

The Beat

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In the Thick of It: Clinical Trials Provide Hope to Patients

A high school student collapses after football practice and dies. A co-worker who has always been the picture of health goes into sudden cardiac arrest.

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▶ ▶ ▶ **These kinds of stories are shocking and, fortunately, uncommon, but they are well-known to cardiologists who treat patients with cardiomyopathies. Cardiomyopathy is a form of heart failure caused by the unusual thickening of the muscles lining the walls of the heart. The rare disease can cause life-threatening arrhythmias and often shows up without any warning. Cardiomyopathies are one of many challenging diseases currently being tackled through Pauley’s specialty clinics and trials.**

“Did you ever have any heart issues growing up? Did any of your siblings ever pass out in basketball practice or anything like that? Are your parents both still living?”

These are some of the questions that cardiologist Dr. Krishnasree Rao and genetic counselor Allison Goodwin ask a patient who is attending a monthly genetic testing clinic for cardiomyopathies. While most heart failure patients are elderly, hereditary cardiomyopathies—especially hypertrophic and arrhythmogenic right ventricular cardiomyopathies—tend to present in young patients. A parent with a mutated gene causing the condition “has a 50/50 chance of passing it on,” said Rao.

Rao reviews the patient’s cardiac history and explains that he has hypertrophic cardiomyopathy and should consider testing to see if there is a genetic link. For the younger patients who may not yet have symptoms, “we’re trying to pre-emptively catch the disease,” said Rao. “We’re working to prevent sudden cardiac death in all these young people.”

Goodwin does a little background digging with the patient, asking him questions about his family’s medical history going back three or four generations. “We pay careful attention to anyone with heart disease, sudden death or heart attacks, and the ages and circumstances of these

While these therapies do not treat the underlying disease, a new drug, Mavacamten, may prove to be “one of the first medications to modify the disease,” said Dr. Keyur Shah.

events,” she said.

Goodwin discusses the importance of genetic testing. If testing positively identifies a gene mutation, then everyone in the family can be tested for that specific gene mutation—a process known as “cascade screening.” Echocardiograms and electrocardiograms can help confirm the extent of thickening in the walls of the heart. For those in who the disease has not presented, appropriate surveillance and management protocols will follow.

Patients who have developed the disease can receive pacemakers and ablations to prevent arrhythmias. For some, a surgery known as a septal myectomy, which involves excising some of the thick tissue, is appropriate.

While these therapies do not treat the underlying disease, a new drug, Mavacamten, may prove to be “one of the first medications to modify the disease,” said Dr. Keyur Shah, section chief of heart failure.

Shah and Rao are primary investigators for Explorer and Maverick, two large, multicenter trials involving Mavacamten. Both are open to patients with hypertrophic cardiomyopathy with or without obstructions to blood flow.

Shah explained how the drug works: “Sometimes with hypertrophic cardiomyopathy, the cells are vigorously contracting and they stay hypercontracted—which is the driver for the thickening. What this drug does is help those muscle cells relax,” he said.

He’s seen momentum for the treatment of heart failure in general. “In the last four to five years, there has been a slew of new therapies introduced that are improving survival and symptoms and delaying advanced treatments,” he said.

In the cardiac catheterization lab at VCU Medical Center, Dr. Zachary Gertz, director of structural heart disease, is a primary investigator for the CardiAmp clinical trial that involves stem cell injection via catheter to repair heart failure.

“The therapy involves recovering your heart with your own heart cells, your own tissue,” he said. The exploration is considered a pivotal trial—what used to be known as phase III. “If this works, it could be the first trial that gets the stem cell therapy approved for treatment.”

Gertz was also involved in the COAPT trial, a transaortic valve replacement trial widely reported in *The New York Times* and other publications.

The trial involved using a MitraClip, a small device that is inserted via catheter and clipped to a patient’s mitral valve leaflets to bring them closer together and reduce mitral regurgitation (MR)—the leaking of blood back into the chambers of the heart.

“Your mitral valve is like two sailboat sails,” he said, holding his hands in front of him, fingertips touching. He mimics the motion of a gate opening and closing. “When your heart squeezes, they don’t let the blood go backwards. If one of the sails breaks, you’ll have a tunnel leak. That’s called degenerative—the valve itself is



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MARTIN J. MANGINO, PH.D., ASSOCIATE CHAIR FOR BASIC RESEARCH, IN THE LAB THAT DR. RICHARD LOWER USED TO PRACTICE IN.

diseased. Now, if you have heart failure, your valve might get stretched. It’s so pulled apart that there’s a leak. That’s called functional.”

Patients with degenerative MR at low to moderate risk of surgical complications or death can undergo surgery, while those at high risk are also eligible for MitraClips; however, there are currently no options for those with functional MR. “The COAPT trial was for people with functional mitral regurgitation, and it showed a 40 percent functional improvement,” said Gertz. “It was also the first treatment that’s ever been shown to improve mortality in patients with functional mitral regurgitation. In our world, that’s a big deal.”

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 For more than 10 years, Dr. Antonio Abbate, vice chair of the Division of Cardiology, and Dr. Benjamin Van Tassel, vice chair for clinical research in VCU School of Pharmacy’s Department of Pharmacotherapy and Outcomes Science, have together studied anakinra, a drug that blocks a specific mediator of inflammation, Interleukin-1 (IL-1)—“a small protein in the blood that promotes heart failure following a heart attack,” said Abbate.

In June, the pair received a \$2.7 million National Heart, Lung, and Blood Institute grant to continue their research through a phase II clinical trial, known as REDHART2, with patient enrollment to initiate by early 2019.



DR. FADI SALLOUM

Preclinical Spotlight: Heart Failure Drug Explored

One recent VCU preclinical study exploring a rising heart failure drug is gaining national attention. The study, published in November in the *Journal of the American College of Cardiology*, provides crucial evidence of the efficacy of the drug sacubitril/valsartan (LCZ696) in preventing heart failure following an acute myocardial infarction.

In an invited editorial, Drs. David Lefer and Thomas Sharp III describe it as “a powerful new study...that provides important new insights into LCZ696 and cardioprotection.” The VCU study is the first to explore the drug, also known as sac/val, in a preclinical model following a heart attack. Sac/val is a fairly new drug, which one recent clinical trial has shown reduces heart failure hospitalization and risk of cardiovascular death by 20% when compared to longstanding treatment with ACE inhibitors.

The VCU study comes at an important time. “There is a paucity of information regarding the precise mechanisms by which LCZ696 improves outcomes in patients with HF,” say Lefer and Sharp. Healthcare providers have been resistant to adopt it as the new gold standard for therapy, due to the “widespread skepticism that a single clinical trial should undermine more than 30 years of clinical data” for ACE inhibitors.

The new VCU trial may provide a boost. According to the senior and corresponding author, Dr. Fadi Salloum, “The goals of this study were multifold. The first was to provide a better understanding of the impact of sac/val treatment on already

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While the team is not yet screening for REDHART2, a white board on Abbate’s wall lists the names of patients that his team is seeing today for other studies. His patients include those taking new drug therapies for the treatment of pericarditis. This condition involves the inflammation of the pericardium—the sac around the heart.

“There are some cases that are very difficult to treat that are called recurrent pericarditis. There’s really no treatment right now,” said Abbate. “We are running two studies. One is a multicenter study led by the Cleveland Clinic, and the other is our own study with new drugs that are IL-1 blockers. They’re similar to the drugs that we use for heart failure but in a different population.”

Van Tassell is excited about the studies. “We’ve only had a handful of patients in them, but the benefits have been dramatic so far. Pericarditis is typically defined by pain. It’s very uncomfortable; you have chest pain that can feel every bit as intense as a heart attack. But it doesn’t have the same triggers as the heart attack; it’s the inflammation that’s causing the pain.” With the patients treated with the anakinra, “we’ve seen impressive reductions in pain—which is great.”

Dr. Greg Hundley has received more than \$24 million in National Institutes of Health funding over the years for his clinical explorations in cardiovascular imaging. As Pauley’s top administrator, he hopes to increase the amount of research and clinical trials taking place.

Pauley’s new director comes from a strong research-focused background. Dr. Greg Hundley has received more than \$24 million in National Institutes of Health funding over the years for his clinical explorations in cardiovascular imaging. As Pauley’s top administrator, he hopes to increase the amount of research and clinical trials taking place.

“We’re looking to grow and expand that. That’s a major focus: how to streamline our processes to enhance entry into trials, facilitate the enrollment of patients and work on the regulatory aspects,” he said. “We’re working to improve efficiency and effectiveness in that area.”

Additionally, “we’ve hired a bunch of people to develop more human subjects research, we’re making a big push into that area. We’re working to develop the infrastructure to be competitive for funding.”

Dr. Vigneshwar Kasirajan, chair of the Department of Surgery, sees research and clinical trials directly related to patient care. “I think the ability to provide excellent care comes from innovation and research to constantly improve what we do and that is the strength of Pauley,” he said. “Then, using that knowledge, we also train another generation of physicians and health care providers. It’s a three-legged mission: good

clinical care, supplemented by innovation and research, and training are what make us unique in the region.”

To see a listing of current clinical trials, please visit studyfinder.cctr.vcu.edu ❤️

Preclinical Spotlight *continues*

established heart failure and to test whether treatment would attenuate further adverse cardiac remodeling by mitigating scar size and improving cardiac function. The second was to test whether sac/val treatment at the time of a heart attack would attenuate the development of adverse cardiac remodeling and prevent heart failure compared to val alone or placebo.”

Among its findings, the VCU investigators discovered that the early and continuous use of either val alone, or, more impressively, sac/val, led to “remarkable” prevention of heart failure following a heart attack. Also, sac/val “blunted and reversed cardiac decline and adverse remodeling when initiated as a ‘rescue’ treatment” even after left ventricular ejection fraction was less than 40% and significantly reduced scarring following a heart attack.

“Reducing scar size is very important because it may reflect preservation of viable heart muscle, which ultimately translates into better function,” said Salloum. The trial may provide supporting evidence for the ongoing PARADISE-MI clinical trial, which is exploring the use of sac/val in reducing heart failure events in patients who have experienced a heart attack.

The article was featured in *MEDPAGE TODAY* and the *American College of Cardiology News Digest*.

Wright Center Receives \$21.5 Million NIH Award

In May 2018, the C. Kenneth and Dianne Wright Center for Clinical and Translational Research received a five-year National Institutes of Health (NIH) Clinical and Translational Science Award totaling \$21.5 million. The award is the largest in VCU history. The center had previously received \$20 million from the NIH, in its inaugural CTSA program in 2010, which supported the creation of 50 research hubs across the U.S. VCU is the only academic institution in Virginia to have received the prestigious award.

The purpose of the network of Centers for Clinical and Translational Research (CCTR) is to accelerate exciting research and make it more quickly available to patients. VCU CCTR provides grants of up to \$130,000 for promising explorations.

600th Heart Transplant



CHERRON GILMORE (CENTER) WITH THE MECHANICAL CIRCULATORY SUPPORT COORDINATORS: KATIE HUMMER, KAT BULL, KATHRYN ABERNATHY AND PROGRAM MANAGER NICOLE BRASSINGTON

Cherron Gilmore called her husband as she sat anxiously in a North Carolina hospital room in September 2018. They both were listening intently when—at age 37—Gilmore learned she was going to die.

“You’re at too much risk and we don’t think you’ll make it through surgery,” Gilmore said the doctor told her. “Even if we put it in, we don’t think you’ll make it through transplant.”

It was the fourth time she was turned town for a heart transplant from three hospitals in her home state.

Without knowing how much time she had left, Gilmore began preparing for her death by writing goodbye letters to her three children, ages 17, 13 and 8. She drafted notes filled with the musings she’d like her young daughter to know when she went to prom and on her future wedding day.

It was not until Gilmore was medevacked to VCU Medical Center—defeated and on her deathbed—that she realized her story did not yet have an ending.

A Fatal Diagnosis During Pregnancy

Gilmore was 29 and pregnant with her third child in 2010 when she was diagnosed with peripartum cardiomyopathy, often referred to as postpartum cardiomyopathy—a rare condition characterized by weakness of the heart muscle during pregnancy. However, her local doctors didn’t know right away that there

It was not until Gilmore was medevacked to VCU Medical Center—defeated and on her deathbed—that she realized her story did not yet have an ending.

was an issue.

“I started having some symptoms that didn’t feel like pregnancy symptoms,” Gilmore said.

The first doctor told her the extreme shortness of breath was normal, and everything was fine. Knowing what it was like to have carried two children prior, Gilmore got a second opinion.

The second doctor came bearing the bad news.

“When you’re pregnant, you don’t even know [peripartum cardiomyopathy] is a possibility,” Gilmore said. “I’d never heard of it.”

Gilmore gave birth to a daughter, Khori, three months early. The baby weighed only three pounds. Mother and daughter spent a combined month and a half in intensive care following the delivery. To compound the matter, Gilmore’s heart wasn’t recovering.

“You’re supposed to be able to recover once the baby is removed, and I guess I was just one of those women who didn’t.”

Six months after the delivery, Gilmore’s doctors gave her an implantable cardioverter defibrillator because she was in danger of experiencing sudden death.

“It just went all the way downhill from there,” she said.

In 2011, her heart function was declining. She visited three hospitals before a doctor told her she needed a left ventricular assist device (LVAD) implanted in her heart to help it pump blood. Without the procedure, she had only one month left to live.

“When I got my LVAD, it was so unexpected,” Gilmore said. “We weren’t prepared at all. It was like, if



LEFT: CHERRON GILMORE WITH THE HEART TRANSPLANT COORDINATORS AND SOCIAL WORKER: (L TO R) EMILY HULBURT-BAKER, MAUREEN FLATTERY, AND MEGAN MALTBY / RIGHT: CHERRON GILMORE (CENTER) WITH CARDIOTHORACIC SURGEONS DRs. DANIEL TANG AND VIGNESHWAR KASIRAJAN

we don't put this thing in right now, you're not going to wake up tomorrow type of thing."

Gilmore underwent the LVAD procedure and went on to live a normal life for nearly eight years. She got her children ready for school each morning, participated in local heart walks, and was selected as a 2018 Forsyth County Go Red Woman for having made lifestyle changes to be heart healthy.

She was doing well, until she wasn't.



CHERRON GILMORE AND HUSBAND GEOFFREY

Four Times Denied

In August 2018, Gilmore's health declined dramatically.

"She did seem like she recovered well enough, so a year [after the LVAD procedure] they took her device out," said cardiac surgeon Dr. Daniel Tang as he reflected on Gilmore's case. "She then had recurrent heart failure. And not only did it recur, but it was just as bad as before."

No medications or lifestyle changes were making a difference as her health declined. "I had been denied four times for a transplant," Gilmore said.

One hospital told her she was at too much risk for a heart transplant. Another said she wasn't sick enough. "Everybody has their own reasons for why. ... It was so many different factors. I had built up a wall because I felt like everywhere I went, they didn't know how to treat me," Gilmore said.

Feeling tired, defeated and on the brink of death, Gilmore had just about given up when her local hospital referred her to VCU Health.

"When I came [to VCU Medical Center] it was at night and I was flown here by a helicopter. I had just been told by my local hospital that they were ready to pull the plug on me," she said.

"From the moment I got off that helicopter, [I felt like the team] was like, 'OK, let's do this. Let's get her work done,'" Gilmore said. "I was just confused, because I came from someplace where everything was dark and gloomy, to a place that said, 'Well, we can do that.'"

"When I Woke Up, I Was Painless"

"When she was transferred, she was pretty sick," Tang said.

Gilmore was admitted to the hospital on Sept. 6 and within four days was in the operating room, where Tang and a skilled team removed her heart and replaced it with a total artificial heart.

Total artificial heart implants are rare, but they are becoming an option for those on the waitlist for a heart transplant. "In the future, many patients unable to receive a heart transplant may instead get an artificial heart that is fully internalized and silent," said Dr. Vigneshwar Kasirajan. "The next five to

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10 years, I expect we will see some pretty remarkable advances in this technology."

According to SynCardia, the manufacturer of the total artificial heart, VCU Medical Center ranks No. 4 worldwide in total artificial heart implants, having implanted 114 to date. Kasirajan said the medical center is one of the most active sites in the country for total

artificial hearts.

With her total artificial heart, Gilmore was able to go home to be with her family. Three weeks later, she got the call she had been praying for: She was getting a heart.

"It was almost like my body needed a couple weeks to heal up and then boom. It happened so fast," she said. "When I got [the call] I was like, 'Oh my God, oh my God!'"

The next day, at sunrise on an October morning, she was back in the operating room as Kasirajan and the heart transplant team performed the surgery Gilmore never thought would happen. The surgery also marked a milestone for the Pauley—600 heart transplants performed in the transplant program's history.

"It was crazy, because they put the heart in and it was like a complete change. I haven't felt like this in a long time," Gilmore said.

"When I woke up, I was pain-free."

Coming Home

Days after her surgery, Gilmore sat in a Pauley Heart Center hospital room with her husband and reflected on what she had gone through and the life ahead of her.

"I never had to look much toward the future. Now I have a future to look forward to," Gilmore said.

She said she lives every day to the fullest, grateful for the time she has, and without any limits or regrets. When she finally returned home 13 days after surgery, her children came rushing out of the house—screaming—ready to hug the mother they'd been missing.

"They also definitely had a lot of questions about the transplant and everything," Gilmore said. "My daughter even asked if I'd start acting like the person whose heart I received. I explained to her that souls go to heaven—organs don't. So even though I have that person's heart, I don't have their soul. But we pray every day that their soul is resting peacefully. And we thank their family for passing the blessing on and allowing me to continue to be here to raise you.

"It just really feels like all is OK in the world now." ❤️

Guzman, Exaire Provide Expertise for CTOs in the Cath Lab

The term chronic total occlusion (CTO) refers to the complete blockage of the coronary arteries, the vessels that provide blood to the heart. Over time, the buildup of plaque in these arteries can lead to this condition, which often catches patients by surprise.

“I just had a patient in my office who had a CTO, and she said, ‘Oh no, I’m doing wonderfully.’ And then when we started to really dig in, she said, ‘Well, every time that I try to go up the stairs I have to stop in the middle because I’m fatigued,’ or ‘Every time I go on an incline, I feel something. I thought it was indigestion,’” said Dr. Luis Guzman, director of the cardiac catheterization lab. “She’d had these symptoms for the last two years, and she just adjusted to her life like that.”

Patients accept a lower functionality, he says, overlooking common CTO symptoms such as chest pain, tiredness or shortness of breath. Left untreated, CTOs can cause decreased blood flow to the heart, leading to lower functionality. The condition is diagnosed by way of an angiogram.

CTOs are present in approximately 20-30% of patients with chronic coronary artery disease as well as in those who have had prior bypass surgery, said Guzman. “However, in most of these patients, the CTO is left without any treatment, which is associated with an increased risk of dying from cardiac reasons.”

Minimally invasive options exist in the cath lab setting. Guzman and VCU Health colleague Dr. Jose Exaire are among the very few interventional cardiologists in the country with special training and expertise in treating CTOs using a full combination of techniques, including antegrade (forward) and retrograde (backward) approaches to the blockages.

He explains how the procedure works using the analogy of a house: “Imagine that you are in a bedroom and outside the door you have a hallway. On the other side of the hallway, you have a room that has a door,” he said. “When you have the door open in your room, you can still see the hallway and the other door—even if one of the doorways is partially blocked.” That’s how the procedure to place a stent usually works, he said. “You see the blockage, but you can also see a path to follow to deploy your tools and open the blockage.”

In the case of a CTO, “instead of having a door in the bedroom you have a wall in front of you—so you can’t see the hallway



DR. JOSE EXAIRE

or the door to the other room. That is what is called a total occlusion. So, you’ve got to create a door and a tunnel through that hallway to reach the other room. Sometimes you can’t do that, so you’ve got to come at it from a back room.”

These back “rooms” are nearby arteries. “You need very small tools that are very slippery and tiny to go across these extremely small arteries—they are the size of a hair—to connect the two doors and reestablish the circulation. There are many dedicated tools for this procedure, different wires, catheters, microcatheters and re-entry devices.”

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The technique of restoring circulation is called percutaneous coronary intervention (PCI), which involves opening the passage with a tiny balloon and then placing a stent. While traditional PCIs involve one catheter, a CTO will require the placement of two catheters, in the wrist and groin, to approach the blockage from the front and back.

Additionally, “when we usually put in a stent, we put in one wire and one balloon. With the CTO procedure, we may use five or more wires and four to five balloons,” said Guzman.



DR. LUIS GUZMAN

Only an estimated five-10 percent of interventional cardiologists are trained in these special techniques for treating CTOs. Guzman has proctored training sessions around the world and has performed about 1,000 procedures to date. He and Exaire often receive referrals from other cardiologists in the region. The team has a 90% success rate of successful PCIs for patients with CTOs. In only 10% of the attempts are the VCU doctors unable to penetrate the arterial wall. For these patients, coronary artery bypass grafting (CABG) provides a surgical option.

During CABG, a healthy artery from another part of the body is grafted to the blocked coronary artery, creating a new path for blood flow. This type of open-heart surgery usually requires a hospital stay of at least seven days.

By contrast, the cath lab procedure usually requires an overnight stay. The recovery is immediate. “They are kind of sedated and then they are sitting up and eating in a few hours,” said Guzman. “Once home, patients notice a significant improvement in their quality of life.” ❤️

CTO Signs and Symptoms

- Chest pain, pressure or tightness
- Shortness of breath
- Easily fatigued
- Pain in the upper body and arm
- Rapid or irregular heartbeat

Heart Failure Symposium

Pauley hosted its Heart Failure Symposium in October, which provided continuing medical education to local health care providers. This year's theme was "Caring for Our Community," and the symposium was held at the VCU School of Medicine's McGlothlin Medical Education Center.

"It was a great day filled with high-impact learning," said Dr. Keyur Shah, section chief of heart failure, who moderated the event with Dr. Richard Cooke, Moses D. Nunnally Professorship in Cardiology and medical director of heart transplantation.

The symposium provides a venue to disseminate vital information to the medical community. "Heart failure is a disease that's not just treated at specialized centers and cardiology clinics, it's also managed by primary care physicians, general cardiologists and others. And, the field is evolving so quickly," said Shah. "The symposium offers an opportunity for our community partners, many of whom refer patients to us, or share patients with us, to come and visit us and learn about the updates in the field and the opportunities for their patients at VCU Health."

Throughout the day, Pauley cardiologists and cardiac surgeons covered topics such as heart failure, cardiac

The symposium provides a venue to disseminate vital information to the medical community. "Heart failure is a disease that's not just treated at specialized centers and cardiology clinics, it's also managed by primary care physicians, general cardiologists and others.



transplantation, mechanical circulatory devices, pulmonary hypertension and structural heart disease. Guests learned about the latest in drug treatments and how to implement them and upcoming clinical trials involving device therapies.

In the afternoon, participants rotated to three rooms for small group sessions. The breakout sessions allowed the attendees to get hands-on experience with mechanical devices and learn how to evaluate for pacemaker dysfunction in heart failure patients. They also learned about the role of MRIs in diagnosing cardiomyopathies.

"The highlights were watching how excited the attendees were working with Dr. Daniel Tang in the wet lab and Dr. Greg Hundley's demonstration, with his hands, showing how an MRI alters electron

spins. It was fun and made difficult concepts understandable," said Cooke.

Attendance was limited. "We found that, having done this in the past, the doctors appreciate the smaller group sessions and the opportunity for more interaction with the speakers," he said.

Pauley has hosted the event three times over the past six years. The planners hope to make the symposium an annual event in the future, due to the rapidly changing nature of the field as well as positive feedback from attendees.

"We hear a variety of things—from appreciation of the educational content to their really enjoying the opportunity to interact with the faculty whom maybe they've only met over the phone before," said Shah.

"The attendees I spoke to wanted to know when the next symposium would be held," added Cooke. "The symposium went very well. My thanks to all who participated." ❤️

Colonial Square Reaches Out to Community

The staff of VCU Health at Colonial Square have been busy taking part in local events focused on heart disease prevention and treatment.

On August 18, the staff helped with the American Heart Association's inaugural "Stroke is No Joke" event, held at the Tabernacle Baptist Church Family Life Center in Petersburg. Dr. George Eapen, a cardiologist who practices at Colonial Square, was one of three doctors who took part in an "Ask the Physician" session.

"The audience asked questions about health care, medication and healthy eating," said practice operations manager Tameka Brown. "There was also a stroke survivor

who was the guest speaker. The purpose of the event was to make people more aware of the signs and symptoms of stroke and heart attack, and how to prevent them."

At the event, RN and Echo Technician TeShell Parham took blood pressure readings and, with Brown, handed out t-shirts, informational brochures and Pauley Heart Center goody bags. Brown also distributed free raffle tickets for prizes, which included a Magic Bullet Blender. Afterwards, the center hosted a comedy brunch featuring comedian Micah "Bam-Bamm" White.

Colonial Square staff members also gave away promotional items at ChesterFest on September 22 and joined with patients in taking part at the 2018 Richmond Heart

Walk on October 6. VCU Health sponsored both events.

The community events offer a special opportunity to get the word out about the outpatient cardiology and neurology practice, which joined VCU Health in June 2016.

"It's important to network with the community and provide education, and also inform them about our location," says Brown, adding, "I hope our presence will benefit the community by the care we provide at our office or within the VCU Health System."

VCU Health at Colonial Square is located at 2905 Boulevard, Colonial Heights, Virginia 23834. To schedule an appointment, please call (804) 526-0682. ❤️

Seeing the Cardiovascular World in 3D

Imagine a room-sized blood vessel that you can walk through like a hallway. Or a transparent 3D model of a patient's heart rotating in the air. These are among the holograms created by a team led by Dr. Dayanjan Wijesinghe and cardiothoracic surgeon Dr. Daniel Tang, for cases that require complex surgical planning.

Back in August 2016, Wijesinghe and his students Ali Panahi, a computer science graduate student, and Bansri Rawal, an undergraduate student, started creating the holograms that would allow the visualization of biochemical networks. "Computer screens are just not big enough to fit all of the information," to see the complex networks, said Wijesinghe, assistant professor in the VCU School of Pharmacy's Department of Pharmacotherapy and Outcomes Science. "That's why we decided to completely ditch the computer screen and create a system that allows the biochemical networks to be all around you. You are essentially immersed in the network. You can walk around it."

As a visitor dons a pair of augmented reality glasses, Wijesinghe's lab in the VCU's School of Pharmacy is transformed into various 3D landscapes superimposed on the real world. In one, a comprehensive biochemical network demonstrating the metabolism of omegas 3 and 6 lipids are displayed as an interconnected network of colored molecules in the air that you can walk through and interact with. The name of each molecule appears as you gaze upon it and disappears as you look away. These holographic objects respond to voice commands and can bring up additional information on demand.

Students in his classes love it. "The hologram has the advantage of allowing for this really natural learning because you're actually interacting with something. It helps the students understand how drugs work from a biochemical network standpoint."

After creating these augmented reality networks, the team began wondering where next to take their project. They found a new direction in medical imaging and the planning of complex surgeries.

Augmented Reality Comes to Pauley

Wijesinghe's venture into the cardiac realm began with a conversation over coffee in the faculty lounge with Tang. "The faculty lounge there is probably the best thing that the school has done," he said. "A lot of ideas bounce back and forth there."

Soon, his lab was creating cardiothoracic holograms with the aid of Panahi and pharmacy student Vasco Pontinha. The team



DR. DANIEL TANG, ALI PANAH, COMPUTER SCIENCES GRADUATE STUDENT, AND DAYANJAN "SHANAKA" WIJESINGHE, PH.D., HAVE WORKED TOGETHER TO DEVELOP AR TECHNOLOGY FOR MEDICAL USE.

created its software program, Med-AR, using the Microsoft HoloLens augmented reality platform. Augmented reality, or AR, involves the projection of interactive computer-generated images into a person's real-world surroundings.

"I think we are the only ones [using the platform who have created applications] for surgical planning of cardiothoracic surgeries," said Wijesinghe. "There have been other applications—dentists have used it to look at cranial bone structures. Those are really easy because those are hard structures, but the heart is all soft tissue so that's a different challenge."

Tang identified several patients who were willing to have their CT scans used to create holographic models that could be used in the planning of their surgeries. One patient had a sarcoma in the center of his heart that had to be removed; another required the repair of leaks around two artificial valves. These first two surgeries took place, successfully, in February 2018.

During each procedure, the surgical team wore AR glasses to review the patient's anatomical model in 3D. In one, the cancerous spot glows green.

"We used it as a way to discuss the operation with fellows, to help them understand what we were planning to do," said Tang. "The 3D model provides a more intuitive way to think about the anatomy than you'd get from looking at it in a conventional way [a CT scan on a computer screen]. You can interact with it. You can get your hands on it, turn it around and so forth."

Multiple viewers can wear the glasses to view the hologram. By pinching your fingers at an object, you can grab it and move it around, even placing it on a patient

to understand its relative position in the chest cavity prior to surgery. Additionally, you can give it verbal commands, such as "hide aorta," to remove structures, allowing an unobstructed view of an area.

With everyone looking at the same image, said Wijesinghe, "the entire surgical team is on the same page."

What the Future Holds

Some current projects include a kidney cancer hologram and one being developed to show a human cadaver, for use by medical students. More cardiothoracic surgical applications are in the works. Additional projects close to completion include neurosurgical planning tools and a 3D protein structure visualization tool.

Dr. Vigneshwar Kasirajan, an early and enthusiastic supporter of the project, secured a \$20,000 grant from the Department of Surgery to support the creation of the Med-AR program. In May, he presented one of the 3D heart models at Pauley's Consortium Dinner.

An upcoming trial will evaluate the teaching value of the holograms for medical students and surgical residents. "We instinctively think it will offer some opportunity for better education, though we have not yet quantified that," said Kasirajan.

Wijesinghe, who is applying for additional grants, said his team includes students and faculty from pharmacy, computer science, biomedical engineering, nursing, radiology and even fine arts. "It used to be very difficult to collaborate in a cross-disciplinary manner, but now it's becoming easier," he said.

The multidisciplinary aspect of the team appeals to Kasirajan. "It's a good opportunity to bring groups of people together to share ideas and keep things moving forward." ❤️



Mysterious Arm Pain? Thoracic Outlet Syndrome May Be Culprit

“It’s an increasing cause of arm pain in athletes and people who work out, as well as those whose work requires them to frequently lift their arms to the shoulder level or above their head,” said Dr. Mark Levy, chair of the Division of Vascular Surgery and the H.M. Lee Professor in Vascular Surgery. “The common clinical scenario is a young patient that presents with shoulder pain, commonly radiating down the arm into the hand, and sometimes into the neck or the back of the head.”

The pain results from the compression of the thoracic outlet, the area between the collarbone and the first rib. The compression is usually caused by repetitive motion but may also be caused by whiplash or other trauma. In rare circumstances, a patient may have a bony abnormality called a cervical rib that presses down on the area.

“It’s a relatively narrow space that is usually just big enough to accommodate all these nerves, arteries and veins,” he said. This neurovascular bundle sends sensations to the arms and hands.

Pressure to the area can cause irritation and pain. “If it pinches off the nerve, it causes pain in the shoulder, arm, neck or hand. If it pinches the vein, it can cause a blood clot in the shoulder vein. And, rarely, if it pinches off a subclavian artery, it can

The pain results from the compression of the thoracic outlet, the area between the collarbone and the first rib. The compression is usually caused by repetitive motion but may also be caused by whiplash or other trauma.

cause either blockages or aneurysms in that artery.” Only about 5% of the cases that Levy sees involve the compression of the subclavian arteries, which carry blood from the heart to the arms.

Many patients go months without being able to pin down their mysterious ailment. “They have often seen orthopedic surgeons about their shoulder pain and had multiple studies including x-rays and MRIs of the cervical spine, to rule out disk disease,” he said. “They have commonly done months of physical therapy.”

Once thoracic outlet syndrome is suspected, providers often make referrals to Levy, who has over 21 years of experience in the field and is one of very few vascular surgeons in central Virginia to treat the condition.

Levy starts with a patient history and exam. He asks the patient to perform various physical maneuvers that “if positive, are suggestive of thoracic outlet syndrome,” he said. In some instances, an electromyography (EMG) study or other imaging may be helpful.

Patients usually undertake at least one month of highly focused physical therapy. “Much of that involves small but significant postural changes that affect the relationship and spacing between the collarbone and the first rib located below it. If that is effective, and it often can be, then no surgery is required.”

However, if the therapy does not suffice, and the patient’s symptoms are significant and long-lasting, then a minimally



DR. MARK LEVY

invasive surgery known as first rib removal/resection is an option. Sometimes physical therapy is required following the procedure.

“The surgery is most commonly done through a small incision just above the collarbone. Through that incision, we go down about an inch to remove the segment of the first rib that is causing the compression,” said Levy.

The patient undergoes general anesthesia for the operation, which takes just over an hour to do.

“Patients most commonly go home the day after surgery,” he said. ❤️

Dr. Levy sees patients at these locations:

- VCU Health at Temple Avenue
- VCU Health Baird Vascular Institute
- VCU Health CMH Surgical Services at C.A.R.E. Building
- VCU Medical Center Ambulatory Care Center

Students Get Inside Look at Health Care Jobs

Pauley’s first “High School to Health Care” program took place in December, and more than 75 students in grades nine through 12 and their parents attended the event at VCU Medical Center.

Dr. Greg Hundley, who ran a similar program at Wake Forest Baptist Medical Center, said he started the initiative to make Richmond-area students more aware of the great variety of occupations in health care. “It’s not all just doctors and nurses,” he said.

The daylong event opened with two case presentations about patients who underwent cardiovascular procedures at VCU Medical

Center. For each case, there were eight individuals who talked about their role in taking care of the patient, and what they liked about their jobs. The presenters ranged from ECHO technicians and biomedical engineers to the retired director of the Adult Cardiac Catheterization Laboratory, Dr. George Vetrovec.

The presenters came from a variety of educational backgrounds. “Some of the people speaking up there just went to high school, others got a two-year associate degree, while some got a bachelor’s, a master’s or even a doctorate,” he said. “We wanted to show kids and parents the job opportunities that are available, that will be needed in the future.”

After lunch, the participants broke into two groups and toured the medical center and school. They got to see Pauley’s cardiac catheterization lab, imaging center and the heart failure and transplantation facilities. Highlights included the simulation lab, where faculty use mannequins to teach various lessons to medical students.

Each student brought one parent, to encourage discussions at home, said Hundley. “My hope is that, when all is said and done, maybe some of the kids were drawn to a particular job and thought, ‘Hey, I could see myself doing that.’” ❤️



DR. VIGNESHWAR KASIRAJAN (CENTER), WHO HOLDS THE STUART MCGUIRE PROFESSOR AND DEPARTMENT CHAIR, CONGRATULATES COLLEAGUES DRS. KEYUR SHAH AND ZACHARY GERTZ UPON RECEIVING ENDOWED PROFESSORSHIPS.

Faculty Honored at VCU Investiture Dinner

Under the skylights of the grand Palm Court Lobby of the Jefferson Hotel, a group of 300 gathered to celebrate the donors and more than 50 faculty members who have recently been awarded endowed professorship and chair positions. An endowed faculty position is one of the highest honors the University bestows on its faculty.

Dr. Michael Rao, president of VCU and VCU Health, and Jay Davenport, vice president of development and alumni relations, gave opening remarks. Next, Dr. Peter Buckley, dean of the VCU School of Medicine, and Ed Grier, dean of the VCU School of Business, led the investiture ceremony.

Seven Pauley faculty were recognized with endowed positions (see sidebar). Among them was, Dr. Fadi Salloum, the Natalie N. and John R. Congdon Sr. Endowed Chair, who enjoyed sitting next to John and Leslie Congdon. John is the son of Jack and Natalie Congdon, who established the professorship.

“I feel extremely honored to be named the first Congdon Endowed Chair,” said Salloum, a basic and translational researcher whose interests include cardio-oncology, which lies at the intersection of cancer and cardiology. The Congdon family has long supported both Pauley and VCU’s Massey Cancer Center.

“The trust that has been put in me truly means a lot and the support from this endowment will enable me and my team to continue working towards making new discoveries to hopefully improve cardiovascular health through cutting-edge research,” said Salloum.

“I am certain they are smiling,” said John Congdon Jr., of his parents’ response



on the selection of Salloum as the first chair. “When he talks about the research he’s doing or shows you around the facility, Fadi lights up with excitement and enthusiasm.”

Salloum will use the endowment to further advance in this field and others. “The trust that has been put in me truly means a lot and the support from this endowment will enable me and my team to continue working towards making new discoveries to hopefully improve cardiovascular health through cutting-edge research,” he said.

At another table, Dr. Keyur Shah was recognized as the new David E. Tolman, M.D. Professorship in Heart Failure. “It was a wonderful evening,” he said. Shah

sat next to Keith Kisse, the donor who with friends created the professorship in memory of Tolman, a VCU heart failure specialist. “I am truly indebted to Keith and deeply respectful for all the efforts of Tolman. I am very grateful and humbled to

receive this,” said Shah.

Because an endowed professorship or chair is attached to the name of a beloved donor or faculty member, “it gives the program institutional memory. The titles remind everyone of all the hard work and character and respect that has been built over decades by individuals here—it’s a generational connection,” said Shah.

To learn more about creating an endowed chair or professorship, please contact Carrie Mills, senior major gift officer, at (804) 828-0423 or Carrie.R.Mills@vcuhealth.org.

Congratulations to the following individuals, who received the following recognitions at the 2018 Investiture Ceremony:

- Dr. Kenneth Ellenbogen, Martha M. and Harold W. Kimmerling, M.D. Chair in Cardiology
- Dr. Zachary Gertz, Hermes A. Kontos, M.D. Professorship in Cardiology
- Dr. Greg Hundley, George W. Vetrovec, M.D. Endowed Chair
- Dr. Mark Levy, H.M. Lee Professorship in Vascular Surgery
- Dr. Fadi Salloum, Natalie N. and John R. Congdon Sr. Endowed Chair
- Dr. Keyur Shah, David E. Tolman, M.D. Professorship in Heart Failure
- Dr. Daniel Tang, Richard R. Lower, M.D. Professorship in Cardiovascular Surgery
- A total of 14 VCU faculty involved in cardiac medicine or research now hold endowed chairs or professorships. ❤️

EMS Responders Receive Device Training

As patients with LVADs and other mechanical assist devices become more prevalent, it's essential that emergency responders receive proper training on how to respond to their medical emergencies. The Weil Institute of Emergency and Critical Care Research at VCU coordinated a daylong training session this fall on the American Heart Association's Scientific Statement for resuscitating patients with the devices.

Dr. Mary Ann Peberdy, a cardiologist who directs VCU Health's Advanced Resuscitation, Cooling Therapeutics and Intensive Care (ARCTIC) program, moderated the conference, held in September at the Henrico County Division of Fire's training center. About 100 EMS providers from throughout central Virginia attended.

The program included lectures by Drs. Keyur Shah, Daniel Tang and Joseph Ornato. In the afternoon sessions, the participants went into different rooms, where they visited a mini-surgical suite and gained hands-on

experience with the devices. In one room, they practiced taking an LVAD patient's blood pressure with a Doppler device, one of the recommendations set out by the American Heart Association (AHA).

Peberdy was the writing group chair for the guidelines, known as the Scientific Statement by the American Heart Association on "Cardiopulmonary Resuscitation in Adults and Children with Mechanical Circulatory Support." Ornato and Dr. Vigneshwar Kasirajan also helped write the statement, published in 2016.

Peberdy suggested the national recommendations as a member of the American Heart Association's Scientific Committee. "The whole concept of how to resuscitate patients with mechanical circulatory support has been a long-standing issue," she said. "Many times, EMS would get conflicting instructions from different hospitals on whether to do chest compressions on these patients or not when they were in cardiac arrest. They really needed a more standardized approach when they had to respond to these

emergencies."

One of the biggest surprises to the EMS providers is that many of the patients with the devices do not have a pulse, but rather a continuous flow of blood. Without proper training, a provider might assume the patient had undergone cardiac arrest if they are found unconscious. "But the lack of pulse alone doesn't necessarily mean it was a cardiac arrest. The patient could have been unconscious because their blood sugar could be low, they could have had a stroke or many other reasons," she said.

As a result, the statement includes two recommendations for determining if these patients are in cardiac arrest:

- 1) Check blood pressure with a Doppler instead of a standard blood pressure cuff
- 2) If a breathing tube is required, measure the breath emanating from the tube to determine if the heart is pumping adequately

Such clarity is critical. "More and more patients with these devices are discharged from the hospital and living in the community. There are more than a hundred in the Richmond area," she said. "And from a national level, it is something of growing importance." ❤️

Peberdy suggested the national recommendations ... "The whole concept of how to resuscitate patients with mechanical circulatory support has been a long-standing issue," she said.

VCU Health Doctors Create Family Scholarship



Kimberly Hise Photography

THOMAS FAMILY

Two VCU Health doctors recently made a generous donation to create the Drs. Deepak and Mareen Thomas Scholarship for an incoming

or current medical student from southern Virginia, with preference for one from Emporia. They are among the youngest VCU alumni to establish a scholarship.

"Deepak and Mareen are thoughtful, smart, caring, empathetic and patient. The ideal characteristics of great doctors," said Dr. Kenneth Ellenbogen, chair of the Division of Cardiology. "We are delighted to have Deepak here at Pauley."

Deepak is an interventional cardiologist who works downtown at VCU Medical Center as well as at VCU Health's Colonial Square outpatient clinic in Colonial Heights, Va. Mareen is an endocrinologist at Children's Hospital of Richmond at VCU.

The married couple, who are busy with three children under the age of six, met while they were both students at the VCU School of Medicine. They attended Yale University for their residencies and Washington University in St. Louis for their fellowships together. Thomas also received an advanced fellowship at the University of Virginia Medical Center.

Deepak's father and both of Mareen's

parents are doctors. While at VCU, Deepak's mentor was Dr. George Eapen, "who became both my cardiology colleague and father-in-law," he says. "In both the clinical and charitable realms, he leads by example every day."

The endowed scholarship is for a medical student based on academic merit, or financial need, or both. They focus on students from southern Virginia because "my wife spent most of her childhood in the area, and we both enjoy taking care of patients from Emporia, Waverly, Sutherland and Dinwiddie County. By helping promote a student of financial need from this area, we want them to know they are welcome into the broader medical community. Maybe they too will see the benefit and reward of a lifelong medical career in their hometown."

He adds, "This is one small way to help medical students in perpetuity—as the fund will continue to grow after we are gone."

If you would like to learn more about ways to support education, research or clinical care at VCU Health, please contact Carrie Mills, senior major gift officer, at (804) 828-0423 or Carrie.R.Mills@vcuhealth.org. ❤️

TAVRs and MitraClips Among the Options for Patients with Heart Valve Disease

A few years ago, transaortic valve replacements (TAVRs) were a new and rare procedure. These days, “we’ve completed around 400 at VCU Medical Center. It’s becoming a standard thing,” said interventional cardiologist Dr. Zachary Gertz.

What may be the latest procedure at other institutions is often commonplace at VCU Health, where Gertz and other members of the team remain at the forefront of research. They are leaders in offering treatments for patients with malfunctioning heart valves, including those with complex conditions not treated at most hospitals.

The heart has four types of valves: aortic, mitral, pulmonary and tricuspid. These valves have tissue flaps or leaflets that open and close with each heartbeat, pushing blood through the four chambers of the heart and the rest of the body. When a valve malfunctions, it can lead to serious and sometimes life-threatening complications. Valve disease can be hereditary, or the result of degeneration or deterioration over time.

One condition, stenosis, occurs when the flaps of a valve calcify and thicken. This condition prevents the heart valve from completely opening. Surgical options exist for patients with valves with narrow openings.

When the narrowing occurs in the mitral valves, a balloon valvuloplasty is another possibility. In this procedure, a catheter with a balloon on its tip is directed to the mitral valve. The doctor then inflates the balloon to expand the opening. Once the procedure is complete, the balloon is deflated and removed with the catheter.

Another common problem is valve regurgitation, which occurs when blood leaks back into the chambers rather than

moving forward. Patients may have their valve repaired or replaced through surgery, which can range from minimally invasive to open-heart options.

Patients with mitral valve regurgitation who do not qualify for surgery can have their condition treated in the catheterization laboratory, or cath lab, through the intravenous insertion of a device called a MitraClip. The small clip is attached to mitral valve leaflets to bring them closer together and reduce the leaking.

“If you have degenerative mitral regurgitation and you are at high risk for surgery, your only other option is a MitraClip. We’ve been implanting those for a few years now and have had very good outcomes,” said Gertz. For more on the latest MitraClip research, please see the cover story.

When an aortic valve needs to be replaced, it can be done through an open-heart procedure known as a sternotomy or a minimally invasive surgery, known as a transapical approach, which uses a small incision through a large artery in the chest or the tip of the left ventricle (the apex).

Some patients can also undergo a cath lab procedure known as a TAVR. In this procedure, a collapsible valve made from the pericardial tissue of a pig or cow is inserted through a catheter in the groin. The valve is then advanced to the heart and unfolded and set in place within the existing, failing valve. Currently, TAVRs are only available for patients at moderate to high risk of surgical complications, but VCU Health has been involved in research exploring the expansion to those with low-risk status.

VCU Medical Center was the first hospital in Virginia to offer conscious sedation in TAVRs. “This means patients are awake during the procedure,” said Gertz. “I would say our median length of stay is



DR. ZACHARY GERTZ

one day, so we’re doing rapid discharge. We may have the shortest length of stay in the country.”

Although the medical center works with some of the highest-risk patients in the area, mortality rates are very low; for TAVRs, for instance, mortality rates are 1-2% in 30 days after the procedure.

That’s one of the reasons many patients choose VCU Health over other institutions for their heart valve procedures, said Gertz. “We are a very experienced team with excellent outcomes.” ❤️

Our heart valve disease team includes:

- Dr. Zachary Gertz, interventional cardiologist
- Dr. Vigneshwar Kasirajan, cardiothoracic surgeon
- Dr. Barbara Lawson, interventional cardiologist
- Dr. Mohammed Quader, cardiothoracic surgeon
- Delia Yanes, nurse practitioner

Discovery Series Focuses on Advanced Imaging

Each year, the MCV Foundation sponsors a Discovery Series in Williamsburg, providing guests with access to the latest work of VCU Health scholars, researchers and clinicians. Now in its 10th year, this year’s event highlighted the impact of advanced imaging on health care. More than 230 guests attended the event at the Two Rivers Country Club in October, which included a welcome

reception, panel discussion, strolling supper and conversation.

Dr. Peter Buckley, dean of the VCU School of Medicine, moderated the panel discussion, “Another Peek Under the Hood: Advanced Imaging Improves Detection and Treatment of Cancer, Cardiac and Pulmonary Diseases.” The multidisciplinary panel included Dr. Greg Hundley and other VCU faculty: Dr. Ralph Clark, chief medical officer and vice

president for clinical activities; Dr. Ann Fulcher, professor and chair of the VCU Department of Radiology and director of abdominal imaging; Dr. Patrick Nana-Sinkam, professor and chair of the Division of Pulmonary Disease and Critical Care Medicine; and Dr. Sarah Temkin, professor of the Division of Gynecologic Oncology.

The faculty discussed advanced imaging techniques, explaining how they can be used for early diagnosis and tailored treatment.

New Clinic Targets Patients with Complex Cholesterol Challenges

Statins are the go-to medication for controlling cholesterol because they have the most evidence for preventing heart attacks and strokes, according to Dr. Deborah Koehn, assistant clinical professor of the VCU Department of Internal Medicine. However, sometimes individuals have difficulty tolerating them.

The problems can range from moderate muscle pain “to a rare but life-threatening condition known as rhabdomyolysis. That’s where you have a massive breakdown of the muscles,” explained Koehn. “Once that happens, using statin medications can be more difficult.”

Koehn helps patients who have had difficult-to-treat lipid disorders at Pauley’s Complex Lipid Management Clinic. A graduate of the VCU School of Medicine, Koehn is board certified in internal medicine as well as clinical lipidology. After years of experience, she wanted to start a lipid clinic at VCU Health—and did so, in March 2018, with the encouragement of colleague Dr. Phoebe Ashley.

“Dr. Koehn is an exceptional physician with advanced training in lipidology,” said Ashley. “The complex lipid clinic is a vital addition to Pauley, and our effort to provide comprehensive cardiovascular care. Dyslipidemia is a large problem and for many patients and physicians very challenging to tackle.”

Dyslipidemia refers to the elevation of LDL (“bad” cholesterol) or triglycerides, or low levels of HDL (“good” cholesterol). When left untreated, the condition can lead to atherosclerosis and other cardiovascular diseases.

Koehn sees a range of patients in her clinic, from those with high cholesterol levels who are trying to prevent a heart attack or stroke to those with known heart disease.

Some have multiple co-morbidities such as diabetes, fatty liver disease, rheumatoid arthritis, autoimmune disease and HIV.


With HIV patients, for instance, “some of the medications that they’re on can cause lipid abnormalities. And they have a lot of interactions with the statin medications,” she said. “It is important to have the knowledge about the drug combinations but also to be compassionate about lifestyle education.”

Koehn usually receives referrals from primary care physicians and cardiologists when statins fail. “The clinic gives patients an opportunity to have someone on their team to really narrow in and help them work on changing eating habits, exercise habits, weight and medications related to their complex lipid disorders,” she said.

One exciting alternative that’s developed in recent years are PCSK9 inhibitors, an injectable medication without the same side effects of statins. Due to their expense, however, “not everybody can be approved by their insurance company. In those cases, we try to go back and look at some of the older medications as well as lifestyle modifications to get them where they need to be,” she said.

Koehn is also trained in culinary medicine, a new evidence-based field at the intersection of food and medicine.


Her initial appointments can last up to an hour as she gets to know the patient. In addition to finding a good match in medications, “we spend a lot of time talking about nutrition, exercise and weight,” she said. “The clinic is an opportunity to try some different things to get them to their goals.”

The Complex Lipid Management Clinic is located on the VCU Health Stony Point Campus, 9000 Stony Point Parkway in Richmond. To make an appointment, please call (804) 628-4327. 

Dixon, Others Highlighted at AHA Meeting

Each year, the American Heart Association’s (AHA) Scientific Sessions present the most important research in cardiovascular disease. This year, numerous Pauley faculty were among those whose work was highlighted at the prestigious national meeting, held in November in Chicago and drawing more than 12,000 attendees from around the world.


Dr. Dave Dixon, vice chair for clinical services for the VCU School of Pharmacy’s Department of Pharmacotherapy and Outcomes Science, served as an expert reviewer for the 2018 American College of Cardiology (ACC) and AHA Cholesterol Guidelines, which were presented at the sessions. He is a certified clinical lipid specialist who works on numerous trials involving heart patients with Drs. Antonio Abbate and Benjamin Van Tassell. Dixon sees patients with cardiovascular risk factors at the Cardio Pharmacotherapy Clinic in downtown Richmond. He previously served as an expert reviewer for the ACC and AHA Hypertension Guidelines that were released in November 2017.

Also, in Chicago, Abbate and Dr. Jordana Kron each led invited talks, and Dr. Fadi Salloum moderated a session. Pauley clinical and preclinical teams presented 19 abstracts. 

“Two themes emerged from the dialogue: how imaging not only supports diagnosis but also the prevention of disease, and the value of collaborating across areas of medicine to do the best for patients,” said Buckley.

In the rapidly growing field of cardio-oncology, for instance, cardiologists and oncologists work together to treat patients who develop cardiovascular disease following chemotherapy and radiation

treatments.

Hundley, a pioneer in using MRI to identify heart disease in cancer patients, talked about his research with attendants. “The discovery series was an excellent discussion about utilization of imaging in health care. Afterwards, attendees expressed a lot of interest in the cardiovascular magnetic resonance capabilities at the new Cardiovascular Imaging Center,” he said. 

Research Team Provides Guidance on Broken-Heart Syndrome



DR. ANTONIO ABBATE

A team of cardiology and psychiatry specialists from VCU Health has authored a new comprehensive clinical review article in the *Journal of the American College of Cardiology* that summarizes the latest evidence-based diagnostic criteria and treatment strategies for Takotsubo cardiomyopathy, also known as broken-heart syndrome.

“Takotsubo cardiomyopathy is a recently recognized condition that is difficult to diagnose and treat,” said corresponding author Dr. Antonio Abbate, a professor of cardiology, associate director of the C. Kenneth and Dianne Wright Center for Clinical and Translational Research and medical director of the Clinical Research Services Unit.

In the state-of-the-art review—the most prestigious type of literature review—the interdisciplinary research team summarized all that is known about the condition, reviewing the proposed risk factors and triggers for the syndrome and discussing practical approaches to diagnosis and treatment. They also highlighted potential challenges and unresolved questions.

The disease, described as a weakening of the heart’s left ventricle, usually results from severe emotional or physical stress such as the death of a loved one. More than 90 percent of reported cases are in postmenopausal women—ages 58 to 75—who experienced severe, unexpected emotional stress one to five days before the onset of symptoms. The condition is reversible, but often misdiagnosed, and can lead to stroke and death. Asthma, depression

and substance abuse—including cannabis use—are also risk factors. “In the article, we discussed that some part of the brain may be overactive in response to an emotional or physical stressor,” Abbate said.

The review builds on existing VCU research conducted by co-author Dr. F. Gerard Moeller, director of the Wright Center, including reports on complex cases of Takotsubo cardiomyopathy at VCU Medical Center and preclinical studies that highlight the interplay between the brain and heart. The researchers plan to use the Wright Center’s research-dedicated MRI scanner to further explore the brain-heart connection in patients who present with the condition, and to explore the link to cannabis.

In the meantime, the *JACC* review will be available to providers worldwide and may help guide diagnosis and treatment. ❤️

The researchers plan to use the Wright Center’s research-dedicated MRI scanner to further explore the brain-heart connection in patients who present with the condition, and to explore the link to cannabis.

New Cardiac Catheterization Laboratory Opens



DR. NIMESH PATEL PERFORMS A DIAGNOSTIC RADIAL ARTERY CATHETERIZATION PROCEDURE INSIDE THE NEW LAB. / THE STATE-OF-THE-ART DIAGNOSTIC CARDIAC CATHETERIZATION LAB INSIDE THE NEW VCU HEALTH COMMUNITY MEMORIAL HOSPITAL IN SOUTH HILL, VA.

Patients in Mecklenburg County, Va. once had to use either a local mobile lab or travel 40 minutes or more to hospitals in Petersburg, Richmond or North Carolina for cardiac catheterizations.

Now, these critical procedures are close at hand with the opening of a new cardiac catheterization laboratory at VCU Health Community Memorial Hospital (CMH) in South Hill, Va.

“With the new lab, we’re able to provide

the most advanced cardiac care in the region,” said Ursula Butts, vice president of Patient Care Services.

The state-of-the-art medical suite opened November 2017, the same month as the new CMH opened, and offers a full range of diagnostic services for the heart and blood vessels. The services include cardiovascular ultrasound, stress testing, Holter monitoring and diagnostic cardiac catheterizations. The staff includes board-certified cardiologists, registered sonographers and diagnostic nurses.

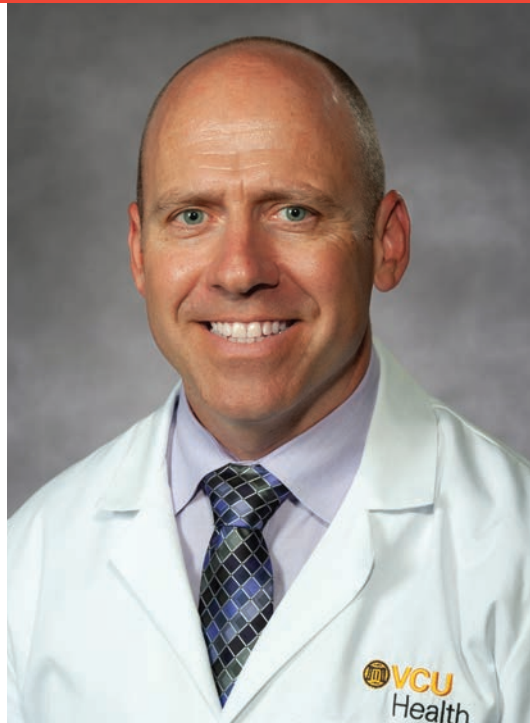
Catheterization procedures are performed using either a patient’s femoral artery or radial artery in the forearm.

CMH’s Cardiovascular Department is accredited by the Intersocietal Accreditation Commission in vascular, echo and nuclear testing and undertakes nearly 5,000 cardiovascular studies each year.

“Our doctors and team are committed to providing the highest quality care in a personalized environment,” said Butts.

Visit vcuhealth.org/community-memorial-hospital for more information. ❤️

Welcome, New Faculty!



DR. JUSTIN MCNAIR CANADA

Justin McNair Canada, RCEP, Ph.D., has been named an assistant professor of internal medicine in the Division of Cardiology. He is spearheading the development and optimization of advanced clinical exercise testing services for both research and clinical use. He also serves as senior clinical exercise physiologist for the Department of Occupational and Physical Therapy at VCU Medical Center, and adjunct faculty instructor for the VCU College of Humanities and Sciences' Department of Kinesiology and Health Sciences.

Canada recently received a pilot grant from the VCU Department of Internal Medicine to explore the feasibility of coupling cardiopulmonary exercise testing with cardiac MRI to precisely identify the causes of exercise intolerance in cancer patients following anti-cancer therapies.

He received his master's in health and movement sciences, with a concentration in exercise physiology, and a doctoral degree in rehabilitation and movement sciences, also with a concentration in exercise physiology, from VCU. His doctoral dissertation examined the use of exercise testing to identify heart abnormalities in cancer survivors who had previously undergone radiotherapy treatments.

Canada recently received a pilot grant from the VCU Department of Internal Medicine to explore the feasibility of coupling cardiopulmonary exercise testing with cardiac MRI to precisely identify the causes of exercise intolerance in cancer patients following anti-cancer therapies. Participants of the study will exercise on a supine bicycle ergometer while undergoing



DR. M. KHALID MOJADIDI

a cardiac MRI to obtain real-time images of heart function during exercise. He is also co-investigator on NIH and numerous other grants with Drs. Antonio Abbate, Benjamin Van Tassel and other faculty evaluating the efficacy of therapeutic treatments in patients with cardiovascular disease.

Jennifer Hawthorne Jordan, Ph.D., M.S., has joined the faculty as director of the new Cardiovascular MRI Core Lab and assistant professor of biomedical engineering. Her previous position was engineering director of the Cardiovascular MRI Laboratory at Wake Forest School of Medicine, where she also served on the faculty.

She received her master's in clinical and population translational sciences at Wake Forest University and her doctoral degree in biomedical engineering at Virginia Tech-Wake Forest University School of Biomedical Engineering and Sciences. She also completed a T32 cardiovascular imaging postdoctoral fellowship. One of her research advisors at Wake Forest was Dr. Greg Hundley.

Jordan is a peer reviewer for numerous journals and currently serves as an investigator on over \$13 million in NIH and other grants, mostly involving MRI studies of patients with cardiovascular disease, including those who have undergone cancer treatments.

M. Khalid Mojadidi, M.D., FACP, has joined the faculty as assistant professor of internal medicine. Mojadidi is an invasive

cardiologist who will see patients at VCU Health Community Memorial Hospital in South Hill, Va.

He received his medical degree from the Shifa College of Medicine in Islamabad, Pakistan, during which time he served an internship with the World Health Organization in Kabul, Afghanistan. He later completed his cardiology fellowship at UCLA, his Internal Medicine residency at the Albert Einstein College of Medicine/Jacobi Medical Center and his cardiovascular disease fellowship at the University of Florida/Shands Hospital.

His areas of practice include cardiovascular disease, echocardiography (including transesophageal), nuclear cardiology, cardiac catheterization, cardioversion, ambulatory ECG monitoring and stress testing. He is board certified in internal medicine and echocardiography, and board eligible for cardiovascular disease, nuclear cardiology, cardiac CT and RPVI.

Mojadidi is widely published in peer review journals and serves as a reviewer for numerous publications. He is fluent in English, Farsi, Hindi and Urdu, with intermediate proficiency in Arabic.

John S. Wilson, M.D., Ph.D., has joined as primary investigator of the Cardiovascular Mechanics and Imaging Lab and assistant professor of the Division of Cardiology and the VCU College of Engineering's Department of Biomedical Engineering.

After receiving his undergraduate degree in engineering at Baylor University, where he was the highest-ranking graduate of Baylor's School of Engineering and Computer Science, he earned his medical degree from the University of Texas Southwestern Medical School, completed an internal medicine internship at Presbyterian Hospital of Dallas and completed his residency in radiology at Wake Forest Baptist Medical Center.

He then went on to attain his master's, postgraduate and doctorate in biomedical engineering from Yale University, afterwards completing a post-doctoral fellowship in MRI-based approaches to quantifying regional vascular strain and remodeling in the departments of Radiology and Cardiology at Emory University.

Along with Drs. Jordan and Canada, he will help Pauley develop new technologies for identifying cardiovascular disease. ❤️



Pauley Heart Center

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Starting this month, Dr. Greg Hundley, director of VCU Health Pauley Heart Center, will be introducing each issue of *The Beat*. He takes over the task from Dr. Kenneth Ellenbogen, who has done an outstanding job in helping us put together the issues over the years. Thank you, Dr. Ellenbogen!

Letter from the Director

It's been nearly a year since I first moved into my office in the West Hospital—and what a whirlwind it's been.

In October, a team led by Dr. Vigneshwar Kasirajan successfully completed our center's 600th heart transplant. In this issue, you can read the heartwarming story about the patient, a mother of three who was turned down for a transplant four times before receiving the lifesaving surgery at VCU Medical Center.

In the new Cardiovascular Imaging Suite, Justin Canada, Ph.D., is working to determine which body compartment causes exercise intolerance in patients with heart failure—something that has never been done before—using a new technology that merges cardiopulmonary exercise testing with MRI scanning. VCU Medical Center is one of only a few sites in the world with this capability, so we're very excited by it. Many other clinical trials are under way throughout the heart center, as you'll see in the cover story.

We talked a lot about research at our first-ever Pauley retreat, held Sept. 8 at the Frontier Project in Scott's Addition. About 70 health care professionals and scientists from the health system and university gathered together. We discussed several big ideas, including a joint incubator for research in cardiovascular disease.

More and more, we will be seeing collaborations between the faculties of cardiovascular medicine and biomedical engineering. We've recently hired two new faculty members with biomedical engineering backgrounds who will be helping us to create new technologies to better cope with heart disease.

Over the past year, I've enjoyed meeting so many wonderful new people—from our highly dedicated faculty and staff and our thankful patients to our incredibly supportive donors who make our work possible. I hope you'll enjoy meeting some of these individuals in this issue.

Sincerely yours,

Dr. Greg Hundley



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