

Welcome to the Harvard Stem Cell Institute

The 1000+ scientists in the HSCI network share one goal: finding cures for human diseases.

We aim to:

- Stimulate healing in patients by harnessing the potential of stem cells.
- Create targeted treatments by combining new gene- and cell-based therapies with traditional medicines.
- Accelerate drug discovery by developing novel stem cell-based tools.



A network for discovery

Our unique value

Since our founding in 2004, we have helped the world's top experts collaborate to harness the body's innate healing and regenerative processes, because we believe that together we can transform medicine for the better.

HSCI scientists excel in understanding what makes each population of stem cells unique, what makes a healthy stem cell different from a diseased one, and how to control a cell's fate. The work of the institute crosses generations, always bringing fresh perspectives to old problems.

Finding solutions

Our mission is to increase the flow of ideas from research into the clinic and on to the marketplace.

The success of our translational work is reflected in the outputs of HSCI scientists, who publish new findings in over 25 scientific papers every month and have spurred the launch of close to 30 biotechnology startup companies.

Our scientists develop sophisticated tools that advance the state of the art in regenerative medicine. For example, by creating organoids — structured, 3D tissues cultured in the laboratory — researchers are now able to experiment on human nerve, ear, kidney, liver, and brain tissue on a larger scale than ever before.

This work is helping us cut straight to the source of human diseases far more quickly, building the strongest possible foundation on which to develop new therapies.

Collaboration across sectors

The achievements of HSCI scientists spring from collaborations that go well beyond Harvard schools, institutes, and hospitals. Our interactions with biomedical companies such as GSK, Astra Zeneca, Roche, and Johnson & Johnson, among others, have all helped us lay essential groundwork for the development of applications to benefit patients.

For example, the Harvard Fibrosis Network is a collaborative program at HSCI that partners with companies such as Boehringer Ingelheim, Bristol Meyers Squibb, and others. The program enables research into diseases such as idiopathic pulmonary fibrosis, chronic kidney disease, cardiac disease, and nonalcoholic steatohepatitis.

Supporting science: infrastructure and training

Harvard is our home. The university offers high-end technical capacity that ensures our scientists have what they need to take research forward. This lowers barriers to performing high-risk exploration, which can offer high returns.

Across the university's schools and affiliated hospitals, HSCI provides fertile ground for scientists to share their findings efficiently, start new collaborations, pursue promising avenues of research, and attract outside grant support.

In addition to supporting research and clinical services, Harvard's hospitals provide a perfect environment for early-stage clinical trials and unique, shared resources for scientists, such as cell manufacturing facilities.

Breakthroughs by HSCI scientists

The impact of our work is reflected in the output of HSCI scientists, whose work appears regularly in top scientific journals. Recent, high-profile achievements include:

- **Diabetes**
Developing healthy insulin-producing cells that can be given to diabetes patients.
- **Cystic fibrosis**
Discovering a new type of lung cell responsible for cystic fibrosis.
- **Heart disease**
Discovering that commonly occurring blood cell mutations increase the risk of heart disease.
- **Bone marrow transplants**
Discovering how to collect 'overachieving' blood stem cells rapidly — an important step in improving bone marrow transplants.
- **Vision**
Bringing discoveries in eye stem cells into the clinic to treat retinal and corneal diseases.
- **Skin**
Establishing when to turn regeneration on or off to promote healing and reduce scarring.
- **Creating healthy tissue**
Converting stem cells to specific kinds of tissue (such as heart muscle or nerves), and developing drugs to stimulate repair by tissue-resident stem cells (such as the in the ear or in skeletal muscle).



Where we are headed

Our next wave of research efforts will center on processes such as immunology, aging, and fibrosis (scarring), which have implications across all disease areas. In addition, we remain dedicated to moving our research on specific diseases closer to the clinic.

Regenerative biology goals

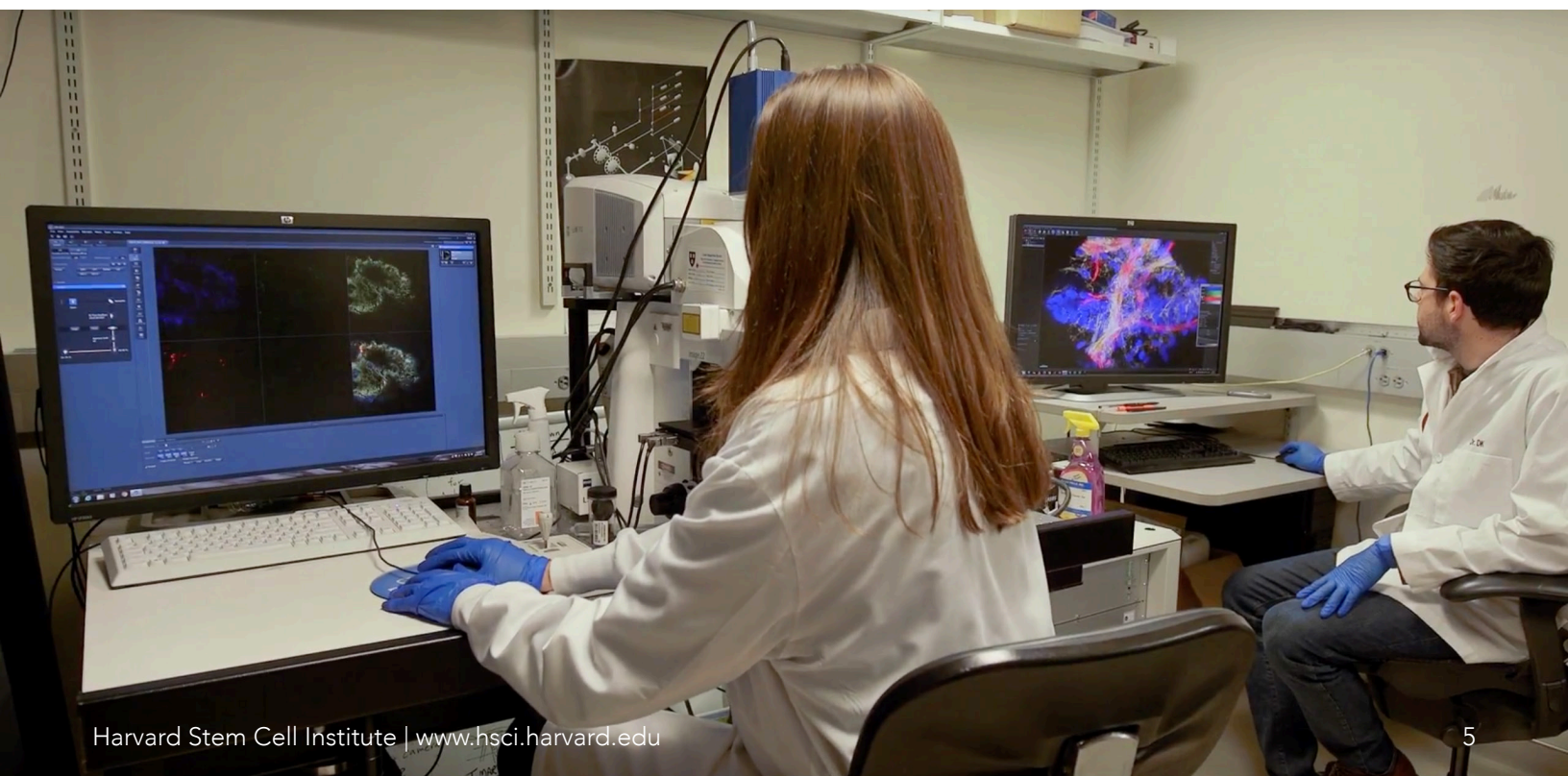
We will continue to advance the frontiers of regenerative biology by:

- Distinguishing the processes that stimulate repair from those that allow cancers to grow and using this knowledge to discover cures for diseases.
- Investigating what determines a cell's fate, how tissues are assembled, and how diverse populations of healthy cells are maintained.
- Developing new methods to carry out high-throughput experiments that speed up the drug discovery pipeline.

Disease program goals

Through disease-specific programs, we channel our world-class resources toward some of the most prevalent, devastating diseases for which stem cell research can hold promise. Some of our ambitious goals include:

- Healing without scarring.
- Finding effective, non-addictive treatments for pain.
- Re-growing a kidney.
- Killing cancer cells without killing healthy ones.
- Curing neurological diseases by reprogramming cells to replace lost neurons.
- Discovering a 'universal donor' and democratizing access to cell therapy.
- Treating hearing loss by re-growing native inner-ear cells.
- Treating blindness by re-growing the cornea, the retina, and even the rods and cones.



What it will take

To achieve our goal of curing human diseases, we depend on the sustained support of philanthropists, public funding agencies, investors, and companies that share our vision. The contributions of our supporters have had a direct impact on the pace of stem cell research over the past decade, and on the breakthrough discoveries contributed by HSCI scientists.

Philanthropic support

Since our founding, we have used philanthropic gifts to leverage funding from traditional sources, such as the National Institutes of Health and other funding agencies.

HSCI depends on these gifts to fund programs such as our seed grants, which ensure that novel research gets a chance to succeed.

A third of these grants attract further funding, at around three times HSCI's original investment on average. This results in the regular production of scientific papers and patents, representing a return on investment that benefits all of society.

HSCI faculty members also attract support from foundations that enable them to sustain novel research over longer timeframes. Given the scope and complexity of human biology — from the human brain to the personalized, intricate 'plumbing' of organs — such support is critical to meaningful progress.

Industry investment

Working with companies is essential for real progress. When companies invest in our scientists, we are all better placed to identify roadblocks and find solutions that accelerate the development of new treatments for patients.

Teamwork

Continued support at all stages of research will allow us to:

- Take daring approaches and probe difficult questions.
- Ensure our laboratories have the right people and resources.
- Use every tool in the scientific arsenal — from organoids to big-data analysis — to find the answers we need.

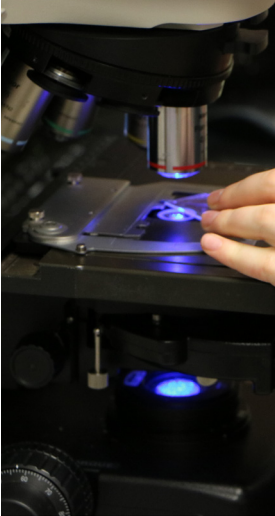
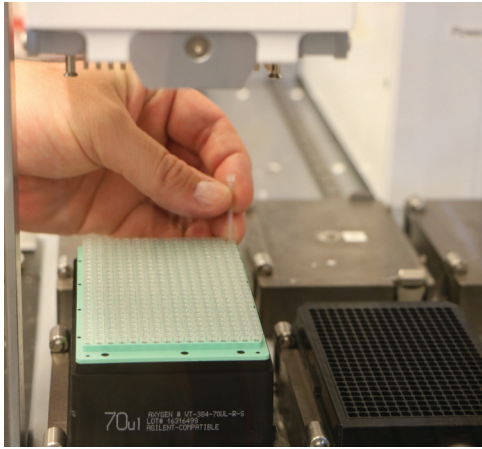
HSCI is built on collaboration. Working together, rather than in parallel, has allowed us to attract some of the best people in the field, and to retain leading scientists who are in very high demand from other institutions.

But for us, teamwork goes well beyond scientific collaboration. We work in partnership with our funders and peer organizations across the country and, indeed, throughout the world, to share knowledge, gain efficiencies, and promote scientific progress.

Working together across sectors, we can only succeed.

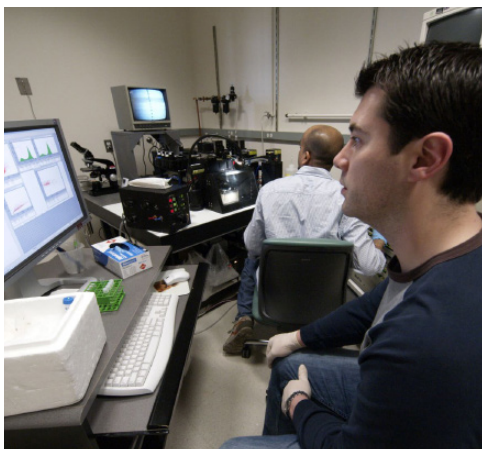
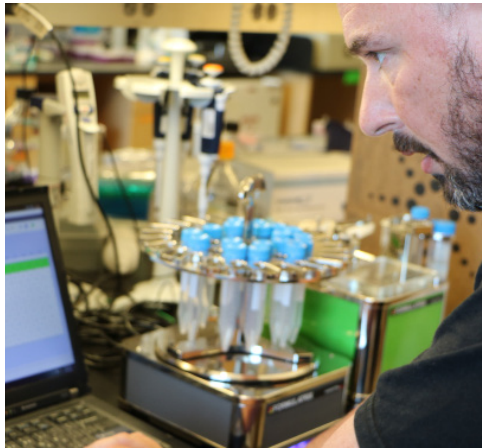
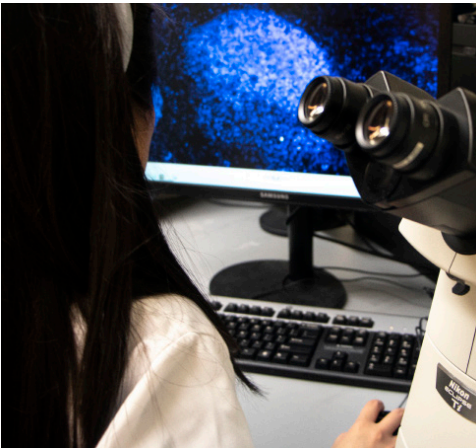
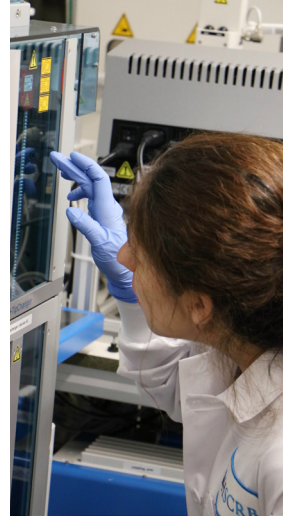


Doug Melton and David Scadden
Co-Directors of the Harvard Stem Cell Institute



HSCI

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Until every child is well



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How to find us

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