Clean-up duty

University team creates a novel ‘calcium sponge’ to help erase one of the country’s leading causes of heart failure

Imagine your heart muscle as a tiny symphony orchestra. Led by a conductor, that heart-muscle orchestra squeezes and relaxes, about one beat per second, in a never-ending tempo. For most of us, the conductor leads the orchestra so well that we never stop to appreciate the wonder of it as our hearts beat on, 100,000 times a day, 35 million times a year.

Joseph Metzger, Ph.D., head of the Department of Integrative Biology and Physiology in the University of Minnesota Medical School, uses the orchestra analogy to explain not just how the heart muscle works, but to help nonscientists make sense of his recent research.

“We’re focused on understanding how the heart muscle works,” says Metzger, referring to his laboratory staff of 18 investigators engaged in molecular cardiovascular research. “It’s a journey of understanding that begins at the level of the gene.”

As he explains, the “conductor” of the heartbeat is calcium, which ebbs and flows as the heart works. Calcium levels shoot up when the heart contracts, then drop sharply as it relaxes. Specialized proteins respond to the calcium levels, prompting the heart’s squeezing-contracting rhythm.

But as hearts age or are weakened by disease, calcium levels may not drop as they should when the heart muscle relaxes. Like the orchestra hanging onto a note too long, the calcium lingers, interfering with the signal to the protein that prompts the “relax” half of the heartbeat.

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“Although the squeezing action is normal,” Metzger explains, “the relaxation becomes dysfunctional. This is called diastolic heart failure, and it’s a growing medical problem in the developed world.”

In fact, the problem is huge: Heart failure is the leading cause of hospitalizations in the United States—and the leading cause of death. Diastolic heart failure, for which doctors currently have no therapies, afflicts about half of all heart patients.

“For this type of heart failure, where calcium languishes in the heart cells, we’ve been working on how modify the signal, how to ‘sop up’ that extra calcium as the heart relaxes,” says Metzger.

That’s where Metzger’s so-called “calcium sponge” enters the picture. In February, the preeminent science journal *Nature Medicine* published Metzger’s paper that details his team’s discovery: a way to modify the blueprints for the body’s calcium buffers, giving the heart muscle new instructions.

“A state-of-the-art place for collaboration

By midsummer, University of Minnesota scientists engaged in cancer and cardiovascular research will be settling into their new building across from TCF Bank Stadium. Conceived as the gateway to the University’s burgeoning Biomedical Discovery District (BDD), the Cancer and Cardiovascular Research Building will not only house researchers, it will also welcome passersby inside to see firsthand the impact of the research being done throughout the BDD.

“The new building allows us to expand the footprint for cardiovascular science and medicine,” says Daniel Garry, M.D., Ph.D., executive director of the Lillehei Heart Institute, which will be housed primarily in the facility. “It’s a terrific opportunity for investigators who share common goals and use similar technologies and equipment to come together under one roof.”

“This new, world-class facility will help us recruit top researchers working on heart disease, diabetes, and a range of other illnesses,” adds Joseph Metzger, Ph.D., whose lab also will move into the building.
Thanks to recent legislation, you can benefit from a popular tax-advantaged giving option again this year.

Make a gift of up to $100,000 directly from your IRA to the University of Minnesota Foundation to support the Lillehei Heart Institute at the University of Minnesota before December 31, and avoid paying federal income tax on the amount of your gift.

For more information, contact our gift planning team at 612-624-3333, 800-775-2187, or plgiving@umn.edu.
Katherine “Kaye” Lillehei believed in spending money wisely.

A longtime coupon clipper who hesitated to throw anything away, Lillehei knew she was making a good investment when she committed $13 million to create the Lillehei Heart Institute (LHI) and $3 million to create the Katherine R. and C. Walton Lillehei Endowed Chair in Nursing Leadership at the University of Minnesota in 2000. It was the largest gift in University history at the time.

Kaye Lillehei, a University-educated nurse, was married to University alumnus and surgeon C. Walton Lillehei, M.D., Ph.D.—known to many as “the father of open-heart surgery.”

After Walt died in 1999, Kaye wanted to do something significant to support the University and honor its strong tradition of research and innovation as well as to educate the next generation of nurses and doctors.

“She supported the University for her entire life,” says grandson Troy Loken. And by giving to medical efforts at the University, she felt that “you’re not just supporting a hospital, you’re supporting a teaching hospital,” Loken says.

Kaye Lillehei died in November at age 91. Her family felt it was only right to honor her by making a gift to the University. In addition to the Lillehei Family Foundation’s $50,000 gift, the LHI received another 32 gifts in her memory totaling more than $17,000.

To make a gift to the Lillehei Heart Institute in Kaye Lillehei’s honor, visit www.give.umn.edu/giveto/lhi.