Discovery incubator

A multidisciplinary research facility provides important space and technology for turning new ideas into patient care realities

The University of Minnesota’s rich history in pioneering cardiology just took another step forward with the opening of its Advanced Preclinical Imaging Center (APIC).

Designed as a state-of-the-art, research-dedicated facility, APIC will allow University investigators to explore and perfect new surgical procedures and medical devices to improve patient outcomes. This interdepartmental center is intended to be a place to foster new therapy ideas for diseases of the heart, brain, and vasculature.

The facility contains several state-of-the-art spaces: a hybrid imaging laboratory, two operating rooms, a chemistry lab for preparing new compounds and cells, and an engineering suite for constructing and modifying devices and catheters on the spot.

“This is a real translational lab,” says interventional cardiologist Robert Wilson, M.D., a professor of medicine in the Division of Cardiology, “which means we are focused on getting new ideas and technologies into the clinic to help patients as quickly as possible.”

Afshin Divani, Ph.D., an assistant professor of neurology and neurosurgery, is one of the first

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Afshin Divani, Ph.D., says that state-of-the-art technologies at the University’s new Advanced Preclinical Imaging Center have made a big difference in his research.
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scientists to take advantage of APIC’s imaging technologies for his research on how to augment blood flow to brain tissue after a stroke. His team has shown how to do that effectively in rats, and they are now ready to try the technique on pigs.

“I was struggling to see what I needed to see in the tiny arteries in the brain and heart,” says Divani. “But the imaging system in APIC makes an enormous difference.”

The importance of imaging

The field of cardiology is moving further and further away from using invasive surgical procedures to solve cardiac problems, relying instead on much less invasive “interventional” techniques, Wilson says. That’s why doctors need the best possible imaging to see inside a patient’s veins and heart.

“People want a big operation but a small hole, and the more we are able to do that, the more imaging-dependent we become,” he says. Interventional cardiologists like Wilson use very thin catheters to go inside blood vessels to diagnose and treat conditions such as heart valve disease and coronary artery disease. As they thread the catheters into a blood vessel, the doctors rely on imaging systems to guide their work.

“Working with a patient in a hospital setting, you don’t get to make mistakes,” says Wilson. “That’s why we need a laboratory with the same high-quality imaging capabilities dedicated to research, a place where we can make mistakes and recover, perfect the thing you’re trying to do, or even decide to toss it out and try something new.”

The more, the merrier

The new APIC facility, which opened in September with significant philanthropic support from Boston Scientific, was conceived as a place that encourages collaboration among faculty members but also welcomes people from outside of the University who work closely with the U’s investigators. As Wilson says, any U researcher doing work that requires advanced imaging will be welcome at APIC: “Biomedical engineers, interventional radiologists, neurologists, vascular surgeons … almost anyone who does work involving the blood vessels can do research in this facility.”

Before APIC opened, Divani adds, investigators who needed this kind of advanced imaging equipment had to go outside of the University to private labs, which charged high fees. “Now we have that facility,” he says.

Most important, APIC provides University scientists a place in which to build bridges from basic scientific research to clinical medicine. And for Wilson, Divani, and others taking advantage of this leading-edge lab, that’s the bottom line.

“Ultimately, labs like APIC save lives,” says Wilson. “And that’s why we’re here.”

While the search for a cure goes on, people with muscular dystrophy (MD) do not wait quietly on the sidelines. At the University of Minnesota, many patients participate in clinical trials that help researchers slow the progress of these debilitating diseases (there are eight known types of MD).

“Because of the improving care they receive, people with MD now live longer,” says Peter Karachunski, M.D., an assistant professor in the Department of Neurology and clinical director of the U’s Paul and Sheila Wallstone Muscular Dystrophy Center. “Boys with Duchenne MD (DMD), for instance, historically wouldn’t survive past their late teens, but today it’s not surprising to see them living into their 30s and even 40s.”

MD breaks down muscle tissue over time, including that of one very important muscle: the heart. Cardiac complications are now a top health concern for people with MD as they age.

Jacob Gunvalson, now 24, was just 7 when he was diagnosed with DMD, the most common and severe form of MD. He is currently part of a trial for a new drug designed to stimulate the production of dystrophin, a muscle-strengthening protein that is missing in people with DMD.

“I want to help further the science,” says Gunvalson, “and if I can help doctors develop this drug, I’d be crazy not to be excited about that.” His parents have generously supported MD research at the U, as well, through their John and Cheri Gunvalson Charitable Giving Fund.

Karachunski says that Gunvalson’s enthusiasm is not unusual. “This is a devastating disease, and our patients want to do everything they can to help change the course of the disease.”

As research has slowed the progression of DMD, health care professionals have also found ways to help patients navigate life outside their childhood homes.

“There’s a whole new set of needs as they come into their late teens,” says Joline Dalton, M.S., C.G.C., a University genetic counselor who started the popular Transition Camp, a weekend-long program designed to help people with MD ages 16 to 26 move on to college, jobs, and independent living.

Gunvalson, who will soon graduate from the University of North Dakota with a degree in social work, acknowledges that some of his needs as an adult have changed. “Accessibility, finding a job, transportation—there are always challenges.”

Meanwhile, he continues to receive aggressive care at the U, where Karachunski oversees services for close to 1,000 adults who have MD.

“It’s a promising time,” Karachunski says, “with four clinical trials under way here, and more coming soon.” And the U’s biggest asset, he adds, is the dedicated, collaborative team that drives both MD care and science: “We really have a strong interest in the research here, and a fierce desire to help these patients.”
Visitors to the Smithsonian’s National Museum of American History in Washington, D.C., will find a little piece of Minnesota history in a new exhibit called “Places of Invention.”

The exhibit, which opened in July, highlights specific places and periods of time that saw extraordinary bursts of creativity and innovation, including Minnesota’s own so-called “Medical Alley” in the 1950s. One of the key artifacts in the collection? An early model of University of Minnesota alumnus and Medtronic Inc. cofounder Earl Bakken’s externally wearable cardiac pacemaker.

The pioneering work of the late C. Walton Lillehei, M.D., Ph.D., a University surgeon who is widely known as the father of open-heart surgery, is also highlighted in the exhibit. So is the 1955 DeWall-Lillehei bubble oxygenator, which Lillehei invented with colleague Richard DeWall, M.D., as a way to keep oxygen-rich blood flowing in a patient’s body during surgery.

Other discoveries and locations in “Places of Invention” include precision manufacturing in Hartford, Conn., in the late 1800s, Technicolor in Hollywood in the 1930s, and the personal computer in Silicon Valley in the 1970s and ’80s.

For more information about the “Places of Invention” exhibit, visit invention.si.edu.