

*New Director Douglas Lewandowski, PhD, pictured here in the state-of-the-art Nuclear Magnetic Resonance (NMR) research facility—which houses a 600-megahertz NMR spectrometer—sees the Center for Cardiovascular Research as a chance to catalyze interdepartmental research.*



# Matters of the HEART and More

Center for Cardiovascular Research



**integrates**  
cardiology and  
related disciplines

# What causes hearts to fail, and how can treatment be improved?

Those very complex questions—the answers to which draw from several medical disciplines, not just cardiology—are being addressed with renewed focus and campus-wide involvement in the University of Illinois' Center for Cardiovascular Research under new director Douglas Lewandowski, PhD.

Center investigators recently earned a \$12 million program project grant renewal from the National Heart, Lung and Blood Institute of the National Institutes of Health for collaborative work focused on the fundamental causes of heart failure.

And, following a five-year period of temporary approval and an extensive evaluation process, the CCVR on April 12 earned certification as a permanent center within the State University System by the University of Illinois Board of Trustees and the Illinois Board of Higher Education (IBHE).

Lewandowski, a professor of physiology and biophysics who also directs the CCVR's Program in Integrative Cardiac Metabolism, says he is excited about how the center is connecting investigators from different departments to share their expertise—and laboratories.

"Previously, investigators were working within intellectual or administrative silos," says Lewandowski. "This is truly an opportunity to bring together our scientists across departments. If you look at many of the top medical schools, there has been a shift toward the formation of centers dedicated to a common research problem. This is, in some ways, modernizing the infrastructure for how research is supported and performed, from basic science to clinical departments."

Lewandowski has brought new faculty to the center, and he expects there will be others. He asked Jason Yuan, MD, PhD, a University of Illinois newcomer and the principal investigator for the university's Institute for Personalized Respiratory Medicine, to play an integral role in the CCVR. Yuan, who has long studied pulmonary hypertension, and Samuel Dudley, MD, PhD, chief of cardiology and director of the Program in Cardiac Electrophysiology in the CCVR, have begun to compare notes on their respective research involving the ventricles of the heart.

Yuan is excited about the possibilities of Lewandowski's vision, calling it a much more tangible and focused endeavor than some centers he has seen in his career. "It's not just a virtual title—it's a real unit with real infrastructure," he says.

The center's reputation also helped attract Terry Vanden Hoek, MD, to the College of Medicine to become professor and chair of the department of emergency medicine. He had previously served for 15 years at the University of Chicago.

"The CCVR is a very important part of what I saw as attractive in

coming here," Vanden Hoek says. "There are components of the CCVR dealing with arrhythmia and electrophysiology, muscle function and metabolism, and lung function that are relevant to what happens during cardiopulmonary resuscitation.

Vanden Hoek has been in conversations with Lewandowski, for instance, about the latter's research into changes in metabolism during conditions of cardiac arrest. Vanden Hoek also hopes to draw on the center's faculty as he investigates how therapeutic hypothermia can improve a patient's chances for survival after cardiac arrest. "We're looking at ways to pharmacologically create drugs that mimic the effects of cooling," he says.

**T**HE WORK OF THE CENTER BEGAN in 1995 under its founding director, R. John Solaro, PhD, head of the department of physiology and biophysics. In 2005, the CCVR officially formed and achieved temporary designation as a center from the IBHE.

Becoming an official center is not easy to achieve, and for good reason, Solaro says. "There are all kinds of hoops you have to jump through because, if they're not successful, centers can be a financial drain on an institution," he says.

CCVR researchers have authored more than 300 peer-reviewed publications, and, perhaps even more importantly, the center has been responsible for a number of major breakthroughs in research. For example, center faculty have pioneered medical image-based methods to visualize the earliest changes in metabolism that occur in heart disease long before overall heart function becomes impaired, and they have developed drug treatments to restore heart function by normalizing patients' metabolisms.

Another area pioneered by CCVR investigators is proteomics, the analysis of changes to proteins in the heart that are critical in the diagnosis of cardiac disorders. Also, a study linking atrial fibrillation and oxidant stress holds promise for a new test for atrial fibrillation risk. Lastly, CCVR research also has found a number of mechanisms that can play a role in the reversal of inherited heart conditions, the biggest killer of young adults in the industrial world.

The best part of these successes, Lewandowski says, is making a difference in patients' outcomes. "Our research is inherently translational, from bench to bedside," he says.

The importance of the work has long attracted funding above and beyond the \$12 million grant from the Heart, Lung and Blood Institute, for which Solaro serves as principal investigator, and which also employs two other project PIs from the university, Lewandowski and Brenda Russell, PhD, professor of physiology and biophysics.

Lewandowski and Solaro have each received a prestigious MERIT award from the National Institutes of Health for the work that occurs in their respective research programs. Both had been funded by the NIH and the American Heart Association for years before the center became a reality.

"The University of Illinois goes very unsung but not unrecog-

nized," says cardiology chief Dudley. "We're known nationally scientifically but not as well known in our own backyard."

One proof of Dudley's statement is in the center's collaborations with other medical institutions that have sought to team with the College of Medicine on important research. While the CCVR has partnerships with each of the other medical schools in the Chicago area, the influence of the center extends well beyond the region, with active collaborations held with medical schools around the country and internationally.

The CCVR also partners with similar bodies on campus, for example working actively with the Center for Clinical and Translational Science at the College of Medicine, which similarly focuses on collaborative, multidisciplinary and state-of-the-art research. As part of this collaboration with both the CCTS and the section of endocrinology, Lewandowski is leading a team of investigators who are studying inter-organ responses to disease.

Lewandowski says the CCVR is investigating the cardiac side of that issue, while outgoing CCTS Director Theodore Mazzone, MD, chief of the section of endocrinology, diabetes and metabolism, is working on the endocrine adipose responses.

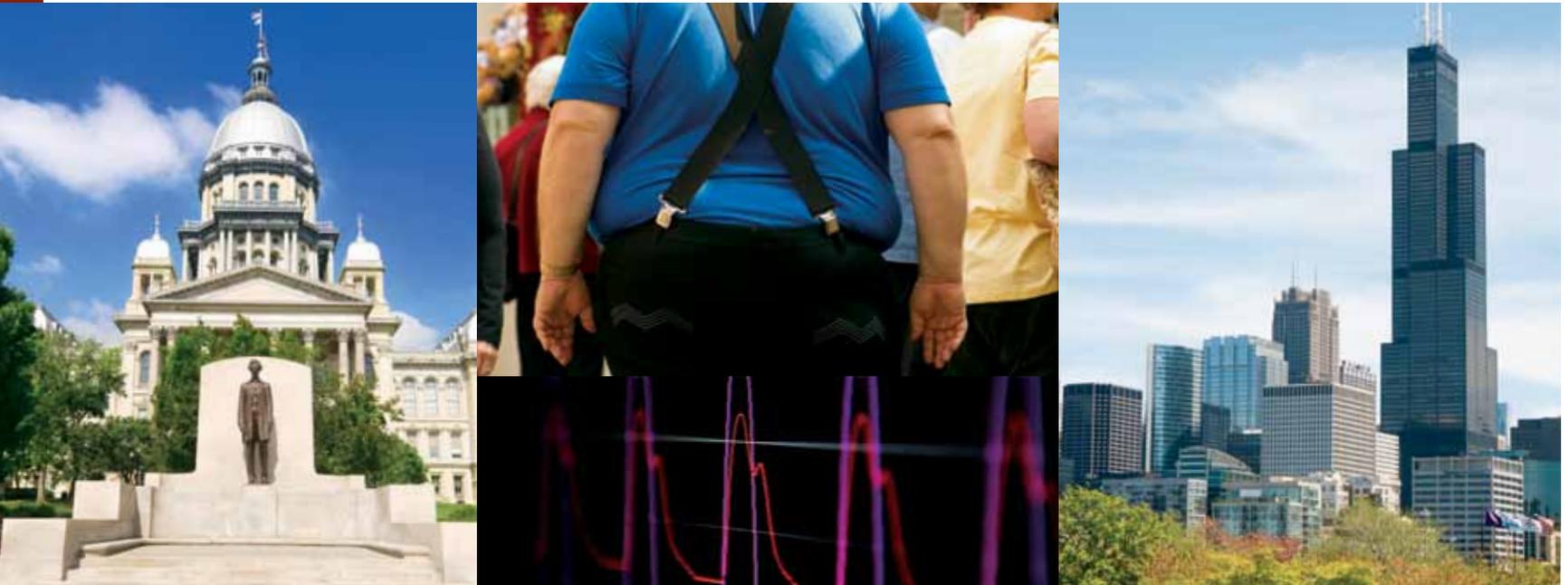
"Together, we are investigating how the heart and other internal

organs interact and respond to changes induced by the presence of disease in any one organ," Lewandowski says. "This is really the most modern approach in studying integrated systems and mechanisms of disease, which is facilitated by these types of centers and one that is generating a good measure of interest from NIH."

Lewandowski hopes the CCVR will one day boast a new building. In the meantime, he and his staff are planning the center's annual Research Day on Aug. 12, when acclaimed researcher and College of Medicine alumnus Daniel P. Kelly '78, MD '82, scientific director at the Sanford-Burnham Medical Research Institute in Orlando, Fla., will speak. "We're the 800-pound gorilla," Lewandowski says.

"If you're interested in the heart," adds Solaro, "this is the place to be." ■

**SAVE THE DATE:** CCVR Research Day will be held Aug. 12. Guest speaker Daniel P. Kelly '78, MD '82, will focus on "Control of Cardiac Mitochondrial Function in Health and Disease," while R. John Solaro, PhD, will address "Translational Medicine and Cardiac Sarcomeres." To RSVP for the event, please e-mail vonaire@uic.edu.



## IMPROVING STATE OF THE STATE

**H**AVING A NATIONAL LEADER in cardiovascular research based at the College of Medicine is a boon to the state, city and the university's own patients, notes Vice Chancellor for Research Joe G.N. "Skip" Garcia, MD, who has championed the Center for Cardiovascular Research because of how expeditiously its findings can be integrated into clinical work.

"As part of our mission, we have an important focus on providing un-

derserved patients with cost-effective and high-quality care," he says. "The center is a great example of bringing that newfound scientific knowledge to the quality of life and care of the patients we serve."

A look at the ravages of cardiovascular disease in Illinois alone speaks clearly to just how crucial a role the center can play in public health:

- Cardiovascular disease is the leading cause of death in Illinois, averaging 42,000 deaths annually.

- The tab for health care costs related to heart disease and stroke are about \$4 billion annually in Illinois.

- More than 3.6 million adults in Illinois alone are considered obese.

AS FOR CHICAGO, Terry Vanden Hoek, MD, chair of the department of emergency medicine, notes the center's presence here is strategically crucial.

"From my perspective, having a place like the CCVR in Chicago is very important," he says. "If you look at the cardiac survival rates in the U.S., Chi-

cago's rates of less than 5 percent are low. Part of the reason is that, in a big city, it's hard to get to cardiac arrest victims in a timely fashion.

"However, there is tremendous opportunity to improve outcomes in Chicago," he adds. My hope is that the CCVR can help play a leadership role in developing new treatment that improves CPR survival. This bringing together of scientists and health care providers can make significant strides in treating a major public health problem."