Going to medical school is all about discovery—in the classroom, in the lab, in the clinic and in the community. Increasingly, medical students are extending that spirit of discovery into research. In addition to uncovering findings that can improve treatment, a generation of physicians is becoming better prepared to practice evidence-based medicine.

Research by medical students has grown in importance in recent years, both in Minnesota and nationwide. A study published in *BMC Medical Education* last year found an “exponential” increase in student research between 1980 and 2010. Researchers looked at 350 journal articles by medical student authors. Just 3.4 percent were published before 1990, while 46.3 percent were published after 2010.

Medical schools in the United States started championing student research in 2008 after the Association of American Medical Colleges (AAMC) recommended they incorporate clinical and translational (bench-to-bedside) research into their core competencies. Since then, many have added required or elective courses in clinical and translational research.

Before the recommendation, which was later adopted by the Licensing Committee for Medical Education, fewer than half of U.S. medical schools required students to take courses in clinical and translational research; in 2012, 84 percent did. There also has been a boost in interest among students. According to surveys conducted by the AAMC, about two-thirds of graduating medical students in 2010 said they wanted to pursue options for research, compared with half in 2004.

“Medical students need to start thinking about research during their training, so that once they are out in the world it becomes an integral part of who they are and how they approach their practice,” says Ann Bonham, Ph.D., chief scientific officer for the Washington, D.C.–based AAMC.

**Charting more opportunities**

The University of Minnesota has put a renewed focus on student research lately, acknowledging that its track record hasn’t been great, says Mark Rosenberg, M.D., vice dean for medical education. Last year, the medical school surveyed students and found that just about one-third of the fourth-year class did research while earning their degree.
“Anyone who is going to be a physician needs to understand scholarship and the importance of discovery,” he says. “They need to know how new knowledge is created and what role you can play in creating the new knowledge. How do you look at causes of disease, the best treatments, and how it applies to your practice? I’d like for them to be exposed to that, even if research isn’t going to be their career option.”

When Rosenberg joined the university in 2012, he led a task force charged with increasing all manner of medical student research including clinical or quality-improvement studies. The group looked at how to improve students’ access to research opportunities, funding and the culture of research. Its recommendations included emphasizing the importance of research among students, providing them with research opportunities, marketing those opportunities to students, lining up more grant funding for student projects, and engaging affiliate sites such as Regions Hospital, the Minneapolis VA Health Care System and Hennepin County Medical Center.

The university now offers grants from the Lillehei Heart Institute that will support five students doing research this summer. Another new grant program provides opportunities for student research in infection and immunity. The University of Minnesota Foundation (formerly the Minnesota Medical Foundation) also provides grants for medical student research. Those awards have funded student projects including one on whether internal jugular vein collapse predicts low central venous pressure and another that investigates the

**JESSICA ADEFUSIKA OLAYANJU**

*Mayo Medical School*

As Jessica Olayanju starts her residency in ophthalmology this summer, she brings the confidence and know-how to turn clinical questions into solid studies. Doing research during medical school motivated her to pursue a career that combines treating patients and academic research.

A native of Nigeria who grew up in Rhode Island, Olayanju arrived at Mayo with basic science research experience gained during a summer program at the University of Massachusetts. She then got involved with projects at Mayo while considering different specialties. Olayanju helped gynecologists study a rare type of ovarian cancer; she worked on dermatology studies of treatments for excessive sweating and a study of primary mucinous carcinoma of the skin, a rare cancer. She also studied complications from glaucoma surgery. These efforts resulted in multiple presentations and publications.

While working at a free clinic sponsored by Mayo, Olayanju became inspired to look for ways to break down language barriers when treating foreign-language speakers in order to prevent miscommunication and medical errors. Some of the ideas she came up with were improving processes for using lay interpreters, making interpreters available by telephone, and teaching physicians and other providers how to work with interpreters. She published an essay about her experience and her observations last spring in *New Physician* (www.onlinedigeditions.com/display_article.php?id=1384114).

As she heads to residency at the University of North Carolina–Chapel Hill, Olayanju is grateful for the opportunities she had to participate in the full spectrum of research while in medical school. She says she gained insight into how to translate discoveries into improving patient care and a deeper understanding of how to read and evaluate papers.

“I learned that research is a never-ending process, and it’s been an enriching experience to understand the process from proposal to publication,” she says. “It boosts my confidence to know that when I leave here, I will be able to use what I have learned not only to continue with research endeavors but also to improve patient care. It’s one of those things no one can take away from you.”
characterization and treatment of infantile nystagmus.

In addition, the medical school recently launched a Craig's List–style website where students can easily search for research opportunities (http://secure.ahc.umn.edu/MedSchool/researchopps/home.cfm).

Third- and fourth-year students who want to do research can do so as an elective. Other students opt to participate in the university’s Flexible M.D. program, which allows them to pause between their second and third years to focus on research, participate in a global health program, or earn a master’s degree in public health or business administration. At both Mayo and the university, a small group of students do significant research while earning both M.D. and Ph.D. degrees.

Research in the curriculum

So far, research hasn’t played a major role in the university’s curriculum, although first-year students now learn how to interpret evidence for diagnostic and screening tests using original literature in four sessions called mastering evidence-based medicine, says Kathleen Watson, M.D., senior associate dean for undergraduate medical education.

However, it has been a part of the curriculum at Mayo Medical School since it opened in 1972. Students spend at least one quarter during their third year doing research, and they must produce a paper or other written piece before they graduate.

When Anna Larson started medical school at the University of Minnesota in 2008, she thought she wanted to pursue pediatric neurology. But after spending nearly two years doing research at Massachusetts General Hospital in Boston, she now hopes to focus on translational epilepsy research as well as patient care.

Larson, who is in the Flexible M.D. program, spent time between her second and third years working with two pediatric neurologists who conduct clinical research related to epilepsy, Angelman syndrome and tuberous sclerosis complex. During her time in Boston, she contributed to several studies, including one that looked at dietary therapy for children with epilepsy and another on the health and clinical needs of adults with Angelman syndrome. She also presented at an international conference and co-authored five articles.

Larson, who recently matched into the child neurology residency program at Massachusetts General Hospital, says her experience cultivated a passion for translational research and epilepsy care. “In the future, I hope to not only care for patients but also work with research teams to improve our understanding of disease and treatment options.”

Their projects can cover basic science, clinical or community-health topics, and it’s up to the students to find a mentor to guide them through a project or include them in their ongoing research.

In 2013, 95 percent of Mayo’s students published a paper—more than twice the national average. Through that process, students develop skills that they’ll use throughout their medical careers, including critical thinking, tenacity, dedication, and writing and speaking prowess, says Susan Romanski, M.D., chair of Mayo Medical School’s admission committee.

Having done research in medical school also makes them more competitive for residencies. “They can really appreciate the scientific process and learn discovery and query,” she says. “And they learn teamwork and how to integrate research into patient care and education.”

Suzy Frisch is a Twin Cities writer.
OLUDARE ODUMADE

University of Minnesota Medical School

Doing research has taken Oludare Odumade to Kenya, to labs at Johns Hopkins University and the University of Minnesota, and to a field she had not imagined pursuing. Odumade came to medical school intending to become a psychiatrist, but volunteering in a lab at the university shifted her interest to pediatric immunology and infectious diseases.

"Immunology was more tangible and objective in terms of what you can measure. I want to do something very translatable that can have an impact sooner," she says. "Immunology has a close impact on patient care, and it can be broadly applicable to all sorts of patients."

Odumade, who is in the M.D./Ph.D. program, started medical school in 2007, completing two years before earning her Ph.D. in microbiology, immunology and cancer biology in 2011. Born in the Twin Cities, she grew up in Nigeria and always was interested in global health. Thanks to a Doris Duke Charitable Foundation Fellowship and an Infectious Diseases Society of America fellowship, Odumade spent the majority of this past year in Kenya doing research on malaria. After graduating this spring, she will start her residency in pediatrics at the University of California, San Diego.

Odumade’s work has run the gamut from helping to investigate diet-induced thyroiditis at Johns Hopkins to studying the immunological risk factors for developing mononucleosis after Epstein-Barr infection for her doctoral thesis. She is now examining the immune response to malaria in pursuit of a vaccine.

She believes being involved in a variety of research settings and projects has been invaluable. "I’ve learned how to think and ask questions, how to write grants and read papers—all of the things that are useful when you’re trying to do evidence-based medicine," says Odumade, who has published 11 papers. "If you learn to ask the right questions, you can answer questions that have a big impact on people. Sometimes a paper can become the standard of care."

Wyatt entered medical school with significant experience, including basic research in chemistry that he gained during his undergraduate years at Grand Valley State University in Michigan. He also spent two summers as an undergraduate research associate at Mayo doing clinical studies related to smoking-cessation therapies. (Although Mayo Medical School does not require its incoming students to have research experience, most come with some.) Wyatt became intrigued by the work of endocrinologist Victor Montori, M.D., on shared decision-making and has been working with one of Montori’s colleagues, emergency physician Erik Hess, M.D., to develop a tool physicians can use with parents in the emergency department to determine whether their child should have a CT scan following a head injury. He also led a study that evaluated videos from hundreds of examinations involving physicians who used shared-decision making tools with patients.

Wyatt has published several articles and travelled to Peru in 2013 to present at an international conference on shared decision-making.

As he starts his pediatrics residency at the Mayo Clinic this summer, he brings with him extensive knowledge about how to conduct a well-designed study—a skill he plans to use in the future.