

The Beat

A publication of
VCU Health
Pauley Heart Center



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Inside:

Inflammation and the heart: our research

Provider as patient: one physician's story



VCU Health[™]

Pauley Heart Center



From left: Jordana Kron, M.D.; Justin Canada, Ph.D.; Roshanak Markley, M.D.; Stefano Toldo, Ph.D.; Benjamin Van Tassell, Pharm.D.; Antonio Abbate, M.D., Ph.D.; Cory Trankle, M.D.; Salvatore Carbone, Ph.D.; Fadi Salloum, Ph.D.

Inflammation and the heart

Pauley experts are renowned worldwide for researching critical links

The body produces inflammation — marked by redness, heat, swelling and pain — as a natural and protective response to injury. In the case of cardiac patients, inflammation often occurs following a heart attack. But lingering, chronic inflammation is also linked to many diseases, including heart failure.

“The idea that inflammation is involved in heart disease is not new,” said Antonio Abbate, M.D., Ph.D., Roberts Professor of Cardiology in the Pauley Heart Center and medical director of the Clinical Research Unit in the C. Kenneth and Dianne Wright Center for Clinical and Translational Research.

But a promising new field in cardiology — in which researchers innovate to find a targeted treatment for inflammation — has evolved at VCU Health. Abbate leads a multidisciplinary team conducting clinical and translational research examining the role of inflammation in heart disease. He is also principal investigator or co-investigator on pilot clinical studies funded by the National Institutes of Health, the American Heart Association or industry aimed at identifying novel anti-inflammatory therapies for patients with acute myocardial infarction or heart failure.

Over the past 20 years, preclinical studies and early stage clinical trials at VCU Health have generated meaningful data advancing the understanding of inflammation and the heart. This research has earned international recognition for Pauley, Abbate and his colleagues.

Here are highlights of their recent work.

Mediating the cardiotoxicity of cancer drugs

Sterile inflammation, or inflammation in the absence of a pathogen, has been linked to aggravating numerous disease processes, including the aftermath of injury to the heart. This injury may be a result of a heart attack or exposure to cardiotoxic agents including FDA-approved treatments for certain types of cancer.

Persistent inflammation in the heart can cause damage or failure. “It is important to identify cardiac conditions that involve persistent inflammation in order to design treatment modalities that specifically target the inflammatory pathways,” said Fadi Salloum, Ph.D., the Natalie N. and John R. Congdon Sr. Endowed Chair at Pauley.

Salloum’s research is focused on studying the role of sterile inflammation in mediating the cardiotoxic effects of chemotherapeutic drugs. A seven-year, \$5.4 million award from the National Heart, Lung and Blood Institute is funding Salloum’s research program, Managing Cardiac Toxicities of Cancer Therapy. The goal of the research is to better understand the basis of cardiotoxicity — damage to the heart caused by chemotherapy drugs — and inform the discovery of new methods of prevention for chemotherapy-induced heart failure.

“Other studies are also exploring the role of persistent sterile inflammation in animal models of heart attack as well as genetic mutations that lead to Duchenne Muscular Dystrophy-induced cardiomyopathy,” he said. “These studies will pave the way for further development of targeted therapies to blunt sterile inflammation in the heart and its related adverse remodeling and failure.”

Our experts

VCU Health Pauley Heart Center faculty researching inflammation include:

Preclinical studies:

Antonio Abbate, M.D., Ph.D.
Fadi Salloum, Ph.D.
Stefano Toldo, Ph.D.

Clinical studies:

Antonio Abbate, M.D., Ph.D.
Justin Canada, Ph.D.
Salvatore Carbone, Ph.D., FHFSA
Jordana Kron, M.D.
Roshanak Markley, M.D.
Cory Trankle, M.D.
Benjamin Van Tassell, Pharm.D.

Blocking inflammation with anakinra

Inflammation is an inevitable response to injury, but too much inflammation leads to more injury.

Abbate and his team have been working on how to modulate the inflammatory response in heart disease so that patients can heal faster and have better cardiac health. In particular, they have started with patients with heart attacks for whom there is a major injury to the heart muscle.

The focus of their studies has been anakinra, a drug that blocks a specific mediator of inflammation called interleukin-1 (IL-1), a small protein in the blood that mediates fever and other inflammatory responses. IL-1 also promotes heart failure following a heart attack.

In heart attacks, there is a clear insult to the heart — a blockage that causes lack of oxygen and cell death and injury. “In other conditions like heart failure, the heart is chronically ill, and inflammation is chronically enhanced,” Abbate said. “This chronic inflammation contributes to heart dysfunction. By resetting the inflammation, some can help improve cardiac function and help heart failure patients do better, feel better and possibly keep them out of the hospital.”

Recently, the team has looked at inflammation of the pericardium, the sack around the heart. In some instances, the pericardium becomes inflamed, a condition called pericarditis. “In a small number of patients, this pericarditis becomes incessant, recurrent and problematic, and it doesn’t stop until patients are put on powerful anti-inflammatory drugs,” Abbate said. “We participated in studies where we tested different anti-inflammatory drugs and showed that when you block that inflammatory vicious cycle, patients can heal from chronic recurrent pericarditis.”

For many years, studies of targeted anti-inflammatory drugs in heart attacks and heart failure were unique to VCU, Abbate said. Notably, VCU has become internationally renowned for its VCUART and REDHART studies focusing on inflammation and centered



around blocking IL-1 in heart disease. Abbate and colleague Benjamin Van Tassell, Pharm.D., are co-principal investigators.

With active NIH funding for the past 10 years building on research from earlier clinical trials, and with another multimillion dollar grant awarded in February, the upcoming IL-1 blockade in STEMI trial 4 study will enroll patients with heart attacks and integrate cardiac magnetic resonance imaging and exercise testing to learn if these combined measures prevent patients from developing heart failure. Eighty-four patients will be treated over a period of approximately five years.

Concurrently, an ongoing NIH-sponsored study of heart failure patients is the phase II clinical trial of anakinra called REDHART2, designed to expand and confirm a beneficial effect of sustained anakinra treatment on aerobic exercise capacity. “We know that inflammation has a negative effect on cardiac function, which becomes even more problematic in patients with heart failure,” Van Tassell said. With prior studies already pointing toward improvements in patients with heart failure who receive IL-1 blockade, Abbate said that the team hopes “the treatment will keep the inflammation low, improve their symptoms of heart failure, improve their exercise capacity and keep them out of the hospital. We’ll have the results in a couple of years.”

Devising an alternative therapy for cardiac sarcoidosis

Another area of focus for the Pauley team is cardiac sarcoidosis, an inflammatory condition in which groups of immune cells form granulomas in different areas of the heart. While sarcoidosis can involve almost any organ system, sarcoidosis of the heart can be life-threatening, causing issues including arrhythmias, heart failure and death.

The team is looking at anti-inflammatory treatments outside of the standard treatment of steroids to see if they can help patients with cardiac sarcoidosis heal inflammation faster or better. “The field of cardiac sarcoidosis, and sarcoidosis in general, really needs new

“A new, safe and effective treatment could be life-altering for patients with cardiac sarcoidosis.”

mechanistically driven therapies,” said Jordana Kron, M.D., a professor in the VCU School of Medicine and a cardiologist at Pauley.

In 2019, Kron was awarded a \$50,000 Pauley Pilot Research Grant to investigate a new treatment protocol for cardiac sarcoidosis. The 15-month philanthropic grant is being used to evaluate the efficacy and safety of using anakinra to treat patients who present with cardiac sarcoidosis. The study was the first of its kind to explore the new treatment paradigm. This pilot study led to a larger study funded by an R21 grant from the National Center for Advancing Translational Sciences at the NIH and by a Collaborative Science Award study from the American Heart Association in which patients with cardiac sarcoidosis are treated with anakinra.

“A new, safe and effective treatment could be life-altering for patients with cardiac sarcoidosis,” said Kron, a translational science scholar at the VCU C. Kenneth and Dianne Wright Center for Clinical and Translational Research. “It may also open the door for new therapies for cardiac sarcoidosis and other inflammatory heart diseases in the future.”

Identifying therapies for patients with HFpEF

Possibly due to comorbidities like diabetes and obesity, data shows that heart failure patients with preserved left ventricular ejection fraction (HFpEF) have higher inflammation in their bloodstreams. Roshanak Markley, M.D., associate professor of medicine in internal medicine and radiology at VCU Health, believes that’s no coincidence. An 18-month study led by Markley uses a novel perfusion technique and MRI to explore possible links among inflammation, microvascular disease and HFpEF.

“If we can find a link and identify these high-risk patients with inflammation and microvascular disease, then we can create therapies to target inflammation, restore microvascular blood flow, and hopefully improve their exercise tolerance and quality of life,” she said.

The hypothesis of Markley’s study suggests that inflammation induces coronary microvascular disease (CMD), leading to impairment of diastolic function and exercise capacity. Markley explores the strength of correlation among CMD, diastolic impairment and inflammatory biomarkers.

Recruited from referrals across VCU Health, the study includes 20 men and women but aims to key in on a prevalence for HFpEF among females. By administering adenosine and increasing blood flow in the heart, the researchers image the perfusion in the heart using a novel sequence that can calculate the myocardial blood flow and create a perfusion map for more accurate assessment of blood flow. Subjects will also undergo an echocardiogram to assess for impairment in diastolic function and laboratory assessment of inflammation in the blood.

Linking diet, obesity and inflammation

An unhealthy diet and obesity can trigger an inflammatory response and heart failure. That’s the premise behind research into diet and obesity performed by nutritionist Salvatore Carbone, Ph.D., assistant professor in the Department of Kinesiology & Health Sciences, College of Humanities & Sciences, and an affiliate assistant professor at Pauley. Carbone investigates the effects of diet, specific macronutrients such as dietary fatty acids, also known as dietary fats, and simple carbohydrates, known as sugars, on the cardiovascular system.

An unhealthy diet and obesity can trigger an inflammatory response and heart failure.

Since he joined VCU, Carbone has worked closely with Abbate, Van Tassell and Stefano Toldo, Ph.D., in both preclinical laboratory and clinical settings. His initial preclinical work had shown that a diet rich in saturated fatty acids, particularly when associated with a diet rich in sugars (the Western diet), could rapidly worsen cardiac function and glucose metabolism. Importantly, this dysfunction could be partially reversed when switched back to a healthy diet low in both saturated fatty acids and sugars.

Additionally, his research showed that many of the detrimental effects of an unhealthy dietary pattern are mediated by pro-inflammatory cytokines (inflammation), namely IL-1 and IL-18. In fact, mice that are fed a Western diet express higher levels of these cytokines in the circulation as well as specifically in the heart cells, which can, in turn, weaken the heart’s ability to contract and relax.

Furthermore, his research revealed that an anti-inflammatory medication specifically targeting IL-1 and IL-18 provided protection from the detrimental effects of the unhealthy diet. Similarly, switching saturated fatty acids with unsaturated fatty acids (also known as “healthy dietary fats”) found in food such as olive oil, canola oil, nuts and avocados, could also reduce the expression and the production of these pro-inflammatory cytokines. These results provided great advances to the field of nutrition and cardiovascular diseases, demonstrating that unhealthy diet can weaken the heart; the negative effects of the Western diet are mediated by specific pro-inflammatory cytokines; and those cytokines can be blocked by using a pharmacologic approach or by modulating the quality of the fats, specifically switching from unhealthy fats (i.e., saturated fatty acids) to healthy fats (i.e., unsaturated fatty acids). ❤️

MRI technology advances research and patient care

Physicians and scientists at Pauley utilize the latest cardiac magnetic resonance imaging (MRI) technology to more effectively detect life-threatening cardiovascular conditions and to research potential therapies.

Compared to most other technologies, MRI produces more accurate images with higher resolution, which has myriad applications, such as cardiac stress testing, the earlier detection of the negative impacts of cancer treatments on the heart and evaluating the effectiveness of cardiac therapies.

One of the biggest advantages of MRI over other imaging technologies is its ability to provide tissue characterization, a determination of which parts of the heart muscle are diseased or healthy. The technology more clearly shows the location of inflammation and scar tissue within the heart muscle.

In 2018, Pauley solidified itself as a leader in the technology by committing



\$4 million to building its 8,000-square-foot cardiovascular imaging suite, equipped with state-of-the-art 3.0 Tesla MRI scanning and echocardiography. Echocardiography helps physicians and researchers screen for problems, while MRI helps them identify exact problems in high definition.

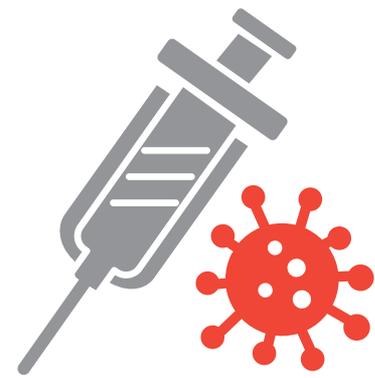
What sets the 3.0 Tesla scanner apart from traditional models is the strength of the magnetization used to generate images, which leads to more rapidly produced,

crisper images, said Cory Trankle, M.D., a Pauley physician and assistant professor in the VCU School of Medicine. Trankle uses the 3.0 Tesla MRI for obtaining images of the heart muscle while patients exercise on an MRI-compatible bicycle. He estimates that only about 20 centers in the world are capable of capturing these quality images.

The MRI technology is also critical to supporting research by Pauley Heart Center director Greg Hundley, M.D., on preventative heart health care for patients undergoing chemotherapy. Hundley was the first in the world to demonstrate that MRI stress testing can identify patients at risk of heart attack. In the clinic’s first year, the number of cardiac MRIs performed at Pauley increased by 95%, preventing at least 87 heart attacks. The three-dimensional images produced by MRI technology are particularly effective at revealing tissue damage caused by a heart attack or compromised blood flow due to arterial blockages. ❤️

COVID-19 vaccine and heart patients

Our experts answer questions about vaccine-related myocarditis and pericarditis



The Centers for Disease Control and Prevention and its partner agencies are actively monitoring reports of myocarditis and pericarditis developing in individuals after receiving SARS-CoV2 mRNA vaccines used to prevent COVID-19.

Myocarditis is inflammation of the heart muscle, and pericarditis is inflammation of the outer lining of the heart. In both cases, the body's immune system causes inflammation in response to an infection (i.e., viruses) or some other trigger (i.e., drugs).

Earlier this year, a multidisciplinary panel of VCU Health clinicians and researchers responded to questions and concerns about myocarditis and pericarditis as related to the COVID-19 vaccine. The Q&A was published on Pauley's website, and an abbreviated version is below.

How common is it for someone with COVID-19 to experience myocarditis or pericarditis?

The likelihood in patients with COVID-19 is very low. It is estimated that about 150 out of every 100,000 people who develop infection will develop myocarditis or pericarditis.

What are the symptoms and signs of myocarditis or pericarditis secondary to COVID-19?

Myocarditis and pericarditis commonly present with chest pain and shortness of breath. Nausea, vomiting and abdominal pain can also occur.

How serious are myocarditis or pericarditis secondary to COVID-19?

Most cases of myocarditis and pericarditis are mild and self-limiting, with symptoms resolving within a few days and without consequences. In some cases, however, treatment is required and, in a small number of cases, the illness can be very serious due to the amount of injury to the heart in

myocarditis (fulminant myocarditis) or due to the recurrent nature of unresolving chest pain (recurrent pericarditis), or severe inflammatory nature of the response.

How are myocarditis or pericarditis secondary to COVID-19 diagnosed and treated?

The diagnosis of myocarditis and pericarditis are based on a clinical examination paired with laboratory testing and imaging of the heart structures by echocardiography and/or cardiac magnetic resonance imaging. The treatment depends on the amount of inflammation and injury and generally consists of anti-inflammatory therapies and restriction from exercise. ❤️

VCU Health's COVID-19 expert multidisciplinary panel

- Antonio Abbate, M.D., Ph.D., medical director of clinical research unit, C. Kenneth and Dianne Wright Center for Clinical and Translational Research
- Gonzalo M. Bearman, M.D., M.P.H., chair, Division of Infectious Diseases and hospital epidemiologist/medical director of VCU Healthcare Infection Prevention Program
- Kerri A. Carter, M.D., FAAP, pediatric cardiologist
- Stamatina Danielides, M.D., rheumatologist
- Greg Hundley, M.D., director, VCU Health Pauley Heart Center, chair of cardiology
- Naveed A. Naz, M.D., cardiologist
- Keyur B. Shah, M.D., cardiologist
- Michael P. Stevens, M.D., infectious disease specialist
- Jeremy S. Turlington, M.D., cardiologist

Richmond Magazine recognizes Pauley's 'Top Docs'

Richmond Magazine recently released its 2022 Top Docs list, and 18 of our Pauley Heart Center providers have been honored. Physicians on this list were chosen by their peers through an online survey conducted by Richmond Magazine, meaning physicians all over the Richmond area recognized these Pauley providers as some of the best in the region in the following categories:

- Antonio Abbate, M.D., Ph.D.: Cardiology
- Phoebe A. Ashley, M.D.: Cardiology
- Kerri Carter, M.D.: Pediatric Cardiology (CHoR)
- Anthony Cassano, M.D.: Cardiothoracic Surgery
- Alice Coombs, M.D.: Anesthesiology
- Kenneth Ellenbogen, M.D.: Cardiology
- Zachary Gertz, M.D.: Cardiology
- Scott Gullquist, M.D.: Pediatric Cardiology (CHoR)
- Vigneshwar Kasirajan, M.D., FACS: Cardiothoracic Surgery
- Jordana Kron, M.D.: Cardiology
- Barbara D. Lawson, M.D.: Cardiology, General Internal Medicine
- Mark Levy, M.D.: Vascular Surgery, CMH Surgical Services
- Brad McQuilkin, M.D.: Pediatric Cardiology (CHoR)
- Daniel Newton, M.D.: Vascular Surgery, CMH Surgical Services
- Mohammed A. Quader, M.D.: Cardiothoracic Surgery
- Charlotte Roberts, ACNP: Cardiology
- Rachit D. Shah, M.D.: Cardiothoracic Surgery
- Richard Shepard, M.D.: Cardiology



Congratulations to all of Pauley's Top Docs!

R25 grant funds fellowship program for underrepresented students

A recently awarded National Institutes of Health grant supporting an undergraduate research fellowship program at Pauley Heart Center will create opportunities for students from underrepresented groups (individuals with disabilities, minorities and those from a disadvantaged background).

The five-year, \$500,000 R25 not only provides 12 students per year with a paid research fellowship but also gives Pauley the chance to partner with five regional universities in Virginia. "We are excited to not only create more research opportunities for undergraduate students but to also build meaningful relationships with other universities in our area to have maximum impact," said Pauley program manager Megan O'Hare Blackwell.

The undergraduate research fellowship program is designed to provide exposure for students who are interested in specific careers in research. It creates meaningful opportunities for them to engage in multidisciplinary, translational cardiovascular research with the goal of enhancing the diversity of the biomedical, behavioral and clinical research workforce. During the program, students will engage in a 10-week cardiovascular-focused research project with a Pauley Heart Center mentor.

Additionally, the students will participate in a weekly course led by Pauley director Greg Hundley, M.D.; specialized facility tours; clinical care and research training; and programs about ethical conduct of research and preparation of first-author peer-reviewed abstract and manuscript submissions. The students will learn from faculty mentors in disciplines including data science, biology, health sciences, chemistry, sociology, engineering, kinesiology and psychology.

To learn about becoming a faculty mentor, or for more information, email megan.blackwell@vcuhealth.org. 

Dr. Walter Paulsen retires after more than 40 years

Walter Paulsen, M.D., retired from VCU Health at the end of 2021. Born in East Africa, he came to VCU in 1980 and was a dedicated and invaluable member of the faculty of the Department of Internal Medicine and Division of Cardiology, earning the position of associate professor in 1987.

During his over 40 years as part of the Pauley team, Paulsen was exceptional in providing patients with the highest quality cardiovascular care as exemplified by his clinical care in imaging, including advanced imaging during interventional procedures and the high-risk obstetrics clinic. He was pivotal to the creation, success and

advancement of the VCU Health structural heart program as its lead expert imager.

In addition to his exceptional clinical work, his dedication to education was awe-inspiring, as evidenced by his multiple Excellence in Teaching Awards throughout his career. Paulsen was a fellow of the American College of Cardiology and the Royal College of Physicians in Canada, and as a researcher, he authored or co-authored more than 50 papers and abstracts.

The dedication of the Heart Station Reading Room in his honor captures his legacy as an extraordinary clinician, master echocardiographer and tireless educator.

Thank you for your years of dedication and incredible work, Dr. Paulsen! 



Pauley director Dr. Greg Hundley (left) and Dr. Walter Paulsen

Alumnus spotlight: Glenn Barnhart, M.D.

Over the course of his 32-year career as a cardiac surgeon, Glenn Barnhart, M.D., witnessed an evolution in the way patients were cared for. He readily accepted this new way of thinking and, in retirement, has found a fulfilling second career as a medical educator and consultant.

“One needs to be flexible and willing to embrace new concepts that are scientifically and clinically proven and be willing to move on to those new concepts and abandon things that have become part of us,” he said. “It can be difficult to let go of things that you think are the right way to do things. But one should never ignore the clinical and scientific data that shows that a new way is a better way.”

Prior to his retirement from clinical practice, Barnhart served as co-executive director of Swedish Heart and Vascular Institute and was chief of cardiac surgery at Swedish Medical Center in Seattle. During his time there, he started the structural heart program and became its surgical director. In the decade since, he has trained residents and young surgeons in how to perform valve surgery and complex operations.

“Teaching young surgeons allows me to contribute to the young surgeons’ continuing education.”

Barnhart has also served as chief medical officer for egnite Health Inc., providing vision for the future of care for structural heart disease patients. “We’re using big data and artificial intelligence to make predictions about patients, for example, when they’re going to convert from moderate to severe disease; this is important in planning for proper timing in their care. There’s no question that the use of artificial intelligence and big data will transform population health management and value-based care in a significant way.”

Concurrently, Barnhart is an educator and consultant for Artivion Inc., lecturing cardiac surgeons and fellows in advanced cardiac surgery techniques both in the U.S. and abroad. He brings the same enthusiasm to medical device maker

Atricure Inc., for whom he trains both surgeons and company representatives in the techniques of surgical ablation for atrial fibrillation with emphasis on the Cox Maze IV procedure.

“A lot of surgeons, once they get out of their training and into their first one to three years of practice, still need some mentoring,” he explained. “Teaching young surgeons allows me to contribute to the young surgeons’ continuing education.”

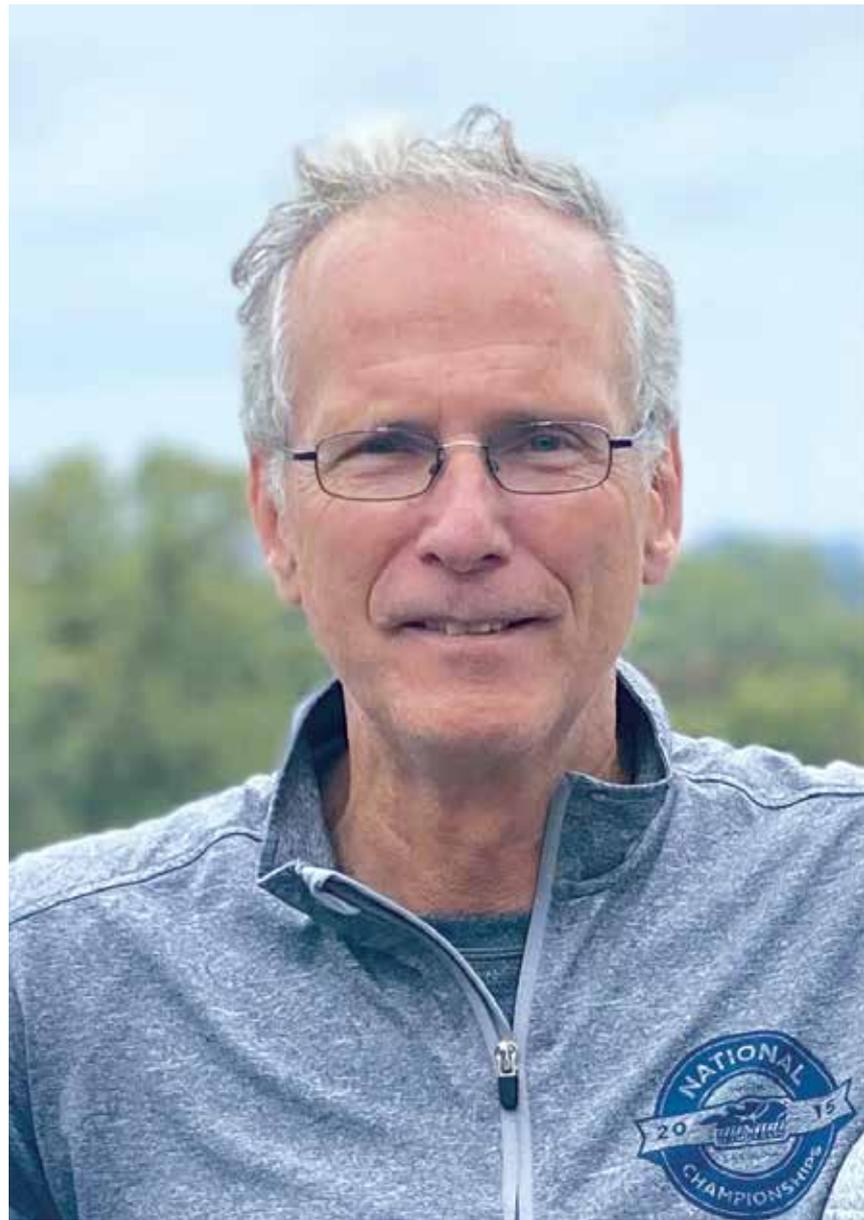
On any given week, Barnhart’s lectures might include a discussion of the disease involved, the natural history of the untreated disease, how to perform the operation, how to avoid complications from the operation, as well as postoperative care. He also teaches operations for atrial fibrillation, complex valve repair and replacement procedures.

Lectures are often followed up with hands-on operations in a mobile lab with cadavers. “You can see in certain surgeons, and especially with the residents, that they finally are able to see the anatomic relationships and understand the important nuances of the operation that result in successful outcomes,” he said.

As operations become more complex, this type of training becomes especially critical.

“Time is the enemy in open-heart operations, and prolonging operations increases the risk to the patient,” Barnhart said. “Some of the operations that have developed for atrial fibrillation, as well as valve repair, are complex and add time to the overall procedure, adding challenges to teaching residents how to do the procedure. This can lead to reluctance on the part of the teaching staff at university centers to allow residents to do certain operations or parts of operations.”

Barnhart came to VCU School of Medicine anticipating a career in family practice or psychiatry. But an elective rotation with the renowned pioneer of heart



Dr. Glenn Barnhart

surgery, Richard Lower, M.D., in his fourth year, sharply changed his focus.

“I was destined for cardiac surgery,” Barnhart said. “I love the intensity. I love making patients that were incredibly sick feel remarkably better. This was especially true with heart transplantation, where I experienced great personal satisfaction: seeing patients who were on their deathbed and restoring their quality of life.”

Keeping the patient at the center of your work will always be the right thing, Barnhart said. “You can never go wrong with that as your North Star.” ❤️

Vitals

Education: VCU School of Medicine, 1973-77; internship and residency, VCU Department of Surgery, 1977-84 (NIH 1979-81); cardiothoracic surgery fellowship, VCU Department of Surgery, 1984-86

MCV/VCU faculty mentors: Jim Brooks, M.D.; Lazar Greenfield, M.D.; Walter Lawrence, M.D.; H.M. Lee, M.D.; Richard Lower, M.D.; Jim Neifeld, M.D.; Szabolcs Szentpetery, M.D.

A novel approach to treating arrhythmias

High-dose targeted radiation therapy provides ‘great outcome’ to patient with end-stage ventricular tachycardia

Alexander Reeves, M.D., former chair of neurology at the Geisel School of Medicine at Dartmouth, is semi-retired from practice at the age of 84 years, and enjoyed being mentally and physically active for decades, until ongoing ventricular tachycardia (VT) threatened his life. VT is most often due to heart muscle damage, resulting in scarring that causes abnormally rapid beats in the lower part of the heart, which substantially increases the risk of sudden cardiac death.

When conventional treatment options failed and Reeves’ condition was end stage, VCU Health Pauley Heart Center physicians, in collaboration with colleagues from the Department of



Dr. Kenneth Ellenbogen

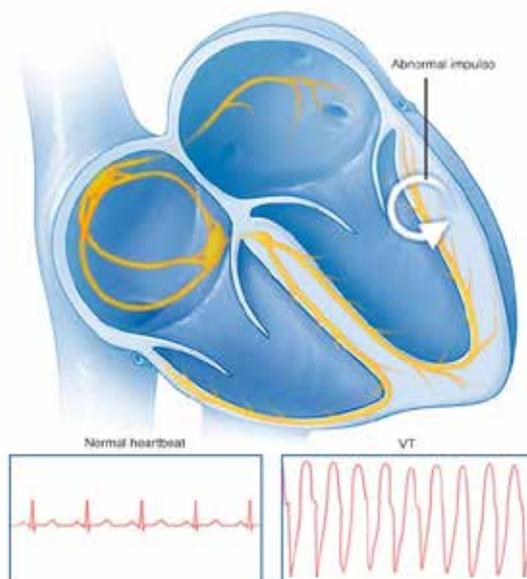
Radiation Oncology and Radiology, used a high-dose of targeted radiation therapy to successfully ablate, or destroy, parts of his heart that were believed to be the source of the arrhythmias. In April 2021, Reeves became the first VCU Health patient to undergo radiation therapy for ablation of refractory VT — a new technique still rarely performed nationally. Since treatment, Reeves has had no full or partial VT events, and his high doses of antiarrhythmic medications are being tapered and discontinued.

“We had a great outcome. He’s an impressive success,” said Kenneth Ellenbogen, M.D., director of clinical cardiac electrophysiology and pacing at VCU Medical Center.

A major advantage of the procedure is that it is outpatient, fast and doesn’t require general anesthesia.

“The patient lies on the table for less than 15 minutes, and we can stop their VT,” Ellenbogen said, though planning prior to the ablation is extensive.

Patients with ongoing VT typically undergo ablation by catheter, which directs heat energy or extreme cold to areas of the



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heart causing the misfire, and scars the tissue to prevent further issues. In contrast to radiation therapy, the catheter ablation procedure is invasive, takes several hours, requires general anesthesia and carries a 50% chance that one treatment will not stop arrhythmias from recurring.

The team mapped the problem area near Reeves’ mitral valve via electrocardiogram and imaging technologies, then applied stereotactic body radiation therapy, a noninvasive radiation procedure most commonly used to treat cancer.

Ellenbogen estimated “a couple hundred patients at most worldwide” have received radiation treatment for VT, pioneered by the Washington University School of Medicine in St. Louis. Data on the long-term effects of treating VT with radiation is limited, Ellenbogen said, and it poses its own risks to the heart. The procedure is a last measure for severely ill patients for whom catheter ablation procedures have been ineffective. Reeves’ physicians initially attempted catheter ablation but had been unable to completely reach the part of his heart causing the

misfire, one of the consequences of prior open-heart surgery to repair a valve in 2013. Reeves also suffered from major side effects caused by drugs physicians hoped helped manage his arrhythmia.

“When I was asked if I wanted to do this new procedure, I said fine, we’ve got nowhere else to go,” Reeves said. “I was on this terrible poison, amiodarone. It’s last resort stuff — any physician will tell you that — with awful complications.”

A defibrillator implanted in Reeves’ heart to shock it back into rhythm during VT felt “like being shot, but there was no wound,” he said.

Ellenbogen and Santosh Padala, M.D., another VCU Health electrophysiologist who, before his death in 2021, had an interest in ventricular tachycardia ablation, planned the strategy for radiation therapy along with their colleagues Greg Hundley, M.D., director of the VCU Health Pauley Heart Center and clinical director of noninvasive cardiology at VCU Medical Center; Cory Trankle, M.D., assistant professor in the Division of Cardiology in the VCU School of Medicine and a VCU Health Pauley Heart Center noninvasive cardiologist; John D. Grizzard, M.D., associate professor of radiology in the VCU School of Medicine and Noninvasive Cardiovascular Imaging Section director for the VCU Medical Center; and Elisabeth Weiss, M.D., a clinical professor in the VCU School of Medicine and a VCU Medical Center radiation oncologist. Padala performed his prior catheter ablation and was able to determine that part of the circuit was under scar tissue from Reeves’ prior open heart surgery.

The team mapped the problem area near Reeves’ mitral valve via electrocardiogram and imaging technologies, then applied stereotactic body radiation therapy, a noninvasive radiation procedure most commonly used to treat cancer.

Reeves is recovering from the mental and physical impacts of treatments prior to radiation therapy, and has an exuberant outlook. “I may have a new lease,” he said. “I figure I’ve used up seven of my nine lives. I probably have two left.” ❤️



Patient-as-provider profile: A.J. Cardounel, M.D.

Pauley Heart Center cardiothoracic surgeon could have gone ‘anywhere in the U.S.’ for his own cardiac surgery but chose Pauley for its world-class reputation.

“There is no better place to get treatment for heart disease than VCU Health Pauley Heart Center,” said Arturo “A.J.” Cardounel, M.D., Ph.D., a cardiothoracic surgeon at Pauley. Cardounel does not simply stake his reputation on the statement — he bet his life on it when he underwent bypass surgery at the center.

Cardounel, who has an extensive history of first-degree relatives with heart disease, recognized the initial signs of heart disease during his first few months as a VCU Health surgeon. At first, the 48-year-old, who regularly exercised and ate well, assumed it was relatively minor — a slight chest tightness he attributed to asthma.

[Cardounel] has become a more compassionate surgeon, who can provide a firsthand account to his patients scheduled for bypass surgery.

“You get a little shortness of breath during activities, and think, maybe I’m just getting a little bit older,” he said. “For the first several months that I had these symptoms, I minimized them and thought it was just exacerbations of other things, maybe some reflux disease.”

But when Cardounel was physically active, the pain continued to worsen and would cease when he was at rest, indicating what he recognized as the signs of angina, a severe pain in the chest that is a symptom of coronary artery disease. It was a red flag, different from the initial, often vague, indicators of heart disease.

Cardounel took a cardiac stress test, during which he was quickly winded. For further insight, he underwent cardiac catheterization the following morning at

Pauley — testing that confirmed he had triple-vessel coronary artery disease, the most severe form of coronary artery disease. All the major blood vessels leading to Cardounel’s heart were damaged from cholesterol deposits.

Severe lesions in his arteries indicated that bypass surgery, which routes blood around arterial blockages, granted the best guarantee of long-term survival. Surgeons remove a healthy blood vessel from the chest, arm or leg and attach it above and below the damage, creating an alternate channel for blood flow. The procedure isn’t a cure for coronary artery disease, but it can improve heart function and reduce symptoms.

He trusted his long-time mentor Vigneshwar Kasirajan, M.D., the Stuart McGuire Professor and chair of cardiothoracic surgery at VCU, to perform the surgery. “I went straight from the cath lab to the operating room,” he said.

Cardounel, who was back on duty three months after his surgery, advises healthy patients with a family history of heart disease to stay vigilant. His father underwent bypass surgery at VCU in the 1970s, at the age of 51, a few years older than when his son faced the same health crisis. Cardounel’s brother also had bypass surgery at the age of 48.

“We have high cholesterol that’s not really driven by diet,” Cardounel said. “You try to make lifestyle modifications to see if it helps, but ultimately, it’s a genetic problem. It’s a problem with how we metabolize cholesterol.”

‘A light at the end’

It’s often said doctors make the worst patients. But Cardounel says he was happy to take a back seat during his care at VCU Health. “I had no interest in seeing my X-rays and labs,” he said. “Everyone has a role, and my role was not to be the doctor;



Dr. A.J. Cardounel

it was to be the patient. I liked the fact that I didn’t have to think about my own care because someone else was managing it.”

He added that he appreciates the multiple VCU Health teams involved in his pre- and post-operative care. “My colleagues in my own department all rounded on me,” he said. “All of them were intimately involved in my postoperative care. And the nursing staff is second to none.”

Kasirajan added, “We are honored that Dr. Cardounel chose us for his own care.”

Cardounel gained a lot from the experience. In addition to greater awareness of his health, he has become a more compassionate surgeon, who can provide a firsthand account to his patients scheduled for bypass surgery.

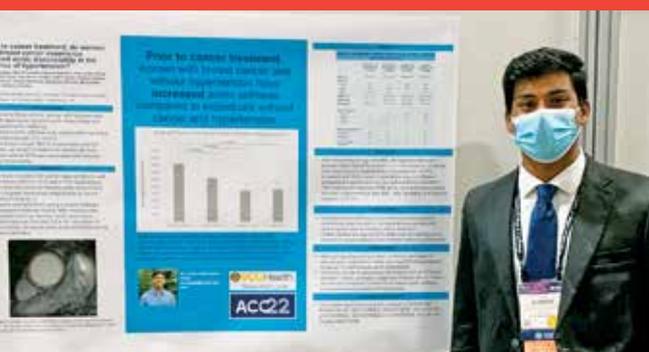
“We educate our patients about the risks and benefits and what we can offer them. And then together, we make an informed decision,” he said. “The fact that I tell my patients that I have been through this and survived it, and that there is a light at the end of the tunnel, is encouraging. They value my opinion, and I value their autonomy in the decision-making process.” ❤️

Pauley fellows in the spotlight

The 71st annual American College of Cardiology Scientific Session and Expo (ACC.22) was a success, and Pauley's undergraduate fellows gave excellent presentations!

While ACC's conference is a wonderful opportunity for the collaboration of well-known cardiologists, it's also an important chance for young scientists to make important steps in their future careers. The conference's presentation spots are highly competitive, and being selected to present is an honor for young scientists and students. As testament to the importance of the research being performed by Pauley's undergraduate fellows, four of our fellows earned the chance to share their work at ACC.22. They are:

- Leila Mabudian and Suhas Suddala, REACH Undergraduate Fellows Summer 2020 (mentored by Greg Hundley, M.D.)
- Whitney Garrett, CNU Undergraduate Fellow Summer 2021 (mentored by Cory Trankle, M.D.)
- Shilpa Jasti, AHA Undergraduate Fellow Summer 2021 (mentored by Jordana Kron, M.D.) ❤️



Suhas Suddala



Whitney Garrett (left) and Shilpa Jasti



Janice Price (far left) looks on while her granddaughter Janiyah Price takes a blood pressure reading of Dr. Sangeeta Shah at a Teach BP event at Anna Julia Cooper School in Richmond. Also pictured is Amy Ladd, Ph.D., assistant director of Pauley Heart Center.

Hypertension 'change agents' Students to become the teachers in blood pressure pilot program called Teach BP

A Pauley pilot program expected to launch this year in Richmond area schools will target multigenerational populations to learn about hypertension and associated health risks. Called Teach BP, the program will educate fourth- and fifth-graders about blood pressure and prepare them to share what they've learned with family members.

"Research has shown that children can affect the health care of their family. Why not use them as change agents?" said Sangeeta Shah, M.D., VCU Health Pauley Heart Center cardiologist. Teach BP builds on a similar program Shah developed for Girl Scout troops in New Orleans.



Dr. Sangeeta Shah

Like the Scouts, the students selected for Teach BP will learn why blood pressure is important, how to take blood pressure readings and what those readings mean. They will learn that high blood pressure is a "silent killer" that can affect your brain, heart, eyes and kidneys, causing heart attack, stroke and kidney failure, even blindness. Armed with that knowledge, the students will be encouraged to model and influence behaviors with a goal of showing family members that hypertension can be prevented and doesn't have to be an inevitable health condition.

Teach BP is a priority project for Pauley. In 2019, more than half a million deaths in the United States had hypertension as a primary contributing cause of death. And for adults living with hypertension, only

about 1 in 4 have it under control. Additionally, high blood pressure is more prevalent in Black and brown adults than whites. In Richmond — a city of about 40% Black residents — research shows "an epidemic of hypertension" and dramatic differences in life expectancies from neighborhood to neighborhood.

"Heart disease and hypertension are prevalent in these high-risk areas. We know treatment includes education awareness, medication adherence and lifestyle changes. But how can we make that human connection with the adults in these communities to take action? That's how Teach BP came about," said Carrie Mills, Pauley's senior director of development.

Teach BP will consist of four hour-long, hands-on instructional sessions aided by students from the VCU schools of pharmacy and medicine. The program will culminate in a family night, at which time the participants will showcase their creative, blood pressure-related projects, and family members will have an opportunity to get blood pressure screenings.

Teach BP also includes an important research aspect, said Amy Ladd, Ph.D., assistant director of Pauley Heart Center. "This is the first educational program where we're going out into the communities to teach young students about hypertension. By researching the impact this may have, in the form of increased awareness and knowledge of hypertension, in not only the students but also their adult caregivers, we can see if this educational model is effective. If we can prove it is effective, we can use the data to raise additional funding to expand the program to reach more communities." ❤️

In Memoriam



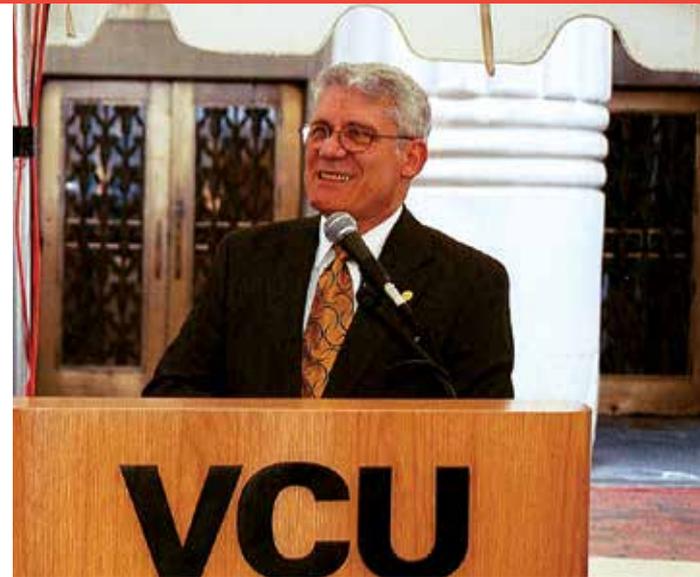
Hermes Kontos, M.D.

Virginia Commonwealth University and VCU Health lost an academic pioneer when Hermes Kontos, M.D., former dean of the VCU School of Medicine and former CEO of the VCU Health System Authority, passed away on Dec. 5, 2021, at the age of 87 years.

Dr. Kontos played an integral role in strategically aligning the academic and clinical vision of the academic health system over his four decades in leadership roles. He began his career at VCU in 1960 as a junior assistant resident in internal medicine, and after completing his fellowship in cardiology, he earned his Ph.D. in physiology in 1967. He quickly rose through the academic ranks at VCU, was promoted to full professor in 1972, and went on to serve as chair of the cardiology division and acting chair of the departments of pathology and internal medicine. He later became dean of the VCU School of Medicine.

Dr. Kontos was appointed the first CEO of the VCU Health System (VCUHS) Authority, which combined MCV Hospitals and MCV Physicians under a single governance structure. At the time of VCU Health's creation, Dr. Kontos was serving as vice president of VCU Health Sciences. With the authority's creation, both roles were combined into a single position, ensuring that the academic mission of VCU's health sciences schools would be aligned with the clinical mission of the health system. Having shepherded the medical center through this historic process, Dr. Kontos stepped aside in 2002, and retired the following year.

Greg Hundley, M.D., director of VCU Health Pauley Heart Center and chair of cardiology, remembers Dr. Kontos from his years as a student in VCU School of Medicine. "Dr. Kontos was a gifted mentor and instilled a lifelong passion for research to hundreds of undergrads, medical and doctoral students, cardiology and



Dr. Hermes Kontos

neurosurgery fellows, as well as his colleagues," he said. "His contribution to cerebrovascular physiology continues to make a significant impact to our patients."

Dr. Kontos earned his medical degree from the School of Medicine of the University of Athens and his doctorate degree from MCV's Department of Physiology. The Hermes A. Kontos Medical Sciences Building at 1217 E. Marshall St. is named in his honor. ❤️

Santosh Padala, M.D.

Colleagues, friends and patients of Santosh Padala, M.D., are mourning his sudden loss. Dr. Padala, an assistant professor of medicine specializing in cardiac electrophysiology at Pauley Heart Center, passed away unexpectedly in December 2021. He joined the VCU Health System in 2015 as a clinical cardiac electrophysiology fellow and became a member of the faculty in 2017.

Dr. Padala earned his medical degree at Kamineni Institute of Medical Sciences in Telanga, India, before completing his internal medicine residency at University of Connecticut Health Center, followed by a cardiovascular disease fellowship at Albany Medical Center and a clinical cardiac electrophysiology fellowship at VCU.

He made a mark early on as a fellow, twice receiving the prestigious Joseph T. Doyle Research Award at Albany Medical Center before going on to win an



Dr. Santosh Padala

Outstanding Fellow Award and two Outstanding Teacher Awards at VCU. Dr. Padala's clinical interests were broad ranging, and he had developed into a national leader. He was an enthusiastic expert in many areas of electrophysiology, bringing cutting-edge approaches to patient care. His skills included device implantations (pacemaker, defibrillator), left atrial appendage occlusion device implantation for stroke prevention, and catheter ablation for complex arrhythmias including atrial fibrillation and ventricular tachycardias. Dr. Padala was also an accomplished clinical researcher, focused on measuring outcomes of catheter ablation and device implantation. His record of scholarly accomplishment was remarkable. He presented at many international cardiology meetings, was an invited

expert at other academic institutions and had published more than 70 manuscripts.

In addition to his many professional accomplishments and promising research career, Dr. Padala was also a caring provider, popular among his patients and colleagues alike.

Kenneth Ellenbogen, M.D., director of clinical cardiac electrophysiology and pacing, who mentored and worked closely with Dr. Padala, said, "He was beloved by everyone who worked with him, from his colleagues (who were also his friends), to our fellows, our staff, and his patients. He was a true force, a wonderful teacher, a fantastic clinician and clinical electrophysiologist, and a gifted clinical researcher. He was kind, gentle and caring. It was pretty hard not to love him."

Greg Hundley, M.D., director of the Pauley Heart Center, remarked, "Dr. Padala was a genuine, compassionate physician who always worked to provide the best care for his patients. We will be forever grateful for the tremendous impact he contributed to our team and our patients." ❤️


Letter from the director

VCU and VCU Health lost a trailblazer last December with the death of Dr. Hermes Kontos, the former dean of the VCU School of Medicine and former CEO of the VCU Health System Authority. I was fortunate to know Dr. Kontos personally and work with him as a young physician. He was a gifted mentor to me and touched countless lives in his four-decades-long career. In this issue of *The Beat*, we remember him as a generous colleague, visionary leader and passionate researcher.

Dr. Kontos recognized the importance of lifesaving cardiovascular research. So do we at Pauley. Every day, our active cardiovascular disease research program furthers knowledge

of heart disease, its treatments and its cures. In our cover story, you'll meet the multidisciplinary team bringing their individual interests and expertise upon the problem of inflammation of the heart. Lingering, chronic inflammation is linked to many diseases, including heart failure. A promising new field in cardiology — in which researchers innovate to find a targeted treatment for inflammation — has evolved at VCU Health, and our renowned physicians are at the forefront.

Several of these physicians have joined me in mentoring young scientists in our summer fellowship program. In these pages, I'm thrilled to acknowledge the hard work of four undergraduate fellows who took important steps in their careers by presenting at the 71st Annual American College of Cardiology Scientific Session and Expo. We're excited to follow their progress and see what comes next for these bright and enthusiastic students.

We love hearing from grateful patients, and in this issue, you'll read about Alexander Reeves. The retired physician became the first VCU Health patient to undergo radiation therapy for ablation of refractory VT. When conventional treatment options failed and Dr. Reeves' condition was end stage, he was offered a new technique that is rarely performed nationally. Today, under the expert care of our Pauley team, Dr. Reeves is thriving.

Speaking of patients, you'll also meet Pauley cardiothoracic surgeon Dr. A.J. Cardounel, who shares his remarkable story of undergoing triple-bypass surgery at Pauley. Learn how the experience has made him a more insightful and compassionate clinician.

Rounding out this issue is news about our latest educational program. Developed by new faculty member Dr. Sangeeta Shah, a pilot program called Teach BP will educate Richmond-area fourth- and fifth-graders about blood pressure and prepare them to share what they've learned with family members. "Research has shown that children can affect the health care of their family. Why not use them as change agents?" Dr. Shah said. We couldn't agree more.

I hope you'll enjoy reading these and other stories in this issue of *The Beat*.

Sincerely yours,
 Greg Hundley, M.D.



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

