UNIQUE

U N I Q U E

(ju^'ni^k) A. adj. 1. Of which there is only one; one and no other; single, sole, solitary.

2. a. That is or forms the only one of its kind; having no like or equal;
standing alone in comparison with others, freq. by reason of superior excellence;
unequalled, unparalleled, unrivalled.

Oxford English Dictionary

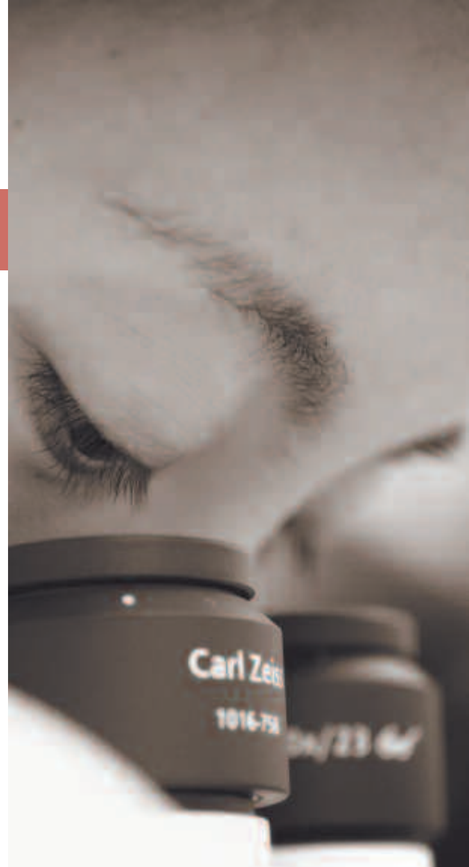
HSCI
HARVARD STEM CELL
INSTITUTE

HSCI is a unique scientific enterprise

The Harvard Stem Cell Institute is a unique scientific enterprise; nowhere else in the world are as many leading scientists gathered together to specifically focus on what today is one of the most important basic question in the life sciences:

What is the property that allows stem cells not only to differentiate into any cell type in the body, but also makes it possible for them to reprogram other cells?

And perhaps as significant, the Harvard Stem Cell Institute is a unique scientific enterprise because it is dedicated to bringing the answers to these questions to patients' bedsides in the form of new treatments for conditions such as Parkinson's disease, heart disease, cancer, blindness, and even dementias.



For a relatively brief interval ... researchers are intoxicated with a mix of the newly discovered and the imaginable unknown. For the first time, the really important questions are asked in a form that can be answered ...

E.O. Wilson

Just as the 20th century was the century of the gene, so the 21st century promises to be the century of the cell. By focusing on development and disease at the cellular level, we have a real chance at unraveling the mystery of degenerative conditions such as Parkinson's disease, Alzheimer's disease, diabetes, cancers, and other heretofore incurable conditions that involve not just a few genes. And to paraphrase E.O. Wilson, the new field of stem cell science allows us for the first time to ask essential questions about cell differentiation and disease origins in forms that allow them to be answered.

Stem cell science offers such immense promise because in their embryonic form, these cells can be transformed into every other cell type in the body. Researchers believe that in as little as a decade it may be possible to use embryonic stem cells to replace damaged nerve cells in the brains of patients with Parkinson's and Alzheimer's diseases, replace missing insulin-producing islet cells in diabetics, and replace damaged heart cells in patients with cardiovascular disease – and the list of potential uses goes on and on. These projections are not all theory; stem cell transplantation has already proven tremendously successful, as any patient who has had a successful bone marrow transplant for leukemia knows.

But to fulfill the promise of stem cell science, we first must learn how to direct stem cells to become islet cells, or heart muscle cells, or retinal cells, or neurons. What makes HSCI's search for these answers unique is that it is focused not only on stem cell science per se, but also on all the areas of basic biology underlying both normal development and disease progression. While the laboratories of HSCI investigators are already at the forefront of stem cell research, rather than support stem cell research solely on an individual lab basis, HSCI has established collaborative platforms with other Harvard scientists, bringing together experts from multiple disciplines and areas of research to focus on one goal:

Advancing the science to the point where the breakthroughs in basic stem cell biology can be turned into treatments and cures for presently intractable diseases and conditions. Thus it is no coincidence that Douglas Melton and David Scadden are HSCI's scientific directors: Melton is a developmental biologist; Scadden is a physician-scientist who treats cancer patients.

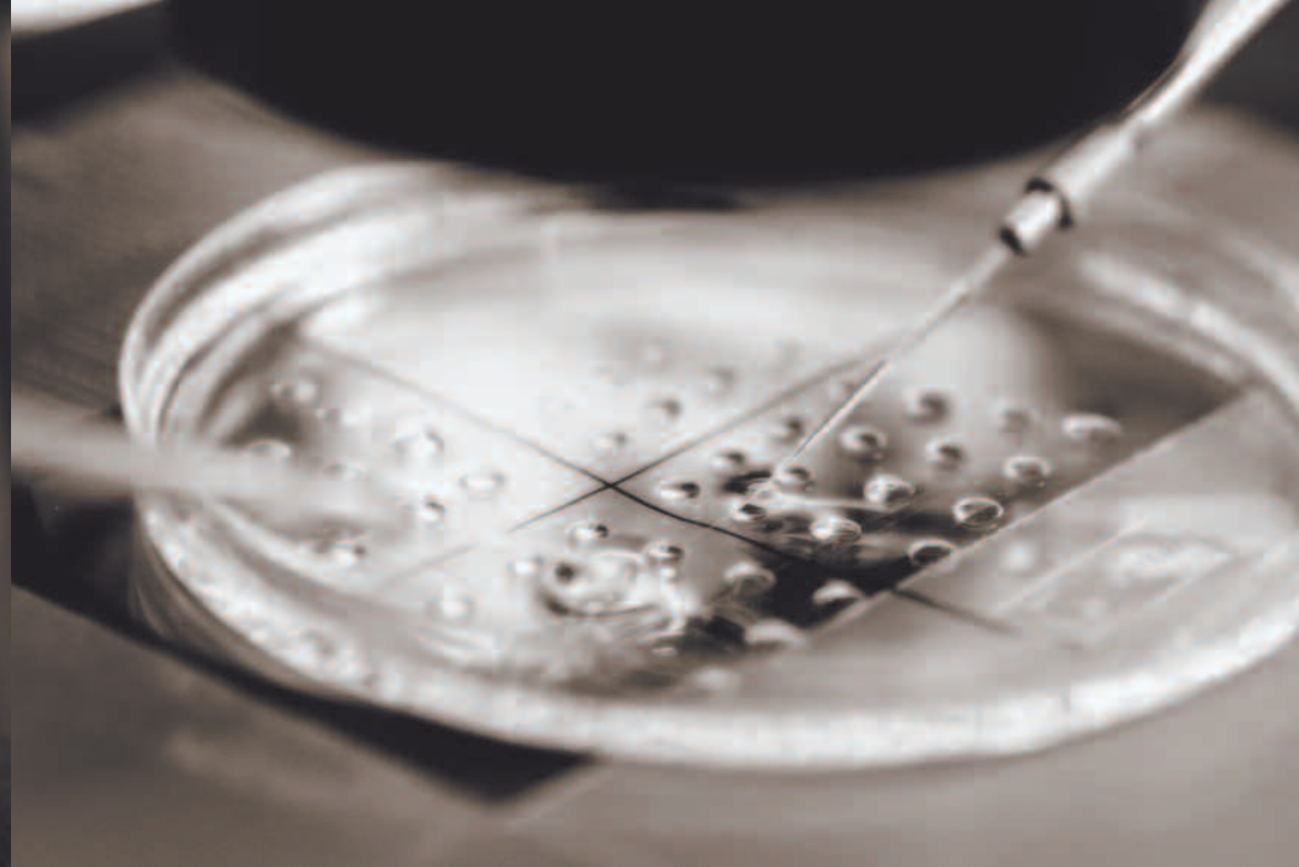
Building research programs around groups of related diseases (blood disease, cancer, cardiovascular disease, diabetes, and nervous system disease) pools the knowledge and resources across HSCI and all of Harvard University and its affiliated hospitals. At this early stage in HSCI's evolution, 70 faculty members are already actively involved in the work of the institute. With two very generous donations in hand, HSCI has established two major disease programs, the Cancer Stem Cell Program and The Howard and Stella Heffron Diabetes/Embryonic Stem Cell Program. Both ask complex questions about the basic function of stem cells in the progression of cancer and diabetes. One part of the Heffron program, in Douglas Melton and Kevin Eggan's laboratories, will involve using somatic cell nuclear transfer (SCNT) to create human embryonic stem cell lines that carry specific disease genes, such as, Parkinson's, diabetes, and Alzheimer's. Working with collaborators at Columbia University's Naomi Berrie Diabetes Center, for instance, HSCI investigators will obtain skin biopsies from patients with diabetes. The genetic information contained in the nucleus of a skin cell will be injected into an unfertilized egg cell, whose own nucleus has been removed. The environment of the egg cell nurtures the skin cell DNA to reset its biological clock back to an embryonic stage. From this beginning, a human embryonic stem cell line that carries a specific disease can be created. Such work will provide stem cell researchers with valuable rare material with which they can study human diseases using a human model.

In 2005 HSCI provided its first dozen seed grants, totaling $1.8 million, to launch innovative work by researchers at six different Harvard institutions and affiliates, in nine different areas of stem cell research. These grants were awarded to Kevin Eggan, in the Faculty of Arts and Sciences; Alan Davidson, Niels Geijsen, Jeannie Lee, and Nabeel Bardeesy, at Massachusetts General Hospital; Amy Wagers and Rohit Kulkarni, at Joslin Diabetes Center; M. William Lensch, at Children's Hospital Boston; Hanna Mikkola, at Dana-Farber Cancer Institute; Craig Micchelli, at Harvard Medical School; Rosario Sanchez-Pernaute, at McLean Hospital; and Dong Feng Chen, at Schepens Eye Research Institute.

Also, the institute has begun establishing core facilities that will be shared among all its affiliated laboratories; stem cell research requires access to cutting-edge technologies that are financially out of reach for any individual laboratory. Initial plans call for the establishment of three such facilities that will analyze and separate individual stem cells for researchers, and another core facility to produce needed animal models of disease. In addition, two

human embryonic stem cell core facilities have been created: one team consisting of the labs of Douglas Melton, Andrew McMahon, Douglas Powers, and Kevin Eggan has already derived more than half of the world's available human embryonic stem cell lines. These facilities will enable every HSCI investigator access to tools essential to unravel the potential of stem cells.

HSCI expects that by approaching this search for answers in a myriad of ways with a vast array of different expertise and technologies, its teams of researchers "intoxicated with a mix of the newly discovered and the imaginable unknown" will make the swiftest progress possible towards understanding human development and degenerative disease, and ultimately, the development of therapies and cures.



HSCI is a unique community

The Harvard Stem Cell Institute is an integral part of Harvard University, which means that it is far more than just a community of the world's leaders in stem cell science: HSCI is also a community whose leadership and membership includes cutting-edge academics and practitioners in the fields of ethics, theology, business, government, and politics; it is a community of leaders in translational and clinical medicine. And it is a community of students who are future leaders in these fields. Because of the breadth, depth, and integration of its community, HSCI is, to quote the Oxford English Dictionary, "unequalled, unparalleled, unrivalled."

If ever there was a field of scientific enterprise that cannot be allowed to progress in the vacuum of the laboratory and closed scientific meetings, that field is stem cell science. Because this promising new type of life sciences research involves the use of human embryonic cells, it is essential that scientists carefully consider the ethical, religious, political, legal, and societal aspects and impacts of their work. And the Harvard Stem Cell Institute is a unique community whose membership and focus include all these fields and more.

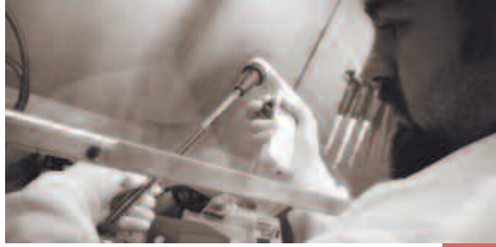
From the moment at which stem cell science became part of the national policy discussion, those planning the institute understood that its membership would have to include not only basic scientists and research physicians from throughout Harvard University and its affiliated institutions, but also members of Harvard's faculties of law, government, divinity, business, and the humanities. To ensure that the discussion and debate over the ethics of stem cell science is fully informed, the community that is HSCI has been created to be as inclusive as possible. This inclusivity permits Harvard scientists to proceed with caution in this vital area of research, to establish regulatory oversight for researchers in this area of study, and to provide funding to compensate for the federal government's decision to radically restrict support of embryonic stem cell research. The HSCI community is not just inclusive in terms of non-scientific disciplines. For instance, where many stem cell programs are focused exclusively on embryonic or adult stem cell research, HSCI is dedicated to simultaneously enabling the advancement of both promising areas of stem cell research. And the HSCI community is unique in its inclusion of scientific and clinical researchers, collaborating across the lines of scientific disciplines and previous areas of research interest.

The breadth and depth of HSCI positioned it to be able to cogently present the case for stem cell research to the Massachusetts state legislature, which in 2005 passed legislation that provided a supportive atmosphere for research in the state and at the same time required the establishment of ethical oversight committees to monitor stem cell research.

Because multiple institutes, disciplines, and technologies are involved, effective and seamless communication is essential. The framework for tackling this extraordinary task on a daily basis takes its form as an elaborate infrastructure being put in place on HSCI's website, creating a virtual "facility" in which collaborations can be advanced and knowledge – and questions – can be shared. But this electronic infrastructure is not to suggest that scientists and the institute's other members are not meeting regularly on a face-to-face basis. In fact, they do so at frequent symposia, inter-lab meetings at which young investigators present their research to their colleagues in other research areas, and seminars that feature stem cell scientists from outside the HSCI community. Already, the institute has featured talks by, among others, Anthony Atala, of Wake Forest University; Elaine Fuchs, of Rockefeller University; Janet Rossant, of Mt. Sinai Hospital, in Toronto; and Freda Miller, of The Hospital for Sick Children, also in Toronto.

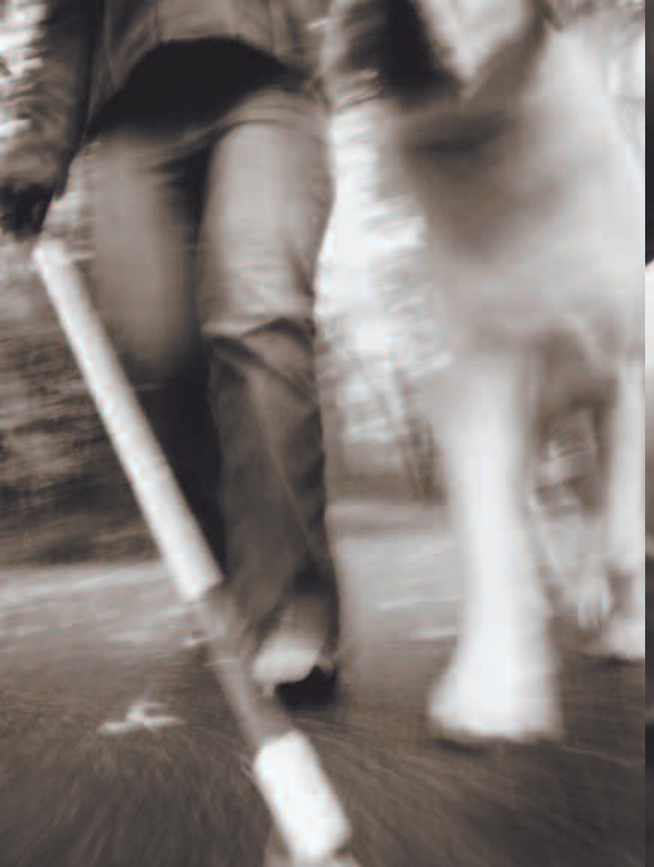
One of the most important scientific features of the HSCI community is its inclusion of world-renowned scientists who are not specifically focused on stem cell science, but rather are asking questions about basic human development and the progression of the diseases that stem cell scientists hope to someday eliminate. Experts in the biology of vision, hearing, cardiac function, cancer, neurodegenerative diseases, insulin production – in fact, in the biological formation and function of every human organ system – are collaborating with stem cell scientists to better understand both normal function and disease. Further, all of these scientists are collaborating within HSCI with scientist-clinicians who are treating patients with diseases and conditions ranging from cancers to Alzheimer's to diabetes to ALS to spinal cord injuries to blindness to heart failure.

In collaboration with Harvard's Humanities Center, HSCI is sponsoring a program titled "Between Two Cultures." Chaired by Michael Sandel, a professor of government who directs the HSCI program on ethics, "Between Two Cultures" centers on a series of discussions designed to explore the ethical and social aspects of scientific advances. The first of those discussions featured Leon Kass, former director of the President's Council on Bioethics, and proponent of limiting embryonic stem cell research. In introducing the event, Harvard Provost Steven E. Hyman put in sharp perspective the value of HSCI's uniquely multifaceted community:



The ethical issues that have been raised by stem cell research, he said, are "just the tip of the iceberg" of important social and ethical questions related to scientific advances. "Ultimately, these are questions about our very humanity," Hyman said.

Because the HSCI community is so uniquely intellectually diverse, it is able to grapple with scientific and nonscientific issues alike, and is able to meaningfully participate in the ways in which stem cell research will be conducted, and the uses to which its findings will be put.



HSCI is a unique educational endeavor

The Harvard Stem Cell Institute is not just a scientific institute, nor is it simply a community, a collaboration of scientists, clinicians, and thought leaders in all the fields related to stem cell research, the deep questions it raises, and the societal and medical issues that touch upon it. HSCI is also a unique educational endeavor that involves Harvard students at every level – and members of the greater world community – in this challenging effort.

educational endeavor

HSCI is a unique educational endeavor, built around scientific seminars and educational events designed to further knowledge of stem cell science and provide thoughtful consideration of the perplexing scientific, ethical, and social policy questions raised by this research. Under the umbrella of Harvard University, members of the HSCI community serve as educators, mentors, and advisers to undergraduates, graduate students, postdoctoral fellows, and scholars in other fields interested in stem cell research. HCSI encourages and seeks to answer demanding questions, whether about basic and applied biology, stem cell law, or the potential impact of scientific research on health care and society as a whole.

How can such a large community – with almost 800 scientists, students, policymakers, faculty, ethicists, and technical personnel – successfully create an educational environment that will meet the needs of this diverse group? In today's highly competitive environment, how can prospective students, staff, and postdoctoral applicants be best educated to carry this complex science forward? What are the best methods for engaging the public and contributing to critical thinking about stem cell science?

The Harvard Stem Cell Institute is responding to these challenges with undergraduate and graduate courses, inter-lab meetings, scientific symposia, internships, and ethics discussion series:

• By the fall of 2005, HSCI faculty at Harvard Medical School, Harvard College, and the Harvard Extension School were teaching 18 separate undergraduate and graduate-level courses related to stem cell research in subjects ranging from the biological sciences to history to ethics and society.

• The inter-lab meeting series is a less formal, but extremely intense teaching tool. These bimonthly gatherings bring together HSCI members and other interested scientists to focus on the work of junior HSCI investigators, postdoctoral fellows and graduate students, and newly appointed faculty. These inter-lab meetings highlight shared scientific problems and commonality, and generate discussion between researchers with widely varied areas of interest.

• To maintain vital connections with the stem cell research community beyond Boston, HSCI and the Massachusetts General Hospital Center for Regenerative Medicine hold a monthly seminar series featuring guest speakers from around the world. It is a testament to the intellectual and scientific power of HSCI that scientists with limited time available are eager to share their work in this seminar series.

• HSCI also hosts the annual Tony & Shelly Malkin Stem Cell Symposium at the Harvard Club of Boston. This scientific symposium attracts many of the world's leading stem cell scientists, developmental biologists, and tissue engineers, all of whom share HSCI's vision and passion for the future of stem cell research. A resounding success, the symposia attract an audience of more than 500, limited only by available space. In addition to featuring talks by leaders in the field, the Malkin Stem Cell Symposia provide an opportunity for young researchers within the HSCI community to present their recent findings in the form of poster presentations. And in keeping with HSCI's commitment to increasing public understanding of stem cell science, the symposia feature a dinner presentation chosen to inform scientists about such nonscientific areas as business modeling, commercialization of stem cell science, and bioethical issues related to the science.

• To encourage students to consider work in the field of stem cell science, HSCI established the Undergraduate Summer Research Internship Program, which in 2005 gave 26 of the 70 Harvard students who applied the opportunity of summer full-time work in HSCI labs. The program includes a seminar series that introduces the students to topics ranging from ethical issues surrounding stem cell science to possible career paths. At the end of the 10-week program, each student presents his or her research results at a scientific conference.

• In seminars, lectures, and informal discussions, HSCI scientists and their colleagues in law, the social sciences, government, and ethics meet to share ideas and deepen their understanding of the ways in which this new science is impacting society. For example, HSCI co-sponsors the seminar series with the Humanities Center. And since 2004, scientists have been gathering regularly under the sponsorship of George Q. Daley's laboratory for a series of discussions about the ethical and societal issues related to stem cell research. This dialogue, led by Harvard Medical School faculty, is providing young scientists with a framework within which to consider the ethical and philosophical implications of their own work.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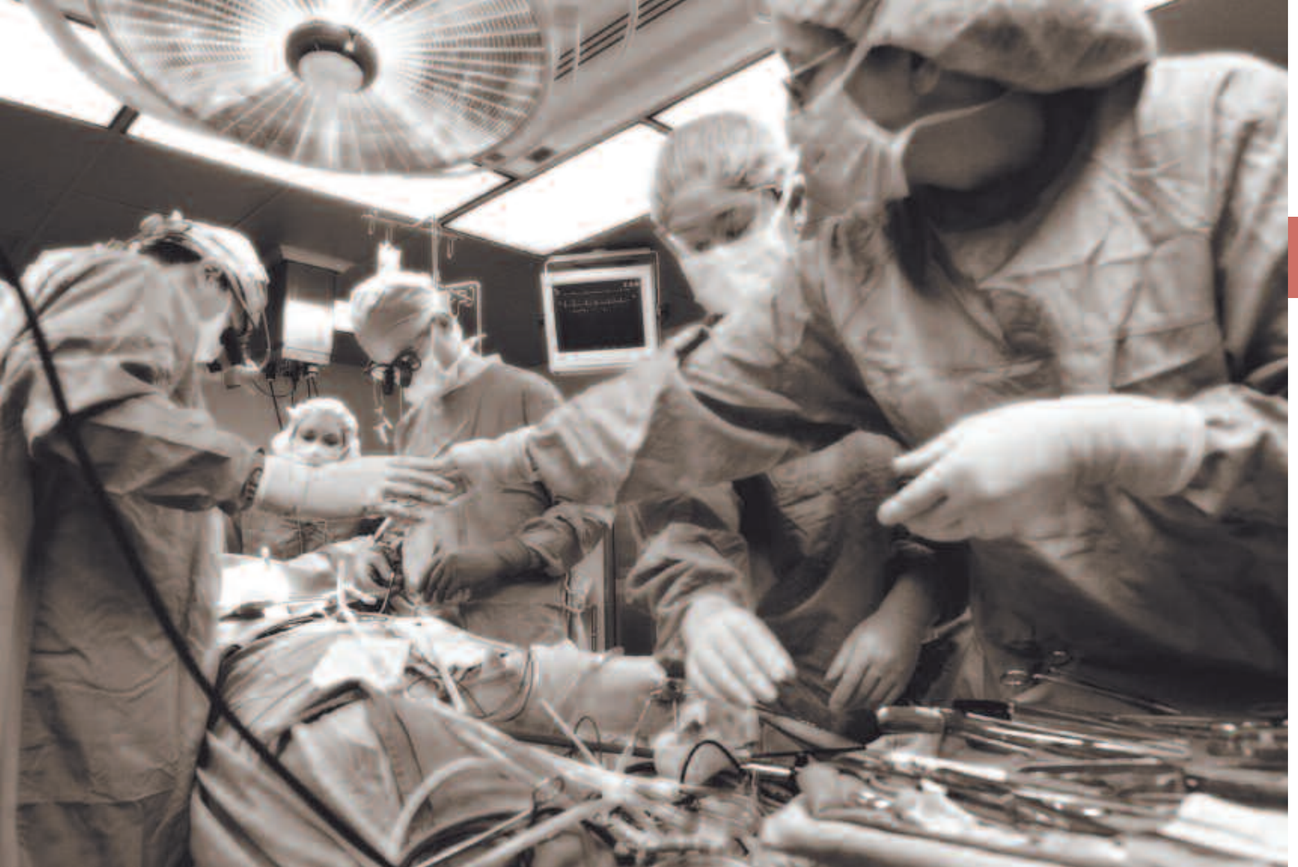

HSCI is a unique philanthropic opportunity

The Harvard Stem Cell Institute provides donors with an opportunity to invest in the most important scientific and medical quest of the 21st century. If we are to succeed in fulfilling the promise of this challenging new science, we will need the support of private individuals and foundations as excited by the possibilities and future of stem cell science as the researchers working in the laboratories. If we are to eliminate from our grandchildren's vocabularies the names of many of the diseases that today resist medical treatment, we will need individuals to fill the fiscal gap left by a government that views science through a political lens. And that indeed provides a unique philanthropic opportunity.

philanthropic opportunity

Medical and life science philanthropy has traditionally been disease directed, driven by what might be termed personal stories or life experience. People have chosen to donate to cancer centers, or hospitals known for their cardiac programs, or institutes doing vision research because a family member was touched by a particular disease or condition. While this kind of philanthropy has underwritten great strides in medical treatment, it is, unfortunately, narrowly focused, helping only those with the disease being funded.

Stem cell science presents potential philanthropists with an entirely new research paradigm because almost every advance in one area of stem cell research will advance research in other areas, and may ultimately help people suffering from a whole host of degenerative diseases and conditions. This potential arises because stem cell science is giving researchers a unique window into all aspects of human development, both normal and abnormal. Stem cells have the ability to become every other kind of cell in the body; therefore, understanding how they differentiate and how that differentiation may go awry provides information that may lead to treatments for numerous diseases. Thus a gift to fund stem cell research in the area of Parkinson's disease may also advance attempts to control dementias; a gift underwriting stem cells and cancer research may advance understanding and treatment of heart disease.

Howard and Stella Heffron understand the value of stem cell research at HSCI and are committed to seeing it fulfill its promise. In fact, the Heffrons' $5 million commitment two years ago launched HSCI. Established in the form of a challenge grant, the Heffrons' gift encouraged other donors to give more than $5 million within a matter of months and created the momentum that has thus far brought in more than $40 million in private support. A 1951 graduate of Harvard Law School, Howard Heffron wanted his gift to send a message to young scientists concerned about the government's policy severely limiting federal funding for this vital research. "The message is you can enter the field of stem cell research… private money is being made available and will be even more available in the future. I find it extremely gratifying to help Harvard undertake embryonic stem cell research at this critical time."

The Heffrons have had years of experience with diseases stem cell research has the potential to cure. They have watched their daughter struggle with Type I diabetes since she contracted it at age 12. A close friend suffered with Parkinson's disease for some fourteen years. "If I magnify my own personal experiences with friends and family and apply them to people around the country," he says," I couldn't think of a better cause to support. I also couldn't think of a better place than Harvard with its myriad first rate research resources." One reason he feels this way, he says, is the presence of HSCI's Scientific Directors Douglas Melton and David Scadden. "I've been to Melton's lab, met some of his colleagues, and observed their dedication and creativity. And in addition to being a leading scientist, David Scadden is a terrific clinician just waiting for the chance to be able to use this research in a clinical setting. We are all looking forward to that time."

Ruthe B. Cowl is no stranger to helping people. In 1958, because of the difficulties a friend had finding services for her child with polio, Mrs. Cowl became aware of the dearth of services available to disabled individuals in her native Laredo, Texas. So she traveled to New York City to seek specialists who could tell her what facilities and services should be provided. She returned to Texas to found what eventually was named – in her honor – the Ruthe B. Cowl Rehabilitation Center. Today, the center which is one of the most comprehensive outpatient facilities in Texas, and 98 percent of the 200 patients it serves receive free treatment.

Still looking to help others with health needs, the 93-year-old who serves full-time without salary or expense account as the Executive Director of the Ruthe B. Cowl Rehabilitation Center recently decided that she wanted to become involved in helping to realize the promise of stem cell science, and she "asked the computer about strong programs in stem cell research." After reviewing the information she found on the Internet, Mrs. Cowl chose to support the research of HSCI, because she believes the work being done at the institute will eventually lead to new ways to approach paralysis, Parkinson's disease, and diabetes.

At 13, Jesse Furman is already familiar with the devastation wrought by degenerative diseases: a grandparent has diabetes and an uncle has battled cancer. After reading numerous magazine and newspaper articles about stem cell research, Jesse quickly became convinced of its importance while learning that the U. S. government had restricted funding this promising new area of science.

So Jesse took action - he donated more than $1200 he had been given for his Bar Mitzvah to HSCI. "My mom and I did a lot of research, and we decided that the Harvard Stem Cell Institute would be the best place to give my money because it has scientists studying so many different diseases," he says.

Recently, Jesse also suggested that his school consider supporting stem cell research when the students were trying to decide where to give money they had raised. School administrators rejected his idea because it was too controversial. "It really bothers me," he says about the decision. "I think this is a great way to help people."


Harvey Leiderman
Kevin Eggers
Bob Weisberg

principal faculty of HSCI

T. Keith Blackwell	Joslin Diabetes Center
Susan Bonner-Weir	Joslin Diabetes Center
Joseph Bonventre	Brigham and Women's Hospital
Constance Cepko	Harvard Medical School
Kenneth Chien	Massachusetts General Hospital
George Daley	Children's Hospital Boston
Alan Davidson	Massachusetts General Hospital
Patricia Donahoe	Massachusetts General Hospital
Kevin Eggan	Harvard Univ. Molecular & Cell Biology Dept.
Niels Geijsen	Massachusetts General Hospital
Gary Gilliland	Brigham & Women's Hospital
Konrad Hochedlinger	Massachusetts General Hospital
Ole Isacson	McLean Hospital
Laurie Jackson-Grusby	Children's Hospital Boston
Jordan Kreidberg	Children's Hospital Boston
Louis Kunkel	Children's Hospital Boston
Thomas Kupper	Brigham & Women's Hospital
Jeffrey Macklis	Massachusetts General Hospital
Diane Mathis	Joslin Diabetes Center
Andrew McMahon	Harvard Univ., Molecular & Cell Biology Dept.
Douglas Melton*	Harvard Univ., Molecular & Cell Biology Dept.
Richard Mulligan	Harvard Institutes of Medicine
Bjorn Olson	Harvard School of Dental Medicine
Stuart Orkin	Dana Farber Cancer Institute
Daniel Podolsky	Massachusetts General Hospital
Jerome Ritz	Dana Farber Cancer Institute
Anthony Rosenzweig	Massachusetts General Hospital
Michael Sandel	Harvard Univ., Dept. of Government
David Scadden*	Massachusetts General Hospital
Leslie Silberstein	Children's Hospital Boston
Daniel Tenen	Beth Israel Deaconess Medical Center
Jay Vacanti	Massachusetts General Hospital
Amy Wagers	Joslin Diabetes Center
Christopher Walsh	Beth Israel Deaconess Medical Center
Gordon Weir	Joslin Diabetes Center
Ralph Weissleder	Massachusetts General Hospital
Leonard Zon	Children's Hospital Boston

** Scientific Directors*

selected publications

May 2004 Dor Y, Melton DA, et al. Nature. Adult pancreatic beta-cells are formed by self-duplication rather than stem-cell differentiation

June 2004 Ogawa K, Vacanti JP, et al. Transplantation. The generation of functionally differentiated, three-dimensional hepatic tissue from two-dimensional sheets of progenitor small hepatocytes and nonparenchymal cells

July 2004 Anneren C, Cowan CA, Melton DA. J Biol Chem. The Src family of tyrosine kinases is important for embryonic stem cell self-renewal

Sandel MJ. N Engl J Med. Embryo ethics—the moral logic of stem-cell research

August 2004 Ravichandran V, Sriram RD and Gilliland G. Mitochondrion. MitoMorphy: an alignment and annotation tool for human mitochondrial DNA polymorphisms

Ransom DG, Zon LI, et al. PLoS Biol. The zebrafish moonshine gene encodes transcriptional intermediary factor 1gamma, an essential regulator of hematopoiesis

September 2004 Traver D, Zon LI, et al. Blood. Effects of lethal irradiation in zebrafish and rescue by hematopoietic cell transplantation, Dor Y, Melton DA. Cell Cycle. How important are adult stem cells for tissue maintenance?

Dahéron L, Daley GQ, et al. Stem Cells. LIF/STAT3 signaling fails to maintain self-renewal of human embryonic stem cells

Sherwood RI, Wagers AJ, et al. Stem Cells. Determinants of skeletal muscle contributions from circulating cells, bone marrow cells, and hematopoietic stem cells

October 2004 Hock H, Orkin SH, et al. Nature. Gfi-1 restricts proliferation and preserves functional integrity of haematopoietic stem cells

Hock H, Orkin SH, et al. Genes Dev. Tel/Etv6 is an essential and selective regulator of adult hematopoietic stem cell survival

November 2004 Sherwood RI, Wagers AJ, et al. Cell. Isolation of adult mouse myogenic progenitors: functional heterogeneity of cells within and engrafting skeletal muscle

Chen J, Macklis JD, et al. Proc Natl Acad Sci USA. Neurogenesis of corticospinal motor neurons extending spinal projections in adult mice

January 2005 Galloway JL, Zon LI, et al. Dev Cell. Loss of gata 1 but not gata 2 converts erythropoiesis to myelopoieses in zebrafish embryos

Renaud EJ, Donahoe PK, et al. Proc Natl Acad Sci USA. Endometrial cancer is a receptor-mediated target for Mullerian Inhibiting Substance

Dooley KA, Davidson AJ, Zon LI, et al. Dev Biol. Zebrafish scl functions independently in hematopoietic and endothelial development

Arlotta P, Macklis JD, et al. Neuron. Neuronal subtype-specific genes that control corticospinal motor neuron development in vivo

Omer A, Weir GC, et al. Transplantation. Long-term normoglycemia in rats receiving transplants with encapsulated islets

February 2005 Laugwitz KL, Chien KR, et al. Nature. Postnatal isl1+ cardioblasts enter fully differentiated cardiomyocyte lineages

March 2005 Zaehres H, Daley GQ, et al. Stem Cells. High-efficiency RNA interference in human embryonic stem cells

Sonntag KC, Isacson O, et al. Mol Cell Neurosci. Context-dependent neuronal differentiation and germ layer induction of Smad4-/- and Cripto-/- embryonic stem cells

selected publications

Shinde Patil VR, Weissleder R, et al. Neoplasia. Bone marrow-derived lin(-)c-kit(+)Sca-1+ stem cells do not contribute to vasculogenesis in Lewis lung carcinoma

April 2005 Emsley JG, Macklis JD, et al. Prog Neurobiol. Adult neurogenesis and repair of the adult CNS with neural progenitors, precursors, and stem cells

Miklos DB, Ritz J, et al. Blood. Antibody responses to H-Y minor histocompatibility antigens correlate with chronic graft-versus-host disease and disease remission

May 2005 Rowan S and Cepko CL. Dev Biol. A POU factor binding site upstream of the Chx10 homeobox gene is required for Chx10 expression in subsets of retinal progenitor cells and bipolar cells

Zhu H, Zon LI, et al. Dev Biol. Regulation of the lmo2 promoter during hematopoietic and vascular development in zebrafish

Schlaeger TM, Orkin SH, et al. Blood. Tie2Cre-mediated gene ablation defines the stem-cell leukemia gene (SCL/tal1)-dependent window during hemaopoietic stem-cell development

Sandel MJ. Perspect Biol Med. Spring. The ethical implications of human cloning

June 2005 Stier S, Scadden DT, et al. J Exp Med. Osteopontin is a hematopoietic stem cell niche component that negatively regulates stem cell pool size

Duffield JS, Bonventre JV, et al. J Clin Invest. Restoration of tubular epithelial cells during repair of the postis-chemic kidney occurs independently of bone marrow-derived stem cells

July 2005 Rodrigues NP, Scadden DT, et al. Blood. Haploinsufficiency of GATA-2 perturbs adult hematopoietic stem-cell homeostasis

Weber GJ, Zon LI, et al. Blood. Mutant-specific gene programs in the zebrafish

August 2005 Sanchez-Pernaute R, Isacson O, et al. Stem Cells. Long-term survival of dopamine neurons derived from parthenogenetic primate embryonics stem cells (cyno-1) after transplantation

Terada S, Vacanti JP, et al. Ann Plast Surg. In vitro cartilage regeneration from proliferated adult elastic chrondrocytes

Cowan CA, Eggan K, et al. Science. Nuclear reprogramming of somatic cells after fusion with human embryonic stem cells

September 2005 Kotton DN, Fabian AJ and Mulligan RC, et al. Blood. A novel stem-cell population in adult liver with potent hematopoietic-reconstitution activity

October 2005 Mao J, McMahon AP, et al. Nucleic Acids Res. An ES cell system for rapid, spatial and temporal analysis of gene function in vitro and in vivo

Honczarenko M, Silberstein LE, et al. Stem Cells. Human bone marrow stromal cells express a distinct set of biologically functional chemokine receptors

Grimm J, Weissleder R, et al. Proc Natl Acad Sci USA. Use of gene expression profiling to direct in vivo molecular imaging of lung cancer

Burns CE, Zon LI, et al. Genes Dev. Hematopoietic stem cell fate is established by the Notch-Runx pathway

November 2005 Duffield JS, Bonventre JV. Kidney Int. Kidney tubular epithelium is restored without replacement with bone marrow-derived cells during repair after ischemic injury

Murtaugh LC, Melton DA, et al. Development. {beta}-Catenin is essential for pancreatic acinar but not islet development

Clark RA, Kupper TS, et al. J Clin Invest. Human skin cells support thymus-independent T cell development

symposia

Harvard Stem Cell Institute Launch Symposium, April 2004

Morning Session "Harvard, Stem Cells, and the Public Lens"
Lawrence H. Summers, President, Harvard University
Douglas A. Melton, Harvard University
David T. Scadden, Massachusetts General Hospital
Michael J. Sandel, Harvard University
Debora L. Spar, Harvard Business School

Afternoon Session "Stem Cell Science: into the 21st Century"
Thomas Jessell, Columbia University
Rudolf Jaenisch, Whitehead Institute for Biomedical Research, MIT
Alain Fischer, Necker Hospital, Paris
Fred H. Gage, The Salk Institute, La Jolla, California

Annual Symposia

First Annual Tony and Shelly Malkin Stem Cell Symposium, November 2004
"Stem Cells and their Microenvironment in Development and Disease"
Robert Weinberg, Whitehead Institute for Biomedical Research, MIT
Rakesh Jain, Harvard Medical School
Linheng Li, Stowers Institute, Kansas City
Mark Keating, Children's Hospital Boston
Allan Spradling, Carnegie Institution of Washington, Baltimore
Azim Surani, Wellcome Trust/Cancer Research Institute, University of Cambridge, UK
Susan Crockin, Massachusetts attorney specializing in reproductive technologies

Second Annual Tony and Shelly Malkin Stem Cell Symposium, December 2005
"Stem Cell Biology and Therapy in Organ Systems: Challenges and Opportunities"
Sean Morrison, University of Michigan
Robert Benezra, Memorial Sloan-Kettering Cancer Center, New York
Fiona Watt, London Research Institute, UK
Richard Young, Whitehead Institute for Biomedical Research, MIT
Sangeeta Bathia, MIT
William A. Sahlman, Harvard Business School

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