently target therapeutic areas that differ from ISCO's, such as BioTime, Inc. (BTX-NYSE) and Advanced Cell Technology, Inc. (ACTC-OTC.BB), as well as providers of clinical-grade SC and derivative products.

The following summaries, classified by therapeutic programs and subsidiaries, are not intended to be an exhaustive collection of potential competitors to ISCO; however, they are believed to be representative of the type of competition that the Company may encounter as it seeks to further develop its products/technologies.

Parkinson's Disease

GlaxoSmithKline plc (GSK-NYSE), Merck & Co., Inc. (MRK-NYSE), Novartis AG (NVS-NYSE), and Teva Pharmaceutical Industries Limited (TEVA-NYSE) are some of the major firms marketing medications to patients suffering from PD. In addition, in 2011 there were approximately 36 medicines in clinical trials or awaiting review by the FDA for the treatment of PD (Source: Pharmaceutical Research and Manufacturers of America [PhRMA], October 2011). Treatment options range from extended versions of L-dopa to investigational approaches, such as SC or gene therapy.

BrainStorm Cell Therapeutics Inc. (BCLI-OTC.BB)

BrainStorm Cell is a biotechnology company engaged in the development of autologous SC-based therapeutic products for the treatment of neurodegenerative diseases. BrainStorm Cell plans to use NurOwn™, a proprietary adult SC technology, for the differentiation of a patient's own bone marrow SCs into neural-like cells, to be used in therapies for neurodegenerative diseases such as amyotrophic lateral sclerosis (ALS, also known as Lou Gehrig's disease), multiple sclerosis, PD, and spinal cord injury. In February 2011, NurOwn™ was granted Orphan Drug designation by the FDA. The company is launching a Phase IIa ALS clinical trial at the Hadassah University Medical Center in Jerusalem, Israel, and plans to begin a Phase II clinical trial in the U.S. in 2013, pending FDA approval. BrainStorm Cell holds rights to the technology through a licensing agreement with Ramot, the technology transfer company of the Tel Aviv University. BrainStorm Cell was founded in 2000 and is based in New York, New York.

Neuralstem, Inc. (CUR-NYSE)

Neuralstem is a biopharmaceutical company engaged in the development and commercialization of treatments for central nervous system diseases based on transplanting human neural SCs and the use of small molecule drugs. Neuralstem's technology allows for the isolation and differentiation of human neural SCs from various areas of the developing human brain and spinal cord into human neurons. The company is conducting a Phase I clinical trial for its product candidate NSI-566 for the treatment of ALS. In addition, it is in preclinical studies with NSI-566 for PD,

with additional clinical development pending the outcomes of the ongoing ALS trial. Neuralstem is also developing products targeting other conditions, including spinal cord injury, ischemic spastic paraplegia, and chronic stroke. Neuralstem was founded in 1996 and is headquartered in Rockville, Maryland.

StemCells, Inc. (STEM-NASDAQ)

StemCells, Inc., a biopharmaceutical company, engages in the research, development, and commercialization of SC therapeutics for the treatment of central nervous system and liver conditions. The company's therapeutic programs are focused on the transplantation of adult SCs (HuCNS-SC® human neural SCs for central nervous system disorders) and progenitor cells (hLEC™ human liver engrafting cells). The company's product candidate HuCNS-SC® has completed a Phase I clinical trial for the treatment of both infantile and late infantile neuronal ceroid lipofuscinosis and Pelizeaus-Merzbacher disease, and is in clinical trials for chronic spinal cord injuries and dry age-related macular degeneration. In addition, the company develops human liver engrafting cells for a range of liver diseases and is involved in commercializing applications of its technologies to enable SC-based research. StemCells also markets a range of proprietary cell culture and antibody reagent products under the SC Proven brand. The company sells its tools and technologies products to researchers at academic institutions, pharmaceutical and biotechnology companies, and government laboratories. StemCells was founded in 1988 and is headquartered in Newark, California.

Metabolic Liver Disease

The liver's ability to regenerate lost tissue makes individuals suffering from conditions that limit or prevent this tissue regeneration from taking place optimal candidates for SC therapy. Currently, SC therapies are being used to treat a wide range of liver disease, and biotechnology companies are attempting to optimize the generation of hepatocytes for such purposes. Some research companies that are involved in the development of SC therapies for neurological disorders are also involved in liver therapeutics. For example, both StemCells, Inc. and Cellular Dynamics International, Inc. are studying the creation of SC-based neurons and liver cells for therapeutic development.

Cellectis SA (ALCLS-EPA)

Cellectis Stem Cells, a business unit of the French company Cellectis SA, was created in November 2011 from the combination of Cellartis AB and Ectycell SA. Cellectis is focusing on the development and differentiation of human ESC and iPS cells for drug discovery research, toxicity testing, and regenerative medicine. The company's portfolio of products includes human ESC and iPS cell-derived hepatocytes, cardiomyocytes (human heart cells), cell culture systems, human ESC and iPS cell lines, and TALEN™ genome engineering (its proprietary SC technology platform). Cellectis was founded in 1999 and is based in Paris, France.

Cellular Dynamics International, Inc.

Cellular Dynamics International (CDI) is a developer of SC technologies for *in vitro* drug development, *in vivo* cellular therapeutics, and SC banking. CDI utilizes its proprietary manufacturing technology, iCell®, to produce differentiated human iPS cells, including human heart cells, blood vessel cells, neurons, and hepatocytes. In addition, it offers custom iPS cell reprogramming and terminal cell differentiation products and services. CDI was founded in 2004 and is headquartered in Madison, Wisconsin.

Stemedica Cell Technologies, Inc.

Stemedica, a biopharmaceutical company, engages in the development and manufacture of adult SCs and SC factors for research institutions and hospitals for preclinical and clinical studies. The company is a government licensed manufacturer of clinical-grade SCs and is approved by the FDA for clinical trials in ischemic stroke, cutaneous photoaging, and acute myocardial infarction. Stemedica is currently developing regulatory pathways for a number of other medical indications using adult allogeneic SCs. The company was incorporated in 2005 and is based in San Diego, California, with a subsidiary in Lausanne, Switzerland.

Corneal Construct

ISCO's corneal blindness program may compete with conventional corneal transplants, artificial corneal constructs, as well as other SC-based approaches that might be under investigation. However, the Company believes that the low availability of eye banks that provide corneal tissue for transplantation in most developing countries, and the lack of specialized training required for this type of surgery, provide ISCO and its strategic partners with a competitive advantage to market the hpSC-derived corneal product.

Lifeline Skin Care

The skin care product market is highly competitive and segmented. Selected companies have included SCs—both of botanic and human origin—in skin care products. However, to ISCO's knowledge, very few SC-based skin care products have the research and medical backing of a SC biotechnology company that it offers.

Cellure Inc.

Cellure is a SC-based skin care company that produces and markets skin cleansers, night and day creams, and eye treatments derived from cultured adult human SCs. The company's main ingredient is Lipotein™, a pure, natural protein complex that results from SC replication. RNL Bio, Cellure's parent company, is a South Korean biotechnology company engaged in the research and development of SC therapies, based on the differentiation of adult SCs collected from the patients' adipose tissues. The company's therapeutic programs include research into Buerger's disease, degenerative arthritis, spinal cord injury, stroke, and renal failure, among others. It also offers an integrated SC bank. RNL Bio was founded in 2000 and is based in Seoul, South Korea. Cellure has a retail location in New York City.

Additional Competitors

In addition, ISCO may face competition from high-end skin care products that compete in similar sales channels as its LSC subsidiary, some of which are listed in Figure 40.

Figure 40
SELECT COMPETITORS OF LIFELINE SKIN CARE

Company	Ticker Symbol	Sales Channel	2012 sales	Founded
Strivectin Operating Company, Inc.		QVC - Prestige Retail Channels	$100 million	2002
Obagi Medical Products, Inc.	OMPI-NASDAQ	Physicians	~$120 million	1988
SkinMedica, Inc. (Allergan, Inc.)	AGN-NYSE	Physicians	~$45 million	1999
Perricone		Prestige retail Channels- Online	$80 million	1998

Source: International Stem Cell Corporation.

Key Points

- International Stem Cell Corporation ("ISCO" or "the Company") is a biotechnology company focused on the development and therapeutic applications of human parthenogenetic stem cells (hpSCs), which display characteristics required for the development of therapeutic applications while avoiding the safety, economic, and ethical concerns inherent with alternative stem cell (SC) technologies.

- The creation of the Company's hpSCs involves using parthenogenesis (a form of asexual reproduction) to stimulate a human egg (oocyte) into reacting as if it has been fertilized and allowing it to start the cell division process. Since the eggs are not fertilized, no viable embryo is created, thus the Company's technology is believed to avoid the ethical controversy associated with the destruction of a human embryo for the generation of therapeutic and research SCs.

- ISCO's core technology creates pluripotent human SCs that can be immune-matched to millions of different people. The immune-compatibility profile of hpSCs is expected to decrease the likelihood that transplanted SCs will be recognized as foreign, and thus rejected, by the recipient's immune system.

- To date, ISCO has successfully derived and characterized 15 hpSC lines, including both HLA homozygous (which may be histocompatible with significant segments of the human population) and HLA heterozygous lines (which are HLA-matched and histocompatible with the donors).

    - In November 2012, the Company announced the generation of what is believed to be the world's first human clinical-grade hpSCs lines, created using ISCO's proprietary technology and designed to meet FDA regulations. The new clinical-grade SC lines position ISCO to transition into a clinical-stage company.

    - The global market for therapeutic SC products was $3.8 billion in 2011 and is expected to reach nearly $4.3 billion in 2012 and $6.6 billion by 2016.

- The Company focuses its therapeutic efforts on three markets where cell therapy has been clinically proven, but where there is a shortage of safe cells or tissue. These markets are believed to have a combined revenue potential of over $5 billion: (1) Parkinson's disease (PD); (2) inherited metabolic liver disease; and (3) corneal blindness. ISCO is also using its proprietary technology to develop an SC bank, UniStemCell™, which, to the Company's knowledge, is the industry's first collection of non-embryonic, histocompatible human SCs available for research and commercial use.

- ISCO's preclinical research has demonstrated the Company's ability to differentiate pure, well-characterized population of both neural cells and hepatocyte-like cells, displaying the ability to survive transplantation in rat models of the respective disease, as well as showing structural and functional capacity. In addition, ISCO has been able to derive 3D corneal constructs with properties characteristic of human corneas.

- In addition, the Company produces and markets specialized cells and growth media for therapeutic research through its subsidiary Lifeline Cell Technology, and SC-based skin care products through its subsidiary Lifeline Skin Care. During 2012, the subsidiaries generated approximately $4.6 million in sales.

- The Company's management includes individuals with extensive experience in key areas including SC and pharmaceutical research, cell production and manufacturing, use of SCs in neurological applications, and international business development.

- At March 31, 2013, ISCO had cash and cash equivalents of approximately $1.9 million, after financing activities totaling $3 million in January 2013 and March 2013. In addition, on July 19, 2013, the Company announced a public offering consisting of 20 million units, each composed of one common stock and an A warrant to purchase one common stock, at a price of $0.15 per unit; and 20 million B warrants, exercisable for one common stock and one A warrant.

Historical Financial Results

Figures 41, 42, and 43 (pages 45-48) provide a summary of ISCO's key historical financial statements: the Condensed Consolidated Statements of Operation, Balance Sheets, and Statements of Cash Flow.

On July 19, 2013, the Company announced a public offering of 20 million units at $0.15 per unit, with each unit consisting of one share of ISCO's common stock and one series A warrant to purchase one share of its common stock at a price of $0.15 per share. In addition, ISCO is also offering up to 20 million series B warrants, exercisable at a price of $0.15, for one share of ISCO's common stock and one series A warrant. Dr. Andrey Semechkin, ISCO's co-chairman and chief executive officer, purchased 5,998,999 units and 5,998,999 series B warrants, and Dr. Ruslan Semechkin, ISCO's vice president of research and development, purchased 667,667 units and 667,667 series B warrants. More information about ISCO's public offering can be found in the Company's prospectus at: http://www.sec.gov/Archives/edgar/data/1355790/000119312513295805/d418224d424b4.htm.

Figure 41
CONDENSED CONSOLIDATED STATEMENTS OF OPERATION
(in thousands, except per share data)
(unaudited)

	Three Months Ended March 31,		Inception (August 17, 2001) through March 31,
	2013	2012	2013
Revenues			
Product sales	$ 1,285	$ 1,077	$ 13,483
Royalties and license	—	—	135
Total revenue	1,285	1,077	13,618
Development expenses			
Cost of sales	334	324	4,940
Research and development	721	937	22,614
Selling and marketing	511	496	6,450
General and administrative	1,419	2,039	40,547
Total development expenses	2,985	3,796	74,551
Loss from development activities	(1,700)	(2,719)	(60,933)
Other income (expense)			
Settlement with related company	—	—	(93)
Miscellaneous income (expense)	(15)	1	(260)
Dividend income	—	—	94
Interest expense	—	—	(2,225)
Sublease income	3	3	319
Change in market value of warrants	—	38	(1,357)
Total other income (expense), net	(12)	42	(3,522)
Loss before income taxes	(1,712)	(2,677)	(64,455)
Provision for income taxes	—	—	7
Net loss	$ (1,712)	$ (2,677)	$ (64,462)
Deemed dividend on preferred stock	—	(1,375)	(1,375)
Dividend on preferred stock	—	(82)	(8,097)
Net loss applicable to common stockholders	$ (1,712)	$ (4,134)	$ (73,934)
Net loss per common share-basic and diluted	$ (0.02)	$ (0.05)	$ n/a
Weighted average shares-basic and diluted	103,566	82,485	n/a

Source: International Stem Cell Corporation.

Figure 42
CONDENSED CONSOLIDATED BALANCE SHEETS
(in thousands, except per share data)
(unaudited)

	March 31, 2013	December 31, 2012
Assets		
Cash and cash equivalents	$ 1,912	$ 654
Accounts receivable, net of allowance for doubtful accounts of $18 and $4 at March 31, 2013 and December 31, 2012, respectively	384	273
Inventory, net	1,206	1,199
Prepaid expenses and other current assets	492	456
Total current assets	3,994	2,582
Property and equipment, net	1,033	1,134
Intangible assets, net	1,768	1,634
Deposits and other assets	20	20
Total assets	$ 6,815	$ 5,370
Liabilities, Redeemable Preferred Stock and Stockholders' Equity (Deficit)		
Accounts payable	$ 430	$ 969
Accrued liabilities	746	730
Deferred revenue	163	233
Related party payable	5	5
Advances	250	250
Total current liabilities	1,594	2,187
Convertible Redeemable Series G Preferred stock, $0.001 par value, 5,000,000 shares were authorized, issued and outstanding at March 31, 2013 and December 31, 2012, liquidation preferences of $5,000 at March 31, 2013 and December 31, 2012	4,941	4,941
Commitments and contingencies		
Stockholders' Equity (Deficit)		
Series D Preferred stock, $0.001 par value, 50 shares authorized, 43 issued and outstanding at March 31, 2013 and December 31, 2012, liquidation preferences of $4,320 at March 31, 2013 and December 31, 2012	—	—
Series B Preferred stock, $0.001 par value, 5,000,000 shares authorized, 300,000 issued and outstanding at March 31, 2013 and December 31, 2012, liquidation preferences of $389 and $385 at March 31, 2013 and December 31, 2012, respectively	—	—
Series C Preferred stock, $0.001 par value, 3,000,000 shares authorized, 0 and 2,000,000 issued and outstanding at March 31, 2013 and December 31, 2012, respectively, liquidation preferences of $0 and $2,507 at March 31, 2013 and December 31, 2012, respectively	—	2
Common stock, $0.001 par value, 300,000,000 shares authorized, 112,363,815 and 87,388,815 issued and outstanding at March 31, 2013 and December 31, 2012, respectively	112	87
Additional paid-in capital	73,672	69,945
Deficit accumulated during the development stage	(73,504)	(71,792)
Total stockholders' equity (deficit)	280	(1,758)
Total liabilities, redeemable preferred stock and stockholders' equity (deficit)	$ 6,815	$ 5,370

Source: International Stem Cell Corporation.

Figure 43

CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS (in thousands) (unaudited)

	Three Months Ended March 31,		Inception (August 17, 2001) through
	2013	2012	March 31, 2013
Cash flows from operating activities			
Net loss	$ (1,712)	$ (2,677)	$ (64,462)
Adjustments to reconcile net loss to net cash used in operating activities:			
Depreciation and amortization	116	125	2,032
Accretion of discount on notes payable	—	—	103
Accretion of discount on bridge loans	—	—	638
Warrants issued for services	—	36	370
Non-cash compensation expense	409	685	11,180
Common stock issued for services	68	—	4,424
Change in market value of warrants	—	(38)	1,357
Amortization of discount on convertible debt	—	—	1,081
Allowance for inventory obsolescence	4	(15)	39
Interest on perpetual preferred stock notes receivable	—	—	(35)
Loss on disposal of fixed assets	—	—	80
Impairment of intangible assets	19	18	212
Changes in operating assets and liabilities:			
(Increase) decrease in accounts receivable	(111)	(117)	(384)
(Increase) decrease in inventory	(11)	55	(1,246)
(Increase) decrease in prepaid assets and other assets	(36)	(23)	(492)
(Increase) decrease in deposits			(20)
Increase (decrease) in accounts payable	(539)	(58)	538
Increase (decrease) in accrued expenses	16	61	1,032
Increase (decrease) in deferred revenue	(70)	(77)	163
Increase (decrease) in related party payable	—	—	(160)
Net cash used in operating activities	(1,847)	(2,025)	(43,550)
Investing activities			
Purchases of property and equipment	—	(44)	(2,686)
Proceeds from sale of fixed assets	—	—	7
Payments for patent licenses and trademarks	(168)	(172)	(2,445)
Net cash used in investing activities	(168)	(216)	(5,124)
Financing activities			
Proceeds from Members' contributions	—	—	2,685
Proceeds from issuance of common stock	3,289	2,084	32,171
Proceeds from issuance of preferred stock	—	4,941	17,202
Proceeds from issuance of convertible promissory notes	—	—	2,100
Proceeds from exercise of warrants and options	—	—	992
Payment of preferred stock dividends	—	(108)	(1,320)
Payment of promissory notes	—	—	(2,203)
Payment of offering costs	(16)	—	(1,776)
Proceeds from convertible debt, advances and loan payable	—	—	1,360
Payment of loan payable	—	—	(625)
Net cash provided by financing activities	3,273	6,917	50,586
Net increase in cash and cash equivalents	1,258	4,676	1,912
Cash and cash equivalents, beginning of period	654	1,337	—
Cash and cash equivalents, end of period	$ 1,912	$ 6,013	$ 1,912

Source: International Stem Cell Corporation.

Figure 43 (cont.)

CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOW (in thousands) (unaudited)

	Three Months Ended March 31,		Inception (August 17, 2001) through
	2013	2012	March 31, 2013
Cash paid for interest	$ —	$ —	$ 372
Cash paid for income taxes	$ —	$ —	$ 11
Non-cash financing activities:			
Discount on convertible debt from beneficial conversion feature	$ —	$ —	$ 641
Discount on convertible debt from warrants	$ —	$ —	$ 270
Accretion of preferred stock dividends	$ —	$ 18	$ 93
Deemed dividend on preferred stock	$ —	$ 1,375	$ 8,058
Reversal of preferred dividends accreted	$ —	$ —	$ (93)
Conversion of debt to common stock	$ —	$ —	$ 500
Warrants issued for placement agent services	$ —	$ —	$ 1,231
Warrants issued with promissory notes	$ —	$ —	$ 638
Non-cash sale of preferred stock	$ —	$ —	$ 382
Dividend on preferred stock exchanged for note receivable	$ —	$ —	$ 95
Conversion of preferred stock	$ —	$ —	$ 2
Cashless exercise of warrants	$ —	$ —	$ 1,847

Source: International Stem Cell Corporation.

Risks and Disclosures

Some of the information in this Executive Informational Overview® (EIO) relates to future events or future business and financial performance. Such statements can only be predictions and the actual events or results may differ from those discussed due to the risks described in International Stem Cell Corporation's (ISCO) statements on Forms 10-K, 10-Q, 8-K, as well as other forms filed from time to time. The content of this Executive Informational Overview (EIO) with respect to ISCO has been compiled primarily from information available to the public released by the Company through news releases, Annual Reports, and U.S. Securities and Exchange Commission (SEC) filings. ISCO is solely responsible for the accuracy of this information. Information as to other companies has been prepared from publicly available information and has not been independently verified by ISCO. Crystal Research Associates has been compensated by the Company in cash of sixty-three thousand U.S. dollars for its services in creating this report, for updates, and for printing costs. Certain summaries of activities have been condensed to aid the reader in gaining a general understanding. For more complete information about ISCO, please refer to the Company's website at www.internationalstemcell.com.

Investors should carefully consider the risks and information about ISCO's business described below. Investors should not interpret the order in which these considerations are presented as an indication of their relative importance. The risks and uncertainties described below are not the only risks that the Company faces. Additional risks and uncertainties not presently known to ISCO or that the Company currently believes to be immaterial may also adversely affect its business. If any of the following risks and uncertainties develops into actual events, the business, financial condition, and results of operations could be materially and adversely affected, and the trading price of the Company's shares could decline.

RISKS RELATED TO ISCO'S BUSINESS

ISCO's business is at an early stage of development and it may not develop therapeutic products that can be commercialized.

The Company's business is at an early stage of development in identifying and conducting research on potential therapeutic products. ISCO's potential therapeutic products will require significant research and development and preclinical and clinical testing prior to regulatory approval in the U.S. and other countries. ISCO may not be able to obtain regulatory approvals, enter clinical trials for any of its product candidates, or commercialize any therapeutic products. The Company's product candidates may prove to have undesirable and unintended side effects or other characteristics adversely affecting their safety, efficacy, or cost effectiveness that could prevent or limit their use. Any product using any of ISCO's technology may fail to provide the intended therapeutic benefits, or achieve therapeutic benefits equal to or better than the standard of treatment at the time of testing or production.

The Company has a history of operating losses, does not expect to be profitable in the near future, and its independent registered public accounting firm has expressed doubt as to its ability to continue as a going concern.

ISCO has not generated any profits since its entry into the biotechnology business and has incurred significant operating losses. The Company expects to incur additional operating losses for the foreseeable future and, as it increases its research and development activities, expects its operating losses to increase significantly. The Company has expended substantial funds to develop its technologies, products, and product candidates. Based on its financial condition, recurring losses, and projected spending, which raise substantial doubts about ISCO's ability to continue as a going concern, the Company's independent registered public accounting firm included an explanatory paragraph in its report on ISCO's financial statements as of and for the year ended December 31, 2012, regarding this uncertainty. The inclusion of the going concern statement by auditors may adversely affect ISCO's stock price and its ability to raise needed capital or enter into advantageous contractual relationships with third parties. If the Company was unable to continue as a going concern, the values it receives for its assets on liquidation or dissolution could be significantly lower than the values reflected in its financial statements.

ISCO will need additional capital to conduct its operations and develop its products. The Company's ability to obtain the necessary funding is uncertain.

During 2012, ISCO used a significant amount of cash to finance the continued development and testing of its product candidates, and the Company needs to obtain significant additional capital resources in order to develop products going forward. The Company may not be successful in maintaining its normal operating cash flow and the timing of its capital expenditures may not result in cash flows sufficient to sustain operations. If financing is not sufficient and additional financing is not available or available only on terms that are detrimental to the Company's long-term survival, it could have a major adverse effect on ISCO's ability to continue to function. The timing and degree of any future capital requirements will depend on many factors, including the following:

- the accuracy of the assumptions underlying the Company's estimates for capital needs in 2013 and beyond;
- scientific progress in the Company's research and development programs;
- the magnitude and scope of ISCO's research and development programs and its ability to establish, enforce, and maintain strategic arrangements for research, development, clinical testing, manufacturing, and marketing;
- ISCO's progress with preclinical development and clinical trials;
- the time and costs involved in obtaining regulatory approvals;
- the costs involved in preparing, filing, prosecuting, maintaining, defending, and enforcing patent claims; and
- the number and type of product candidates that the Company pursues.

Additional financing through strategic collaborations, public or private equity, debt financings, or other financing sources may not be available on acceptable terms, or at all. Additional equity financing could result in significant dilution to the Company's stockholders, and any debt financings will likely involve covenants restricting ISCO's business activities. Additional financing may not be available on acceptable terms, or at all. Further, if ISCO obtains additional funds through arrangements with collaborative partners, these arrangements may require the Company to relinquish rights to some of its technologies, product candidates, or products that it would otherwise seek to develop and commercialize on its own. If sufficient capital is not available, ISCO may be required to delay, reduce the scope of, or eliminate one or more of its research or product development initiatives, any of which could have a material adverse effect on the Company's financial condition or business prospects.

ISCO has limited clinical testing and regulatory capabilities, and human clinical trials are subject to extensive regulatory requirements, which are very costly, time-consuming, and difficult to design and implement. The Company's products may fail to achieve the necessary safety and efficacy endpoints during clinical trials, which may limit ISCO's ability to generate revenues from therapeutic products.

Due to the relatively early stage of its therapeutic products and stem cell therapy-based systems, the Company has not yet invested significantly in clinical testing and regulatory capabilities, including for human clinical trials. ISCO cannot assure investors that it will be able to invest or develop resources for these capabilities successfully or as expediently as necessary. In particular, human clinical trials can be very expensive and difficult to design and implement, in part, because they are subject to rigorous regulatory requirements. The clinical trial process is time consuming. ISCO estimates that clinical trials of its product candidates will take at least several years to complete. Furthermore, failure can occur at any stage of the trials, and the Company could encounter problems that cause it to abandon or repeat clinical trials. The commencement and completion of clinical trials may be affected by several factors, including those listed on page 51:

- unforeseen safety issues;
- determination of dosing issues;
- inability to demonstrate effectiveness during clinical trials;
- slower than expected rates of patient recruitment;
- inability to monitor patients adequately during or after treatment; and
- inability or unwillingness of medical investigators to follow ISCO's clinical protocols.

In addition, the Company or the FDA may suspend ISCO's clinical trials at any time if it appears that the Company is exposing participants to unacceptable health risks or if the FDA finds deficiencies in ISCO's IND submissions or the conduct of these trials.

Patents held by other persons may result in infringement claims against ISCO that are costly to defend and which may limit the Company's ability to use the disputed technologies and prevent ISCO from pursuing research and development or commercialization of potential products.

A number of pharmaceutical, biotechnology, and other companies, universities, and research institutions have filed patent applications or have been issued patents relating to cell therapy, stem cells, and other technologies potentially relevant to or required by ISCO's expected products. The Company cannot predict which, if any, of such applications will issue as patents or the claims that might be allowed. ISCO is aware that a number of companies have filed applications relating to stem cells. The Company is also aware of a number of patent applications and patents claiming use of stem cells and other modified cells to treat disease, disorder, or injury.

If third-party patents or patent applications contain claims infringed by either the Company's licensed technology or other technology required to make and use ISCO's potential products and such claims are ultimately determined to be valid, the Company might not be able to obtain licenses to these patents at a reasonable cost, if at all, or be able to develop or obtain alternative technology. If ISCO is unable to obtain such licenses at a reasonable cost, the Company may not be able to develop some products commercially. ISCO may be required to defend itself in court against allegations of infringement of third-party patents. Patent litigation is very costly and could consume substantial resources and create significant uncertainties. An adverse outcome in such a suit could subject the Company to significant liabilities to third parties, require disputed rights to be licensed from third parties, or require ISCO to cease using such technology.

ISCO's competition includes fully integrated biotechnology, pharmaceutical, and cosmetic companies that have significant advantages over the Company.

The market for therapeutic stem cell products is highly competitive. ISCO expects that its most significant competitors will be fully integrated and more established pharmaceutical, biotechnology, and cosmetic companies. These companies are developing stem cell-based products and they have significantly greater capital resources and research and development, manufacturing, testing, regulatory compliance, and marketing capabilities. Many of these potential competitors are further along in the process of product development and also operate large, company-funded research and development programs. As a result, ISCO's competitors may develop more competitive or affordable products, or achieve earlier patent protection or product commercialization than the Company is able to achieve. Competitive products may render any products or product candidates that ISCO develops obsolete.

If it fails to meet its obligations under its license agreements, ISCO may lose its rights to key technologies on which its business depends.

ISCO's business depends, in part, on licenses from third parties. These third-party license agreements impose obligations on the Company, such as payment obligations and obligations to diligently pursue development of commercial products under the licensed patents. If a licensor believes that ISCO has failed to meet its obligations under a license agreement, the licensor could seek to limit or terminate the Company's license rights, which could lead to costly and time-consuming litigation and, potentially, a loss of the licensed rights. During the period of any such litigation, ISCO's ability to carry out the development and commercialization of potential products could be significantly and negatively affected. If the Company's license rights were restricted or ultimately lost, ISCO's ability to continue its business based on the affected technology platform could be severely adversely affected.

Significant delays or reductions in U.S. government funding may negatively affect ISCO's results of operations.

The Company estimates that governmental funding, either directly or indirectly (through sponsorship of academic research), comprises approximately 40% of the market for basic and applied research in biological sciences, which is the target market for ISCO's primary human cell research products. The U.S. government is considering significant changes in government spending and other governmental programs, with several automatic spending cuts being implemented. There are many variables in how these laws could be implemented that make it difficult to determine specific impacts on the Company's customers, and ISCO is unable to predict the impact that these automatic spending cuts would have on funding its customers receive. Additionally, U.S. governmental programs are subject to annual congressional budget authorization and appropriation processes. However, whether through the automatic cuts or other decisions, long-term funding for certain programs in which ISCO's research product customers participate may be reduced, delayed, or cancelled. In the event that government funding for any of the Company's research product customers is reduced or delayed, ISCO's sales to those customers would likely suffer, which could have a material adverse effect on the Company's results of operations.

Restrictive and extensive government regulation could slow or hinder ISCO's production of a cellular product.

The research and development of stem cell therapies is subject to and restricted by extensive regulation by governmental authorities in the U.S. and other countries. The process of obtaining FDA and other necessary regulatory approvals is lengthy, costly, and uncertain. ISCO may fail to obtain the necessary approvals to continue its research and development, which would hinder the Company's ability to manufacture or market any future product.

Research in the field of embryonic stem cells is currently subject to strict government regulations, and the Company's operations could be restricted or outlawed by any legislative or administrative efforts impacting the use of nuclear transfer technology or human embryonic material.

Significant portions of ISCO's business are focused on human cell therapy, which includes the production of human differentiated cells from stem cells and involves human oocytes. Although the Company's focus is on parthenogenetic stem cells derived from unfertilized oocytes, certain aspects of that work may involve the use of embryonic stem cells. Research utilizing embryonic stem cells is controversial, and currently subject to intense scrutiny, particularly in the area of the use of human embryonic material.

Federal law is not as restrictive regarding the use of federal funds for human embryonic cell research (commonly referred to as human ESC research) as it once was. However, federal law does prohibit federal funding for creation of parthenogenetic stem cells. The Company's operations may also be restricted by future legislative or administrative efforts by politicians or groups opposed to the development of human ESC technology, parthenogenetic cell technology, or nuclear transfer technology. Further, future legislative or administrative restrictions could, directly or indirectly, delay, limit, or prevent the use of human ESC technology, parthenogenetic technology, or nuclear transfer technology, the use of human embryonic material, or the sale, manufacture, or use of products or services derived from nuclear transfer technology or human ESC or parthenogenetic technology.

Restrictions on the use of human stem cells and the ethical, legal, and social implications of that research could prevent ISCO from developing or gaining acceptance for commercially viable products in these areas.

Although the Company's stem cells are derived from unfertilized human eggs through a process called "parthenogenesis" that can produce cells suitable for therapy but are believed to be incapable of producing a human being, such cells are nevertheless often incorrectly referred to as "embryonic" stem cells. Because the use of human embryonic stem cells gives rise to ethical, legal, and social issues regarding the appropriate use of these cells, the Company's research related to human parthenogenetic stem cells could become the subject of adverse commentary or publicity and some political and religious groups may still raise opposition to ISCO's technology and practices. In addition, many research institutions, including some of the Company's scientific collaborators, have adopted policies regarding the ethical use of human embryonic tissue, which, if applied to ISCO's procedures, may have the effect of limiting the scope of research conducted using the Company's stem cells, thereby impairing ISCO's ability to conduct research in this field. In some states, the use of embryos as a source of stem cells is prohibited.

To the extent ISCO utilizes government grants in the future, the government entities involved may retain certain rights in technology that the Company develops using such grant money and ISCO may lose the revenues from such technology if it does not commercialize and utilize the technology pursuant to established government guidelines.

Certain of ISCO's licensors' research has been or is being funded in part by government grants. ISCO's research may also be government-funded in the future. In connection with certain grants, the governmental entity involved retains various rights in the technology developed with the grant. These rights could restrict the Company's ability to fully capitalize upon the value of this research by reducing total revenues that might otherwise be available since such governmental rights may give the government the right to practice the invention without payment of royalties if ISCO does not comply with applicable requirements.

ISCO relies on parthenogenesis, cell differentiation, and other stem cell technologies that the Company may not be able to successfully develop, which may prevent it from generating revenues, operating profitably, or providing investors any return on their investment.

ISCO has concentrated its research on parthenogenesis, cell differentiation, and stem cell technologies. Its ability to operate profitably will depend on being able to successfully implement or develop these technologies for human applications. These are emerging technologies with, as yet, limited human applications. ISCO cannot guarantee that it will be able to successfully implement or develop its nuclear transfer, parthenogenesis, cell differentiation, and other stem cell technologies or that these technologies will result in products or services with any significant commercial utility. ISCO anticipates that the commercial sale of such products or services, and royalty/licensing fees related to its technology, would be an additional source of revenues.

The outcome of preclinical, clinical, and product testing of ISCO's products is uncertain, and if the Company is unable to satisfactorily complete such testing, or if such testing yields unsatisfactory results, ISCO may be unable to commercially produce its proposed products.

Before obtaining regulatory approvals for the commercial sale of any potential human products, the Company's products will be subjected to extensive preclinical and clinical testing to demonstrate their safety and efficacy in humans. The clinical trials of ISCO's prospective products, or those of its licensees or collaborators, may not demonstrate the safety and efficacy of such products at all, or to the extent necessary to obtain appropriate regulatory approvals. Similarly, the testing of such prospective products may not be completed in a timely manner, if at all, or only after significant increases in costs, program delays or both, all of which could harm the Company's ability to generate revenues. In addition, ISCO's prospective products may not prove to be more effective for treating disease or injury than current therapies. Accordingly, ISCO may have to delay or abandon efforts to research, develop, or obtain regulatory approval to market its prospective products. The failure to adequately demonstrate the safety and efficacy of a therapeutic product under development could delay or prevent regulatory approval of the product and could harm ISCO's ability to generate revenues, operate profitably, or produce any return on an investment.

If ISCO is unable to keep up with rapid technological changes in its field or compete effectively, the Company will be unable to operate profitably.

ISCO is engaged in activities in the biotechnology field, which is characterized by extensive research efforts and rapid technological progress. If the Company fails to anticipate or respond adequately to technological developments, its ability to operate profitably could suffer. Research and discoveries by other biotechnology, agricultural, pharmaceutical, or other companies may render ISCO's technologies or potential products or services uneconomical or result in products superior to those the Company develops. Similarly, any technologies, products, or services the Company develops may not be preferred to any existing or newly developed technologies, products, or services.

The Company may not be able to protect its proprietary technology, which could harm ISCO's ability to operate profitably.

The biotechnology, cosmeceutical, and pharmaceutical industries place considerable importance on obtaining patent and trade secret protection for new technologies, products, and processes. ISCO's success will depend, to a substantial degree, on its ability to obtain and enforce patent protection for its products, preserve any trade secrets, and operate without infringing the proprietary rights of others. ISCO cannot assure investors of any of the following:

- that the Company will succeed in obtaining any patents, obtain them in a timely manner, or that the breadth or degree of protection of any such patents will protect its interests;
- that the use of ISCO's technology will not infringe on the proprietary rights of others;
- that patent applications relating to the Company's potential products or technologies will result in the issuance of any patents or that, if issued, such patents will afford adequate protection to the Company or will not be challenged, invalidated, or infringed; or
- that patents will not be issued to other parties, which may be infringed upon by the Company's potential products or technologies.

ISCO is aware of certain patents that have been granted to others and certain patent applications that have been filed by others with respect to nuclear transfer and other stem cell technologies. The fields in which the Company operates have been characterized by significant efforts by competitors to establish dominant or blocking patent rights to gain a competitive advantage, and by considerable differences of opinion as to the value and legal legitimacy of competitors' purported patent rights and the technologies they actually utilize in their businesses.

Considerable research in the areas of stem cells, cell therapeutics, and regenerative medicine is being performed in countries outside of the U.S., and a number of the Company's competitors are located in those countries. The laws protecting intellectual property in some of those countries may not provide adequate protection to prevent ISCO's competitors from misappropriating its intellectual property.

ISCO's business is highly dependent upon maintaining licenses with respect to key technology.

Although the Company's primary focus relates to intellectual property developed by ISCO internally, some of the patents it utilizes are licensed to ISCO by Advanced Cell Technology, which has licensed some of these from other parties, including the University of Massachusetts. These licenses are subject to termination under certain circumstances (including, for example, the Company's failure to make minimum royalty payments). The loss of any of such licenses, or the conversion of such licenses to non-exclusive licenses, could harm ISCO's operations and/or enhance the prospects of its competitors. Although the Company's licenses with Advanced Cell Technology allow ISCO to cure any defaults under the underlying licenses to them and to take over the patents and patents pending in the event of default by Advanced Cell Technology, the cost of such remedies could be significant and ISCO might be unable to adequately maintain these patent positions. If so, such inability could have a material adverse effect on the Company's business.

Cybersecurity breaches could expose ISCO to liability, damage its reputation, compromise its confidential information, or otherwise adversely affect its business.

ISCO maintains sensitive company data on its computer networks, including intellectual property and proprietary business information, as well as certain personal information regarding customers who purchase the Company's skin care products online. ISCO faces a number of threats to its networks from unauthorized access, security breaches, and other system disruptions. Despite the Company's security measures, ISCO's infrastructure may be vulnerable to attacks by hackers or other disruptive problems. Any such security breach may compromise information stored on ISCO's networks and may result in significant data losses or theft of its intellectual property, proprietary business information, or its customers' personally identifiable information. A cybersecurity breach could hurt the Company's reputation by adversely affecting the perception of customers and potential customers of the security of their orders and personal information. In addition, a cybersecurity attack could result in other negative consequences, including disruption of ISCO's internal operations, increased cyber security protection costs, lost revenues, or litigation.

Certain of ISCO's technology may not be subject to protection through patents, which leaves the Company vulnerable to theft of its technology.

Certain parts of the Company's know-how and technology are not patentable or are trade secrets. To protect ISCO's proprietary position in such know-how and technology, the Company intends to require all employees, consultants, advisors, and collaborators to enter into confidentiality and invention ownership agreements. These agreements may not provide meaningful protection for ISCO's trade secrets, know-how, or other proprietary information in the event of any unauthorized use or disclosure. Further, in the absence of patent protection, competitors who independently develop substantially equivalent technology may harm the Company's business.

ISCO depends on its collaborators to help develop and test proposed products, and its ability to develop and commercialize products may be impaired or delayed if collaborations are unsuccessful.

ISCO's strategy for the development, clinical testing, and commercialization of its proposed products requires that the Company enters into collaborations with corporate partners, licensors, licensees, and others. ISCO is dependent upon the subsequent success of these other parties in performing their respective responsibilities and the continued cooperation of its partners. The Company's collaborators may not cooperate with ISCO or perform their obligations under its agreements with them. ISCO cannot control the amount and timing of its collaborators' resources that will be devoted to the Company's research and development activities related to its collaborative agreements with them. The Company's collaborators may choose to pursue existing or alternative technologies in preference to those being developed in collaboration with ISCO.

Under agreements with collaborators, ISCO may rely significantly on such collaborators to perform the following, among other tasks:

- design and conduct advanced clinical trials in the event that ISCO reaches clinical trials;
- fund research and development activities with the Company;
- pay ISCO fees upon the achievement of milestones; and
- jointly market with the Company any commercial products that result from such collaborations.

The development and commercialization of potential products will be delayed if collaborators fail to conduct these activities in a timely manner, or at all. In addition, ISCO's collaborators could terminate their agreements with the Company and ISCO may not receive any development or milestone payments. If the Company does not achieve milestones set forth in the agreements, or if ISCO's collaborators breach or terminate their collaborative agreements with the Company, ISCO's business may be materially harmed.

ISCO's reliance on the activities of its non-employee consultants, research institutions, and scientific contractors, whose activities are not wholly within the Company's control, may lead to delays in development of its proposed products.

ISCO relies extensively upon and has relationships with scientific consultants at academic and other institutions, some of whom conduct research at the Company's request, and other consultants with expertise in clinical development strategy or other matters. These consultants are not ISCO's employees and may have commitments to, or consulting or advisory contracts with, other entities that may limit their availability to the Company. ISCO has limited control over the activities of these consultants and, except as otherwise required by its collaboration and consulting agreements to the extent they exist, can expect only limited amounts of their time to be dedicated to ISCO's activities. These research facilities may have commitments to other commercial and non-commercial entities. The Company has limited control over the operations of these laboratories and can expect only limited amounts of time to be dedicated to ISCO's research goals.

ISCO may be subject to litigation that will be costly to defend or pursue and uncertain in its outcome.

The Company's business may bring it into conflict with the Company's licensees, licensors, or others with whom ISCO has contractual or other business relationships, or with competitors or others whose interests differ from the interests of the Company. If ISCO is unable to resolve those conflicts on terms that are satisfactory to all parties, it may become involved in litigation brought by or against ISCO. That litigation is likely to be expensive and may require a significant amount of management's time and attention, at the expense of other aspects of the Company's business. The outcome of litigation is always uncertain, and in some cases could include judgments against ISCO that require the Company to pay damages, enjoin ISCO from certain activities, or otherwise affect the Company's legal or contractual rights, which could have a significant adverse effect on its business.

The Company may not be able to obtain third-party patient reimbursement or favorable product pricing, which would reduce its ability to operate profitably.

ISCO's ability to successfully commercialize certain of its proposed products in the human therapeutic field may depend to a significant degree on patient reimbursement of the costs of such products and related treatments at acceptable levels from government authorities, private health insurers, and other organizations, such as health maintenance organizations. Reimbursement in the U.S. or foreign countries may not be available for any products ISCO may develop, and, if available, may be decreased in the future. Also, reimbursement amounts may reduce the demand for, or the price of, the Company's products with a consequent harm to ISCO's business. ISCO cannot predict what additional regulation or legislation relating to the healthcare industry or third-party coverage and reimbursement may be enacted in the future or what effect such regulation or legislation may have on ISCO's business. If additional regulations are overly onerous or expensive, or if healthcare-related legislation makes the Company's business more costly or burdensome than originally anticipated, ISCO may be forced to significantly downsize its business plans or completely abandon its business model.

ISCO's products may be costly to manufacture, and they may not be profitable if the Company is unable to control the costs to manufacture them.

The Company's products may be significantly more expensive to manufacture than other therapeutic products currently on the market today. ISCO hopes to substantially reduce manufacturing costs through process improvements, development of new science, increases in manufacturing scale, and outsourcing to experienced manufacturers. If ISCO is not able to make these, or other improvements, and depending on the pricing of the product, the Company's profit margins may be significantly less than that of other therapeutic products on the market today. In addition, ISCO may not be able to charge a high enough price for any cell therapy product it develops, even if they are shown to be safe and effective, to make a profit. If ISCO is unable to realize significant profits from its potential product candidates, the Company's business would be materially harmed.

To be successful, ISCO's proposed products must be accepted by the healthcare community, which can be very slow to adopt or unreceptive to new technologies and products.

The Company's proposed products and those developed by its collaborative partners, if approved for marketing, may not achieve market acceptance since hospitals, physicians, patients, or the medical community, in general, may decide not to accept and utilize these products. The products that ISCO is attempting to develop represent substantial departures from established treatment methods and will compete with a number of more conventional therapies manufactured and marketed by major pharmaceutical companies. The degree of market acceptance of any of the Company's developed products will depend on a number of factors, including the following:

- ISCO's establishment and demonstration to the medical community of the clinical efficacy and safety of its proposed products;
- the Company's ability to create products that are superior to alternatives currently on the market;
- ISCO's ability to establish in the medical community the potential advantage of its treatments over alternative treatment methods; and
- reimbursement policies of government and third-party payers.

If the healthcare community does not accept ISCO's products for any of the foregoing reasons, or for any other reason, its business would be materially harmed.

ISCO depends on key personnel for its continued operations and future success, and a loss of certain key personnel could significantly hinder the Company's ability to move forward with its business plan.

Because of the specialized nature of its business, ISCO is highly dependent on its ability to identify, hire, train, and retain highly qualified scientific and technical personnel for the research and development activities it conducts or sponsors. The loss of one or more key executive officers, or scientific officers, would be significantly detrimental to ISCO. In addition, recruiting and retaining qualified scientific personnel to perform research and development work is critical to the Company's success. ISCO's anticipated growth and expansion into areas and activities requiring additional expertise, such as clinical testing, regulatory compliance, manufacturing, and marketing, will require the addition of new management personnel and the development of additional expertise by existing management personnel. In the past year, ISCO has had significant turnover in its management personnel and there is intense competition for qualified personnel in the areas of the Company's present and planned activities. Accordingly, ISCO may not be able to continue to attract and retain the qualified personnel, which would adversely affect the development of its business.

ISCO may not have sufficient product liability insurance, which may leave the Company vulnerable to future claims that it may be unable to satisfy.

The testing, manufacturing, marketing, and sale of human therapeutic products entails an inherent risk of product liability claims. ISCO currently has a limited amount of product liability insurance, which may not be adequate to meet potential product liability claims. In the event ISCO is forced to expend significant funds on defending product liability actions, and in the event those funds come from operating capital, the Company will be required to reduce its business activities, which could lead to significant losses. Adequate insurance coverage may not be available in the future on acceptable terms, if at all. If available, ISCO may not be able to maintain any such insurance at sufficient levels of coverage and any such insurance may not provide adequate protection against potential liabilities. Whether or not a product liability insurance policy is obtained or maintained in the future, any product liability claim could harm the Company's business or financial condition.

RISKS RELATED TO THE SECURITIES MARKETS AND THE COMPANY'S CAPITAL STRUCTURE

Stock prices for biotechnology companies have historically tended to be very volatile.

Stock prices and trading volumes for many biotechnology companies fluctuate widely for a number of reasons, including but not limited to the following factors, some of which may be unrelated to their businesses or results of operations:

- clinical trial results;
- the amount of cash resources and the Company's ability to obtain additional funding;
- announcements of research activities, business developments, technological innovations, or new products by competitors;
- entering into or terminating strategic relationships;
- changes in government regulation;
- disputes concerning patents or proprietary rights;
- changes in revenue or expense levels;
- public concern regarding the safety, efficacy, or other aspects of the products or methodologies that ISCO is developing;
- reports by securities analysts;
- activities of various interest groups or organizations;
- media coverage; and
- status of the investment markets.

This market volatility, as well as general domestic or international economic, market, and political conditions, could materially and adversely affect the market price of ISCO's common stock.

Two of the Company's executive officers and directors can significantly influence ISCO's direction and policies, and their interests may be adverse to the interests of other stockholders.

As of March 15, 2013, Dr. Andrey Semechkin, chief executive officer and co-chairman of the Board of Directors, and Dr. Ruslan Semechkin, vice president of ISCO and a director, beneficially own approximately 39% of the outstanding shares of common stock, including shares issuable upon conversion of all the outstanding shares of the Company's Series D and Series G preferred stock and shares issuable upon exercise of options and warrants. As a result of their holdings and the rights, preferences and privileges of those series of preferred stock, Dr. Andrey Semechkin and Dr. Ruslan Semechkin may appoint and remove two of ISCO's six directors, and propose candidates for nomination of up to two additional directors, and therefore will be able to significantly influence the election of ISCO's Board of Directors. They may also prevent corporate transactions (such as a merger, consolidation, a sale of all or substantially all of the Company's assets or a financing transaction) that may be favorable from the standpoint of ISCO's other stockholders or they may cause a transaction that ISCO's other stockholders may view as unfavorable.

The application of the "penny stock" rules to ISCO's common stock could limit the trading and liquidity of its common stock, adversely affect the market price of the Company's common stock, and increase stockholder transaction costs to sell those shares.

As long as the trading price of ISCO's common stock is below $5.00 per share, the open market trading of the Company's common stock will be subject to the "penny stock" rules, unless ISCO otherwise qualifies for an exemption from the "penny stock" definition. The penny stock rules impose additional sales practice requirements on certain broker-dealers who sell securities to persons other than established customers and accredited investors (generally those with assets in excess of $1,000,000 or annual income exceeding $200,000 or $300,000 together with their spouse). These regulations, if they apply, require the delivery, prior to any transaction involving a penny stock, of a disclosure schedule explaining the penny stock market and the associated risks. Under these regulations, certain brokers who recommend such securities to persons other than established customers or certain accredited investors must make a special written suitability determination regarding such a purchaser and receive such purchaser's written agreement to a transaction prior to sale. These regulations may have the effect of limiting the trading activity of the Company's common stock, reducing the liquidity of an investment in ISCO's common stock, and increasing the transaction costs for sales and purchases of the Company's common stock as compared to other securities.

The rights of holders of the Company's common stock are subordinate to significant rights, preferences, and privileges of ISCO's existing four series of preferred stock, and to any additional series of preferred stock created in the future.

Under the authority granted by ISCO's Certificate of Incorporation, the Company's Board of Directors has established three separate series of outstanding preferred stock, including Series B, Series D, and Series G preferred stock, which have various rights and preferences senior to the shares of common stock. Shares of ISCO's existing preferred stock are also entitled to enhanced voting rights and liquidation preferences. As a result of the various voting rights, the holders of the Company's existing preferred stock may be able to block the proposed approval of various corporate actions, which could prevent ISCO from achieving strategic or other goals dependent on such actions.

As a result of the liquidation preferences, in the event that the Company voluntarily or involuntary liquidates, dissolves, or winds up its affairs (including as a result of a merger), the holders of the preferred stock would be entitled to receive stated amounts per share, including any accrued and unpaid dividends, before any distribution of assets or merger consideration is made to holders of ISCO's common stock. Additionally, these shares of preferred stock may be converted, at the option of the holders, into common stock at rates that may be adjusted, for the benefit of holders of preferred stock, if the Company sell equity securities below the then existing conversion prices. Any such adjustments would compound the potential dilution suffered by holders of common stock if ISCO issues additional securities at prices below the current conversion prices. Additionally, subject to the consent of the holders of the Company's existing preferred stock, ISCO's Board of Directors has the power to issue additional series of preferred stock and to designate, as it deems appropriate (subject to the rights of the holders of the current series of preferred stock), the special dividend, liquidation, or voting rights of the shares of those additional series. The creation and designation of any new series of preferred stock could adversely affect the voting power, dividend, liquidation, and other rights of holders of ISCO's common stock and, possibly, any other class or series of stock that is then in existence.

The market price for the Company's common stock may be particularly volatile given ISCO's status as a relatively unknown company with a limited operating history and lack of profits, which could lead to wide fluctuations in its share price. The price at which stockholders purchase shares of ISCO's common stock may not be indicative of the price of its common stock that will prevail in the trading market.

The market for the Company's common stock may be characterized by significant price volatility when compared to seasoned issuers, and ISCO expects that its stock price could continue to be more volatile than a seasoned issuer for the indefinite future. The potential volatility in ISCO's share price is attributable to a number of factors. First, there has been limited trading in the Company's common stock.

As a consequence of this lack of liquidity, any future trading of shares by its stockholders may disproportionately influence the price of those shares in either direction. Second, ISCO is a speculative or "risky" investment due to its limited operating history and lack of profits to date, and uncertainty of future market acceptance for the Company's potential products. As a consequence of this enhanced risk, more risk-averse investors may, under the fear of losing all or most of their investment in the event of negative news or lack of progress, be more inclined to sell their shares on the market more quickly and at greater discounts than would be the case with the stock of a seasoned issuer. Many of these factors will be beyond ISCO's control and may decrease the market price of the Company's common stock, regardless of its operating performance. ISCO cannot make any predictions or projections as to what the prevailing market price for its common stock will be at any time or as to what effect that the sale of shares or the availability of shares for sale at any time will have on the prevailing market price.

In addition, the market price of the Company's common stock could be subject to wide fluctuations in response to the following:

- quarterly variations in ISCO's revenues and operating expenses;
- announcements of new products or services by the Company;
- fluctuations in interest rates;
- significant sales of ISCO's common stock;
- the operating and stock price performance of other companies that investors may deem comparable to ISCO; and
- news reports relating to trends in the Company's markets or general economic conditions.

Shares eligible for future sale may adversely affect the market.

From time to time, certain stockholders may be eligible to sell all or some of their shares of common stock by means of ordinary brokerage transactions in the open market pursuant to Rule 144 promulgated under the Securities Act of 1933, as amended, subject to certain limitations. In general, pursuant to Rule 144, a stockholder (or stockholders whose shares are aggregated) who is not an affiliate of the Company and who has satisfied a six-month holding period may, as long as ISCO is current in its required filings with the SEC, sell securities without further limitation. Rule 144 also permits, under certain circumstances, the sale of securities, without any limitations, by a non-affiliate of the Company who has satisfied a one-year holding period. Affiliates of ISCO who have satisfied a six-month holding period may sell securities subject to limitations. Any substantial sale of the Company's common stock pursuant to Rule 144 or pursuant to any resale prospectus may have an adverse effect on the market price of ISCO's securities. Currently, a substantial majority of ISCO's securities are either free trading or subject to the release of trading restrictions under the six-month or one-year holding periods of Rule 144.

Certain provisions of ISCO's Certificate of Incorporation and Delaware law may make it more difficult for a third party to affect a change-in-control.

ISCO's Certificate of Incorporation authorizes the Board of Directors to issue up to 20,000,000 shares of preferred stock and the Company's Board of Directors has created and issued shares of three series of preferred stock that remain outstanding, including Series B, Series D, and Series G preferred stock. The terms of the Series B, Series D, and Series G preferred stock include, among other things, voting rights on particular matters (for example, with respect to the Series D preferred stock, restricting ISCO's ability to undergo a change in control or merge with, or sell assets to, a third party), preferences as to dividends and liquidation, and conversion rights. These preferred stock rights diminish the rights of holders of the Company's common stock, and therefore could reduce the value of such common stock. In addition, as long as shares of the Company's Series B, Series D, and Series G preferred stock remain outstanding, or if its Board creates and issues additional shares of preferred stock in the future with rights that restrict ISCO's ability to merge with, or sell assets to, a third party, it could make it more difficult, delay, discourage, prevent, or make it more costly to acquire the Company or affect a change-in-control.

The sale or issuance of a substantial number of shares may adversely affect the market price for the Company's common stock.

The future sale of a substantial number of shares of ISCO's common stock in the public market, or the perception that such sales could occur, could significantly and negatively affect the market price for the Company's common stock. ISCO expects that it will likely issue a substantial number of shares of its capital stock in financing transactions in order to fund the Company's operations and the growth of its business. Under these arrangements, ISCO may agree to register the shares for resale soon after their issuance. ISCO may also continue to pay for certain goods and services with equity, which would dilute its current stockholders. Also, sales of the shares issued in this manner could negatively affect the market price of the Company's stock.

The sale of the Company's common stock to Aspire Capital may cause substantial dilution to ISCO's existing stockholders and the sale of the shares of common stock acquired by Aspire Capital could cause the price of the Company's common stock to decline.

On December 9, 2010, ISCO entered into a purchase agreement with Aspire Capital which provided that, upon the terms and subject to the conditions and limitations set forth therein, Aspire Capital is committed to purchase up to an aggregate of $25.0 million of the Company's common stock. As of March 15, 2013, ISCO had sold Aspire Capital 10,533,333 shares of common stock for aggregate proceeds of $6,206,000, and the Company may sell Aspire Capital up to an additional $18,794,000 of its common stock in the future. Pursuant to the purchase agreement, the number of shares of common stock that ISCO may designate Aspire Capital to purchase is dependent on the closing price of the Company's common stock on the date that the Company provides Aspire Capital with a purchase notice directing it to purchase shares, and the purchase price per share is the lower of (i) the lowest sale price for the common stock on the date of sale or (ii) the arithmetic average of the three lowest closing sale prices of ISCO's common stock during the 12 consecutive business days preceding the date of sale. If the Company elects to sell additional shares to Aspire Capital under the Common Stock Purchase Agreement, depending upon market liquidity at the time, it may cause the trading price of ISCO's common stock to decline.

After Aspire Capital has acquired additional shares of ISCO's common stock under the purchase agreement, it may sell all, some or none of such shares. In connection with the purchase agreement, the Company also entered into a registration rights agreement with Aspire Capital, dated December 9, 2010, that provides, among other things, that the Company will register the resale of all shares acquired by Aspire Capital under the purchase agreement. Therefore, sales to Aspire Capital by ISCO pursuant to the purchase agreement may result in substantial dilution to the interests of other holders of ISCO's common stock. The sale of a substantial number of shares of the Company's common stock to Aspire Capital pursuant to the purchase agreement, or anticipation of such sales, as well as the resale of such shares by Aspire Capital, could make it more difficult for ISCO to sell equity or equity-related securities in the future at a time and at a price that it might otherwise wish to affect sales. However, ISCO has the right to control the timing and amount of any sales of its shares to Aspire Capital, and may terminate the purchase agreement at any time without any cost to the Company.

The exercise of outstanding options and warrants to acquire shares of ISCO's common stock would cause additional dilution, which could cause the price of the Company's common stock to decline.

In the past, ISCO has issued options and warrants to acquire shares of its common stock. At March 15, 2013, there were 11,662,500 warrants, and 15,811,628 vested and 6,920,565 non-vested stock options outstanding, and the Company may issue additional options, warrants, and other types of equity in the future as part of stock-based compensation, capital raising transactions, technology licenses, financings, strategic licenses, or other strategic transactions. To the extent these options and warrants are ultimately exercised, existing common stockholders would experience additional dilution, which may cause the price of ISCO's common stock to decline.

Limitations on director and officer liability and indemnification of ISCO's officers and directors by the Company may discourage stockholders from bringing suit against a director.

ISCO's certificate of incorporation and bylaws provide, with certain exceptions as permitted by governing state law, that a director or officer shall not be personally liable to ISCO or its stockholders for breach of fiduciary duty as a director, except for acts or omissions that involve intentional misconduct, fraud, or knowing violation of law, or unlawful payments of dividends. These provisions may discourage stockholders from bringing suit against a director for breach of fiduciary duty and may reduce the likelihood of derivative litigation brought by stockholders on ISCO's behalf against a director. In addition, the Company's certificate of incorporation and bylaws may provide for mandatory indemnification of directors and officers to the fullest extent permitted by governing state law.

Compliance with the rules established by the SEC pursuant to Section 404 of the Sarbanes-Oxley Act of 2002 is complex. Failure to comply in a timely manner could adversely affect investor confidence and ISCO's stock price.

Rules adopted by the SEC pursuant to Section 404 of the Sarbanes-Oxley Act of 2002 require ISCO to perform an annual assessment of its internal controls over financial reporting, certify the effectiveness of those controls, and obtain an opinion by the Company's independent registered public accountants. The standards that must be met for management to assess the internal controls over financial reporting now in effect are complex, costly, and require significant documentation, testing, and possible remediation to meet the detailed standards. ISCO may encounter problems or delays in completing activities necessary to make an assessment of its internal controls over financial reporting. If the Company cannot perform the assessment or certify that its internal controls over financial reporting are effective, investor confidence and share value may be negatively impacted.

ISCO does not expect to pay cash dividends in the foreseeable future on its common stock.

ISCO has not historically paid cash dividends on its common stock, and it does not plan to pay cash dividends on its common stock in the foreseeable future.

Recent Events

08/01/2013—International Stem Cell Corporation announced that it is scheduled to host a conference call on August 9, 2013, to discuss its financial results for the three- and six-month periods ended June 30, 2013.

07/19/2013—Announced the pricing of a public offering of 20,000,000 units at a price of $0.15 per unit, as described on page 45.

06/27/2013—Announced that it is scheduled to present preliminary data from its IND-enabling study in Parkinson's disease (PD) at the Society for Neuroscience annual meeting in San Diego, California, on November 10, 2013. This meeting is believed to be one of the largest scientific and medical conferences in the world.

06/11/2013—Announced that its subsidiary, Lifeline Skin Care, signed distribution agreements with My Son IEI and Advanced Skincare Technologies Co., Ltd., to expand its stem cell (SC) skin care products into Vietnam and Thailand, respectively. Complementing Lifeline's current distribution relationship in China, these two new agreements demonstrate Lifeline's commitment to capitalize on the opportunities presented by the Asian market.

05/30/2013—Announced the initiation of an IND-enabling pharmacology and toxicology non-human primate study for its PD program, under the direction of Yale School of Medicine Professor D. Eugene Redmond Jr., M.D. The studies are using non-human primates with moderate to severe PD symptoms to assess the safety and functional efficacy of ISCO's proprietary SC-derived neuronal cells. Initial interim results are expected by the end of 2013, with the final results expected to be available by the second quarter 2014.

05/01/2013—Announced that Dr. Ruslan Semechkin, the Company's vice president of research and development (biography on page 12), was scheduled to present additional data from the primate study on the use of neuronal cells for the treatment of PD at the 16th annual meeting of American Society of Gene and Cell Therapy, May 16, 2013, in Salt Lake City, Utah.

03/20/2013—Presented results of its preclinical studies demonstrating the safety and efficacy of SC engraftment in a primate model of PD at the American Academy of Neurology (AAN) 65th Annual Meeting on March 20, 2013, in San Diego, California.

03/19/2013—Announced positive safety and efficacy results of its rodent and non-human primate studies in PD. Overall, these results provided evidence to support the hypothesis that human parthenogenetic stem cell (hpSC)-derived neuronal cells can be safe and have a disease-modifying effect. The results were presented at the 65th American Academy of Neurology annual meeting held in San Diego, California, on March 20, 2013.

03/15/2013—Announced the publication of its method of deriving neuronal cells for the treatment of PD in *Scientific Reports*, a primary research publication from the publishers of *Nature*. The paper describes the technology, developed by ISCO's R&D team, for producing highly pure populations of GMP-grade neuronal cells suitable for preclinical studies and clinical trials. The full-text of the publication can be found at http://www.nature.com/srep/2013/130315/srep01463/full/srep01463.html.

03/14/2013—Announced that the Company raised $1 million from a number of existing long-standing investors through a private placement on the same terms as the transaction with management reported on January 23, 2013. The funds, along with those received in January 2013, were expected to be used to advance the Company's therapeutic programs toward clinical stage.

02/15/2013—Announced amendments to the license agreements with Advanced Cell Technology, Inc. (ACT). The amendment extended ISCO's rights in the area of parthenogenesis for treating any human diseases, granting ISCO an exclusive worldwide license to ACT's patents and applications covering the uses of parthenogenetically derived SC in generating human tissue.

02/12/2013—Announced conclusions from its preclinical study demonstrating the efficacy and safety of the hepatocyte-like cells (HLC) derived from hpSCs. The data from this preclinical study indicated that implanting HLC in rodents produced both a significant initial decrease and the long-term stabilization of bilirubin levels in blood serum.

02/04/2013—Announced positive 12-week results from its preclinical *in vivo* PD study, designed to demonstrate the therapeutic benefits of hpSC-derived neuronal cells in a rat model of PD. The interim results demonstrated that a single injection of hpSC-derived neuronal cells into the striatum of rats with induced PD symptoms can lead to a significant slowdown in the progression of the disease.

01/23/2013—Filed an 8-K with the U.S. Securities and Exchange Commission (SEC) announcing an equity financing operation totaling $2,025,000. ISCO's co-chairman and chief executive officer (CEO), Dr. Andrey Semechkin (biography on page 12) and the Company's executive vice president of business development, Dr. Simon Craw (biography on page 12), purchased a total of 10,125,000 shares of common stock at a price of $0.20 per share.

01/10/2013—Announced that its wholly owned subsidiary, Lifeline Skin Care (LSC), hosted a breakfast for over 40 short lead (newspapers and online media) and long lead (magazine) editors in New York City.

01/07/2013—Announced positive top-line efficacy results from its preclinical *in vivo* liver study demonstrating the therapeutic equivalence of hpSC-derived HLC to adult liver cells. Results demonstrated that the HLCs engrafted in the liver of Gunn rats and behaved in a similar manner to primary human hepatocytes. Additionally, a single intrasplenic injection of hpSC-derived HLCs resulted in a change in the plasma indirect bilirubin level equivalent to that achieved by injecting primary hepatocytes.

01/03/2013—Announced that Dr. Craw was scheduled to present at the Biotech Showcase 2013 on January 7, 2013, in San Francisco, California.

Glossary

6-DMAP (6-Dimethylaminopurine)—A broad-spectrum kinase inhibitor and oocyte activation agent.

Action Potential—The change in electrical potential associated with the passage of an impulse along the membrane of a muscle cell or nerve cell.

Adult SC—Also known as somatic stem cells, adult stem cells are undifferentiated cells found throughout the body after development, which multiply by cell division to replenish dying cells and regenerate damaged tissues.

Alleles—One member of a pair (or any of the series) of genes occupying a specific spot on a chromosome (called locus) that controls the same trait, and that are responsible for hereditary variation.

Alpha-1-Antitrypsin Deficiency (Alpha-1)—An inherited disorder that can cause defective production of Alpha-1 antitrypsin (AAT), a protein that protects the lung. The condition can cause lung disease in adults and liver disease in adults and children.

Antigens—A toxin or substance from the external environment or formed within the body that induces an immune response in the body and the production of antibodies.

Autologous—Derived or transferred from the same individual's body.

Bilirubin—A pigment produced by the liver that is derived from the degradation of hemoglobin during the normal and abnormal destruction of red blood cells. High levels of bilirubin causes jaundice.

Blastocyst—A thin-walled hollow structure in early embryonic development that contains a cluster of cells called the inner cell mass from which the embryo arises.

Collagen A1/A2—Collagen is the main structural protein found in animal connective tissue, especially in the skin, bone, cartilage, tendon, and teeth. Collagen A1 and collagen A2 are collagen molecules belonging to collagen Type I group, which compose the majority of the body's collagen content.

Corneal Blindness—A range of eye conditions that affect the transparency and integrity of the cornea, leading to blindness or compromised vision.

Crigler-Najjar Syndrome (CNS)—A rare metabolic disorder affecting the metabolism of bilirubin. The disorder results in high levels of unconjugated bilirubin and often leads to brain damage in infants.

Cuboidal—Shaped like a cube.

Current Manufacturing Good Practices (cGMP)—A series of production and testing principles that must be followed during the manufacturing of pharmaceuticals and medical devices to ensure a quality product. In the U.S., GMPs are enforced by the FDA.

Definitive Endoderm (DE)—The innermost of the three primary germ layers of an animal embryo, which develops into the gastrointestinal tract, the lungs, and associated structures, such as the liver and pancreas.

Deoxyribonucleic Acid (DNA)—A molecule that encodes the genetic instructions used in the development and functioning of all known living organisms and many viruses. DNA is the main component of chromosomes.

Differentiated—The process by which cells or tissues change from relatively generalized to specialized kinds during development.

Dopamine—A neurotransmitter (or chemical in the brain) that regulates the activity of neurons (nerve cells). Dopamine is essential for the smooth control and coordination of the movement of voluntary muscle groups.

Dopaminergic—Dopaminergic cell groups are collections of neurons in the central nervous system that have been shown to contain the neurotransmitter dopamine.

Dyskinesia—Abnormality or impairment of voluntary movement.

Embryo—An organism in its early stages of development. In humans, the prefetal product of conception from implantation through the eighth week of development.

Embryonic Stem Cells (ESCs)—Pluripotent stem cells derived from the inner cell mass of the blastocyst, an early-stage embryo.

Gamete—A mature sexual reproductive cell, as a sperm or egg, that unites with another cell to form a new organism.

Genes—A unit of heredity composed of segments of DNA occupying a fixed position on a chromosome.

Genome—The complete set of genetic material of an organism.

Germ Layers—Any of three cellular layers—the ectoderm, endoderm, or mesoderm—into which most animal embryos differentiate and from which the organs and tissues of the body develop through further differentiation.

Glycogen—A substance deposited in bodily tissues as a store of carbohydrates. In humans, glycogen is made and stored primarily in the cells of the liver and the muscles, and functions as the secondary long-term energy storage.

Haplotype—The set of alleles that determine the antigenic phenotype. Haplotype is determined by closely linked genes inherited as a unit from one parent, providing a distinctive genetic pattern used in histocompatibility testing.

Hepatocyte—A cell of the main tissue of the liver. Hepatocytes are responsible for the synthesis, degradation, and storage of a wide range of substances, and are the site of storage of glycogen.

Heterozygous—Having dissimilar alleles at corresponding chromosomal loci; having two different alleles for a single trait.

Histocompatible—A measure of the similarity of the antigens of a donor and a recipient of transplanted tissue or cells. It determines the compatibility between the tissues or cells of different individuals.

Homozygous—Having identical pairs of genes or alleles for any given pair of hereditary characteristics.

Human Leukocyte Antigen (HLA)—Proteins located on the surface of white blood cells and other tissues in the body that play an important role in the immune system's defense against invaders. The HLA complex is a collection of genes that control the expression of particular proteins on a cell surface, and provide an individual histocompatibility profile. The more HLA antigens shared between a recipient and donor, the better the potential outcome of the transplantation.

Human Parthenogenetic Stem Cells (hpSCs)—A type of pluripotent human stem cell derived from unfertilized oocytes. The creation of hpSCs involves methods to stimulate a human egg into believing that it has been fertilized, and allowing it to start the cell division process without being fertilized by a sperm.

Induced Pluripotent Stem (iPS) Cells—A type of pluripotent stem cell artificially derived from a non-pluripotent adult somatic cell, which has been genetically reprogrammed by inducing a "forced" expression of specific genes.

Inherited Metabolic Liver Diseases—Any genetic syndrome or disease that involves an alteration in the normal functioning of the liver.

Inner Cell Mass (ICM)—The mass at the embryonic pole of the blastocyst concerned with the formation of the body of the embryo.

Ionomycin—A molecule that increases the permeability of cell membranes to calcium. It is used in research to raise the intracellular level of calcium and to stimulate the intracellular production of certain cytokines.

Levodopa (L-dopa)—A synthetic substance that is converted in the brain to dopamine; used chiefly in the treatment of Parkinson's disease.

Neural Cells—A cell relating to the brain or the nervous system. Also referred to as "neurons."

Nuclear Reprogramming—The process that reverts cell nuclei of fully differentiated somatic cells to a pluripotent or totipotent state, by the introduction of external factors.

Nuclear Transfer—A laboratory procedure in which a cell's nucleus is removed and placed into an oocyte with its own nucleus removed, so the genetic information from the donor nucleus controls the resulting cell. Such cells can be induced to form embryos. This process was used to create the cloned sheep "Dolly."

Oocyte—An immature female cell in an ovary that may undergo division to form an ovum (egg). A female gamete.

Orphan Drug Designation program—A U.S. Food and Drug Administration (FDA) designation for investigational products that are being developed for diseases that affect fewer than 200,000 patients in the U.S. The program is accompanied by a period of market exclusivity and other benefits for the makers of approved Orphan Drug products.

Parkinson's Disease (PD)—A progressive, neurodegenerative disorder of the central nervous system that occurs when the neurons within the brain responsible for producing the chemical dopamine become impaired or die.

Parthenogenesis—A type of asexual reproduction that occurs in some insects and flowers, in which the unfertilized ovum develops directly into a new individual.

Parthenotes—A cell resulting from parthenogenesis.

Permeability Coefficient (Papp)—Also known as the apparent permeability coefficient, Papp is a parameter that measures the volume and rate of flow of a fluid or substance across all permeation pathways in a test system. Paap is a measure widely used as a screening process to study drug absorption.

Pluripotent—Capable of developing into any type of cell or tissue except those that form a placenta or embryo.

Puromycin—An antibiotic and a potent inhibitor of protein synthesis normally used to treat sleeping sickness and amebic dysentery.

Retroviruses—Any RNA virus that inserts a DNA copy of its genome into the host cell in order to replicate. Retroviruses include the AIDS virus and certain oncogene-carrying viruses implicated in various cancers.

Somatic—Relating to the body.

Stem Cell (SC)—An unspecialized cell found in fetuses, embryos, and some adult body tissues that has the potential to develop into specialized cells or divide into other stem cells. It is one of the human body's master cells, with the ability to grow into any one of the body's more than 200 cell types.

Stem Cell Bank—A collection of multiple stem cell lines. The proliferation and self-renewal characteristics of stem cells allow cell banks to be a source of pluripotent stem cells, either for cell-based treatment or research activities, without the need to generate new stem cells.

Stem Cell Linea—Stem cells that have proliferated in cell culture for a prolonged period of time without differentiating, are pluripotent, and have not developed genetic abnormalities.

Striatum—A striped mass of white and grey matter located in front of the thalamus in each cerebral hemisphere.

Substantia Nigra—A deeply pigmented area of the midbrain containing dopamine-producing nerve cells.

Teratoma—A tumor or group of tumors composed of tissue foreign to the site of growth.

Transcription Factors—A protein that binds to specific regulatory DNA sequences, thereby controlling the flow of genetic information and gene expression. Regulation of transcription is the most common form of gene control.

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