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## Ph.D. Students Want Medical Training

Do graduate students really need medical training? Several current and former HHMI predoctoral fellows say yes.

"In my career, I hope to bridge the gap between research and the clinic, to develop novel and effective therapies based on drug and gene-delivery research," says J. Andrew MacKay, a fifth year graduate student in a joint bioengineering program at the University of California at San Francisco and Berkeley.

During their first year in graduate school, MacKay and his classmates attended a weekly seminar series where physicians give talks on their specialties and take the graduate students to see patients undergoing related treatments. MacKay's group also attends regular radio-oncology lab meetings with neuropathologists and neurosurgeons.

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**- Andrew MacKay, HHMI predoctoral fellow, University of California,  
San Francisco and Berkeley**

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Yet, as a graduate student, MacKay has not taken any courses offered by the medical school. His classes are taught by basic science faculty.

"This system promotes a knowledge gap between doctors and researchers that grows with time and certainly affects a scientist's approach to and choice of research projects," MacKay observes.

Some schools are taking steps to give their Ph.D. students clinical training. At Washington University in St. Louis in the late 1990's, Melanie Leitner was a Markey Pathway fellow, in addition to being an HHMI predoctoral fellow. The Lucille P. Markey Foundation Pathway program included clinically oriented seminars and lectures by both basic and clinical researchers.

"We also shadowed clinicians," says Leitner, who earned her Ph.D. in neuroscience in 2000. "We had a lot of access to patients, and it made a huge difference. There was a powerful charge placed upon us by those patients, to make sure that what we do as basic scientists has a real and immediate impact on patients.

Leitner now is program director of *FasterCures*, a nonprofit organization in Washington, D.C., whose mission is to increase the rate of translational research. The Markey Foundation finished spending its endowment as planned and shut its doors, but Washington University has continued to support the Pathway program.

Andrew Snow is a sixth-year graduate student in immunology at Stanford University. He took an *Introduction to Medicine* course at Stanford that used diabetes mellitus as a model for learning how clinicians think about and treat disease. In addition to lectures, the graduate students visited an outpatient clinic, clinical laboratories, and a company that designs physiology simulation software.

They also worked in groups on research projects associated with the management or treatment of diabetes. Based on their research, Snow's group developed a theoretical plan for harvesting and micro-encapsulating functional islet cells from tilapia fish for xenotransplantation into humans.

"I think the course afforded me perspective on how to think about specific diseases and immunology in general from the broader standpoint of practical medicine," Snow says. "Courses like this might help graduate students see how their solutions to basic research questions could be translated into real clinical applications."

Alexandra Dumitrescu, a fourth year graduate student in human genetics at the University of Chicago, wants to combine research and clinical medicine in an academic medical setting. Dumitrescu attended medical school in her native Romania before she started work toward a Ph.D., so she brought more medical knowledge to her studies than most doctoral students.

She gives the University of Chicago high marks for the way it approaches graduate biological sciences education. "The university has no separate medical school," she explains. "Medical and basic science departments all are components of the Division of Biological Sciences, under a single dean. Research seminars and conferences are presented and attended by both basic science and clinical faculty, exposing graduate students to diverse approaches to research. Accomplished investigators who bridge the basic and applied sciences serve as role models to graduate students."

Another University of Chicago practice that fosters an integrated approach to science is the composition of thesis committees, Dumitrescu says. Graduate students are encouraged to choose thesis committee members from

departments other than their own, including clinical ones, to bring different points of view to their research.

Dumitrescu recommends going even further. She suggests opening medically relevant courses to Ph.D. students as well as medical students and allowing investigators with medical background to serve as advisors to basic science students who are interested in medical research.

Although some Ph.D. programs are incorporating some medical training, HHMI is seeking comprehensive, innovative approaches for its new graduate training grants.