The Beat

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PAULEY HEART CENTER

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Partners in Life

ARCTIC Medical Director Dr. Mary Ann Peberdy and her husband, Dr. Joseph Ornato, have created one of the world's most renowned cardiac resuscitation programs.

The pair have been at the forefront of clinical care and research in cardiac arrest for decades.

Continued ▸▸▸

VCU Health
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JOSEPH ORNATO, M.D., AND MARY ANN PEBERDY, M.D., WORKING TOGETHER ON THE ARCTIC PROGRAM, WHICH CARES FOR ABOUT 90 PATIENTS EACH YEAR.

With the recent arrival of the Weil Institute, VCU is poised to also become a basic and translational research powerhouse in this field.

"That day is a total blank in my memory. What I've been told is that I had been on an elliptical machine, and I left that and went to a stationary bicycle. At that point, I blacked out and fell off the bicycle," recalled Bob Hershberger, 70, a U.S. Air Force veteran and retired executive vice-president of the Williamsburg Chamber and Tourism Alliance.

"The work Dr. Peberdy and Dr. Ornato did with the ARCTIC Program was pioneering. They did this at a time when no one was really thinking about cardiac arrest and post-sequalae to the brain. Much of the work was done quietly and without much fanfare. Now, this is the cutting edge of cardiovascular medicine."

— Vigneshwar Kasirajan, M.D.

Hershberger has pieced together some of the details from April 7 when he suffered a cardiac arrest—an often-fatal condition when the heart suddenly stops beating effectively—while working out at a local health club. Attendants at the club rushed to his aid and called a rescue squad. Paramedics shocked his heart with a defibrillator and brought him to Sentara Williamsburg Regional Medical Center, where he was stabilized and then loaded onto a critical care helicopter for transport.

At VCU Medical Center, he was placed under the care of Mary Ann Peberdy, M.D., a cardiologist and the medical director of the Advanced Resuscitation, Cooling Therapeutics, and Intensive Care (ARCTIC) program for post-cardiac arrest care. Peberdy and her husband, Joseph Ornato, M.D., chairman of the VCU Emergency Department, began cooling of patients at VCU in 2004, shortly after "new data became available that demonstrated that if you lower the body temperature you can improve survival and neurological outcomes in patients that have had cardiac arrest," said Peberdy.

Following successful heart resuscitation after cardiac arrest, the patient often remains in a coma from lack of blood flow to the brain during the cardiac arrest. The body undergoes a rapidly escalating inflammatory response that can further jeopardize survival and neurological outcomes. To prevent and reverse this damage, ARCTIC patients like Hershberger undergo therapeutic temperature management with an intravascular cooling device, which chills their body temperature to 92 degrees for 24 hours, then gradually returns the body temperature to normal.

For Hershberger's wife, Margaret, and other family members who gathered at VCU to wait and worry, it was a lot to process: The death of a loved one, resuscitation, then a coma. But Peberdy helped them through it.

"They were impressed by her. She was very calm, which helped to keep everybody else in somewhat of a calm manner, despite the precariousness of the situation," said Hershberger.

Peberdy, the C. Kenneth Wright Professor of Cardiology, created the ARCTIC program, one of the first of its kind in the country, in 2004. The program is multi-tiered, with components including a continuum of clinical care, research, community training in CPR, and coordination with a highly trained network of EMS's and partner hospitals.

"She is a master physician and truly devoted to advancing the science for the care of our patients," said Vigneshwar Kasirajan, M.D., cardiothoracic surgeon and chair of the department of surgery.

In 1974, on the first day of his cardiology fellowship at New York Hospital—Cornell Medical Center, Ornato was assigned to oversee and hone the training of the paramedics. "At that time, it was the only 24/7 paramedic program in all of New York City," he recalled.

Although he knew little about the work, he began joining the paramedics on calls during slow times in cardiology. "Within a couple of months, we actually had our first survival from cardiac arrest…which in 1974 was virtually unheard of. If your heart stopped out of hospital, you were going to die," he recalled. A few days after she awakened in the coronary care unit, his elderly patient—who was looking forward to the birth of her first grandchild—expressed her gratitude to Ornato with a kiss on his cheek. "I remember thinking, `I've been kissed by a dead person'. That moment changed my career."

Today, through his work as a cardiologist and Emergency Medicine specialist, Ornato still works closely with early responders, who play a key part in the "chain of survival" necessary for cardiac arrest patients to survive. In addition to his work at VCU, he is the medical director of the Richmond Ambulance Authority, Richmond Fire & EMS, and Henrico County Division of Fire. He ensures all are kept up-to-date on VCU's ARCTIC program and cutting-edge science in resuscitation.

Peberdy, the C. Kenneth Wright Professor of Cardiology, created the ARCTIC program, one of the first of its kind in the country, in 2004.

He and Peberdy also oversee the training of ARCTIC attending physicians, a component of the program that separates it from others in the small club of top-tier cooling programs.

"We have five attending physicians who are on call, 24/7, to help with the decision-making for the therapy," he said. "We really tried to have a small enough number so that we could ensure that every one of us is absolutely up-to-date on what the latest science is showing as to the proper use and selection of patients for this kind of cooling therapy."

The volunteer group includes Ornato and Peberdy; Antonio Abbate, M.D., Ph.D., James Roberts Professor of Cardiology and vice-chair of the Division of Cardiology; Stephen Miller, D.O., assistant professor of Emergency Medicine; and Harinder Dhindsa, M.D., chair of the Division of EMS.

"Dr. Ornato is one of the leading international experts in cardiac resuscitation. He is not satisfied with the current state of the art, and he and his research and clinical partner, Dr. Mimi Peberdy, are developing new tools for treating and preventing cardiac arrest," said Kenneth Ellenbogen, M.D., chair of the Division of Cardiology.

One of Ornato's most important contributions was serving as principal investigator of the Public-Access Defibrillation study, which was funded by the NIH, the AHA, and industry. Peberdy served as the PI for VCU/Richmond. The 18-month study trained 19,000 people and placed 1,500 AEDs in 24 U.S. and Canadian cities in how to perform CPR and how to recognize a cardiac arrest and call 911. In half of the study sites, lay volunteers were also trained and equipped to use an AED on the victims before EMS arrival.

The study's findings were published in the New England Journal of Medicine in 2004. "We were able to show that lay persons performing CPR and using an AED doubled the chances of survival from cardiac arrest out of hospital compared to having the lay person just perform CPR. And based on the study—which got a lot of national and international press—the AHA got Congress to pass the Cardiac Arrest Survival Act of 2006," said Ornato.

Soon after the study was published and the Act was passed, all federal buildings in the country were required by law to have AEDs in public places, and all airlines and airports now have AEDs and personnel trained to use them.

The ARCTIC program underwent several big changes in 2008. The first was that VCU began serving as a regional hub to other hospitals for its advanced post-arrest therapies. The second was that the program's attending physicians shifted their focus from cooling patients from the "outside in"—using cooling blankets, ice bags and gel pads—to the "inside out." The latter involves endovascular cooling, which involves the use of a closed-circuit catheter that controls body temperature internally.

The newer process allows for "targeted temperature management," which includes an induction phase, in which the body is cooled; a maintenance phase, in which the lowered temperature is maintained for about 24 hours; and a rewarming phase, in which the body is returned gradually to its normal temperature.

The process of caring for ARCTIC patients in the Coronary ICU is dynamic. "Care is minute-to-minute and hour-to-hour. It's constant evaluation and re-evaluation," said Michelle Gossip, BSN, ARCTIC care coordinator.

Nurses play a key role, she said. "It is the nurse who sees subtle changes in our patient population and, working with our physician staff, provides ongoing emotional support for patients and families."

Unlike many other programs, continuous brain wave monitoring is performed and there is a strong focus on ventilation, hemodynamic, and metabolic parameters to improve outcomes. The ARCTIC program was also the first in the country to perform detailed neuro-cognitive testing in survivors to identify more subtle, persistent areas of brain injury and begin early rehabilitation treatment in these patients. Treatment plans require multidisciplinary teams, made up of heart doctors as well as nurses, neurologists, pulmonologists, technicians, social workers, nutritionists, rehabilitation experts, and physical, occupational, and speech therapists.

Hershberger, who exercised regularly and had no history of heart disease, was found to have blockages in the arteries supplying blood to his heart, which led to his arrhythmia and ultimately cardiac arrest. Once he completed the comprehensive post-arrest care and awoke from his coma, he underwent a successful double bypass surgery at VCU. Upon discharge, he started a 12-week, medically supervised cardiac rehabilitation program near his home.

About the Doctors:

Mary Ann Peberdy, M.D., and Joseph Ornato, M.D., have devoted a significant part of their careers to cardiac arrest patients. Triple board-certified in Cardiology, Internal Medicine, and Emergency Medicine, Ornato has published over 400 papers in the field and recently was awarded the prestigious American Heart Association National Clinical Research Award for his work. Peberdy is also triple boarded in Internal Medicine, Cardiology, and Advanced Heart Failure and Transplant and has published over 200 articles.

Both physicians have served on the AHA national committees for resuscitation science and have been authors in the AHA Guidelines for resuscitation continuously since the 1980s. They are also founding physicians of the AHA Get with the Guidelines-Resuscitation Program, which is the world's largest repository of performance improvement and research data for in-hospital cardiac arrest.

Learn more…

View the VCU ARCTIC Program on a PBS NOVA program that aired on January 26, 2011. To view it, visit *PBS.org/wgbh/nova/body/can-we-live-forever.html* *(the segment starts around the 47-minute mark).*

Hear the story of 16-year-old ARCTIC survivor Ellie Whelan at *vcuhealth.org/success*

For updates on the Weil Institute research, presentations and awards go to: www.weil.vcu.edu

SAVE THE DATE:
Pauley Heart Center Consortium Event on Thursday, May 17, 2018 at Rhythm Hall on the first floor of Dorothy Pauley Square in the Dominion Arts Center.

Partners in Life *continued*

"We want to arm our patients with all the tools they need to be successful when they're discharged," said Gossip, who coordinates the care for this complex patient population and runs a support group for cardiac arrest survivors. She also teaches Hands Only CPR and, with Peberdy, provides training to partner hospitals.

"Michelle is the glue [that holds this program together]," said Ornato. "I just can't say enough good things about her."

Despite the great success of the ARCTIC program, "the one thing we were lacking was the ability to go back and forth between the bench and the bedside to further increase our knowledge and improve outcomes," said Peberdy.

That all changed in 2016, when, after a year-long search, the Weil Institute of Critical Care Medicine chose to move its world-renowned, basic science laboratory from Rancho Mirage, California, to VCU Medical Center. The institute, founded in 1961, was named after the late Max Harry Weil, M.D., Ph.D.—a mentor and friend of Peberdy's and Ornato's for over 25 years—who is considered the father of critical care medicine. Most of the institute's work involves cardiac arrest and emergency care.

"Weil's board of directors made the decision to come to VCU because they wanted the ability to have their basic science work translate into clinical work and they chose us, in part, because of the ARCTIC program," she said. "We are working very closely with them so that the projects they do can be easily translated to the bedside if there are promising outcomes found in the laboratory."

Wanchun Tang, M.D., who was trained by Weil and ran the Institute after Weil passed away in 2011, joined VCU as professor of Emergency Medicine and continues as the Institute's director. Peberdy and Ornato were named co-deputy directors of the Weil Institute of Emergency and Critical Care Research at VCU, which held its grand opening in October 2016.

"We are learning more and more about how to better care for these patients," said Peberdy. "And it's our hope that we can further our research and continue to get better at what we do."

According to the American Heart Association, more than 350,000 out-of-hospital cardiac arrests occur in the U.S. each year, and overall survival is 10%. Chances of survival can double or triple with timely CPR and early defibrillation with an AED.

Walk of Fame: Patient Leads 'Virtual Heart Walk'

When the American Heart Association Richmond Heart Walk took place in September 2016, Craig Trowbridge was in the VCU Health Pauley Heart Center, awaiting a donor heart. But he was determined to take part in the walk.

HEART PATIENT CRAIG TROWBRIDGE AND THE HELPFUL STAFF AT VCU.

"I've always been an active person—running, biking, hockey, golf—and when I heard about the Heart Walk, I told [Clinical Nurse Specialist] Kim Nelson that I was going to participate by walking the 3.1 miles that day on the 10th floor, having my own virtual Heart Walk. Kim took that idea and set up the Heart Walk for the floor," recalled Trowbridge, 58.

He had received a total artificial heart in March 2016; by the time of the walk, he was still tethered to the large console that drove the heart, known as "Big Blue." However, at that time, he was actively engaged in cardiac rehab and walking two miles a day.

"I can't give enough gratitude and praise to the physicians, nurses, cardiac rehab staff, and others for the care and support that I and my family received at VCU."

"I was confident that I would complete the walk, but I was more worried about finding people to pull the 400-pound Big Blue machine for 36 laps. But as was true of the staff at VCU, they enthusiastically supported my walk both by pulling Big Blue and cheering me on," he said. Also lending support was his wife, Maureen, three daughters (with one participating by Facetime from Colorado), and friends.

Several patients from the Cardiothoracic Surgery Progressive Care Unit and some former patients now home with left ventricular assist devices (LVADs) also took part in the walk. A total artificial heart patient with a theatre background sang the national anthem for the opening ceremonies.

When Trowbridge completed the laps, "I was very elated, as it was the longest walk that I had completed while living with Big Blue," he said. Through his walk, he raised about $2,000 for the AHA.

Eight months after Daniel Tang, M.D., performed his total artificial heart surgery, Trowbridge underwent a successful transplant, led by Mo Quader, M.D. "Both are excellent surgeons, personable and very compassionate about their patients," said Trowbridge, who was discharged from VCU on December 7, 2016.

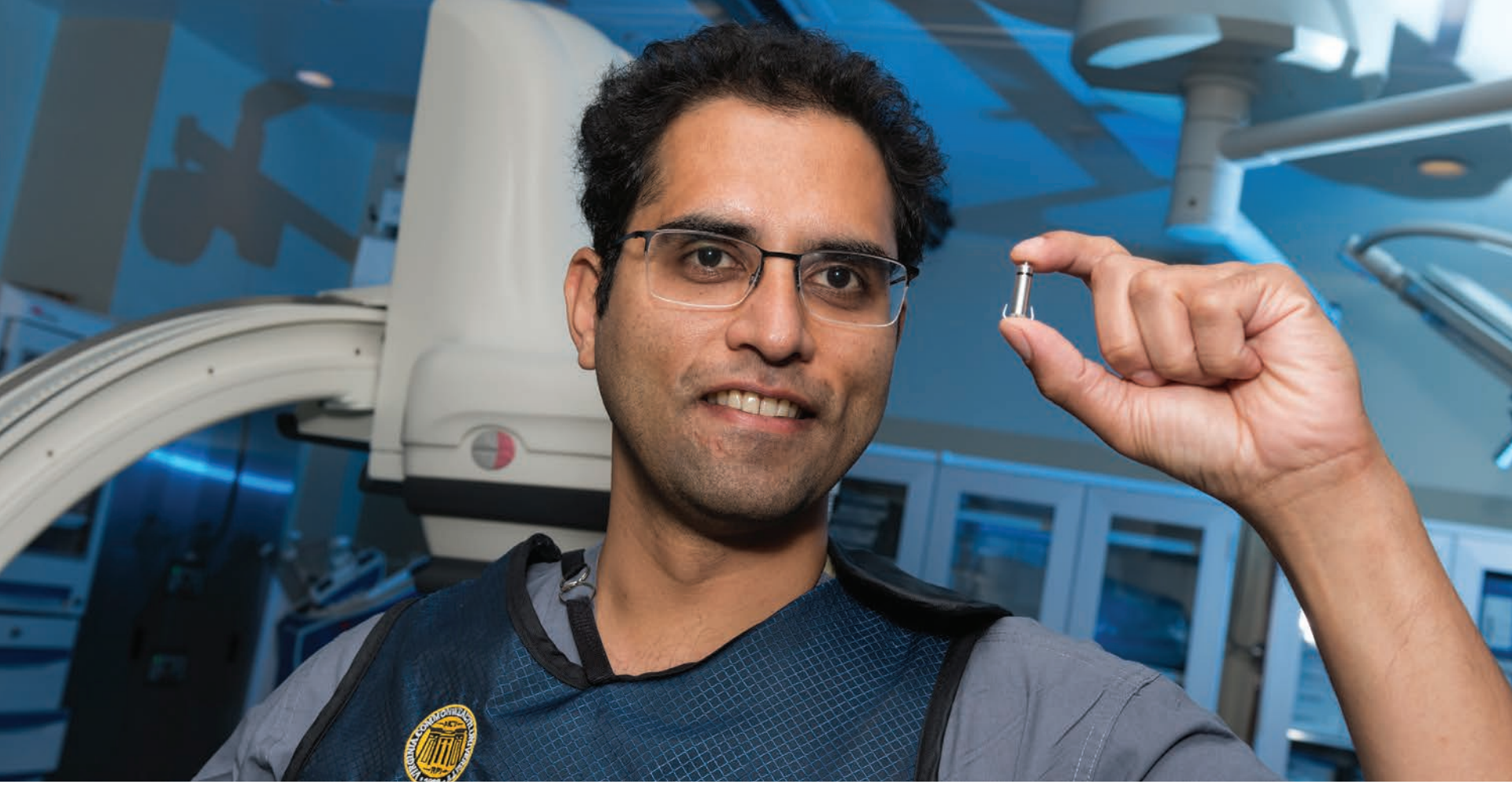
Although he lived at the hospital for many months, he recalls the time fondly. "I can't give enough gratitude and praise to the physicians, nurses, cardiac rehab staff, and others for the care and support that my family and I received at VCU. Many of them became second family to us as we talked about vacations, kids, weddings, engagements, and new births."

He has moved back home to Ithaca, New York, and returned to work at Cornell University, where he directs an applied research unit.

He has many special memories of the Heart Walk: "The opening ceremony and presentations, walking the 10th floor and having other patients in the doorway to their room cheering us on, seeing LVAD and other patients participating in the walk. Having family and friends participate with me was special, and the overall atmosphere was just warm and supportive."

"For several months after the walk, I would see people on the 10th floor that would say `I know you, you did the Heart Walk.'"

Craig Trowbridge's tradition will continue, as the patients on the 10th floor CVT Progressive Care Unit will take part in the 2nd annual virtual AHA Richmond Heart Walk on October 7.



Leadless Pacemaker Provides New Option for Patients

A tiny pacemaker is making huge waves in the electrophysiology community.

The one-inch Micra Transcatheter Pacing System is currently the world's smallest pacemaker and is also the first one without wires, known as leads. VCU Pauley Heart Center is the first health system in central Virginia to implant the pacemaker, which was approved by the FDA in April 2016.

"This is a brand-new technology—the future of pacing," said Kenneth Ellenbogen, M.D., chair of the Division of Cardiology and director of Clinical Cardiac Electrophysiology and Pacing. "It's a new procedure, you can't get it done at any other hospital in central Virginia. We're excited to be offering this procedure and have been successful with it."

Pacemakers generate electrical impulses to treat irregular heartbeats and are traditionally placed through an incision in the chest. Because of its small size, Micra can be implanted directly into the heart's right ventricle by a deflectable catheter—entering the body through a vein in the groin. This provides a new option for patients who were previously not candidates for surgery, including some with a history of infections or who have had prior surgery on the chest, such as a mastectomy.

"It's a new procedure, you can't get it done at any other hospital in central Virginia. We're excited to be offering this procedure and have been successful with it."
—Kenneth Ellenbogen, M.D.

Micra also differs from standard pacemakers because it is self-contained and does not contain leads—the wires that connect the device to the heart. Over time, leads can sometimes get scarred into nearby tissue or be secondarily infected when a patient has a bloodstream infection. This would necessitate major interventions and occasionally might require surgical removal.

The device is available to patients who require a single-chamber ventricular pacemaker to control arrhythmias, such as atrial fibrillation or bradycardia-tachycardia syndrome. While it can vary by patient, the estimated battery life is 12 years.

"At this moment, it is a niche device, helping patients who need pacing in only one chamber, but the future of this technology is truly promising. The current leadless pacemaker is a spectacular device with an outstanding safety profile," said Jayanthi Koneru, M.D., who with fellow electrophysiologist Gautham Kalahasty, M.D., received special training in the device and began implanting it in Dec. 2016.

Koneru predicted that "leadless pacing will truly be a game changer."

ABOVE: JAY KONERU, M.D., HOLDING PACEMAKER

Cardiology Fellows Give Back to Heart Center

Nirmal Shah, M.D., has pleasant memories of the years he spent at VCU Medical Center, where he completed his internship and residency in Internal Medicine, then his fellowship in Cardiology in 2001.

At the time known as MCV, VCU "has the best clinically oriented program and the best teachers," said Shah. "I fondly remember my many mentors." He counts among them Drs. Walter Paulsen, Ian Nixon, Michael Kontos, Bob Jesse, Andrea Hestillo, Michael Hess, Kenneth Ellenbogen, Mark Wood, George Vetrovec, and Anthony Minisi.

In appreciation, Shah—a cardiologist who is now affiliated with Cardiovascular Specialists of Frederick, Maryland,—has made several donations to the VCU Pauley Heart Center. His contributions have helped support a fellowship fund and a cardiology scholarship.

"I wanted to express my gratitude to the place which trained me so well and is the reason for my success in life," he said.

Another former cardiology fellow recently provided support to the newly established Vetrovec Symposium. Named after George Vetrovec, M.D., longtime director of the VCU Cardiac Catheterization Lab, the symposium will bring national speakers to Richmond to discuss advances in the cardiovascular field.

Chair of Cardiology Kenneth Ellenbogen appreciates Shah and other alumni fellows who wish to honor their years at VCU through a donation. "Giving back is certainly a lovely way of saying, thank you," he said. "Gifts like these help us to support so many more academic activities that further enhance the clinical and educational opportunities for our fellows."

If you would like to honor a mentor or a loved one, or learn about other giving opportunities at the Pauley Heart Center, please contact Carrie Mills, Senior Major Gift Officer, at (804) 828-0453 or cmills@vcuhealth.org.

FROM LEFT TO RIGHT: FARIN BALA, PA; CASSAUNDRA MINTER, NP; VICKI GREEN, NP (BACK ROW); LINDA TONEY, NP ; MARY KAY JARRETT, NP (BACK ROW); KRISTIN COX, NP; JENNIFER CARLIN, NP (BACK ROW); MICHELLE KENNEDY, NP; AMY RUSNAK, NP (BACK ROW); KRISTYN RUDISILL, PA; LISA CAPPS, NP, AND ERIN SWITZER, PA

Increase in Patient Load, New Responsibilities Lead to Rise of APPs

Mary Kay Jarrett, FNP-BC, is part of a growing trend. "I was drawn to advancing my nursing education when I met Judy Collins, a longtime Women's Health Care nurse practitioner here at VCU many years ago. I witnessed her outstanding clinical skills as well as her excellent care of the entire patient. I knew right then that I wanted to pursue that kind of role," said Jarrett, lead nurse practitioner for Cardiology.

Recent years have seen an increase in the number of highly trained clinicians like Jarrett who are known as Advanced Practice Providers, or APPs. Made up of nurse practitioners (NPs) and physician assistants (PAs), these individuals provide care to patients while supporting doctors in caring for the multi-dimensional needs of patients.

"APPs often have more time to spend with the patients and assist patients as they transition from the hospital to the home. They're just wonderful care providers and are so expert in their field," said Kenneth Ellenbogen, M.D., chair of the Division of Cardiology, which has 20 APPs.

NPs and PAs require specialized training, including at least a master's degree, and must pass national exams. Both occupations require continuing education and recertification after a certain number of years.

Their numbers have grown due to a rapidly growing patient population, reduction in barriers to practice, and a reduction in the number of allowable hours for residents at the hospital.

"An APP can help the surgeon manage their ever-growing patient load without endlessly overbooking their clinics. This leads to reduced wait times for clinic appointments, reduced use of emergency rooms, higher patient satisfaction, and less burnout for the physician," said Morgan Messner, one of two nurse practitioners in Vascular Surgery.

In the hospital, their duties can range from assisting in the operating room to providing bedside care to patients in ICUs, progressive care units, and outpatient procedure rooms.

"Our APPs work hard to collaborate care with other healthcare professionals to provide the highest level of patient care," said Physician Assistant Erin Switzer.

"Each patient is important and cared for by these advanced practice providers with attention to detail in their medical management, compassion for their emotional needs, and care for the whole patient," said Jarrett, who has been a nurse practitioner for 26 of her 30 years as a registered nurse.

During the critical inpatient time, working with others—from surgeons and nurses to fellows, residents and anesthesia and perfusion teams, as well as many other specialists—is key. "Our APPs work hard to collaborate care with other healthcare professionals to provide the highest level of patient care," said Physician Assistant Erin Switzer, one of 18 APPs in Cardiac Surgery.

These advanced clinicians also help patients prepare for discharge by providing them with education about their condition, filling out the forms required by their employers, setting up any needed therapies, and arranging home health equipment and follow-up appointments. Once the patient is home, they may see them in outpatient clinics, refill medications, and respond to their questions.

"Our APPs are often more accessible to patients than our surgeons, who are frequently in the OR," said Switzer. "Patients can reach our APPs via phone, the call center, or the portal."

"The APPs are excellent clinicians and work both independently and in collaboration with our physician colleagues. They take time to listen to patients, ask questions and provide education and information," said Jarrett. "The combination of these skills helps patients feel confident in their medical care as well as making them feel as if they are being heard."

A Long, Storied History: Dr. Michael Hess Recalls Early Days of Transplant Program

VCU Health's reputation as a leader in cardiac transplantation has its roots in the 1960s, in the MCV West Hospital laboratory of Richard Lower, M.D.

"Dr. Lower was very low key, very soft spoken and fanatically dedicated to cardiac transplantation," says cardiologist Michael Hess, M.D., who worked with Lower, beginning in the mid-1970s.

Lower studied under pioneering transplant surgeon Norman Shumway, M.D., at Stanford. In 1959, during his residency there, Lower transplanted part of a dog's heart to a second dog, which lived for eight days—a record at the time.

He was recruited to MCV by David Hume, M.D., who with his mentee H.M. Lee, M.D., performed Virginia's first kidney transplantation at the medical college in 1957. Lower arrived in Richmond in 1965 and continued his work in animal transplantation.

In 1966, South African surgeon Christiaan Barnard, M.D., spent six months visiting Lower's laboratory, studying his approach. He then studied with Shumway.

Today, the organization is the world's leading scientific society of transplant physicians and surgeons and operates the International Registry for Heart and Lung Transplantation, the only database of its kind in the world.

As the possibility of human transplantation grew closer, many wondered if Barnard, Lower, and Shumway would be the first to perform the surgery. Their rivalry was explored in "Every Second Counts: The Race to Transplant the First Human Heart" by Donald McRae.

In the end, Barnard performed the world's first successful human heart transplant in 1967, while the surgeons who had trained him in their techniques followed in 1968.

MICHAEL HESS, M.D.

(Shumway, the first in the U.S. at Stanford; Lower, the first in Virginia at MCV).

Hess later would tease Lower about this tension. "I knew how to make him angry. You'd just say, `Chris Barnard.'"

Hess says his work with Lower "started out as a hallway conversation in West Hospital." It was a Friday when he introduced himself to the surgeon and expressed interest in caring for his post-transplant patients. "He looked me square in the eye and he said, `Well, I have two new patients coming in to the clinical research unit Monday morning. Go to work on them.'"

In the early days of transplantation, the brain-dead organ donors were at MCV, and transplants were performed locally. "Lower made a very significant contribution when he clearly showed in his lab that he could preserve a heart for four hours and it would still work," says Hess.

This led to MCV's taking part in the first long-distance transport in May 1977. Retired MCV surgeon Szabolcs Szentpetery, M.D., who was a fellow at the time, was sent to Indianapolis to retrieve the heart. The young doctor was nervous that "it wouldn't work and we would lose everything," says Hess. "And it worked like a champ. That revolutionized the field."

Hess himself was a revolutionary. In 1981, claiming "I had no one to talk to," he created the International Society of Heart and Lung Transplantation at the annual meeting of the American Medical Association. "I thought it was very important to start the project, number one, to have an exchange of ideas and good science and number two, it was obvious the field was going to grow and somebody had to take a leadership role and maintain quality and standards," says Hess, who served as the first president—even bringing in a Canadian colleague passing by the room to make the first meeting truly international.

Today, the organization is the world's leading scientific society of transplant physicians and surgeons and operates the International Registry for Heart and Lung Transplantation, the only database of its kind in the world.

"This was a landmark event," says Vigneshwar Kasirajan, M.D., cardiothoracic surgeon and chair of Surgery. "Without the ISHLT, thoracic organ transplant science and practice would have never been widely spread and benefited thousands of patients. Mike Hess deserves all the credit for this very remarkable endeavor."

The Pauley Heart Center wishes all the best to Dr. Michael Hess, who retired in June. He came out of retirement in 2013 to start Virginia's first cardio-oncology program at VCU. Our faculty, staff, and supporters thank Dr. Hess for his many years of inspiring work and dedication to his patients.

In the News

In December, the Journal of Heart and Lung Transplantation will publish an issue dedicated to the 50th anniversary of the first human heart transplant, performed by Christiaan Barnard, M.D., in Cape Town, South Africa, on Dec. 3, 1967. VCU cardiologist Michael Hess, M.D., and Sharon Hunt, M.D., of Stanford University, are co-authoring the special issue's first chapter, "Early Challenges in Cardiac Transplantation."

First in Our Hearts

1968 – First heart transplant in Virginia *(and 9th in the country, 16th worldwide)* takes place at MCV; 557 completed to date
1972 – MCV wins landmark Tucker Trial involving a human heart transplant; for the first time, death can be defined by "brain death"
1977 – First long-distance heart transplant in the world occurs at MCV
1981 – International Heart Lung Society created by MCV physician
1986 – First heart-lung transplant in Virginia takes place at MCV
1994 – First LVAD implanted at MCV
2006 – First total artificial heart implanted on the East Coast at VCU

VCU Health has the longest-running cardiac transplantation program on the East Coast and the second oldest in the nation.

Grateful Patient Recalls Cardiac Arrest

Chain of Survival Saves Runner

LEFT: ON JUNE 2, CARDIAC ARREST SURVIVOR JEFF STOVER REUNITED WITH VCU ARCTIC PROGRAM COORDINATOR MICHELLE GOSSIP AND FIRST RESPONDERS DR. DEBORAH VINTON, FLIGHT PARAMEDIC HUGH CLINE, AND PARAMEDICS FROM THE RICHMOND AMBULANCE AUTHORITY WHO HELPED SAVE HIS LIFE. RIGHT: JEFF STOVER WITH MICHELLE GOSSIP WHO HELPED COORDINATE HIS CARE AT VCU.

Jeff Stover was steps away from the finish line of the Monument Avenue 10K this April when he collapsed.

Stover, 48, has little memory of the race—a family tradition that he undertakes each year with his eldest son. "I remember starting, and then I remember at the very end, I could see the finish line. I remember thinking to myself, `Should I pick up the pace a little bit—you know, finish strong?' And then I remember saying to myself, `No, I'm good.'"

"Every person in that chain is extremely important," said ARCTIC Medical Director Mary Ann Peberdy, M.D. "The early care that those patients get really sets the tone for how well they're going to do afterwards."

His 15-year-old son, Harrison, had already completed the race and was waiting for his dad at Monroe Park with friends when Stover went into cardiac arrest and collapsed about 10 yards from the finish line. Fortunately, he had some helpful—and well-trained—strangers who jumped in to help. Running behind him was an emergency physician from University of Virginia, who immediately began administering CPR. A paramedic bystander, who was waiting for his wife to complete the 10K, also rushed over to help. Nearby in a tent at the finish line were Richmond Ambulance Authority paramedics, who used a defibrillator to quickly regain a heartbeat and then brought him to VCU for the ARCTIC program.

Stover underwent ARCTIC therapy at VCU, then required surgery to fix the problem that had led to his cardiac arrest.

"My issue was a bicuspid aortic valve. It's hereditary, but I didn't know I had it," he said. Most people have three flaps on this valve, but Stover had only two. "So, it already isn't working as efficiently as it should. And then it tends to calcify more."

Looking back, he realized that a doctor had detected a murmur during a high school physical—but no testing was ever done, which would have revealed his condition.

He also remembers that he got more out of breath training for the 10K this year than in the past.

As to his care, Stover benefited from the perfect experience of what the American Heart Association calls the out-of-hospital **Chain of Survival for Cardiac Arrest**. The five links in this chain are:

- Recognition of cardiac arrest and activation of the emergency response system
- Early cardiopulmonary resuscitation (CPR) with an emphasis on chest compressions
- Rapid defibrillation
- Basic and advanced emergency medical services
- Advanced life support and post-cardiac arrest care

"Every person in that chain is extremely important," said ARCTIC Medical Director Mary Ann Peberdy, M.D. "The early care that those patients get really sets the tone for how well they're going to do afterwards."

"Every person that I come into contact with through the ARCTIC program has either been saved by CPR or potentially saved by knowledge of CPR," said Michelle Gossip.

ARCTIC Program Nursing Coordinator Michelle Gossip, who assisted in coordinating Stover's care in the hospital, said VCU trained about 2,000 community members in Hands Only CPR last year. She is passionate about this outreach. "Every person that I come into contact with through the ARCTIC program has either been saved by CPR or potentially saved by knowledge of CPR," she said.

Stover, whose path ran smoothly from immediate CPR all the way through to the care he received at VCU ("I can't speak highly enough of the folks at VCU") knows he is fortunate.

"All the stars aligned—almost as perfectly as they could have."

Note: According to cardiologist Joe Ornato, M.D., exercise is very beneficial to the heart. A very small percentage of cardiac arrests occur during exercise, usually as the result of a previously unknown blockage or other form of heart disease. Most cardiac arrests—88 percent, according to the AHA—occur at home, but your chances of survival are much better if your arrest is witnessed, in a public place, and bystanders call 911 immediately, perform CPR, and apply an AED before EMS arrives.

Raising Awareness of Women's Heart Health

VCU Pauley Heart Center hosted the second annual Heart Health in Women Symposium on Feb. 4 at the Virginia Museum of Fine Arts. Phoebe Ashley, M.D., and Jordana Kron, M.D., co-chaired the event for the second year, and were among the many VCU cardiologists who spoke that day.

"Our goal is to update and educate healthcare professionals so that women receive state-of-the-art cardiovascular care throughout Virginia and the surrounding areas," said Ashley.

The event, which began with breakfast and concluded at noon, drew 70 participants who were physicians, nurse practitioners, physician assistants, and nurses.

"One highlight of our program was Dr. Reavey-Cantwell's discussion of stroke in women. He outlined the unique features of stoke, particularly in young women, and unique risk factors in women. He was very well-received," said Ashley.

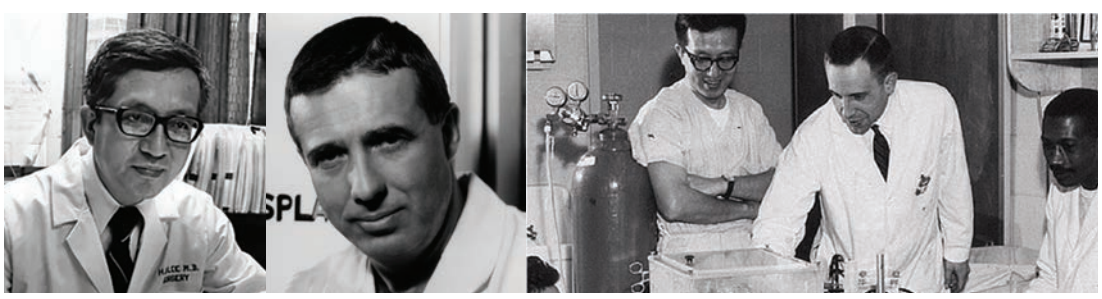
Other topics included exercise and cardiac rehab in women, pregnancy and the heart, and a panel discussion on "Survivorship: The Heart of the Breast Cancer Patient" that included specialists in cardio-oncology and heart failure.

"The participants seemed to really enjoy the program with many being interested in moving it to a full-day event," said Ashley. "We plan to annually bring the most up-to-date information relating to women's cardiovascular health to continue to advance heart health in our community."

ABOVE: DR. INNA TCHOUKINA, DR. DEBORAH KOEHN, DR. HEM BHARDWAJ, DR. PHOEBE ASHLEY, DR. JORDANA KRON, DR. JENNIFER SALLUZZO, DR. SUSAN WOLVER, AND DR. JOHN REAVEY-CANTWELL WERE AMONG THE SPEAKERS AT THE HEART HEALTH IN WOMEN SYMPOSIUM. THE EVENT RAISED AWARENESS ABOUT THE UNIQUE FEATURES OF WOMEN'S HEART DISEASE, THE NO. 1 KILLER OF WOMEN AND THE CAUSE OF DEATH IN 1 OF 3 WOMEN.

Heart Health in Women's Symposium on Saturday, February 3, at the Virginia Historic Society Museum.

Hume-Lee Celebrates 60 Years and 5,000 Transplants



LEFT: H.M. LEE, M.D., AND DAVID HUME, M.D. / MARCH 12, 2002, THE TRANSPLANT CENTER LEE DIRECTED FOR TWO DECADES, WHICH OPENED IN 1964 AND IS NOW THE OLDEST TRANSPLANT UNIT IN THE UNITED STATES, WAS RE-DESIGNATED AND OFFICIALLY NAMED THE HUME-LEE TRANSPLANT CENTER.

It's a banner year for the VCU Health Hume-Lee Transplant Center. The transplant program at VCU—formerly the Medical College of Virginia—was once one of only three such programs in the U.S. In 1957, it was the site for Virginia's first kidney transplant.

The center is named after pioneering MCV transplant physicians David Hume, M.D., and H.M. Lee, M.D. Accomplishments at the center also include Virginia's first liver transplant, one of the world's first tissue-typing labs, and Virginia's first vascular-access program. In May, the center completed its 5,000th transplant.

A 60th Anniversary Celebration for the VCU Health Hume-Lee Transplant Center will take place on Sat., Dec. 2 at 6 p.m., at the Virginia Museum of Fine Arts. *To learn more, please visit First-in-Second-Chances.com.*

Pauley Reveals Latest EP Lab; Interventional Cardiology Suite Now Complete

After nearly seven years in the making, the new VCU Health Pauley Heart Center interventional cardiology suite dazzles with eight bright, spacious rooms and state-of-the-art technologies, including fully integrated GE imaging systems.

"We worked very hard to make the rooms as functional and efficient as possible. We've tried to include everything the doctors and staff need to make the rooms work well," said Ruth Williams, nurse manager of the Cardiac Catheterization and Electrophysiology Labs and Cardiovascular Progressive Care Unit.

"These rooms have advanced technologies that all communicate with each other. All rooms were equipped with booms that contain all cables to keep the rooms less cluttered, cleaner and safer for staff with no trip hazards," said Williams.

Take EP2, the final ,room in the suite, which was completed in July. An x-ray table in the middle of the room is surrounded by the latest in technologies—from a GE Innova 620, with a C-shaped arm for imaging, to the multiscreen flat monitors and the three Stryker booms that suspend from the ceiling, containing outlets for medical gases, electrical outlets, and IT integration for all equipment.

"These rooms have advanced technologies that all communicate with each other. All rooms were equipped with booms that contain all cables to keep the rooms less cluttered, cleaner, and safer for staff with no trip hazards," said Williams. "Additionally, each room is equipped with CleanSuite ceiling technology developed by Huntair. This is a custom, laminar air delivery system that continuously filters air in the procedure rooms, reducing airborne contaminants."

Many of the components in the room, such as the lighting, attach to the Huntair ceiling grid. Large flat-screen monitors angle wherever needed throughout the room, with additional screens in the procedure room and control room to optimize visualization for all team members.

"EP has a lot of very complex equipment. We were able to integrate all of that equipment so that the staff can see any modality, at any place in the room," she said. "Everybody can see what everybody else is doing and keep a closer eye on the patient." Additionally, "radiation exposure to our patients, as well as doctors and staff, has decreased."

The four rooms that make up the EP surgical suite are connected by a hallway to the four new cardiac catheterization labs, which include a hybrid operating room. Near the EP labs, a conference room that will connect audiovisually to the procedure rooms is under construction. It will support the increasing number of clinical staff who want to watch the many innovative procedures taking place at the Pauley Heart Center.

An estimated 1,900 EP and 3,800 Cardiac Cath Lab procedures will take place at VCU this year. The labs will help VCU meet growing patient demand, including an increasing number of complex, high-risk cases.

"We are doing a lot more structural heart procedures that close abnormal openings in the heart or correct valve problems. In EP, we are performing left atrial appendage closures. We were doing those before the construction, but it's much, much easier in these new rooms," said Williams.

The process began in 2012 when the Pauley Heart team closely reviewed and meticulously tweaked the plans and helped select the equipment. "I think the biggest challenge has been the extreme number of details…When you're trying to conceptualize new construction, you really have to put yourself into that room in your mind and think, `What do I need? What do I need where?'"

A daily challenge was keeping the departments up and running safely, she said. "We have a very vulnerable population, especially with our cardiac transplant patients. Everything has to be very tightly sealed in the construction areas, so we were constantly working with our epidemiology colleagues and assuring all quality and safety metrics were being met.

All the hard work has paid off. The custom design and equipment wows visitors, including those from other hospitals.

"I've even had people ask to see our blueprints," Williams said with a laugh. "I think everybody has been really impressed."

Cardiac Surgeons Explore New Heart Failure Devices

VCU Health Pauley Heart Center cardiothoracic surgeons Daniel Tang, M.D., and Mohammed Quader, M.D., are taking part in several clinical trials involving new devices for patients with advanced heart failure.

"The field of device therapy for advanced heart failure has certainly exploded," said Tang. "Yet despite the marked improvement in outcomes with newer generation devices, patients still face significant potential for adverse events." For that reason, "VCU remains actively engaged in being at the forefront of advanced therapies for end-stage heart failure."

Here are some updates from some recent trials:

Momentum (Heartmate III) – Chair of Surgery Vigneshwar Kasirajan, M.D., is the primary investigator (PI) for this Phase III trial. Patients are implanted with the Heartmate III left-ventricular assist device (LVAD), which offers the use of a magnetically levitated rotor with wider flow pathways than previous models, along with other innovations. The device is being evaluated for its safety and effectiveness, and patients are compared to a control group using the Heartmate II.

The trial began in Jan. 2015, and short-term results from the trial's first 1,000 enrolled patients were reported at the Nov. 2016 AHA Scientific Sessions.

"Overall, outcomes were relatively similar, but the Heartmate III group did demonstrate superiority compared to the Heartmate II in freedom from re-operation for pump thrombosis [the creation of blood clots, which increases the risk of strokes]," said Tang. "While we wait for further and longer-term results, the trial is currently enrolling another 1,000 patients."

"VCU remains actively engaged in being at the forefront of advanced therapies for end-stage heart failure," said Tang.

Heartware HVAD Lateral – This non-randomized study, which was conducted to explore the feasibility of using a minimally invasive approach to implant this continuous flow, centrifugal LVAD. The trial completed its enrollment of 145 patients in 2016, with preliminary six-month results reported at the recent International Society for Heart and Lung Transplantation meeting in April.

"The data is undergoing review and only very early results have been reported. It appears promising as there was 92 percent survival rate at six months," said Tang. "Our experience and pretrial data suggests potential benefits of reduced blood loss and possible less right ventricular failure."

Syncardia DT trial – Tang is the PI for this Phase III trial, which explores the Syncardia DT total artificial heart as destination therapy—that is, implanted permanently instead of as a bridge-to-transplant.

"The trial is ongoing, with very limited enrollment. We were the first center to enroll a patient—who was, for a time, the only patient," said Tang. "It is a challenging trial due to a very narrow risk/benefit window. Nonetheless, it is an important trial as the total artificial heart may be the only device option for certain patients who are not candidates for transplantation."

Syncardia 50cc trial – Tang is the PI for this Phase III trial, which is open for enrollment. "The current 70cc device offered by Syncardia is sized for large men. The smaller pump opens the total artificial heart to smaller-sized patients—namely, women and children," he said.

Stony Point Opening

Coming soon: The Pauley Heart Center will begin offering outpatient services at a new VCU Health building located at 9000 Stony Point Parkway, Richmond, VA. 23235. Cardiology, cardiothoracic, and vascular services will be offered, using state-of-the-art imaging. VCU cardiologist Phoebe Ashley, M.D., will serve as the facility's medical director. Stay tuned.

Reaching Out, Saving Lives

Beyond their walls, VCU Health and the Pauley Heart Center participates in many community events. Here are a few coming up:

VCU Health is sponsoring the **Retreat and Refresh Stroke Camp** for stroke survivors and their loved ones. The camp will be held **Sept. 8–10** at Airfield Conference Center in Wakefield. Offered throughout the U.S., the nonprofit camp was started by a stroke survivor and his loved one. This will be the first time the camp is offered in Virginia according to Kristina Gooch, a nurse with the VCU Stroke Program who is helping to coordinate the effort.

During camp, survivors and caregivers will have the opportunity to meet and interact with others in their situation. "There will be activities to retreat and relax from the daily struggles they face," said Gooch. As participants talk about their problems and triumphs, "the value is it provides everyone with a new sense of purpose in the community." For more information, visit StrokeCamp.org.

VCU Health is a sponsor for the American Heart Association's **Life Is Why Richmond Heart Walk**, which will take place **Saturday, Oct. 7**, at West Creek Parkway. The annual 1- and 3.1-mile walk supports education and research for heart disease and stroke, with the Richmond chapter hoping to raise $1.6 million this year.

Last year, the Pauley Heart Pumpers, led by co-captains Lorraine Witzke, RN, and patient Greg Lowe, raised $11,830 and were the number-one VCU fundraising team. The team included transplant survivors and several patients who took part in the walk from inside the heart center *(see article "Walk of Fame: Patient Leads 'Virtual Heart Walk.'").* To sign up or support a VCU Pauley Heart Center team, please visit *RichmondVaHeartWalk.org*.

At the Heart Walk, VCU Pauley Heart Center staffers will take part in demonstrations of **Hands-Only CPR**. Promoting this simple rescue technique that does not require mouth-to-mouth resuscitation has been an important and frequent outreach effort for Pauley.

During CPR Awareness Week (June 1-7), Michelle Gossip, BSN, Advanced Resuscitation Cooling Therapeutics and Intensive Care (ARCTIC) Program Coordinator took part in one to two community events every day. At one function, she helped train 700 City of Richmond employees in Hands-Only CPR.

"It does save lives," said Gossip. "People are afraid of doing CPR and we need to debunk that fear."

Read more online at vcuphc-thebeat.org.

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HOW TO MAKE A GIFT. Gifts to the Pauley Heart Center allow us to invest resources in transforming patient care, education and research at VCU Health. For more information on how to honor a loved one or a caregiver, please contact Carrie Mills at (804) 828-0453 or cmills@vcuhealth.org

Friends and Supporters,

Welcome to the fall issue of *The Beat*. In this issue, you'll visit some of our innovative programs and meet some of the talented physicians and teams who are making a difference in the lives of our patients.

Our cover story will bring you up close and personal to a truly terrifying experience: cardiac arrest. In the story, you will meet two patients who lived to tell their tales and, like so many, are grateful to Pauley's world-class ARCTIC program, led by Dr. Mimi Peberdy and Dr. Joe Ornato.

In electrophysiology news, you can read about Dr. Jay Koneru and Dr. Gautham Kalahasty, the first physicians in central Virginia to implant the world's tiniest, and first leadless, pacemaker. We have also completed the new EP suite, which provides an optimal setting for both exploration and patient care.

Longtime heart center innovator Dr. Michael Hess recently retired. But he leaves behind many important legacies—including his innovative work with cardiac transplant patients. I hope you will enjoy reading about his memories of working with pioneering transplant physician, Dr. Richard Lower, in the early days of the program.

One of the things that's fantastic about this place is the people that we're surrounded by—including the many Advanced Practice Providers—nurse practitioners and physician assistants–who are so expert in cardiology and patient care. In this issue, you can read about the many ways they are helping patients in the divisions of cardiology, cardiac surgery and vascular surgery.

There are so many phenomenal things occurring on this campus, and some of the best are the result of our doctors, researchers, nurses, and other team members working together to provide the best care possible to our patients. They, together with friends like you—who make so much of our work possible—are truly what makes this place great.

SINCERELY,
Kenneth A. Ellenbogen, M.D.
Chairman, Division of Cardiology

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