



Opening Eyes and Doors

Undergrads Experience Research First-Hand at Dartmouth

by **Tim Dean**

During the months of summer, opportunities abound on the campuses of medical schools and academic medical centers across the country for undergraduate students wishing to explore careers in biomedical research or medicine.

This is especially true at the Geisel School of Medicine and its clinical partner, Dartmouth-Hitchcock Medical Center (DHMC), which together offer some of the most distinctive experiential learning environments found anywhere. An in-depth look into two programs at Dartmouth shows the quality and breadth of research opportunities available to undergraduate students.

Exploring The Physician-Scientist Track

Part of Geisel's eight-year MD-PhD training program, the Dartmouth MPUS (MD-PhD Undergraduate Summer) 10-week fellowship exposes top undergrads from across the US—especially those from under-represented minority groups—to the vibrant career pathway of the physician-scientist. This year, four fellows were chosen from a pool of nearly 100 applicants.

“Each of our fellows is paired with a MD-PhD trainee who is currently engaged in bench-top research in a Geisel lab and serves as their primary mentor,” explains Brian Lacy, PhD, MD, who directs the MD-PhD program and is section chief of gastroenterology and hepatology at DHMC. “They then get to shadow physicians each week, which allows them to observe medicine in practice and see first-hand how patient care and research come together.”

“And then at the end of the summer, we have them present the data from their lab experiences at a poster session with other undergrads doing summer research at Dartmouth, and then in a final presentation to our entire MD-PhD group and their associated labs,” says Alex Thorngren, MS, operations director of the MD-PhD program and director of MPUS. “We feel that adding academic rigor to their experience will make them stronger scholars in the future.”

In addition to developing skills in scientific communication, MPUS fellows participate in career planning sessions with faculty and administrators of the MD-PhD program.

“Being able to sit down with Dr. Lacy and Alex, receive career advice, and learn about the process of applying to MD-PhD programs was invaluable—I was able to answer some longstanding questions that I had about myself as an applicant,” says MPUS fellow Chelsea Nnebe, a senior at

Howard University in Washington, DC, whose experiences included doing epilepsy research in the lab of Dr. Barbara Jobst and shadowing pediatric neurosurgeon Dr. David Bauer. “Being in the MPUS program showed me what I can do and has made me that much more excited to do it.”

For Kali Smolen, a junior at Grand Valley State University in Michigan, being an MPUS fellow was “eye opening” and “unforgettable.” “We got to see what every piece of an MD-PhD track looks like and I can definitely see myself integrated between research and patient care,” says Smolen, who worked in the biochemistry research lab of Arminja Kettenbach, PhD, and whose clinical rounds included shadowing oncologist Dr. Constantine Dragnev. “We also had the opportunity to spend a lot of time interacting with the MD-PhD students socially, which included hiking Mt. Katahdin in Maine—one of my favorite experiences of the whole summer.”

“It’s a little early to know for sure where I want to focus, but I enjoyed both doing research in the lab and interacting with patients—this program confirmed my decision to follow this path,” says Kishan Patel, a junior at UCLA whose experiences included working in Todd Miller’s pharmacology and toxicology lab and shadowing otolaryngologist Dr. Benoit Gosselin. “I’ve had lots of opportunities that I otherwise wouldn’t have had, like being able to go on overnight rounds with Dr. Mahathi Komaragiri, which exposed me to a whole different side of medicine.”

David Posner, a junior at Sienna College in New York, says he was attracted to the program because of the personalized attention fellows receive. He worked in David Lieb’s microbiology lab and shadowed hospitalist Dr. Ryan Ratts, among other physicians. “It was a fantastic experience overall—



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Geisel MD-PhD student Kevin Shee helps Kishan Patel in the lab.

and our two MD-PhD student directors, Kevin Shee and Laurie Delatour, put us in contact with many current MD-PhDs to really learn what our life would be like.”

For Delatour and Shee, who are fulfilling two-year rotations as student directors, working with the MPUS fellows has enhanced their experiences at Geisel. “I’ve learned so much about mentoring, the application process, and just logistically what it takes to run a program like this,” says Delatour. “And it’s so exciting to see the ‘next generation’ come through each year.”

“It’s really gratifying to see these outstanding young people get excited about the various aspects of the physician-scientist track—interacting with them informs and enriches our own work,” Shee says. “In the end, we hope to inspire them and to show them that, despite being a long path, it’s something that is very worth pursuing.”

Enhancing Research in New Hampshire and New England

As part of the New Hampshire Idea Network for Biomedical Research Excellence (NH-INBRE), the 10-week INBRE Summer Undergraduate Research Fellowship program (ISURF) provides a “full-time, immersion” experience for students who wish to acquire skills and knowledge that can be directly applied towards research careers or graduate studies in the biomedical sciences.

Led by the Geisel School of Medicine and the University of

New Hampshire (UNH), the NH-INBRE program is a statewide collaborative partnership of two- and four-year colleges aimed at expanding biomedical research capacity and training in New Hampshire. Having excelled during its first five years of existence, the program recently received five more years of support from the National Institutes of Health (NIH).

“Out of a larger applicant pool, we accept a total of ten undergraduate students each summer from partner institutions around the state and offer them a variety of research experiences, from wet lab to clinical research, that complement their research interests and career plans,” explains Bob Maue, PhD, director of research support and training for NH-INBRE. “In addition, we typically host a student or two from other nearby states with INBRE programs, such as Vermont, Maine, Delaware, and Rhode Island, as NIH encourages all of its INBRE programs to work together.”

The program provides a number of other valuable elements to undergrads to help round out their experience. These include: strategies for applying to graduate school, GRE exam preparation, career development classes, journal clubs and discussion groups, and opportunities to do poster and oral presentations on their research projects at the annual NH-INBRE statewide meeting in August.

“One of the unique features of our ISURF program is the nursing component, which pairs four of our students from undergraduate nursing programs in New Hampshire with

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nursing researchers at DHMC and exposes them to a wide range of experiences related to clinical and translational research in an academic medical center setting,” says Steve Fiering, program coordinator for NH-INBRE. “This is a novel aspect of summer undergrad research programs, and Dartmouth may be the only place in the country offering it.”

Having nursing students participate in clinical and translational research projects fits well with the goals of the SYNERGY Clinical and Translational Science Institute—another large, NIH-funded program at Dartmouth. Focused on developing clinical researchers, the SYNERGY program, along with DHMC, has helped support the ISURF nursing research initiative since its inception. Having student researchers focused on clinical, translational, and basic science aspects of cancer research has also attracted aid from the Norris Cotton Cancer Center, making the NH-INBRE ISURF program truly a broadly supported, Dartmouth-wide endeavor.

The ISURF nursing research initiative has been “transformative” for UNH senior Eleni Zotos, “It was a wonderful experience—I got to shadow nurses in different research-related roles, and I had an excellent mentor, who I’m going to be able to publish some papers with,” she says.

Zotos was paired with Bridget Logan, ARNP, PhD, a nurse practitioner in pediatric urology at DHMC, and recently presented her research on athletic incontinence in high school age girls at the annual NH-INBRE conference. “You know, it’s funny; entering college I never thought I’d do research—I had a very narrow-minded view of what it was. Now, I can’t imagine not incorporating it into my career.”

Teresa Samson, a senior biology and pre-med student at St. Anselm College, came into ISURF two years ago with no lab experience, “and wanting to see if I would be interested in research as much as medicine,” says Samson, who spent the last two summers doing immunotherapy research on breast



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~ MPUS fellow Chelsea Nnebe

cancer in Steve Fiering’s lab, and this year served as student coordinator organizing social activities for the fellows to do on weekends. “Even though I’ve decided to focus on becoming a doctor first, I absolutely loved my time at Dartmouth. It was great to be surrounded by people who were as excited about science and medicine as I am.”

For David Giacalone, a recent graduate of New England College (NEC), going through the ISURF program proved pivotal in helping him begin a promising career in biomedical research. “I was just hired as a lab tech in George O’Toole’s lab at Geisel, which studies biofilms—I was a summer student there, and had taken my project back to NEC so I could continue working on it there,” explains Giacalone, who plans on pursuing a PhD in microbiology. “The beauty of the ISURF program is it allows you to field-test whether a career in science is for you, it opens your eyes to what’s happening in the field of research, and it provides opportunities that you couldn’t get otherwise.”

Promoting Science Education and Careers at Dartmouth

As impactful as the MPUS and NH-INBRE programs are, there are a variety of other ways for undergrads to experience careers in academic medicine during the summer—from Dartmouth’s ASURE (Academic Summer Undergraduate Research Experience) program to other opportunities made possible by research faculty. Every year, a great number of Dartmouth undergrads get hands-on research experience in Geisel labs.

“I enjoy the infusion of young people into the lab because of their excitement and eagerness to learn,” says Bryan Luikart, PhD, an assistant professor of physiology and neurobiology at Geisel, who this year hosted undergrads from ASURE, NH-INBRE, and Dartmouth College. “Furthermore, given the right project, a full-time summer student can usually generate data that is useful to the laboratory.

“It’s also important to me to promote science in their education and help them to understand what science is like as a career,” adds Luikart. “For Geisel, I think this is important because when the summer students have a positive experience, they are more likely to apply to graduate and medical school here.”

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Dartmouth ISURF-Nursing fellow Eleni Zotos reviews study data with research mentor Bridget Logan, ARNP, PhD, a nurse practitioner in pediatric urology at DHMC.