HST AT MIT

"Medicine is not just in a hospital, in a laboratory, or in a boardroom any more. All of these together will allow us to address the more difficult medical problems. It takes someone who is conversant in bioinformatics, talking to the person who's designing the drugs, who in turn is talking to the person who's going to turn it all into a profitable venture. This is the future of medicine. If you want to have the greatest impact on what's going to happen five years, 10 years, 20 years down the road, you can't do any better than this."

— Richard Mitchell, M.D., Ph.D.
Associate Director, HST

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Moving innovations from lab bench to bedside

Harvard-MIT Division of Health Sciences and Technology (HST)

You may not realize it, but your life may already have been saved, or at least touched, by medical innovations conceived within the Harvard-MIT Division of Health Sciences and Technology (HST).

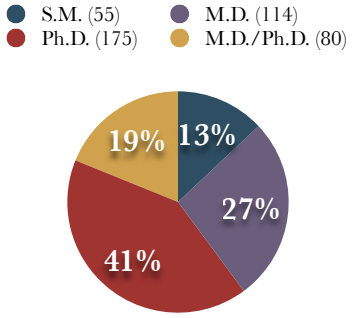
Let's say you've visited the hospital for some surgery. It's likely, then, that you've been hooked up to a pulse oximeter, a device that uses a sensor attached to your finger to monitor the oxygen saturation of your blood—instantly, accurately, and non-invasively. This innovative tool was developed by an alumnus of HST. Alumni and faculty also developed the electronic monitoring that kept track of your heart rate and blood pressure, or the CT scan and MRI that gave your doctors an accurate view of what was happening within you.

It is this translation of innovation from the laboratory bench to the bedside—and in parallel, the transferral of clinical insight from the bedside back to the lab—that is HST's hallmark.

Founded in 1970, the Harvard-MIT Division of Health Sciences and Technology is an inter-institutional, cross-disciplinary community of scientists, engineers, health practitioners, and business experts who, together, explore the fundamental principles underlying disease, and discover—and bring to market—new pharmaceuticals and new devices aimed at lightening human suffering. The Division is one of the oldest, largest, and most successful biomedical engineering and physician scientist training programs in the country.

HST in a nutshell

HST has two interwoven components: interdisciplinary education and collaborative research. On the education side, its 400-strong student body is comprised only of graduate students—master's, Ph.D., and M.D. candidates. Since HST is a joint collaboration between MIT and Harvard, HST M.D. students get a medical degree from Harvard, while most of the Ph.D.s are granted by MIT. Regardless of their program, all students are trained to appreciate clinical investigation, performing research that runs the gamut from genetic engineering to clinical trials, and in large part underpin that important translation between research and practice.



HST students by degree program

In its research enterprise, HST focuses on three primary areas:

- *Biomedical imaging* — non-invasive visualization and manipulation of molecules, cells, tissues, and organs in ways that were previously impossible, resulting in new techniques for investigating chronic conditions like schizophrenia, arthritis, and diabetes

- *Biomedical informatics and integrative biology* — combining and connecting data and knowledge resources in a variety of biomedical science domains, stemming from the ability of scientists to organize and analyze large volumes of data

- *Regenerative and functional biomedical technologies* — applying the physical sciences to the problem of harnessing and engineering tissues, cells, and molecules, with eyes on the ultimate prize of cost-effective replacement of cell, tissue, and organ function.

In a nutshell, it's work that's biologically fertile, technologically rich, and cutting-edge.

Here are some exciting, real-time examples of what's going on, or on deck, in HST's labs today:

- engineering new organs or organ replacements (regenerative medicine),
- seeing how the brain works as it grapples with a problem—in other words, visualizing thought,
- predicting who's going to get sick and *preventing* illness (*health* care as opposed to *sick* care),
- developing drug trials that don't require enrolling 10,000 people and three years of time, and
- advancing medical intelligence—the idea of making *predictive* diagnostic decisions about a drug or about a person.

HST by the numbers

- **36** — years old
- **65** — faculty
- **436** — students
- **1,175** — alumni and alumnae
- **70** — U.S. institutions with HST alumni/ae on the faculty
- **~ 75%** — proportion of HST alumni/ae who hold faculty appointments
- **~20%** — proportion of HST students in each Harvard Medical School graduating class
- **~40%** — proportion of the Honors in a Special Field awards given to HST students at each Harvard Medical School graduation

Growing pains—and possible therapies

HST's successes (and ensuing renown) are enhancing its outlook for the future, and spurring discussions on new ways the program might contribute to global health. To get there, though, some basic needs must first be addressed. Your gift to one of these areas can go a long way toward ensuring a bright and lasting future for HST.

- *A home.* Revitalized, contiguous space. Right now, HST research at MIT is spread throughout six buildings. The transformation of 18,000 square feet in Building E25 will provide a "center of gravity," bringing people together to create synergy and stimulate innovation.

- *Student support.* We're creating an opportunity for the most entrepreneurial, ambitious, and creative students in the world to make a difference. HST graduate students in medicine, medical physics and medical engineering, speech and hearing biosciences and technology, medical informatics, biomedical enterprise and more, go to class together, round wards together, dissect cadavers together, and swim in Boston's incomparable pool of biomedical talent together — achieving a kind of dual or even triple citizenship in traditionally separate but powerfully related fields. Yet these students will not be able to realize their full impact on health care if funding constraints force them to work outside of their areas of talent, insight, and expertise.

- *Faculty support.* Our faculty currently have to raise 100% of their salaries, and that puts many of them—particularly the younger ones—in difficult positions. We want them to teach, and we want them to mentor, not just fundraise, so we have to find a way to stabilize at least a portion of their salaries.

- *Equipment.* There's nothing quite like hands-on learning, and that's largely the way we teach—experientially. But it takes technology. With the proper equipment, there are opportunities to do much more than we can afford to do now.

Further down the road, there is also a vision for a new "MetaSphere." Aimed at creating an enabling environment for further collaboration in teaching and research, the MetaSphere will incorporate state-of-the-art physical and virtual spaces designed to catalyze the development of community among those involved in the biomedical sector (including industry as well as academia).

For information about ways to support HST …

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Last updated: October 10, 2006