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## HHMI Awards \$10 Million to Graduate Programs that Combine Science and Medicine

The Howard Hughes Medical Institute wants to shorten the time it takes to translate basic science discoveries into new medical treatments by challenging graduate schools to change the way students are trained. As a first step, HHMI has awarded \$10 million to fund 13 innovative graduate programs that will introduce Ph.D. students to the world of clinical medicine.

We, like many others, are concerned by how difficult it is becoming for scientists to harness the explosion of new biomedical research information and translate it into medical practice, said Thomas R. Cech, HHMI president. At a time when science and medicine must work hand in hand to solve problems of human health and disease, we want to help change graduate education to increase the pool of scientists who are doing medically oriented research.

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HHMI's new graduate education program supports and encourages graduate schools to integrate medical knowledge into their Ph.D. training. The goal is to produce researchers who have the knowledge and skills to address clinically important biological problems from the perspective of basic science.

A distinguished panel of graduate educators, biomedical researchers, and physician scientists helped in selecting the awardees. HHMI received applications from 82 institutions.

The Institute was pleased to see such thought and creativity being put into the design of new curricula that could have a significant impact on the way Ph.D. students in the biomedical sciences are taught, said Peter J. Bruns, HHMI vice president for grants and special programs.

In some of the programs funded by the new HHMI initiative, graduate students will earn certificates or Master's degrees in molecular medicine, translational medicine, or medical science, in addition to their Ph.D. The additional coursework and clinical mentoring will prepare them to understand the symptoms, treatments, and unmet needs of patients whose underlying disease mechanisms they may be studying.

The initiative is just one example of HHMI's efforts to transform graduate education in the United States. A parallel program in partnership with the National Institutes of Health supports interdisciplinary graduate studies to prepare biomedical scientists to do interdisciplinary research. In 2005, HHMI awarded grants totaling \$10 million to 10 universities to incorporate the physical sciences, engineering, and mathematics into life sciences Ph.D. programs. A new, interdisciplinary graduate program in partnership with the University of Chicago and the University of Cambridge also is planned for HHMI's Janelia Farm Research Campus, now under construction in Loudoun County, Virginia.

### **Awardee Institutions**

**Baylor College of Medicine** will initiate a new graduate program designed to train Ph.D. students to conduct research in translational and pre-clinical biology. These students receive rigorous training in the basic biomedical sciences and are introduced to human health and disease issues through dual clinician-Ph.D. mentorship, new medically related courses, medical conferences, and participation in clinical rounds.

**Case Western University** has designed a new doctoral program in which students study the basic life sciences in the context of human biology and disease. This program includes an integrated core curriculum, a clinical mentor program, and a specially designed course in principles of clinical research. The initiative has been formed in the new Cleveland Clinic Lerner College of Medicine of Case Western Reserve University.

**Harvard University's** Leder Medical Science Program will provide Ph.D. students with a working knowledge of the fundamentals of human biology and disease, primarily through a series of courses. Students will also engage clinicians, physician-scientists, medical students, and patients through activities in a clinical environment.

**Massachusetts Institute of Technology** will develop a training program to foster cooperation between clinicians and biomedical scientists. Ph.D. students will be educated in human and medical pathology and trained through individualized clinical experiences. The students will also participate in seminars showcasing translational and interdisciplinary research.

**Rice University** will partner with the University of Texas M.D. Anderson Cancer Center to develop a training program for bioengineering Ph.D. students. This program will integrate courses in bioengineering, biology, and medicine; require clinical internships; and encourage jointly mentored Ph.D.

projects.

**Stanford University** will initiate a Masters of Medicine program that offers the preclinical medical curriculum to students admitted to any of the institution's Ph.D. training programs. These students will have a physician co-mentor who will help them formulate clinically meaningful questions for their dissertation research. In addition, they propose medically focused courses for Ph.D. students not enrolled in the Masters of Medicine program.

**University of Alabama, Birmingham** proposes a new graduate education program that provides exposure to patient-oriented case-based topics, vocabulary in clinical research, and an understanding of drug discovery. An enrichment program will catalyze interactions between fellows and faculty, and provide career development training.

**University of California, Davis** has developed a new one-year curriculum that augments traditional graduate training. Ph.D. students are placed in clinical medicine-basic science learning groups, enrolled in courses, and engaged in interactive clinical rotations. A new summer institute focused on clinical medicine will also be established.

**University of California, San Diego, School of Medicine** will establish a curriculum that immerses trainees in medical subspecialties. Each program includes team training in areas such as inpatient consult service, outpatient clinics, and case conferences. Graduate courses in drug design and stem cell biology provide technical knowledge for conceptualizing new therapeutics.

**University of North Carolina at Chapel Hill** aims to provide students with a broad knowledge of human disease and the clinical perspective. Students will be awarded a certificate in translational medicine for completing medically relevant course work and basic clinical training. This certificate will complement a thesis granted from any of their existing degree programs.

**University of Pennsylvania** has proposed to develop a certificate program that will consist of three modules that present core principles that underlie medical sciences, focus on human physiology and pathology, and offer clinical clerkships that stress translational research.

**University of Washington** is establishing a molecular medicine training certificate program with three key elements: case-based courses, clinical involvement, and dual mentorship of Ph.D. research. This program will evolve into an interdisciplinary molecular medicine Ph.D. program that will begin in 2010.

**Yale University** will initiate a program in medicine and pathobiology for first- and second-year Ph.D. students. The curriculum includes coursework and clinical tutorials, and will be superimposed on pre-existing requirements for existing Ph.D. programs.