In total, we’ve launched and grown more than 500 new programs. These remarkable accomplishments made possible only by faculty, staff and fellows coming together to envision a community and to work collectively toward common goals.

Our faculty and fellows have penned more than 160 peer-reviewed publications that highlight their discoveries in medical and scientific journals. We have participated on more than 100 national and international cardiovascular disease committees, authored more than 20 separate cardiovascular guidelines for patient care and secured over $13M in grant funding. Let me add that this funding has been accomplished at a time in which NIH funding has been at its lowest point in more than 50 years.

Importantly, these accomplishments have not been at the expense of our mission of educating the next generation of cardiovascular specialists. We have increased the size of our general cardiology fellowship program, which continues to be the largest fellowship training program in the University of Minnesota Medical School; we have established a mentorship program; we have added seven sub-specialty training programs to support our centers of excellence; and we have delivered more than 600 lectures to our students and trainees.

At the University of Minnesota, innovation is our tradition. Our halls are filled with echoes of greatness; echoes of great leaders who changed the world. Now is our time and we are every bit as bold as our predecessors. By standing together as a team, focusing on our mission and marching in a common direction, we will discover life-changing innovations, heal our patients with extraordinary care and educate tomorrow’s academic cardiovascular leaders. Now is our time.

Over the past five years, our division has experienced tremendous growth. We have more than doubled our faculty. We have grown from zero to six endowed chairs; we have six consecutive American Heart Association Cardiovascular Heroes and we have established centers of excellence that have six endowed chairs; we have six consecutive American Heart Association Cardiovascular Heroes and we have established centers of excellence that have six endowed chairs; we have six consecutive American Heart Association Cardiovascular Heroes and we have established centers of excellence that have six endowed chairs; we have six consecutive American Heart Association Cardiovascular Heroes and we have established centers of excellence that have six endowed chairs; we have six consecutive American Heart Association Cardiovascular Heroes and we have established centers of excellence that have six endowed chairs; we have six consecutive American Heart Association Cardiovascular Heroes and we have established centers of excellence that have six endowed chairs; we have six consecutive American Heart Association Cardiovascular Heroes and we have established centers of excellence that have six endowed chairs; 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2012: Jay N. Cohn, M.D., Professor of Medicine and Director,
2011: David Benditt, M.D., Professor of Medicine and Co-
2013: Jian-Ming Li, M.D., Ph.D., Associate Professor of Medi
-
2010: Gary S. Francis, M.D., Professor of Medicine and Interim
2008: Robert Bache, M.D., Ph.D., Professor of Medicine, Clinic
-
A History of American Heart Association Heart Heroes
-
2009: Robert F. Wilson, M.D., Professor of Medicine, Interven
-
Demetri Yannopoulos, M.D.

The National Institutes of Health has recognized Dr.

− Robert K. Eddy Endowed Chair in Cardiovascular Medicine: Rita Perlino, Ph.D.
− St. Jude Medical Endowed Chair in Cardiology: Daniel J. Garry, M.D., Ph.D.
− John E. Foker, M.D., Ph.D.
− Endowed Chairs
− University of Minnesota Medical Center, Fairview (UMMC) is the

Top Doctors in the Twin Cities 2013

Cardiology and Cardiovascular Surgery

• Stephen C. Battista, M.D.
• Candace D. Dick, M.D.
• Eric R. Ernst, M.D.
• Karl W. Foster-Smith, M.D.
• Gary S. Francis, M.D.
• Steven M. Heifetz, M.D.
• Alan T. Hirsch, M.D.
• Rosemary F. Kelly, M.D.
• David D. Lawson, M.D.
• Kenneth K. Liao, M.D., M.P.H.
• Richard C. Madlon-Kay, M.D., M.S.
• Ganesh Ravindran, M.D., M.S.
• Scott Sakaguchi, M.D.
• Sara J. Shumway, M.D.
• Robert F. Wilson, M.D.

SNAPSHOT OF OUR PROGRAM: 2012-2013

FUNDING

13 R01 Grants
4 U01/Center/PPG Grants
1 T32 Grant
K Awards/AHA SDG
25 Other NIH Grants
14 Foundation/Industry Grants
3 University of Minnesota Grants

161 Peer-reviewed publications including those that appeared in:

EXPERTISE

43 Clinical and Basic Science Faculty
5 AHA Heart Heroes - Physician Scientists
46 Endowed Chairs
2 Editors-in-Chief
4 AHC Academy for Excellence in Health Research Awards
161 Peer-reviewed publications including those that appeared in:

TEACHING/MENTORSHIP

22 Clinical Cardiovascular Fellows
138 Subspecialty Fellowships
830 Lectures for fellow, residents and medical students
5 Named Mentorship Colleges established
The third annual Red Hot Soiree was held on April 6, 2013, at the historic Depot in downtown Minneapolis. This black-tie event featured retired news legend Don Shelby as emcee and was dedicated to the founder of the Lillehei Heart Institute, Katherine (Kaye) Lindberg Lillehei, wife of world-famous cardiac surgeon C. Walton Lillehei. Nearly 700 people attended the event, which raised more than $719,000 towards cardiovascular research and education.

**HEART ADVISORY COMMITTEE**

Earl E. Bakken  
Co-founder of Medtronic, Inc.

Timothy Baer  
Executive Vice President and General Counsel, Target Corp.

David S. Cannom, M.D.  
Founding & Managing Partner Los Angeles Cardiology Associates

Yale T. Dolginow  
Consultant, Elanstrategic, LLC

Robert K. Eddy  
Retired CEO, Connections, etc.

Brian E. Engdahl, Ph.D.  
Psychologist, Veterans Affairs Medical Center, Minneapolis

Donald L. Garofalo  
Former President and CEO Andersen Corporation

Patrick A. Garofalo  
University of Minnesota Heart Health Advocate

Daniel J. Garry, M.D., Ph.D.  
Chief, Division of Cardiology  
Department of Medicine  
University of Minnesota

Dan Gladey  
Medical Device Chairman/CEO,  
Cardiology, Orthopaedics & Spine

Susan Gunderson  
CEP, LifeSource

Steven E. Kruger  
Partner, Best & Flanagan, LLP

David D. Laxson, M.D.  
Executive Medical Director  
UMPhysicians Heart at Fairview

John Lindahl  
Managing General Partner Norwest Equity Partners

Troy Loken  
Project Manager, Ecreativeworks  
President, Lillehei Family  
Charitable Foundation

Maureen McDonough  
Communications Consultant

Joseph M. Metzger, Ph.D.  
Chair, Department of Integrative Biology and Physiology  
University of Minnesota

Ozzie Nelson  
President & CEO, NELSON

Cheryl L. Rantala  
Former Executive  
UnitedHealth Group

Beha R. Rasmussen  
Chairperson  
Northeast Community Bank

Eva B. Rasmussen  
Vice President, Organizational Strategy and Analysis, Northeast Community Bank

Timothy M. Scanlan  
President & CEO  
Scanlan International, Inc.

Randall L. Schiessl, PMP  
Vice President R&D  
Engineering Services Group  
Boston Scientific Corporation

Thomas P. Schnettler  
Managing Director, Merchant Banking  
Vice Chairman, Piper Jaffray

Dennis Wahl, M.D.  
President and CEO, Holaira

Brian D. Wenger  
Chair, Briggs and Morgan, P.A.

**Philanthropy**

**Red Hot Soiree Raises More Than $719,000**

The third annual Red Hot Soiree was held on April 6, 2013, at the historic Depot in downtown Minneapolis. This black-tie event featured retired news legend Don Shelby as emcee and was dedicated to the founder of the Lillehei Heart Institute, Katherine (Kaye) Lindberg Lillehei, wife of world-famous cardiac surgeon C. Walton Lillehei. Nearly 700 people attended the event, which raised more than $719,000 towards cardiovascular research and education.

**Clinical Programs**

Formed in 2010, the Heart Advisory Committee strives to raise the community’s awareness of the innovative, research-driven healthcare options available at the University, and to raise $100 million by 2017 to achieve these goals. Members are listed on the right.
Best Care/Best Value Score
Heart Failure | UMMC

In 2012-13, 100% of all heart failure patients at the University of Minnesota Medical Center (UMMC) received "best care/best value" as defined by the Centers for Medicare & Medicaid Services (CMS) value-based purchasing scores.

Source: CMS

*Intervals established by CMS

Length of Stay
Heart Failure | UMMC

<table>
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<tr>
<th>Days</th>
<th>Minnesota Average</th>
<th>National Average</th>
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<td>17.9</td>
<td>21.4</td>
<td>24.7</td>
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Source: Interagency Registry for Mechanically Assisted Circulatory Support (INTERMACS).
Data covers period from June 23, 2006 through June 30, 2013.

Best Care/Best Value Score
Acute Myocardial Infarction (AMI) | UMMC

In 2012-13, 100% of all AMI patients at the University received "best care" as defined by the Centers for Medicare & Medicaid Services (CMS) value-based purchasing scores.

Source: CMS
*Intervals established by CMS

With a history of breakthroughs in transplantation and advanced heart failure, our team continues to push the boundaries of research and treatment.

60 Years of Breakthroughs
• 1952: Performed world’s first successful open heart surgery
• 1970s: Conducted first clinical studies in heart failure, leading to first treatments that reduced death and disability
• 1978: First heart transplant
• TODAY: The most heart transplants in Minnesota — 798 since 1978
• TODAY: Transplant survival after one year (93%) and three years (93%) is among the best in the nation
• 80 percent of heart transplant patients at our center survive five years or more
• Established an innovative new clinical program called C.O.R.E. (Cardiomyopathy Optimization Rehabilitation and Education) to provide 24-hour care with individualized outpatient treatment focused on education and support that improves survival and dramatically reduces re-hospitalizations.
• Established new advanced heart failure satellite clinics within the region.

Ushered in a new era in medicine by implanting a total artificial heart, driven by a power pack that doesn’t keep patients tethered to the hospital. The mechanical heart is designed as a bridge to transplant.

Advanced treatment for a condition called Heart Failure with Preserved Ejection Fraction (HFpEF), which results from increased ventricular stiffness commonly associated with aging. We are exploring new treatments that reduce the risk for congestive heart failure, atrial fibrillation and pulmonary hypertension.

With a history of breakthroughs in transplantation and advanced heart failure, our team continues to push the boundaries of research and treatment.

INITIATIVES & INNOVATIONS

8
A veteran Navy corpsman and business executive with little medical background, Lawrence Lessard has sought out many ways to answer questions about his heart disease. Since his initial diagnosis in 1998, he undertook multiple drug regimens and two renal stents; enrolled in two trials, received an ICD implant and a heart transplant; had an aortic abdominal aneurism repaired; received ablation and a carotid endarterectomy. Over the last 15 years, Lessard joined and enthusiastically participated in patient groups to learn more about the pros and cons of various therapies and treatments. As he noted, “the more you know, the more you know what you don’t know.” With his 2002 diagnosis of end-stage heart failure, he joined a weekly heart support group at the University of Minnesota, which included both patients who were waiting for and those who had already received heart transplants. He learned directly from patients in his same situation and heard about their experiences—the highs and lows—before and after surgery. He grew to understand that fear was a natural reaction, but an emotion that could be better managed through peer relationships and the exchange of relevant and accurate information.

Lessard also joined the Second Chance for Life Foundation, whose mission is “patients helping patients.” He started by answering patients’ and family members’ questions and finding funding sources to ease financial burdens on families. Soon he volunteered his leadership skills on the board of directors. Setting up fundraisers, writing grants, visiting patients, all while still attending weekly support groups, gave him a profound feeling of accomplishment. He is now the president. This role “has brought me great satisfaction, to see the fear factor dissipate from the patients and families,” he says. “That fear reduction is turned into a positive attitude and a great healing factor.”

According to Daniel J. Garry, M.D., Ph.D., Lessard’s physician, fear is a real and damaging factor in one’s recovery. “I can attest to the fact anything we can do to reduce this emotion through education does indeed lead to more positive outcomes,” he says. “Mr. Lessard has also taken what some would consider a tragic turn of events and used it as a positive motivation for himself and others,” Garry continues. “His dedication to educating others in ways only another patient can, is an amazing example of using one’s extra years of life to change others’ lives.”
**Major Procedures Mortality**

CAB, Valves, CAB/Valve procedures combined

Average mortality consistently well below national average:

- 2010 - 1.4%
- 2011 - 2.1%
- 2012 - 1.5%

**At a Glance:**

- National leader in implanting Ventricular Assist Devices (VADs), with more than 650 total, or about 70/year
- Recognized pioneers in mechanical circulatory support bridge-to-transplant clinical trials
- One of a handful of training sites for transplant technologies such as Thoratec® HeartMate® II and CentriMag® devices

**Cardiovascular Surgery**

Our nine outstanding cardiac surgeons perform nearly 1,000 adult and 300 pediatric cardiac surgical procedures each year. Areas of expertise include coronary artery bypass grafting, valve surgery, aortic surgery, surgery for cardiac arrhythmias and surgery for heart failure.

The total artificial heart, designed to keep patients alive until they can get a human heart transplant, is an excellent option for selective patients who have biventricular failure.

**New Hybrid O.R.:**

Newly opened hybrid O.R. integrates vascular surgery, interventional radiology, cardiac surgery and anesthesia services, allowing clinical cardiovascular subspecialties to work together to provide the safest, most advanced care in the nation. It is a unique combination: part endoscopy suite and part operating room that offers unparalleled technology designed to assist in minimally-invasive procedures as well as to improve outcomes during the most serious and invasive operations. In designing this space, our focus has been locked onto one thing: improving care for our patients.

**Pioneer program in hybrid and robotic-assisted coronary artery bypass surgery:**

Some patients with coronary artery disease in multiple vessels benefit most from a combination of angioplasty and coronary artery bypass surgery known as a “hybrid” procedure. Interventional cardiologist Gladwin Das, M.D. and cardiothoracic surgeon Kenneth Liao, M.D., have pioneered a program specifically for these patients. A dedicated angiography/surgical suite at the University of Minnesota Medical Center accommodates hybrid procedures in one room. The hybrid suite is used for transcatheter aortic valve replacements (TAVR), and the newly formed Aortic Surgery Center.

A recently inaugurated Aortic Surgery Center will focus on vascular disease in the aorta including patients who have had previous aortic dissection surgery and aneurysm surgery. Novel techniques such as hybrid surgery, debranching operations and aortic stenting will be performed in UMMC’s new hybrid room.

**Offering breakthrough surgical options for patients with advanced heart failure:**

Patients with advanced heart failure benefit from a multidisciplinary approach to evaluation by a team of both experienced cardiologists and cardiac surgeons. Surgical options for such patients often include high-risk coronary artery bypass grafting as well as aortic and mitral valve surgery. Other patients benefit from life-saving procedures that utilize VADs and cardiac transplantation.
ADULT CONGENITAL & CARDIOVASCULAR GENETICS

Pioneers in Treatment of Congenital Heart Disease

Coordinated care for complex health issues

The Adult Congenital and Cardiovascular Genetics Center (ACCGC) provides a unique approach to cardiac care. The program features the combined expertise of adult and pediatric cardiologists, a nurse coordinator and a genetic counselor, which allows us to care for patients through all stages of their lives. This collaborative care model features an extensive team of professionals providing coordinated care for complex medical problems.

Clinical

• Created a separate Adult Congenital Heart Disease (ACHD) Clinic and Cardiovascular Genetics Clinic and staff an ACHD inpatient consult service 24 hours a day, seven days a week.

• Established an Adult Neuromuscular Cardiomyopathy Clinic, the first of its kind in the U.S. Among the many genetic conditions we treat are inherited/familial cardiomyopathies, including those related to muscular dystrophy (MD). Due to enhanced medical treatments, the abbreviated life span of patients with MD has been prolonged, but now all develop heart failure. By collaborating with cardiology, neurology and pulmonary experts, we are able to provide comprehensive health care services to these patients.

Research

Conducting research that delves deeper into patients’ genetic makeup to determine the cause of their disease. Through molecular analysis (genomics), we are discovering why a shared genetic mutation affects family members in different ways. Soon, with patients as critical partners, we will make family-specific stem cells to study how the heart cells that grow from them are abnormal and to discover new therapies for their diseases.

At a Glance:

Cardiovascular imaging serves as the backbone for evaluation of all cardiovascular patients by providing:

• Early, accurate diagnosis

• Perform lowest risk imaging tests to help avoid invasive procedures

• Evaluation of treatment and follow up

• Support for multiple programs in our service line that includes TAVR, pulmonary hypertension, adult congenital, cardiomyopathy, vascular disease and more

GROWTH & RESULTS

The University of Minnesota is one of the first in the state to offer the full line of state-of-the art multimodality imaging services side by side in one location. Because of our focus on excellence in patient care, all services are located in close proximity to enable a seamless clinical experience for our patients.

We continue to make great strides building a “Top 10” imaging program that is patient-centric, most notably by embedding it in Cardiology. In collaboration with the University’s Center for Magnetic Resonance Research (CMRR), home to some of the most advanced MR instrumentation in the world, we are at the forefront of interdisciplinary biomedical research that has a direct impact on patient care. One major benefit is the ability to apply low-level radiation techniques in our imaging studies. We use the lowest level of radiation offered by any other facility in the state, which helps to relieve patient concerns.
Our skilled and dedicated physicians have established clinical interventional programs and conducted research that have kept the University of Minnesota at the forefront of clinical and technical advancements in interventional cardiology for decades, benefiting thousands of patients in Minnesota and beyond.

Our program was one of the first in the nation, in 1986, to use angioplasty to rapidly reopen heart arteries in patients having heart attacks. This procedure has since become standard therapy for heart attacks around the world.

Our door-to-balloon time is within the top 1% of U.S. hospitals.

Meet Diane Waldoch

"The worst heartburn of my life"

At work on Friday, October 5, 2012, Diane Waldoch was having “the worst heartburn of my life.” A nurse co-worker urged her to go to the emergency room. So did her personal physician.

“I argued with them — can’t I just make an appointment? I’ll be fine; I just need some medicine,” she said. At age 65, she had normal cholesterol and no history of heart trouble.

After a blood test in the ER, they took her to the catheterization lab with diagnostic imaging equipment used to visualize the arteries and chambers of the heart for any abnormalities. “I was sure they had the wrong person,” she said. Yet she ended up with a spontaneous dissection of her coronary artery. “I was very lucky Dr. Kimara March was on staff,” Waldoch said. “I felt like I was in good hands.”

Waldoch had been set to retire in a few weeks from her stressful job at the hospital. She has since learned that one of the main reasons for heart events like the one she experiences is indeed stress. “Three things can cause the most stress: moving — and we were in the process of selling our house; work — my job was going through a lot of changes; and divorce — fortunately, my marriage was fine,” she relates.

She started cardiac rehab in the hospital, and is now in good shape. “It’s truly a life-changing event,” she says. “I was very upset that this happened. I didn’t smoke; didn’t drink much, and my husband and I are hikers. You do need to exercise your heart.”

Now retired, she has met one of the goals on her “bucket list”: Traveling Route 66 from beginning to end and not making any hotel reservations. “It was the best vacation I’ve ever had in my life,” she said. “It gave me the confidence I’m going to be just fine.”

Next on their list is to hike every state park in Minnesota. “We’re on park number 41 out of 73,” she says. Waldoch wants to remind people that she never had chest pain or arm pain. “It just seemed like really bad heartburn.” It’s important that people pay attention to heartburn. “I’m thankful every day the emergency staff picked up on that.”

After recovery, Diane was able to meet one of the goals on her “bucket list.” Traveling Route 66 from beginning to end and not making any hotel reservations. “It was the best vacation I’ve ever had in my life,” she said. “It gave me the confidence I’m going to be just fine.”

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Clinical Outreach Sites

New/Advanced services:
- Heart-Mind Center established
- Physicians collaborate with colleagues in emergency medicine, neurology, program with a focus on syncope and cardiac resuscitation.
- In addition, our care is complemented by a comprehensive and innovative clinical and basic science research program with a focus on syncope and cardiac resuscitation.
- Conditions. Clinical care at the Cardiac Arrhythmia Center is complemented by a comprehensive and innovative clinical and basic science research program.
- We optimize care by providing the most appropriate, effective and advanced diagnostic methods and treatments for patients with a broad range of heart rhythm disturbances: excessively fast or slow heart rhythms, life-threatening abnormalities, syncopal episodes fainting spells and related disorders.
- We serve as a referral center for patients with complex rhythm disorders.
- More than 30 years after its founding, the University of Minnesota Cardiac Arrhythmia Center remains a regional, national, and international leader.
- To facilitate public awareness of sudden cardiac arrest, drug interventions and prevention training for first responders, Jian-Ming (Jimmy) Li, M.D., Ph.D., a University of Minnesota faculty member, convened a joint symposium at the 2013 Great Wall International Congress of Cardiology to promote new treatments in resuscitation science.
- Jian-Ming Li, M.D., Ph.D.
- Associate Professor of Medicine
- University of Minnesota
- Director of Cardiac Pacing and Electrophysiology
- Director of EP fellowship program
- Minneapolis VA Health Care System

OUTREACH

While the annual incidence of sudden cardiac death is estimated to be 300,000 to 350,000 in the United States, it exceeds 500,000 in China. To facilitate public awareness of sudden cardiac arrest, drug interventions and training for first responders, Jian-Ming (Jimmy) Li, M.D., Ph.D., a University of Minnesota faculty member, convened a joint symposium at the 2013 Great Wall International Congress of Cardiology to promote new treatments in resuscitation science.

More than 30 years after its founding, the University of Minnesota Cardiac Arrhythmia Center remains a regional, national, and international leader. We serve as a referral center for patients with complex rhythm disorders and advanced overactive nerve pathways. We optimize care by providing the most appropriate, effective and advanced diagnostic methods and treatments for patients with a broad range of heart rhythm disturbances: excessively fast or slow heart rhythms, life-threatening abnormalities, syncopal episodes fainting spells and related disorders.

Cardiac ablation procedures for arrhythmias, including atrial fibrillation
- Diagnosis of abnormal heart rhythms using conventional electrocardiography (ECG), short-term and long-term wearable and implantable ECG monitoring, and comprehensive electrophysiological studies
- Management of pain and related disorders
- Placement of implantable devices (pacemakers and defibrillators) to prevent and treat life-threatening arrhythmias and heart failure
- Cardiac ablation procedures for arrhythmias, including atrial fibrillation and postoperative tachycardias

More than 30 years after its founding, the University of Minnesota Cardiac Arrhythmia Center remains a regional, national, and international leader. We serve as a referral center for patients with complex rhythm disorders and advanced overactive nerve pathways.

We optimize care by providing the most appropriate, effective and advanced diagnostic methods and treatments for patients with a broad range of heart rhythm disturbances: excessively fast or slow heart rhythms, life-threatening abnormalities, syncopal episodes fainting spells and related disorders.

Cardiac ablation procedures for arrhythmias, including atrial fibrillation
- Diagnosis of abnormal heart rhythms using conventional electrocardiography (ECG), short-term and long-term wearable and implantable ECG monitoring, and comprehensive electrophysiological studies
- Management of pain and related disorders
- Placement of implantable devices (pacemakers and defibrillators) to prevent and treat life-threatening arrhythmias and heart failure
- Cardiac ablation procedures for arrhythmias, including atrial fibrillation and postoperative tachycardias

While the annual incidence of sudden cardiac death is estimated to be 300,000 to 350,000 in the United States, it exceeds 500,000 in China. To facilitate public awareness of sudden cardiac arrest, drug interventions and training for first responders, Jian-Ming (Jimmy) Li, M.D., Ph.D., a University of Minnesota faculty member, convened a joint symposium at the 2013 Great Wall International Congress of Cardiology to promote new treatments in resuscitation science.
In the U.S., one in eight women ages 45 to 64 has heart disease.

Meet Susan Goodrich

In 1987, 24-year-old Susan Goodrich of Crookston, Minnesota, had a heart attack from out of the blue. Although she smoked and had high cholesterol, it was still a shock. “I was raising kids, working, doing the usual things,” she says. And she couldn’t look to her family history for explanation, because she was adopted.

Although Susan was well cared for by her physicians in nearby Grand Forks, ND, in her late 30s she developed unremitting leg muscle pain that would stop her walking at less than a block. No doctor could explain why she had developed such severe leg artery blockages. In 2001, she ended up in the hospital for 33 days and underwent nine sequential surgeries to open her arteries and dissolve clots. She was then referred to Dr. Alan T. Hirsch, the director of the Vascular Medicine Program at the University of Minnesota and one of the founders of this important cardiovascular specialty that diagnoses and treats blood vessel diseases that occur outside the heart.

Hirsch diagnosed her with not one, but two rare inherited clotting disorders, as well as with an aggressive form of peripheral artery disease (P.A.D.). “P.A.D. is as common as heart disease, and is extremely dangerous,” he says. “While there is a longstanding myth that P.A.D. is a disease of older men, we have worked hard to bust this myth. People like Susan are often overlooked. That is why we recently worked with the American Heart Association to publish the first ever Scientific Statement on Women and P.A.D.”

Not only did the University of Minnesota make the right diagnosis for Susan, she also was given access to a new anti-clotting drug, fondaparinux. According to Susan and Hirsch, she’s done extremely well since then, and has enjoyed a long decade of health without any new blood clots in her heart or legs.

Because she continues to have some leg symptoms from her P.A.D., she sought access to a new stem cell study Hirsch is leading that is designed to grow new leg arteries. It turns out that for Susan, stem cells are not needed. Instead, she is starting a new home-based P.A.D. exercise therapy that has recently been proven by other University-sponsored research to be equally effective to procedures that open leg arteries.

Susan is grateful for the care she received at the University of Minnesota. “They keep me alive and going,” she says. “Any day in an upright position is a good day,” she adds with a chuckle.
Helping cancer patients minimize or prevent their risk of developing heart disease

Early-stage cancer patients have become one of medicine’s biggest success stories, as the almost 14 million survivors in the United States would be happy to attest. But for many of them, another threat lurks in the background: heart disease. An unwelcome after-effect of many chemotherapy and radiation regimes, heart disease is now the leading cause of death among cancer survivors.

Through its integrated cardio-oncology program, the University of Minnesota has taken aim at this problem with a full-bore range of research and treatment facilities geared toward the prevention and early detection of heart disease in cancer patients, and our physicians are helping patients already diagnosed with cardiovascular problems withstand cancer treatment.

Meet Duane Otremba

U of M doctors first cured his cancer, and now help him fight heart disease.

Forty years ago, when Duane Otremba was 10 years old, he found he couldn’t stay awake in school. “I’d be awake for two hours, then sleep for eight,” he recalls. His family doctor at North Memorial Hospital was stumped. After nine long months of tests, he was diagnosed with Hodgkin’s disease. His parents were told he wouldn’t live past age 16.

Fortunately, his doctor referred him to the late Dr. John Kersey at the University of Minnesota, who was doing some studies with leukemia and drugs. “They accepted me into the study and I started taking treatments,” he says. “Dr. Kersey would come in with his little notebook, check me over and say, ‘he’s strong enough for treatments. Give him this much.’ I’d get sick from the chemo — I mean dog sick. I’d have three days on, one day off.” Otremba became one of the first survivors treated at the University for childhood cancer.

“It’s really been a blessing, to have someone who listens to me when I speak,” he says of the doctors and nurses who care for him. “I know when I ask a question, I’ll get a straight answer.”

Our Expertise

As one of the first programs in the region, our specialized team of cardiologists and oncologists is at the forefront of breakthroughs in cardiovascular care of cancer patients. Led by Suma H. Konety, M.D. and Gary S. Francis, M.D., the team uses the latest advanced imaging technology and a multidisciplinary approach that includes complementary medicine, genetics, rehabilitation and nutrition services.

The Masonic Cancer Center is housed in the newly opened Cancer and Cardiology Research Building, and is one of only two National Cancer Institute (NCI)-designated cancer centers in the state. This recognition for our program meets rigorous criteria for world-class, state-of-the-art programs in multidisciplinary cancer research. The NCI designation not only recognizes excellence but opens doors to greater federal funding, information sharing and resources.

CARDIO-ONCOLOGY

A First for Minnesota

University of Minnesota cardiologists and oncologists are working together to minimize heart disease in cancer patients undergoing chemotherapy.

L to R: Gary S. Francis, M.D., Suma H. Konety, M.D., Marc Pritzker, M.D.
For two decades, the University of Minnesota Vascular Medicine Program has been a national leader in creating and disseminating new diagnostic approaches and treatments for vascular diseases. This program at the University literally “writes the guidelines ...”

CLEVER: As the nation re-tools to provide effective and cost-effective treatments for cardiovascular diseases, the C.L.E.V.E.R. (CLaudication: Exercise Vs. Endoluminal Revascularization) study has concluded its 18-month multicenter investigation. C.L.E.V.E.R. definitively demonstrated that supervised exercise is at least as effective as stenting in improving pain-free walking and quality of life for patients with peripheral artery disease (P.A.D.). As well, exercise is twice as cost-effective. The C.L.E.V.E.R. exercise protocol is now established in five key Fairview rehabilitation sites, demonstrating how research is rapidly translated into effective community care. The C.L.E.V.E.R. study, chaired by Alan T. Hirsch, M.D., remains the only such national trial to provide data that informs ideal use of both stenting and exercise interventions.

The Cardiovascular Cell Therapy Research Network: The PACE trial of stem cell therapy for Peripheral Artery Disease (P.A.D.): When arteries cannot be opened with stents, and exercise is not feasible, it would be ideal to grow new arteries to supply the legs. The PACE (Patients with Intermittent Claudication Injected with Aldehyde Dehydrogenase Bright Cells) trial continues to evaluate the efficacy and safety of a patient’s own stem cells as a method to improve blood flow to legs for individuals with exertional leg pain, known as “claudication.” This novel study provides hope when traditional vascular surgery or stenting are not possible.

The research portfolio continues to evaluate the impact of smoking on P.A.D.-related health events and costs; the benefit of leg compressive devices on swelling and quality of life for patients with lymphedema; and new methods to provide early detection of P.A.D. across health systems.

INITIATIVES & INNOVATIONS

Minnesota Heart Health Program: “Partners in Prevention” A Public Health Campaign That Prevents Heart Attacks Via Low-Dose Aspirin

This one-of-a-kind state-based public health campaign, leveraging the resources of the University of Minnesota’s Lillehei Heart Institute and the School of Public Health, in collaboration with the Minnesota Department of Health, uses public and health professional awareness tools to inform Minnesotans as to how they can prevent a first heart attack or stroke.

The program highlights the benefits of taking low-dose aspirin daily. After a successful two-year pilot program in Hibbing, Minnesota, the program is now expanding in northeastern Minnesota in 2014. The science on aspirin is clear. When used correctly, daily low-dose aspirin can reduce the number of heart attacks and strokes. Before this program was initiated, fewer than 30% of Minnesotans in the target group — men ages 45 to 79 and women ages 55 to 79 — actually were using aspirin daily. By increasing the safe use of aspirin, more citizens would stay healthy—and the state would realize millions of dollars in health-care cost savings as the number of people hospitalized by strokes and heart attacks decreased.

The program saturated the city of Hibbing—population 16,350— by creating an award-winning media campaign (the national “Ragan Award” for Best 2013 Health Campaign), urging older residents to work with their health-care professional to lower their risk by using aspirin. The program also engaged health professionals across three health systems to approach their patients about primary prevention aspirin use. The program was very effective, with aspirin use increasing from 36% to more than 54% within six months and the success was sustained one year later. Efforts continue with a goal of achieving a rate more than 75% in the year ahead.
Demetri Yannopoulos, M.D., one of the national leaders in resuscitation medicine, directs the Minnesota Resuscitation Consortium (MRC), which was established in 2011 with funding from the Medtronic Foundation. Its goal is to increase survival rates in Minnesota for sudden cardiac arrest (SCA), so that every person who suffers from one will receive lifesaving, state-of-the-art care at the scene, en route and in the hospital.

Because every minute counts during a sudden cardiac arrest, we participate in the Cardiac Arrest Registry to Enhance Survival (CARES), which measures how quickly first responders react to SCA calls as a way to improve the "chain of survival" process. The MRC’s efforts have increased overall participation in CARES by almost 50 percent, with nearly half of the state’s counties, 20 EMS agencies and 55 hospitals participating in this important research.

Due to the many initiatives developed by the MRC, overall survival in the state of Minnesota for cardiac arrest victims is now 14%, one of the highest rates in the United States. This marks a 55% increase in lives saved from 2011 to 2012.

Demetri Yannopoulos, M.D.

Since the MRC has begun its efforts to raise awareness in bystander CPR and AED use, there have been 475,461 Minnesotans trained in CPR - over 7% of the total state population - and 1125 AEDs registered.

Yannopoulos’ research team is changing the way that CPR is performed. The team has found new therapies to protect the heart and the brain so more people can return home and enjoy a second chance. The goal: to increase survival from Sudden Cardiac Arrest by 50% by 2017.

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Thanks to the MRC, in Minnesota one is never far from...a bystander trained in CPR.

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Since the MRC has begun its efforts to raise awareness in bystander CPR and AED use, there have been 475,461 Minnesotans trained in CPR - over 7% of the total state population - and 1125 AEDs registered.

• Worked collaboratively with AHA to pass legislation requiring all high school seniors in the state to receive CPR training prior to graduation.

• Partnered with the Minnesota Bankers Association to bring awareness of SCA to the community and to provide training for CPR and AEDs, which when used quickly is the most effective treatment for SCA, dramatically increasing the survival rate.

• Trained nearly half a million Minnesotans on new protocols for CPR.

• Implemented a standard process within six large metropolitan hospitals to ensure SCA patients are quickly taken to the cardiac catheterization lab in hospitals for imaging of the heart and arteries. This more aggressive treatment is critical to improving survival rates.

• Increased awareness and marketing with major distribution of a bystander training video. To date, our ‘Save a Life’ simulator has been viewed by over 5 million all over the world.

Due to the many initiatives developed by the MRC, overall survival in the state of Minnesota for cardiac arrest victims is now 14%, one of the highest rates in the United States. This marks a 55% increase in lives saved from 2011 to 2012.
New device helps prolong CPR, giving doctors more time to save patients.

When Steven Froemel, of Alexandria, Minn., went into cardiac arrest on August 11, a new device helped prolong CPR — and kept him alive for more than an hour.

Physicians used the LUCAS 2 Chest Compression System, an automated CPR unit. The device keeps a patient's blood circulating, delivering much-needed oxygen to his organs. The LUCAS device became available in the Twin Cities metro area about four years ago, and since then it has been adopted widely by Twin Cities emergency medical professionals. Increasingly, the technology is being used to save lives.

Froemel recently visited the cardiac team that saved his life at the University of Minnesota Medical Center. His cardiologist, Dr. Uma Valeti, showed Froemel the LUCAS device that kept him alive while Valeti repaired a vessel that was detaching from his heart.

“Your heart was in arrest for about 70 or 80 minutes without a heartbeat and we couldn’t shock you out of it,” Valeti said. Froemel, a soft-spoken 62-year-old, can hardly believe he survived.

Valeti said there was a risk that he could fix Froemel’s heart and later discover that his patient’s brain was irreparably damaged, to the extent that Froemel would have to be cared for in a nursing home. Despite the risk, Valeti was successful and as a result Froemel is doing fine.

There are some ways that doctors can get a sense of how a patient’s brain is coping with extended CPR. But there are no perfect tests during emergency situations, and research on the subject is limited, based only on a handful of cases. Accounts of the efforts to save Froemel will be published in a state case series report that so far includes about 20 extended resuscitations that have occurred in Minnesota during the past two years of which eight have lasted longer than an hour.

Dr. Demetri Yannopoulos, Medical Director of the Minnesotta Resuscitation Consortium, said he has visited every cardiac catheterization lab in the Twin Cities to encourage doctors to be more aggressive in trying to save cardiac arrest patients who may have a treatable problem such as a blood clot or a damaged vessel. He said it is now common practice in the Twin Cities to get such patients into the catheterization lab within two hours of an arrest so medical professionals can re-establish blood flow to the heart, brain and other vital organs.
UMP Heart - By the Numbers

Data from FY 13, July 1, 2012 – June 30, 2013

• Cardiology consultations
• Cardiac catheterization lab (Fairview Southdale and Ridges Hospitals)
• C.O.R.E. Clinic heart failure management (Fairview Southdale and Ridges Hospitals)
• Preventive cardiology

• Device clinic (Fairview Northland Medical Center)
• Electrophysiology consultations
• Nuclear cardiology
• Stress testing

Additional services provided at these sites include:

Patient Care Sites:

Heart Centers
University of Minnesota Medical Center, Fairview Minneapolis, MN
Fairview Southdale Hospital
Edina, MN
Fairview Ridges Hospital
Burnsville, MN

Heart Clinics - Twin Cities Metro
Fairview Maple Grove Medical Center
Maple Grove, MN
Fairview Clinics – Uptown
Minneapolis, MN
Fairview Clinics – Fridley
Fridley, MN

Heart Clinics - Greater Minnesota
Fairview Lakes Medical Center
Wyoming, MN
Fairview Range Medical Center
Hibbing, MN
Fairview Northland Medical Center
Princeton, MN

U M P  H e a r t  -  B y  t h e  N u m b e r s

CV Surgeries 889

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<tr>
<td>Coronary &amp; Structural Interventions</td>
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| Clinic Visits | 55,705 |

Data from FY 13, July 1, 2012 – June 30, 2013
The Lillehei Heart Institute (LHI) strives to carry out the highest quality cardiovascular health research by bringing together faculty and students committed to cardiovascular scholarship, facilitating their interaction and allowing them to share core University resources. LHI researchers continue a long tradition of leading-edge innovation and build on it by preparing the next generation of scientists to eclipse their accomplishments in the global effort to cure heart and vascular diseases.

A new initiative is the creation of Colleges within the University of Minnesota Cardiovascular Fellowship Program named for our luminaries who transformed cardiovascular medicine, including the Burchell College, the Cohn College, the Lillehei College for general cardiovascular fellows, the Dantzig College for residents and the Wilson College for Medical Students. Each College consists of two college mentors and approximately 10 trainees. Together they focus on establishing a “home within a home” environment to promote academic and career mentoring as well as support, wellness and balance in their lives. The overall goal for the Cardiovascular College Program is to fuel the passion and excitement for discovery, innovation and pursuit of an academic career and love of medicine. In addition, the goal is to foster autonomy and pride and sustain an awareness of the impact that one leader can have on an entire field.

Launched New LHI Educational Initiatives in 2013:
• Fellows and Resident Colleges
  - The NIH Transformative Research Award was granted to one of the University of Minnesota’s visionary leaders for his pursuit of a discovery that has the potential for transformational breakthroughs in CPR. Demetri Yannopoulos, M.D., Associate Professor of Medicine, Research Director of Interventional Cardiology and Director of the Minnesota Resuscitation Consortium, was recognized for his work in preventing patient injuries in the administration of CPR. Yannopoulos is the Principal Investigator of a multi-disciplinary, multi-institutional team from the University of Minnesota, the Medical College of Wisconsin and the University of Michigan. Their proposal “Reperfusion Injury Protection Strategies during Cardiopulmonary Resuscitation” is recognized as one of ten “High Risk, High Reward” awards granted for proposing a highly innovative approach to a major contemporary challenge in biomedical research. Yannopoulos and his team will receive $5.4 million in total grants over five years.
  - Jop van Berlo, M.D., Ph.D., Assistant Professor of Medicine, received the NIH Pathway to Independence Award (K99/R00) from the National Heart Lung and Blood Institute, recognition designed to increase and maintain a strong cohort of new and talented NIH-supported independent investigators. He was also a finalist for the AHA Melvin L. Marcus Young Investigator Award in Basic Cardiovascular Sciences. Van Berlo’s research focuses on stem cell directed cardiogenesis.
  - Ganesh Ravendran, M.D., Assistant Professor of Medicine, Primary Investigator with the Stem Cell ASSURANCE study, is evaluating the safety and effectiveness of administering a person’s own stem cells to repair damaged heart muscle in patients with heart failure who are undergoing left-ventricular assist device (LVAD) implantation.

The University of Minnesota hosted the 5th Annual PCBC Investigators Meeting of the NHLBI Progenitor Cell Consortium for more than 200 nationally renowned stem cell investigators from September 30 to October 2, 2013. This annual meeting supports collaborative efforts and advancement of synergistic research projects among the consortium members.

The University of Minnesota is one of 17 select hub sites receiving $170 million in grant funding over seven years to identify and characterize progenitor cell lineages, to direct the differentiation of stem and progenitor cells to desired cell fates (such as heart or vascular cells) and to develop new regenerative medical strategies in patients with heart disease. Directed by Daniel J. Garr, M.D., Ph.D., this programmatic initiative assembles outstanding research investigators at the University of Minnesota and the Midwestern Hub.
The University of Minnesota celebrated the opening of the “gateway to the Biomedical Discovery District,” the new Cardiovascular and Cancer Research Building (CCRB), in June 2013. The CCRB is the fifth new research building added to the University’s Biomedical Discovery District, a center of the most advanced research buildings found anywhere in the state. The facility joins the Lions Research Building, the McGuire Translational Research Facility, the Winston and Maxine Wallin Medical Biosciences Building and the Center for Magnetic Resonance Research.

The Lillehei Heart Institute and the Department of Integrative Biology and Physiology have relocated a number of investigators to the new facility to continue their work in cardiac regeneration, cardiac development, muscular dystrophy, congenital heart medicine and genomics. The Masonic Cancer Center plans to utilize the new space for two specific groups of investigators: chemical biologists focusing on studying chemical carcinogens as a cause of cancer, and faculty focusing on novel new therapeutic strategies to fight cancer. The proximity of these disciplines will spawn new synergistic interactions and discoveries.

In partnership with the State of Minnesota, the University of Minnesota developed the Biomedical Discovery district to allow researchers from across the Academic Health Center to work side by side, unlocking new cures and therapies for our most challenging health conditions. As an incubator for new ideas and products, the Biomedical Discovery District will bolster Minnesota’s economy, firmly positioning the state as a leader in the bioscience industry.

The Lillehei Clinical Research Unit (LCRU) is an innovative trials center run by the Lillehei Heart Institute and connected to both the University of Minnesota campus and the University of Minnesota Medical Center, Fairview. Conducting research in all aspects of cardiovascular disease and its prevention, the LCRU recruits study participants from Minnesota and the U.S. to help answer critical questions about new treatment modalities, innovative medical devices and disease prevention strategies.

The LCRU has a dedicated clinical research staff consisting of an administrative director with more than 20 years in clinical research, a regulatory specialist, eight clinical research coordinators, three clinical trials assistants, a laboratory technician and two full-time biostatisticians, including one in a faculty-level position. Together with community practice cardiologists located at Fairview Southdale in Edina, Minnesota there are 48 cardiologists participating in clinical trials.

A state-of-the-art place for collaboration

The Summer Research Scholars Program at the Lillehei Heart Institute provides select high school and undergraduate students with valuable career development and mentorship through intensive basic and clinical research. This program is one of only two in the state that focuses so intensely on cardiovascular research and provides access and mentoring by high-level faculty. Twelve participants were selected from more than 150 applicants to participate in 2013. With this program, we intend to build future leaders in cardiovascular medicine and science.
We train nearly 65% of the cardiologists practicing in Minnesota.

Since the establishment of the first cardiovascular medicine fellowship program in 1954, we have trained more than 300 cardiologists, including 65 percent of those practicing in Minnesota, and have dramatically impacted cardiovascular healthcare throughout the Midwest.

Our mission, to educate future generations of academic cardiologists, has taken on new energy and passion. The one constant is change — change in growth of fellowships, change in programmatic partnerships, change in the growth of fellows and changes leading to new discoveries by our fellows.

Training the Next Generation

Four-Year Curriculum

Our fellowship has expanded to a four-year program, one of a few across the country, to promote career development and an innovative research experience for each fellow. With this model we will coordinate efforts with our seven subspecialty fellowships to recruit trainees who have an interest and passion to move forward into these areas. We believe this investment and focus will amplify and accelerate the careers of our fellows.

At a Glance:

- Complete spectrum of patients with CV disease
- Depth in all subspecialties, including vascular disease, heart disease prevention, women’s health, CV imagery and electrophysiology
- Increasing responsibility and autonomy with each level of training in invasive/non-invasive procedures
- Dedicated faculty committed to training future leaders in cardiovascular medicine
- Collaborative opportunities with Lillehei Heart Institute, Center for Cardiac Repair and Recovery and Stem Cell Institute

We train nearly 65% of the cardiologists practicing in Minnesota.

New Programmatic Partnerships:

We continually look for opportunities to improve how we educate and emphasize the importance of mentorship. As a resource for our trainees, we have assembled a profile of all mentors and research opportunities which can be obtained in hardcopy or at z.umn.edu/cvprofile.
Resources - Provider Directory

Cardiovascular Surgery
Gregg Anderson, M.D.
John E. Fiscus, M.D., Ph.D.
Rafi Noch, M.D.
Bruce A. Zwei, M.D., Ph.D.
Gabriel Lurie, M.D.
J. Ernesto Molina, M.D., Ph.D.
Sara J. Shrumoey, M.D.
Herbert B. Ward, M.D., Ph.D.

Cardio-Oncology
Stephen实验室, M.D.
Sue T. Koren, M.D.
Thenappan Thenappan, M.D.
Tushar Vora, M.D.

Electrophysiology
Ahmet Selcuk Adabag, M.B.B.S., M.D.
Wayne Appleson, M.D.
Lakshya Arora, M.D.
David G. Behrith, M.D.
Lin Xie Chen, M.D.
Demosthene Ikos, M.D.
Huagui Li, M.D., Ph.D.
Jian-Ning Li, M.D., Ph.D.
Quan Pham, M.D.
Hien Riouko, M.D.
Scott Selz, M.D.
Verkathikonda Thilakavathi, M.D.

General Cardiology
Robert J. Becher, M.D.
R.J. Dahiya, M.D.
Candace D. Dick, M.D.
James W. Erdahl, M.D.
Eric R. Ernst, M.D.
Sara J. Shrumoey, M.D.
Charles X. Kim, M.D.
Suma H. Konety, M.D., M.S.
Robert Ketroser, M.D.
C. Jennifer Dankle, M.D.

Heart Failure & Transplantation
Sita R. Adyan, M.D.
Inderjit Anand, M.D.
Rebecca J. Cogswell, M.D.
Monica Colin-Adams, M.D., M.S.
Peter Ekstrom, M.D.
Eric Ernst, M.D.
Violet Florence, M.D.
Gary S. Francis, M.D.
Daniel J. Garry, M.D.
Cindy M. Martin, M.D.
Marc Priztler, M.D.
Therappra Thanappan, M.D.

Interventional Cardiology
Ahmet Selcuk Adabag, M.B.B.S., M.D.
Stephen C. Battista, M.D.
Alan K. Berger, M.D.
Stefan Bortol, M.D.
Trinder Brind, M.D.
Y.S. Chandrashekhar, M.B.B.S.
Glebens S. Das, M.D.
Santiago Garcia, M.D.
Stephen Herrick, M.D.
Gregory A. Sauer, M.D.
Abel Jaima, M.D.
David D. Lassen, M.D.
Michael J. Manson, M.B.
S. Kimara March, M.D.
Abdul Mahmood, M.D.
Gary S. Mann, M.D.
David D. Lassen, M.D.

Lipid Disorders
Daniel Duprey, M.D., Ph.D.

Preventive Cardiology
Jay N. Cohn, M.D.
Daniel Duprey, M.D., Ph.D.
Robert Kleinman, M.D.

Pulmonary Hypertension
Monica Colin-Adams, M.D., M.S.
Marc Priztler, M.D.
Therappra Thanappan, M.D.

Vascular Medicine
Alan K. Berger, M.D.
Trinder Brind, M.D.
Daniel Duprey, M.D., Ph.D.
Alan T. Hirsh, M.D.
Charles X. Kim, M.D.
Brian T. Lew, M.D.

General Resources - Location Directory
Cardiovascular Division Administration (academic):
(612) 625-9100 • www.med.umn.edu/cardiology

Lillehei Heart Institute (basic science research):
(612) 625-8998 • www.ihhi.umn.edu

Lillehei Clinical Research Unit (clinical trials):
(612) 626-6966 • www.med.umn.edu/crui

Patients, please call: toll free (877) 740-6444 / (612) 365-6000
Physicians, please call: toll free (877) 650-1555 / (612) 365-5000
University of Minnesota Physicians Heart at Fairview (patient care):
(612) 626-6966 • www.med.umn.edu/lcru
Lillehei Clinical Research Unit (clinical trials):
(612) 625-8988 • www.lhi.umn.edu

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Project Assistant
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