

next

The Future of Discovery at VCU Health

Winter 2025



Breathe Easier

Lung Transplant Returns to VCU Health

BOARD OF TRUSTEES

Nupa Agarwal, J.D.
Danny Avula, M.D.
Wyatt S. Beazley IV, J.D.
Michael C. Bisceglia
Robert C. Canfield
Alex W. Cecil
I. Lee Chapman IV
Sheila A. Corcoran
Paul W. Croston
D. Oscarlyn Elder
Peter F. Farrell
Robert L. Findling, M.D.
Jennifer F. Flinchum
Louis N. Formica, D.D.S.
Moses W. Foster Jr.
Stephen J. Gaidos
Sheryl L. Garland
Stephen M. Goddard
Elizabeth Hopkins
Darius A. Johnson
Susan G. Kornstein, M.D.
Marlon F. Levy, M.D.
H. Frederick T. Moore
Ghulam D. Qureshi, M.D.
Kee Tilghman Rabb
Michael Rao, Ph.D.
W. Taylor Reveley III, J.D.
Michele A. Romano, M.D.
Ernesto Sampson
Liza Jarvis Scott
Louise Woltz Smith
Ellen E. Spong
Tracy Kemp Stallings
Judith Forehand Starkey
Elizabeth Whalley, RN, J.D.
Jennifer Wold
Rachel L. Yost

A New Era for Research

Dear Friends,

This is an extraordinarily exciting time to think about research at VCU Health and VCU Health Sciences. In October, the university announced it had surpassed \$500 million in sponsored research funding for the first time. The fiscal year 2024 total of \$506 million reflects an 86% increase over six years and 9% over last year. We're proud that our MCV Campus partners contributed significantly to that total because it means the engines of health care research and innovation are turning faster than ever, translating basic science into the building blocks for future inquiry, uncovering new cures for diseases that have plagued humanity for generations, and ensuring the latest and most advanced hope-giving clinical trials and treatments are available right here in Richmond.



Our optimism about the future of health care in the region and the MCV Campus's ability to improve health around the world expanded even more this November with the announcement that Marlon F. Levy, M.D., has been appointed senior vice president for VCU Health Sciences and chief executive officer of VCU Health System. In his time serving in the interim role for this position, Dr. Levy has been a thoughtful and strategic partner to the MCV Foundation, an insightful leader for the entire campus, and a tireless advocate for patients across the region. We congratulate Dr. Levy and look forward to working with him for many years to achieve everything we know is possible at VCU Health and VCU Health Sciences.

We developed *NEXT* magazine seven years ago to share with readers the discoveries and breakthroughs that are happening every day on the MCV Campus. We are confident that as funding grows, generous donors provide support and a vision for the future is realized, the talented investigators, care providers and educators at VCU Health and VCU Health Sciences will continue making discoveries that benefit our families, our communities and our world.

We are proud to share and celebrate examples of that progress in the pages of *NEXT* – please enjoy this issue.

Sincerely,

Darius A. Johnson
BOARD CHAIR

Margaret Ann Bollmeier
PRESIDENT AND CEO



COVER STORY

12 **Breathing New Life Into VCU Health's Lung Transplant Program**

Excellence in advanced lung disease care has led to approvals for the VCU Health Hume-Lee Transplant Center to resume lung transplants on the MCV Campus.

02 **Light Therapy**

VCU Health Hume-Lee Transplant Center researchers are developing a method to selectively target liver cancer cells using photodynamic therapy.

06 **A Whole-Body Experience**

The Stravitz-Sanyal Institute for Liver Disease and Metabolic Health is uncovering the liver's surprising connection to cognitive health.

20 **A Breakthrough for Breast Cancer**

Researchers at VCU Massey Comprehensive Cancer Center are developing new ways to better treat an aggressive form of breast cancer known as HER2-positive.

24 **The Global Framework**

A VCU orthopaedics leader developed the global gold standard for geriatric fracture patient care that ensures quicker recovery and better outcomes.

32 **Follow-ups**

VCU has another record-breaking year in research, and the U.S. Air Force invests in potential trauma solutions developed on the MCV Campus.

LIGHT THERAPY

VCU Health Hume-Lee Transplant Center researchers are developing a method to selectively target liver cancer cells using photodynamic therapy.

By Paul Brockwell Jr., MCV Foundation

This is the stuff of sci-fi dreams: healing cancer patients through focused light beams. While the idea sounds light-years away, it could soon become a reality thanks to the work of researchers here on the MCV Campus.

Seung Duk Lee, M.D., Ph.D., associate surgical director of liver transplants for the VCU Health Hume-Lee Transplant Center, has been researching potential therapies using targeted light to selectively kill hepatocellular carcinoma (HCC).

HCC is the most common type of liver cancer and the third leading cause of cancer-related deaths. This year, the American Cancer Society estimates more than 41,630 new cases will be diagnosed in the U.S., with 29,840 deaths. Treatment can be challenging depending on the size and location of the tumor cells, as well as a patient's overall health. It also is most prevalent in patient populations over the age of 60.

As a surgeon, Dr. Lee became interested in this research after seeing many patients for whom surgery to remove a tumor or to receive a transplant is not a viable treatment option due to the patient's health or the tumor's location or size. He was intrigued by the potential to discover treatment modalities. Transplants will never be a viable, sustainable option for addressing the growing prevalence.

"Liver cancer is often not as responsive to chemotherapy and radiation," Dr. Lee said. "I became interested in figuring out how we can treat these patients with other modalities."

DESTROYING CELLS USING LIGHT

Dr. Lee is exploring how to leverage photodynamic therapy (PDT) to treat this type of liver cancer. PDT is a treatment modality in which clinicians deploy light-sensitive medicines — called photosensitizers or photosensitizing agents — and use a light source to selectively destroy abnormal cells in the affected area.

Dr. Lee's work has examined how to use indocyanine green (ICG), a fluorescent dye used in medical diagnostics, as the photosensitizing agent.

Once the ICG photosensitizer has been administered, cancer cells are exposed to a specific wavelength of light that causes the photosensitizer to produce a form of oxygen. This begins apoptosis, a type of cell death in which a series of molecular steps in a cell lead to its death.

The process creates a slow, controlled cell death that is noninvasive and differs from similar photodynamic therapies that burn cells and initiate necrosis, a passive and uncontrollable cell death process. This part is key. Being able to administer this treatment to patients who may be sicker will depend on it causing no additional harm.

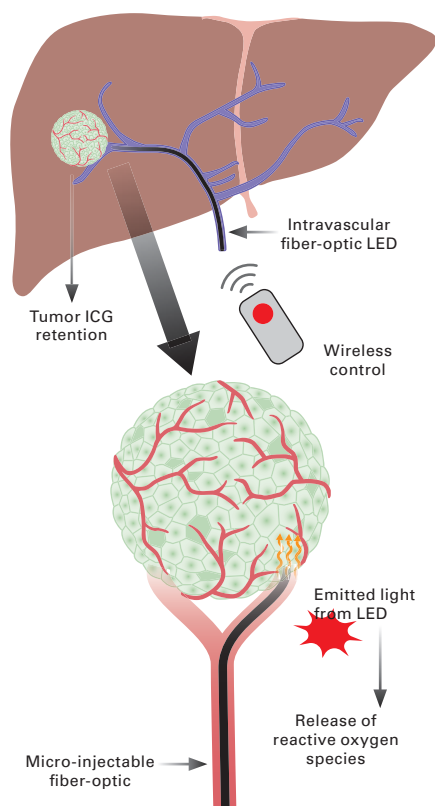
"Liver cancer is often not as responsive to chemotherapy and radiation. I became interested in figuring out how we can treat these patients with other modalities."

Seung Duk Lee, M.D., Ph.D.,
associate surgical director
of liver transplants for the
VCU Health Hume-Lee
Transplant Center

“VCU is unique. We have research staff and clinical staff working hand in hand. Because of that, we’re able to do advanced research that maybe other centers aren’t able to.”

Kush Savsani, a first-year medical student

Photodynamic Therapy



Reaching tumors in the liver can be challenging. The research team is developing an approach that delivers targeted photodynamic therapy via a fiber-optic cable that reaches affected areas by moving through vascular channels to shine a specific wavelength of light that begins selective cell death in cancer cells via apoptosis. *Illustration courtesy Seung Duk Lee, M.D., Ph.D.*

“We have completed research in animal models given ICG and laser therapy and saw significant reduction in tumor growth,” said Kush Savsani, a first-year medical student. “Currently, we do this with healthy and cancerous models to measure the effect of the photodynamic therapy on the tissue.”

Savsani has been working as Dr. Lee’s research assistant on the project. One of 12 inaugural McGlothlin Scholars at the VCU School of Medicine, Savsani said he chose VCU in part because of the opportunities to engage in this cutting-edge research.

“VCU is unique,” Savsani said. “We have research staff and clinical staff working hand in hand. Because of that, we’re able to do advanced research that maybe other centers aren’t able to.”

Dr. Lee and Savsani are working to advance this potential treatment through continued research. The biggest challenge they’re working to address is how to deliver the necessary light source to tumors in the liver. Their goal is to do so in the most noninvasive manner through use of fiber-optic cabling to deliver the light source via an artery to the affected portions of a patient’s liver.

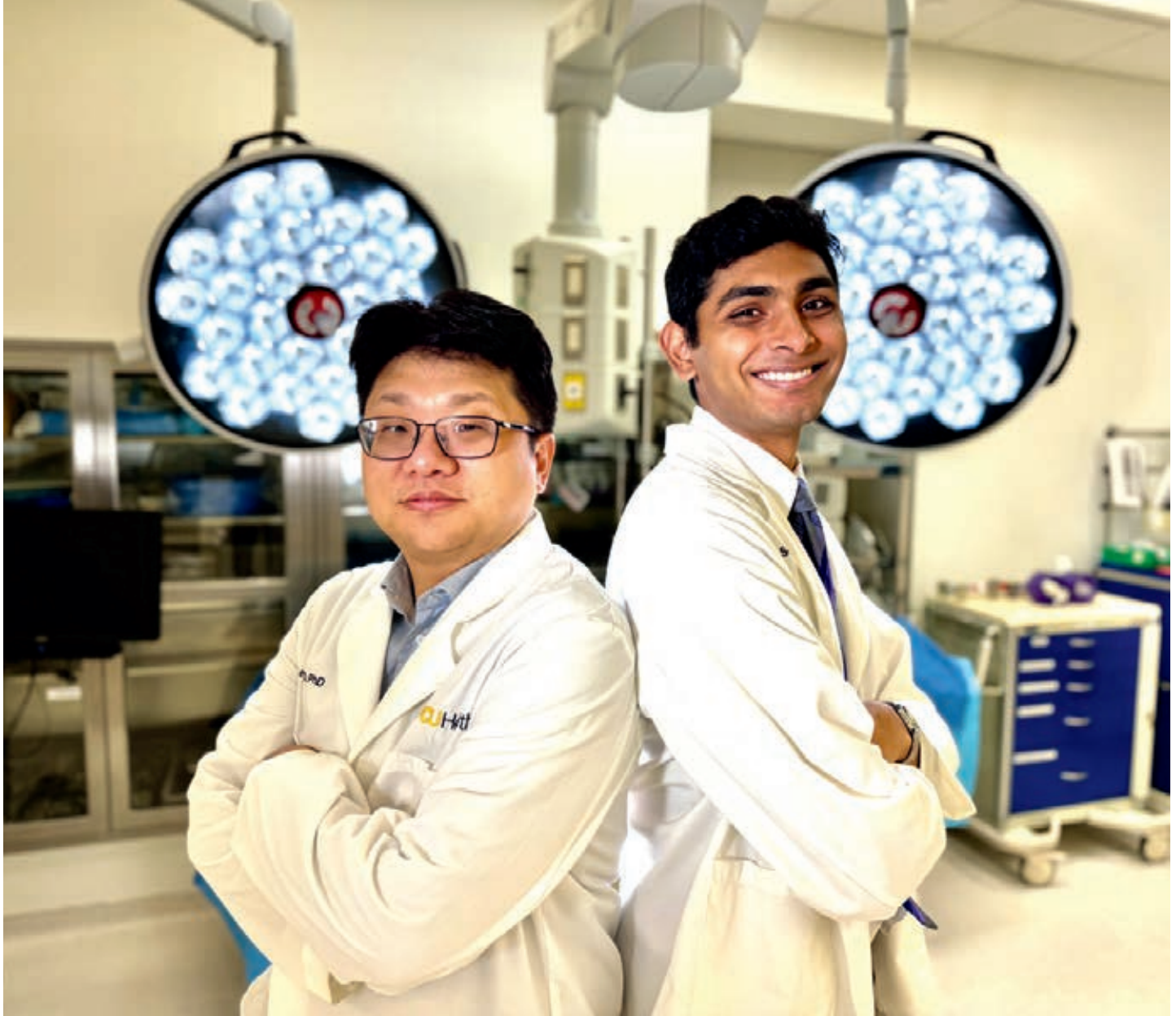
Earlier this year, they received commercialization fund assistance from VCU TechTransfer and Ventures, which supports inventors doing innovative research with a clear pathway to take solutions to market by helping them secure patent protections for their work.

“Initiatives like this one embody the intersection of pioneering science and entrepreneurial vision, promising to revolutionize health care,” said P. Srirama Rao, Ph.D., VCU’s vice president for research and innovation. “Through our commitment to fostering innovation and collaboration, VCU continues to lead the way in advancing health care solutions that positively impact lives far beyond our campus.”

WHAT’S NEXT?

Dr. Lee and Savsani anticipate that the research to demonstrate efficacy and safety will take several years. One benefit of their approach is that the team is using a novel application of existing, approved U.S. Food and Drug Administration devices and treatments as they develop this new modality.

“Using FDA-approved devices helps ease the barriers that similar treatments face when being developed for potential use,” Dr. Lee said. “Once we prove efficacy and safety of these modalities, we can quickly progress to testing the therapy in clinical trials.”

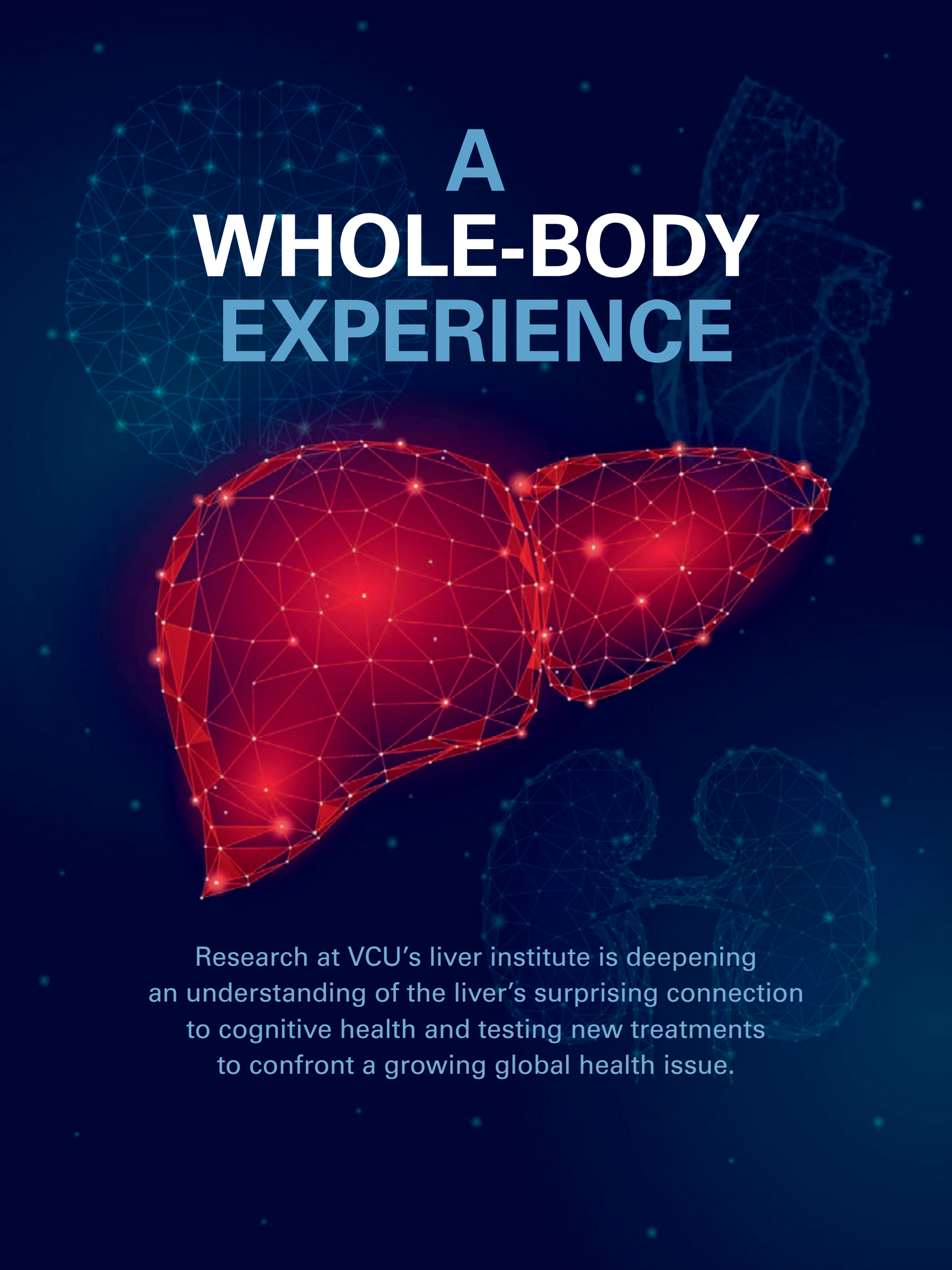


The next step for their research is scaling to models that can offer the testing environment needed to approximate the delivery of the light source via arterial cabling. The team is also interested in exploring a combination of liver tumor reduction through photodynamic therapy and using doxorubicin, a chemotherapy drug commonly used in interventional radiology, through transarterial chemoembolization (TACE). TACE combines delivery of the chemo drug with an embolization procedure when treating hepatocellular carcinoma, and they hope the one-two punch of both therapies may translate to even stronger results for future patients.

“Liver cancer is not a problem we will solve through only organ transplants or surgery,” said Dr. Lee, a robotics transplant surgeon. “What I hope this work can do is to provide a promising treatment option that reduces the burden of cancer and gives hope to future patients.”

If you would like to support this research at the VCU Health Hume-Lee Transplant Center, please contact Andrew Hartley, senior director of development in the VCU Office of Medical Philanthropy and Alumni Relations, at 804-628-5312, or aphartle@vcu.edu.

Seung Duk Lee, M.D., Ph.D. (left), associate surgical director of liver transplants for the VCU Health Hume-Lee Transplant Center, and his research assistant Kush Savsani, a first-year student at the VCU School of Medicine, are working on a new method to treat liver cancer using light therapy. *Photo: Jeff Kelley*



A WHOLE-BODY EXPERIENCE

Research at VCU's liver institute is deepening an understanding of the liver's surprising connection to cognitive health and testing new treatments to confront a growing global health issue.

By A.J. Hostetler, VCU Stravitz-Sanyal Institute for Liver Disease and Metabolic Health

Thanks to a full embrace of research and patient care surrounding a sometimes overlooked organ, the VCU School of Medicine is making discoveries that could dramatically improve lives for millions of people around the world.

The liver plays a role in more than 500 vital processes for the body – from filtering toxins to assisting with digestion, immunity and storage of vitamins.

New research from campus also shows that the prevalence of certain forms of dementia caused by scarring and inflammation in the liver may be reversible with readily available treatments.

“The liver controls the health of all of the other organs,” said Arun Sanyal, M.D., director of the Stravitz-Sanyal Institute for Liver Disease and Metabolic Health and chief of the Division of Gastroenterology, Hepatology and Nutrition at the VCU School of Medicine. “So very simply put, the liver is the driver of human health and well-being.”

The VCU Stravitz-Sanyal Institute is a global leader in the quest to better treat liver issues, advance the scientific understanding of overall metabolic health and identify the liver’s links to diseases throughout the body. The institute was created in 2022 after a historic \$104 million gift from R. Todd Stravitz, M.D., and his family’s Barbara Brunckhorst Foundation. It remains the largest publicly shared gift for liver research in U.S. history.

“Our vision is really to transform the lives of people with liver disease through innovation and by training the next generation of investigators,” Dr. Sanyal said.

The vision is now evident in the research output and insights being gained by researchers and clinicians here in Richmond. Dr. Sanyal was among five faculty members at the institute who were recently named in the top 2% of the most influential scholars and scientists worldwide in career rankings compiled by Stanford University and analytics firm Elsevier based on citation metrics, co-authorship and other factors that ensure a diverse roster and representation of researchers. Joining him on that list are Dr. Stravitz, institute co-founder; Richard Sterling, M.D., chief clinical officer; Saul Karpen, M.D., Ph.D., chief scientific officer; and Jasmohan Bajaj, M.D.



Arun Sanyal, M.D., director of the Stravitz-Sanyal Institute and chief of the Division of Gastroenterology, Hepatology and Nutrition, VCU School of Medicine. *Photo courtesy Stravitz-Sanyal Institute*

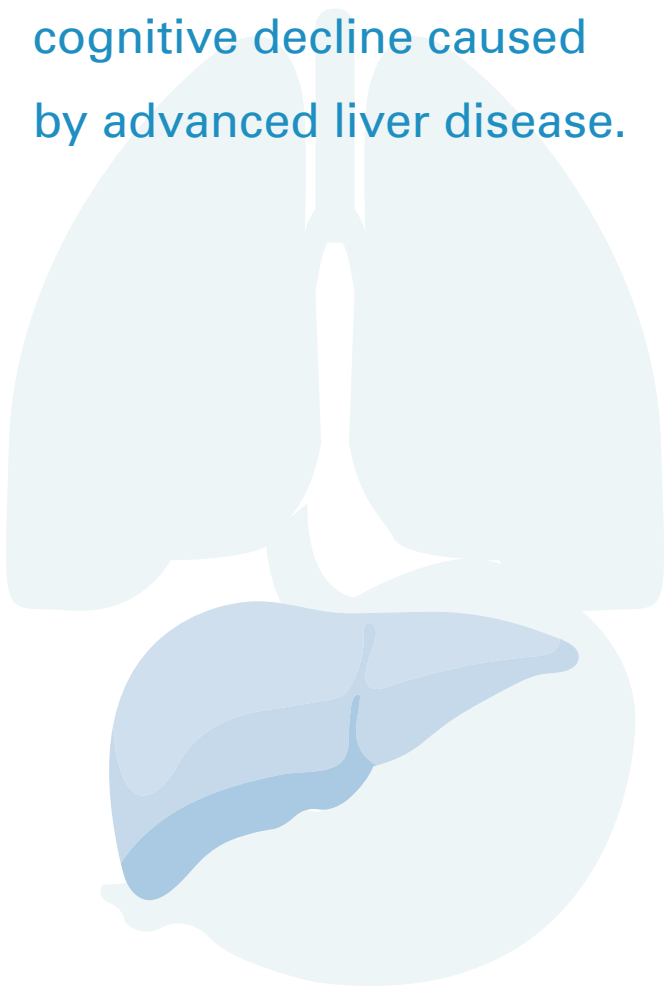
In just two years, the collective progress made in advancing scientific understanding has been impressive and swift. The institute has also been developing and training a global network of researchers and clinicians to ensure the broadest reach for its insight into care.

UNRAVELING THE MIND-LIVER CONNECTION

One of the most intriguing discoveries from the Stravitz-Sanyal Institute includes research demonstrating that around 13% of individuals diagnosed with dementia may suffer instead from reversible cognitive decline caused by advanced liver disease.

Researchers at the VCU School of Medicine and the Richmond Veterans Affairs Medical Center published these findings recently in the *American Journal of Medicine*. They included the additional analysis of nonveteran patients that corroborated and extended the research group’s earlier work. The results showed that about 10% of U.S. veterans diagnosed with dementia may suffer instead from cirrhosis, and those earlier findings appeared in the journal *JAMA Network Open*.

One of the most intriguing discoveries from the Stravitz-Sanyal Institute includes research demonstrating that around 13% of individuals diagnosed with dementia may suffer instead from reversible cognitive decline caused by advanced liver disease.



It can be difficult for physicians to differentiate dementia from hepatic encephalopathy, which is the cognitive decline caused by cirrhosis. If it is undetected, patients will not receive treatment that can reverse or halt the impairment. Hepatic encephalopathy is a nervous system disorder brought on by cirrhosis, an advanced form of liver disease in which patients experience severe scarring of the liver.

When the liver doesn't work properly, toxins build up in the blood. These toxins can travel to the brain and affect brain function, leaving patients confused or delirious. Widely available medications can readily rid the body of toxins and reverse this condition, but without treatment, patients can lapse into a coma or die.

The VCU-VA analysis suggests that physicians treating veteran or nonveteran patients with dementia — even without a cirrhosis diagnosis — should consider assessing them for liver disease. Identifying cirrhosis early on may point to reversible causes of cognitive impairment, potentially improving the lives of these patients.

“This important link between dementia and liver health emphasizes the importance of screening patients for potentially treatable contributors to cognitive decline,” said the study's corresponding author, Dr. Bajaj, a gastroenterologist with the Stravitz-Sanyal Institute and the Richmond VA Medical Center.

In their publication of results from the VA study, researchers said that they believed the findings would apply to nonveterans with dementia, but that further research was needed. The subsequent study also sought to provide additional data by examining health records of nearly 69,000 nonveteran patients diagnosed with dementia between 2009 and 2019.

Almost 13% of the patients with dementia had high scores that are used to estimate the level of scarring of liver tissue, meaning they were very likely to have cirrhosis.

Dr. Bajaj said it should not be difficult to incorporate liver assessments into routine care for patients, as their risk for liver disease can be easily evaluated with an initial, noninvasive screening tool called the FIB-4 index.

“Early detection of liver issues, which can contribute to the treatable cognitive decline known as hepatic encephalopathy, in those with dementia could help ensure that patients get access to targeted and appropriate therapies,” Dr. Bajaj said.



The Stravitz-Sanyal Institute's deep expertise includes renowned researchers (L to R) Jasmohan Bajaj, M.D., gastroenterologist, Stravitz-Sanyal Institute and the Richmond VA Medical Center; Richard Sterling, M.D., chief clinical officer, Stravitz-Sanyal Institute; and Juan Pablo Arab, M.D.

DEVELOPING SCORING FOR SCARRING

The FIB-4 score is recommended by leading liver, gastroenterology and endocrinology associations as a first-line test to screen for liver scarring, or fibrosis. It is based on multiple measurements, including age, and was developed by Dr. Bajaj's VCU Health colleague and co-author on the new study Dr. Sterling, the chief clinical officer of the Stravitz-Sanyal Institute.

Dr. Bajaj's interest in the connection between dementia and cirrhosis was sparked by the cases of two older veterans who were thought to have dementia and Parkinson's disease but whose symptoms dramatically improved after being treated for hepatic encephalopathy. About 30% of veterans suffer from some form of liver disease, and in 2023, it was estimated that about 8% of U.S. veterans with cirrhosis had dementia.

In the VCU study published in *JAMA Network Open*, researchers reviewed medical records of 177,422 U.S. veterans diagnosed with dementia, but not cirrhosis, between 2009 and 2019. It showed that 10.3% of veterans with dementia had high FIB-4 scores and were very likely to have cirrhosis.

Factors that increase the risk of cirrhosis include older age, being male, congestive heart failure, viral hepatitis, alcohol use and other health conditions. The new findings among nonveterans were unexpectedly higher than those for veterans, Dr. Bajaj noted.

"The 13% rate we found in nonveterans was surprising in that it was higher than we found among veterans, who tend to be older, less diverse and more male. But ultimately, it confirms and extends the results in a database more

reflective of the U.S. population," said Dr. Bajaj, who has spent the past several years focusing on hepatic encephalopathy and the gut-brain axis and helped author the new findings on nonveteran patients published in the *American Journal of Medicine*. "The next step is to ensure that health care providers are made aware of this potential overlap between dementia and hepatic encephalopathy, which is treatable."

CONFRONTING A GLOBAL CHALLENGE: FATTY LIVER DISEASE

Liver-related dementia is just one of the many issues caused by a failing liver that institute researchers are working to address. Among some of the most significant liver conditions is fatty liver disease, also known as steatotic liver disease, which develops when the body begins storing excess fat in the liver. This doesn't always cause problems for people, but when it does, the buildup of fat can cause inflammation and damage. Because of the liver's crucial role in helping the body process nutrients, remove toxins and build key proteins, the disease can precipitate multiple medical issues. The condition affects as many as 15 million people in the U.S. alone.

The advanced stage of fatty liver disease is called metabolic dysfunction-associated steatohepatitis, or MASH, which is the leading cause of liver-related medical conditions and mortality. MASH affects approximately 6 to 8 million people in the U.S., and it is often associated with other health problems, such as high blood pressure, Type 2 diabetes, obesity and high blood fat levels.

By the Numbers

1 in 10
Americans have some
type of liver disease.

Nearly
11,000
livers were transplanted
in the U.S. in 2023.



More than
9,400 people
are on the waiting list
for liver transplants as
of September 2024.

For every patient who
makes it to transplant,
9 to 10
people die of liver disease.

The condition is closely linked to obesity and diabetes. That means that many people are gradually developing fatty deposits in their livers, which cause greater inflammation and can lead to serious organ disease and death if left unaddressed. Often, the warning signs come too late to reverse the damage. As it worsens, it can cause scarring, known as fibrosis, and can continue to advance to significant fibrosis or even cirrhosis, cancer and the need for a liver transplant.

“The liver is the only way you can get rid of extra cholesterol,” said Dr. Sanyal, the director of the Stravitz-Sanyal Institute. “Those who take statins are really taking a drug that works on the liver to lower cholesterol. The liver controls how the heart works, and it generates fuel and controls the supply of energy for all the body’s other organs. It’s complicated stuff.”

Researchers at the Stravitz-Sanyal Institute have been exploring multiple potential treatments, often collaborating with industry leaders investigating drug candidates. Most recently, Dr. Sanyal was a key investigator in the Phase 3 trial for resmetirom. Until the Food and Drug Administration approved resmetirom to treat fatty liver disease in March 2024, there were no approved drugs to treat the condition. The problem is so pressing that the FDA approved the resmetirom, now branded as Rezdiffra, under its accelerated approval pathway, which allows for earlier approval of drugs that treat serious conditions and address an unmet medical need.

Dr. Sanyal was a pivotal leader whose broader contributions to the field helped establish the pathway to this approval.

“This is a major milestone for our patients and for the field. MASH is a leading cause of liver-related morbidity and mortality,” Dr. Sanyal said. “With resmetirom approved, our patients with clinically significant scarring of the liver due to MASH will have access to an effective and approved therapeutic agent to reverse disease progression. As an investigator working on MASH, I congratulate Madrigal Pharmaceuticals and the communities of scientists and patients who participated in the treatment trials to make approved therapy for MASH a reality.”

Resmetirom became available for patients in April 2024 and is approved to treat MASH. The medication is intended for people with MASH whose livers indicate moderate to advanced fibrosis — when patients are on the cusp of cirrhosis.

Among some of the most significant liver conditions is fatty liver disease. Because of the liver's crucial role in helping the body process nutrients, remove toxins and build key proteins, the disease can precipitate multiple medical issues.

Additional drugs are undergoing clinical testing to treat patients whose fibrosis is less advanced and could possibly halt the scarring or even lessen the amount of fat in the patient's liver.

Until Madrigal's development of resmetirom, physicians treating MASH patients focused on managing the disease through weight loss from lifestyle changes such as a healthy diet and regular exercise. The newly approved medication targets a protein directly in the liver and reduces liver fat, inflammation and scarring.

Clinical trials found it can halt the progression of fibrosis or even reverse it. It's intended to be used along with a healthy diet and exercise. Liver disease is often called "silent" because so many patients don't feel any symptoms and their illness goes undiagnosed, but it is the ninth leading cause of death in the U.S. and is an increasing burden on health care systems globally. Patients with MASH, especially those with metabolic diseases like obesity or Type 2 diabetes, are at greater risk for adverse cardiovascular events and increased illness and mortality.

WHAT'S NEXT?

Researchers at the Stravitz-Sanyal Institute are working on a broad array of projects to improve overall liver health. One project seeks to measure the effect on liver scarring by a class of drugs known as glucagon-like peptide 1 agonists (GLP-1). Most people will know this type of drug by names like Ozempic, a medication developed to help regulate insulin in Type 2 diabetes patients that has also become popular to use off-label for weight loss.

Early studies, including several involving Dr. Sanyal, have suggested benefits for liver health. The drugs work by mimicking the actions of the GLP-1 hormone that stimulates production of insulin and have been shown

to curb hunger. The better regulation of blood sugar and weight ultimately also benefit the liver's health according to early studies at the center.

As the institute has grown, its roster of experts has deepened its bench strength. The chief scientific officer, Dr. Karpen, identified the first genetic variant to biliary atresia, a rare disease of the liver and bile ducts that occurs in infants. Juan Pablo Arab, M.D., who recently joined the institute, is a world leader in the study of alcohol-related liver disease, striving to advance early diagnosis and treatment strategies to improve patient outcomes. And the chief clinical officer, Dr. Sterling, not only developed the gold standard, noninvasive test for estimating fibrosis, but he is also an expert in hepatitis and liver disease in people living with HIV.

With this team of specialists, the liver institute broadens its areas of research expertise and hopes to create a sea change in the way the world understands the liver as the key to overall health.

"It has been a fantastic journey over the last few years creating this disruptive influence," Dr. Sanyal said, "because it is only through disruption that we will transform medicine with transformed human health and the human state."

If you would like to support research at the VCU Stravitz-Sanyal Institute for Liver Disease and Metabolic Health, please contact Nathan Bick, executive director of development in the VCU Office of Medical Philanthropy and Alumni Relations, at 804-827-0387, or ngbick@vcu.edu.



Breathing New Life Into VCU Health's Lung Transplant Program

An array of excellence in caring for advanced lung disease has led to approvals for the VCU Health Hume-Lee Transplant Center to resume lung transplants on the MCV Campus.

By Holly Prestidge, MCV Foundation
Photos by Daniel Sangjib Min, MCV Foundation

After a nearly 20-year hiatus, VCU Health's lung transplant program is returning.



Vipul Patel, M.D., medical director of lung transplantation at VCU Health Hume-Lee Transplant Center and faculty member in the Division of Pulmonary Disease and Critical Care Medicine at the VCU School of Medicine, was hired in 2024 as the health system prepared to resume lung transplantation.

Under Dr. Patel, VCU Health's program will initially perform 10 to 30 transplants annually over a span of several years, then up to 50 transplants each year.

Word came in late September that the health system's application to restart the program had been accepted. For Vipul Patel, M.D., the past nine months of planning — securing multidisciplinary teams involving everyone from surgeons to dietitians and identifying potential transplant candidates — had lead to this new reality.

Lung transplants are scheduled to begin in early 2025, and when they do, VCU Health will be only the third health system in Virginia to offer the procedure.

"It's a big achievement," said Dr. Patel, the physician hired in March 2024 to lead that program. "We are active again."

The achievement did not happen in a vacuum.

In fact, the Division of Pulmonary Disease and Critical Care Medicine at the VCU School of Medicine has transformed in recent years. Strategic hires and recalibrated mission statements have sharpened the focus to do more for patients by diving into and expanding care within pulmonary subspecialty areas like asthma, for which Virginia is a hotspot nationally, and interstitial lung disease, which includes pulmonary fibrosis, or scarring of the lungs, one of the leading indicators for lung transplant candidacy.

Cystic fibrosis and pulmonary hypertension are other disease areas, as is chronic obstructive pulmonary disease, better known as COPD, which is the third leading killer of adults worldwide behind cancer and heart disease.

Sarcoidosis, an inflammatory disease that can affect multiple areas of the body, is yet another disease with higher prevalence in Virginia and the Southeastern U.S.

Each of these pulmonary care areas has been meticulously addressed at VCU Health through handpicked expert faculty, aggressive research pursuits and highly selective educational programs that train the next generation of pulmonary health care professionals. Collectively, these subspecialties represent the foundation on which VCU Health is building a successful, high-volume transplant program.

"We are a multidisciplinary, multispecialty, comprehensive care center," said Patrick Nana-Sinkam, M.D., chief of the Division of Pulmonary Disease and Critical Care Medicine, "and now we have the ultimate treatment."

BUILDING FROM THE GROUND UP

As transplants go, lungs are a different beast.

Often considered more challenging than transplants for hearts, livers or kidneys, lung transplants pose serious risks. Immunosuppressant drugs needed to help reduce the risk of organ rejection also weaken the recipient's immune system, which opens the door for infections. Those drugs are taken for the rest of the patient's life.

Unlike the heart, liver or kidney, for which a transplanted organ can add many years to the patient's life, lung transplants offer no such promise of longevity. Five to seven years is a best-case scenario for most people.

Still, lung transplants provide relief to patients who have no other options.

More than 3,000 lung transplants were performed nationally in 2023, a milestone for that organ, according to UNOS, the national organ sharing network in which VCU Health now has membership for lung transplants.

Under Dr. Patel, the program will initially perform 10 to 30 transplants annually over a span of several years, then up to 50 transplants each year.

It's a stark contrast to the lung transplant program that existed at VCU Health between 1991 and 2006. During that time, a total of 38 lung transplants were performed. At most, four were done in one year.

Lung transplant programs thrive when volumes are high and outcomes are successful, said Dr. Patel, who came to VCU Health after working at several high-volume centers in Arizona and Maryland, where annual transplants numbered 80 to 100 and 30 to 40, respectively. He specializes in transplants involving both lungs, which, with few exceptions, he said, is the norm around the world.

Dr. Nana-Sinkam, who was recruited to VCU Health in 2016 specifically to expand pulmonary care, echoed those thoughts. VCU Health has gained momentum over the past decade as a pulmonary comprehensive care center, he said, so about two years ago, faculty members set their sights on reviving the lung transplant program.

"Establishing a lung transplant program is not an easy task," he said. "You must have the subspecialty programs to eventually support lung transplant, and that takes years of very thoughtful and intentional planning because a successful program is entirely dependent on infrastructure."

Every hire is crucial, every connection across disciplines must be strong, from preoperative evaluations to operative care and postsurgical pulmonary rehabilitation. The VCU Health Hume-Lee Transplant Center is the Division



"Establishing a lung transplant program is not an easy task. You must have the subspecialty programs to eventually support lung transplant, and that takes years of very thoughtful and intentional planning."

Patrick Nana-Sinkam, M.D.,
chief of the Division of Pulmonary
Disease and Critical Care Medicine,
VCU School of Medicine

of Pulmonary Disease and Critical Care Medicine's main partner for the lung transplant program.

"Outcomes, and ultimately accreditation, are directly linked to the number of patients you manage and infrastructure," he said. "If you don't have a multidisciplinary team that works together in a seamless manner, or the pulmonary rehabilitation facilities aren't equipped to support our patients prior to and following surgery, the transplant program is unlikely to succeed. We are fortunate to have an amazing team who has worked collaboratively to make this a reality for our patients."

GETTING TO THE SOURCE OF LUNG DISEASE

As Dr. Patel and his team prepare to get the transplant program off the ground, others around the MCV Campus are researching the sources of the diseases with hopes of finding better therapies or, ultimately, cures.

Patricia Sime, M.D., chair of the Department of Internal Medicine and the William Branch Porter Professor of Medicine, is researching, among other things, interstitial lung disease. Specifically, she's interested in the causes of pulmonary fibrosis — when lung tissues are damaged and scarred.

The disease is typically attributed to inhaling harmful particles like dust or having an allergic reaction to mold or other environmental antigens. In some cases, it's a combination of genetics and exposure. The term idiopathic pulmonary fibrosis means the specific causes are unknown.

Over time, the hardened tissues prevent the lungs from working properly and individuals struggle to breathe. Existing therapies can sometimes slow the progression depending on the severity at the time of diagnosis, but there are no cures.

"There's still a big need to understand how people get these diseases," Dr. Sime said.

One member of Dr. Sime's team is senior postdoctoral fellow Maggie Freeberg, Ph.D., a biomedical engineer who is studying the cellular response to mechanical changes in the lungs when scarring occurs and how that potentially contributes to the progression of the disease.

With funding from a National Institutes of Health grant, as well as the Pulmonary Fibrosis Foundation Scholars grant, Dr. Freeberg is focusing on a particular protein discovered in fibrotic lung tissue called Piezo2. Normally found in nerves, these proteins are mechanoreceptors, which means they help cells feel changes in stiffness. Because Piezo2 has been found in fibrotic tissue, the team is exploring whether this protein, when it detects the stiffening of the lungs, triggers a cellular reaction that promotes more fibrosis.

Through a multidisciplinary approach involving the VCU School of Pharmacy, Dr. Freeberg is working to create a therapy that targets Piezo2 by blocking its ability to worsen the fibrosis.

"We have limited therapeutic options, and they're not great for patients," Dr. Freeberg said, adding that those with the most severe fibrosis cases often have no alternative but transplants.

"Where my project threads the needle is by taking what we already know about the disease and what the drugs currently do, then taking a little bit out



Aamer Syed, M.D., co-founder of the VCU Health sarcoidosis clinic, studies a patient's scans. The clinic is one of the first 10 designated as a World Center of Excellence.

of the cancer playbook by testing combinatorial therapies," Dr. Freeberg said. "These are complex conditions where multiple things are going wrong, so a target drug is probably not going to be sufficient."

She said she often participates in grand rounds with other doctors, like Dr. Patel.

"We're working hard to think deeply about these problems, and part of that is thinking about them from the whole perspective of the patient," she said. "We have a really strong team — I'm just one piece of the puzzle."

A UNIQUE APPROACH TO CARE

For a so-called "rare" disease, VCU Health sees roughly 2,500 sarcoidosis patients a year. In fact, a heat map posted on a hallway bulletin board near the West Hospital office of Aamer Syed, M.D., shows a prevalence of the disease in Virginia and neighboring Southern states.

There is no definitive reason why, but enough people are affected throughout Virginia that VCU Health took a novel approach to treating it.

An inflammatory disease, sarcoidosis affects the lungs as well as the heart, kidneys, joints, eyes and other areas. It occurs when there's an inappropriate response by the body that produces persistent inflammation, which eventually leads to organ damage, blindness, heart failure and other serious conditions. If found early enough, the disease is manageable.

One of the first 10 centers globally to receive a World Center of Excellence designation, VCU Health's sarcoidosis clinic sees patients of all ages, from 18 to 80.

Among the patients, about 70% are African American women, Dr. Syed said.

Sarcoidosis spans various areas of the body, and for that reason, VCU Health's treatment system was built around

addressing patients' needs simultaneously. The sarcoidosis clinic started 12 years ago with a team from pulmonology, cardiology and rheumatology, and now includes neurology, neuro-ophthalmology and hepatology.

"Our clinics are very unique," said Dr. Syed, one of the founders of the sarcoidosis clinic. Health care is often fractured, he said. Many doctors stick to their specialty areas.

"That means patients are the go-between among their specialists, which can be problematic depending on the patient's recall," he explained. "But sarcoidosis can affect so many parts of the body at one time, so we bring all of those issues under one roof through combined visits."

During one visit, sarcoidosis patients can see Dr. Syed at VCU Health's Stony Point location as well as their cardiologist and rheumatologist.

"Patients like the interconnectedness," he said. "We are the quarterbacks managing all these organ systems, and it's proven to be very popular."

VCU Health's program is among the largest in the country, he said, noting that the group intentionally does not have a director.

"We do everything collaboratively," he said. "I don't think there's any other program that has this many physicians of different specialties embedded together."

LOOKING AHEAD

VCU Health will be opening a new pulmonary and cardiac rehabilitation facility in Reynolds Crossing in Henrico County, Va., in 2025. The facility will provide lung transplant candidates with the presurgical care they need to be healthy enough for transplant.

Pulmonary rehab works with nearly 300 patients annually. Currently, the services are housed in Main Hospital on the MCV Campus in downtown Richmond.

The new facility is one more feather in the cap for pulmonary care at VCU Health.

"We have dedicated ultra-specialists everywhere," said Alpha "Berry" Fowler III, M.D., former chair of the Division of Pulmonary Disease and Critical Care Medicine and the current William Taliaferro Thompson Professor of Medicine.

"Research sets us apart," he said. "We train future pulmonology doctors, and we have one of the best programs in the country."

If you would like to support pulmonary health on the MCV Campus, please contact Nathan Bick, executive director of development in the Office of Medical Philanthropy and Alumni Relations, at 804-827-0387, or ngbick@vcu.edu.

Breathe Easier With VCU Health

VCU Health offers a wealth of nationally and globally recognized expertise in pulmonary subspecialty areas, including newly opened clinics for severe asthma and COPD.

Interstitial Lung Disease

VCU Health is accredited by the Pulmonary Fibrosis Foundation as a national care center, as well as by the LAM Foundation. LAM is lymphangioleiomyomatosis, a rare lung disease that nearly exclusively affects women.

Cystic Fibrosis

The clinic is recognized as a CF Center of Excellence by the Cystic Fibrosis Foundation.

Pulmonary Hypertension

VCU Health is designated as a national comprehensive care center by the Pulmonary Hypertension Care Centers program.

Sarcoidosis

VCU Health is one of 33 designated World Centers of Excellence by the Foundation for Sarcoidosis Research and World Association for Sarcoidosis and Other Granulomatous Disorders.

Lung Cancer

VCU Massey Comprehensive Cancer Center was recognized by *U.S. News & World Report* as a high-performing hospital for lung cancer surgery.

Pulmonary Rehab

VCU Health is expected to open a new facility in spring 2025 at Reynolds Crossing in Henrico County.



Breathing Easier Thanks to VCU Health

In hindsight, Williamsburg, Va., residents Grover and Betty Lewis had an inkling from their very first meeting with Alpha “Berry” Fowler III, M.D., that their relationship with VCU Health would be different from other health care systems.

Grover’s chronic lung condition, called mycobacterium avium complex, is something he’s lived with for years. It’s a condition caused when bacteria commonly found in the environment, namely in soil and water, are inhaled through daily activities. In many cases, an individual’s immune system can fight off the bacteria, but for those with preexisting conditions — including pneumonia or COPD or an otherwise weakened immune system — the bacteria remain. They cause infections that lead to shortness of breath, chronic cough, fatigue and complications as the patient ages.

The Lewises, who are retired and moved to Williamsburg from Florida 15 years ago, had seen area doctors in both places for Grover’s condition. But when Grover’s pulmonologist retired in 2015, he sought out someone new.

Within the Lewises’ tight-knit community, Dr. Fowler’s name came up. A longtime pulmonologist, Dr. Fowler is the William Taliaferro Thompson Professor of Medicine and the former chair of the Division of Pulmonary Disease and Critical Care Medicine.

The Lewises said their first consultation with Dr. Fowler in 2016 made a lasting impression.

During that initial meeting, Grover shared the details of a life well-traveled. His career led his family all over the world, from Saudi Arabia and Iran to China, Singapore and the United Kingdom. Through the years, as his condition worsened, he always wondered if he picked up something during one of their “adventures.”

In all, Dr. Fowler listened to every detail for nearly an hour and a half.

“We were shocked that we had that much time with a doctor,” Grover said. “He went over my entire history, and that gave us a high level of confidence that we were in the right place.”

Grover added: “You could tell that he cared about his patients.”

That dedication hasn’t wavered.



Williamsburg residents Betty and Grover Lewis. *Photo: Daniel Sangjib Min, MCV Foundation*

Betty said in recent years, and even within the last few months, Grover has needed emergency care for ongoing issues. A recent visit to VCU Health involved an interventional radiology procedure.

“I don’t know that this procedure could even be performed anywhere else outside of MCV,” Grover said.

The Lewises credit Dr. Fowler and others such as Denise Lynch, RN, director of the VCU Health Access, Support and Assistance Program, or ASAP, who quickly jumped in to help make arrangements on the MCV Campus when Grover’s needs surpassed care he could receive in Williamsburg.

“The level of expertise at MCV is beyond anything we’ve come across in a very long time,” Betty said. “You hear a lot about patient care, and the word care is not necessarily always understood the way it used to be, but they have put the ‘care’ back into ‘patient care.’”

Dr. Fowler said that within his 43 years on the MCV Campus, what inspires him still is the sense of care and commitment found throughout the campus. Pulmonary diseases are complicated because they often affect other systems within the body, he said. But the urgency with which his peers from every department — like cardiology, radiology, gastrointestinal and rheumatology — jump into action to help patients with pulmonary issues is what sets VCU Health apart.

“This institution is fabulous,” he said. “We all work for the best interests of patients, and I am happy to be in the position where I can push the buttons and make the calls to anyone, anytime, to get people like Mr. Lewis the help that they need.”

Dr. Fowler said that within his 43 years on the MCV Campus, what inspires him still is the sense of care and commitment found throughout the campus.



A Breakthrough for Breast Cancer

Massey researchers are developing new ways to better treat certain types of aggressive breast cancers.

By Sarah Vogelsong

For cancer researchers, life can be one long cat-and-mouse game.

We've all seen the familiar pattern unfold. The cat studies the behavior of the mouse: how it comes and goes, where it hides. Watching, waiting, the cat stalks and then pounces. For a moment, you think it's got the prey captured between its paws, the tiny invader stilled. But then, there goes the mouse, skittering away, just out of reach — back to the other mice who are inevitably waiting in the wings for their turn to emerge.

"That's what cancers do; they have these escape mechanisms," said Kandace McGuire, M.D., a surgical oncologist who is chief of breast surgery and leader of the breast cancer program at VCU Massey Comprehensive Cancer Center. "The nature of cancer is that what we find to destroy it ... it will try to find a way to get around that."

Medical advancements over the past few decades have meant that in many cases, humans can now get ahead of cancer cells, stopping them in their tracks through interventions like surgery and radiation. But not every situation follows such a smooth path.

"For some people, that's not the case," Dr. McGuire said. "The cancer outpaces the medications. It changes before we can kill all the cells."

HER2

A particular challenge for patients and doctors has been a kind of breast cancer known as HER2-positive breast cancer. HER2 — a shorthand for human epidermal growth factor receptor 2 — is a protein receptor that, when present in higher-than-normal quantities, causes cancer cells to multiply quickly. Researchers estimate that in about 20% of all breast cancers, the gene that makes this protein goes into overdrive, producing too much HER2 and thereby spurring wild growth of cancer cells.

For years, patients with HER2-positive breast cancers faced steep odds in fighting the disease. Then, in 1998, the U.S. Food and Drug Administration approved a drug known as Herceptin, or trastuzumab, that targets the protein receptor by inhibiting its ability to receive the chemical signals that tell breast cancer cells to keep growing. Clinical trials showed the drug significantly slowed the spread of the disease and reduced its recurrence; one book about

its development labeled the treatment "revolutionary."

Since then, other drugs targeting the HER2 receptor have appeared on the market, appreciably improving the prognosis for patients diagnosed with this form of breast cancer. Still, some cases manage to elude treatment. The mouse found new ways to slip from the cat's grasp.

"We still get patients who die of this cancer because the cells figure out a way around everything, or patients don't tolerate some of the medications that we currently have available," said Dr. McGuire. Furthermore, she continued, cancers that have managed to spread to the brain are virtually untreatable with current drugs because of what's known as the blood-brain barrier, a membrane that stops nearly everything in the circulatory system from crossing over into the central nervous system. That barrier, she said, "is supposed to protect your brain, but in this case, it doesn't let the good stuff in."

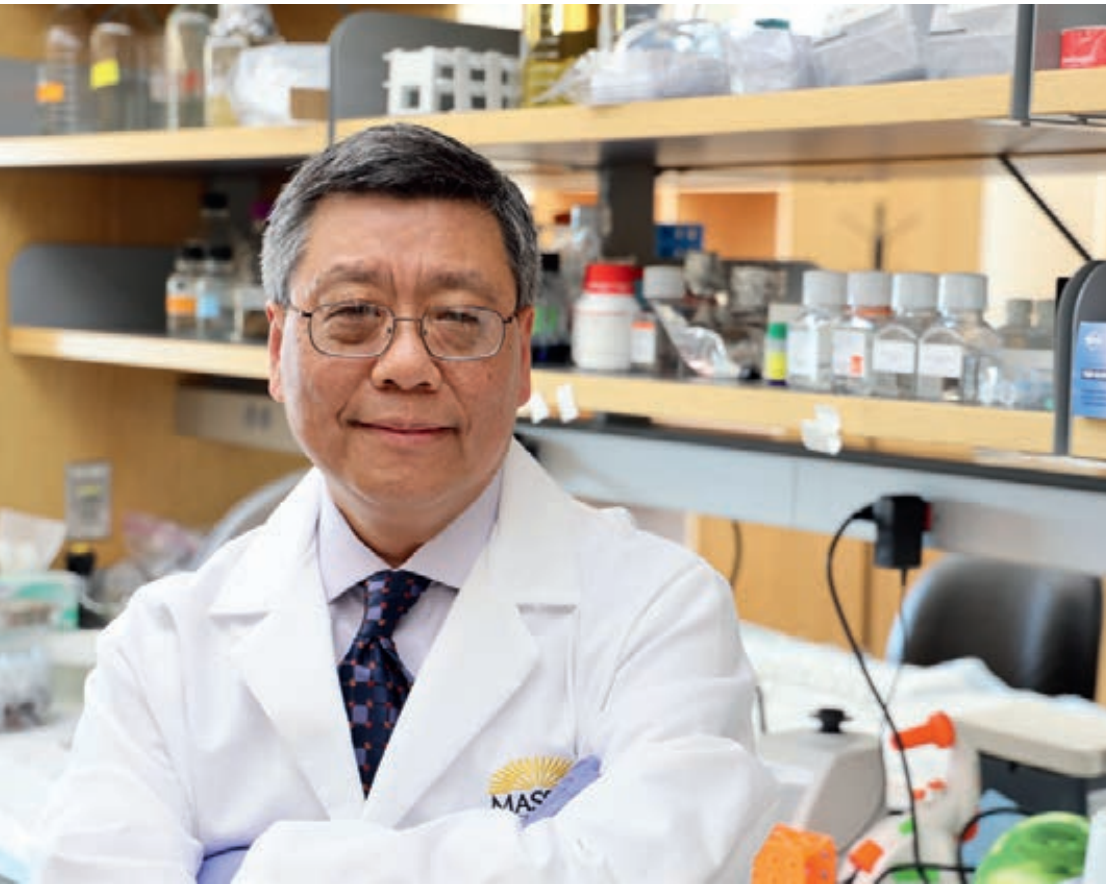
A POTENTIAL GAME-CHANGER

Now, however, Massey research recently published in *Drug Resistance Updates* shows a promising new drug could prove groundbreaking for HER2-positive breast cancer patients who have been resistant to other treatments.

The drug, a human protein generated in the lab as a recombinant protein known as PEPDG278D, goes a step further than existing treatments by not just inhibiting the HER2 protein from acting but by eradicating it. At the same time, it wipes out another protein that drives cancer cell growth known as the epidermal growth factor receptor, or EGFR.



Kandace McGuire, M.D., chief of breast surgery and leader of the breast cancer program at VCU Massey Comprehensive Cancer Center. Photo: Tom Kojcsich, VCU



Yuesheng Zhang, M.D., Ph.D., professor in the VCU School of Medicine Department of Pharmacology and Toxicology and the Harrigan, Haw and Luck Families Chair in Cancer Research at VCU Massey Comprehensive Cancer Center. *Photo: Blake Belden, VCU Massey*

Current drugs on the market “don’t really eliminate the protein itself that well. In fact, sometimes the protein responds to the inhibition by increased expression,” said Yuesheng Zhang, M.D., Ph.D. “But this agent, we found, is very powerful in eliminating the existence of the protein. So this is very novel. We haven’t seen any drug that is doing that.”

Dr. Zhang holds the Harrigan, Haw and Luck Families Chair in Cancer Research and is a professor in the VCU School of Medicine Department of Pharmacology and Toxicology. He is also an author of the study and has been working to develop PEPDG278D for nearly a decade, including at his prior institution, the Roswell Park Comprehensive Cancer Center in Buffalo, N.Y.

The latest research shows that when combined with the anticoagulant enoxaparin, the drug reduced tumor growth by 98% in mice after just two weeks of treatment. When combined with a monoclonal antibody called garadacimab, the drug led to “complete remission of all tumors after less than three weeks of treatment.” While both enoxaparin and garadacimab were used to stabilize the PEPDG278D protein in the mice used for testing, Dr. Zhang said garadacimab may prove the most promising combination for human use because it only needs to be given to patients once every three weeks, while enoxaparin has to be given daily.

All of the tumors studied had been removed from patients and transplanted to animal models — an approach Dr. Zhang said is “well known to better predict treatment response in patients.” And in all of the situations tested, trastuzumab, the drug approved in 1998, was ineffective, demonstrating that the new drug may be capable of overcoming even treatment-resistant cancers.

“In both cases, the combination is very powerful. It just eliminated the tumor completely,” said Dr. Zhang. And because the drug specifically targets cells with higher-than-normal levels of HER2 and EGFR, leaving normal cells unaffected, he said researchers “think the toxicity is going to be very, very little.”

Additionally, recent research found the drug reduced metastatic brain tumor growth by 64% in animal models — a finding that indicates it can cross the blood-brain barrier. “This is a game-changer,” Dr. McGuire said. “Is it going to cure every patient with brain metastasis? No, because there’s always going to be those cells that aren’t going to respond to this drug. But it makes it possible where currently it’s impossible.”

NATIONAL CANCER INSTITUTE TESTING

For now, drug testing remains in what’s known as the preclinical stage — the phase before it’s tested on humans.

But clinical trials involving humans are expensive, Dr. Zhang noted. He estimated it would take more than \$3 million to manufacture several grams of the new drug for testing, and those grams would have to be manufactured at a facility certified by the FDA.

Consequently, even before Dr. Zhang arrived at Massey from his Roswell Park laboratory, he had submitted an application to the National Cancer Institute for support in developing the drug for FDA approval. He was successful: The institute accepted the drug into the pipeline of its

“Every year and every day, we get better and better. ...
The pace at which we are improving is insane. It’s almost
like computer technology how fast we learn new things.”

Kandace McGuire, M.D., chief of breast surgery
and leader of the breast cancer program at
VCU Massey Comprehensive Cancer Center

NCI Experimental Therapeutics Program, which supports the development of the most promising new cancer treatment discoveries.

Reaching that stage is a milestone itself, said Dr. McGuire: “Maybe about 1% of all basic science research will actually make it to a clinical trial.”

Drug development remains a grueling process. Dr. Zhang said the NCI is still validating the findings. Once it does, it will work to manufacture the drug, and an additional study known as an investigational new drug-enabling study will be conducted. Finally, the data will be presented to the FDA, which will have to approve clinical evaluation of the drug at Massey.

“Once the FDA is OK with it, then we can quickly move it to patients,” Dr. Zhang said. “We don’t have a shortage of patients. There are patients waiting for this sort of thing.”

Even before then, the most recent findings can inform medical teams about how best to approach treatment-resistant cases of HER2-positive breast cancer, said Dr. Zhang. Particularly significant is the discovery that to overcome cancers that have been resistant to treatment, drugs should target not only the HER2 protein but also the EGFR protein — and should seek to eliminate both.

“It actually guides the field in terms of what you should do in developing the next generation of HER2 treatments,” Dr. Zhang said.

For Dr. McGuire, who can recall a childhood friend losing her mother to HER2-positive breast cancer, the recent findings offer a welcome dose of optimism in the ongoing fight against the disease.

“We’re going to figure out a way someday to kill these cells so quickly and hit them with the right combination that we will eliminate them before they can change,” she said. “Every year and every day, we get better and better. ... The pace at which we are improving is insane. It’s almost like computer technology how fast we learn new things.”

One contributor to those advancements? Team science, said Dr. McGuire. This runs counter to the typical Hollywood portrayal of medical breakthroughs that sees a scientist having a “Eureka!” moment while bent over a microscope late at night, alone in a lab. Most discoveries today are the product of scientific collaboration and knowledge sharing. A university’s embrace of team science is one of the factors the NCI considers in granting the coveted comprehensive cancer center status — a recognition Massey achieved in 2023.

“Research like this is happening in our backyard. The next big thing may not come from an MD Anderson or a Memorial Sloan Kettering,” Dr. McGuire said, referring to the two traditional heavyweights of cancer research in the U.S. “It may come from VCU.”

If you are interested in supporting research at VCU Massey Comprehensive Cancer Center, please contact Caitlin Doelp, Massey’s executive director of development, at 804-828-1450 or doelpc@vcu.edu.

The **GLOBAL FRAMEWORK**

One VCU leader developed the global standard for geriatric fracture patients that ensures quicker recovery and better outcomes.

By Holly Prestidge, MCV Foundation

Photos by Daniel Sangjib Min, MCV Foundation

Hip fractures are easy. Let the interns do it.

Those sentiments proved a startling introduction to geriatric fracture surgeries for Stephen Kates, M.D., professor and chair of the VCU School of Medicine Department of Orthopaedics and the John A. Cardea Chair of Orthopaedic Surgery.

It was the 1980s, and as a young doctor starting his career in New York, he was struck by the lack of priority given to older people languishing in hospitals, sometimes for days, before receiving hip surgeries due to falls and accidents.

The surgeries were viewed as routine procedures, Dr. Kates recalled, easily handled by junior faculty for a population that largely went ignored.

Dr. Kates — who now serves as second vice president of the American Orthopaedic Association and who was instrumental in founding an international society for the field of geriatric fracture — would go on to create a system of patient-centric standardized care both nationally and around the globe. He brought those standards to VCU Health in 2013 when he joined the faculty.

But he remembers how his initial observations did not match the perception he was fed.

“It was completely wrong,” Dr. Kates recalled. A few of the many books he authored were perched on a bookshelf in his West Hospital office.

“Hip fracture surgeries were not easy, and in fact, they were very difficult,” he said. “And the outcomes were not good.”

Each year, about 330,000 people in the United States over the age of 65 fracture a hip.

And in Dr. Kates’ early days, nearly one-third of those patients died in the first year following hip surgery. Some died before they left the hospital. Those who lived beyond a year or so often lost several degrees of functionality within their daily lives. Hip fractures disproportionately affect women, which makes the injury more deadly for them than breast and ovarian cancer combined.

It was grim.

“People weren’t paying attention, and it just struck me,” Dr. Kates said. “The outcomes are bad, the treatments are hard and, ultimately, it usually didn’t go well.”

Despite peers who laughed at him, Dr. Kates took the opportunity to visit patients in nursing homes after their surgeries to get the full picture of their needs. He realized they needed better presurgical care, including shorter waits for surgery. He saw ways to improve postsurgical care, including such simple tasks as sending patients to rehab with a checklist of discharge summaries, contact numbers for their doctors, follow-up appointment dates and lists of their medications.

In other words, opportunity knocked. Dr. Kates — ignoring the skeptics — answered.

VCU Health's program stands on a few central pillars. Most surgeries are performed within 24 hours from the time the patient arrives regardless of the day of the week.

A TEAM OF BELIEVERS

VCU Health is ranked 33rd nationally in orthopaedics by *U.S. News & World Report*.

About 250 patients receive hip surgeries at VCU Health each year, or roughly 20% of the Richmond area's hip fracture patients. Those 20% represent the worst cases. The others are treated at smaller community hospitals.

VCU Health's program stands on a few central pillars. Most surgeries are performed within 24 hours from the time the patient arrives, regardless of the day of the week, and the surgeries constitute "single-shot" procedures, meaning they're done right the first time, Dr. Kates said. Another pillar is that patients can begin to walk nearly immediately after the surgery and bearing full weight.

It's a sea change from decades ago. Gone are the days of a patient waiting for hip surgery simply because their physician's designated surgery day wasn't until the next week.

Gone are the myriad sedatives and opiates given to patients during those painful days in waiting, which often caused additional medical issues — delirium, aspiration pneumonia, blood clots — that ultimately worsened their conditions, sometimes fatally.

Gone, too, is the lost connection between hospital and patients once they leave and head to rehab.

VCU Health, the Richmond-area's first Level I trauma center, not only adopted standardized care for geriatric fracture patients but embraced it. These days, a team composed of Dr. Kates, four orthopaedic trauma surgeons and three joint surgeons exclusively perform all the geriatric fracture surgeries.

"We have a true comprehensive program, but that took a culture change," Dr. Kates said, namely because until recently, hip fractures weren't viewed as trauma. "What we're doing here requires a different mindset because it's beginning-to-end care."

He added: "It's a team effort — you have to have folks on these teams who are believers."

THE COMPLETE CARE PACKAGE

If surgery is the backbone of VCU Health's program, specialized care both before and after is its heart, soul and connective tissue.

Even before Dr. Kates arrived, geriatric care was changing on the MCV Campus.

Sarah Hobgood, M.D., a geriatrician and assistant dean for clinical medical education at the VCU School of Medicine, arrived in 2009 with the task of reviving geriatric consultation services, a crucial element that provides co-management care for geriatric patients from the moment they're admitted to the emergency department to postsurgical rehab and beyond.

"We needed to not only be doing the acute medicine for the patients, but we needed to be thinking about geriatric syndromes associated with hospitalization," she said, conditions such as dementia, anxiety, delirium and loss of function for activities of daily life, like dressing or bathing.

She immediately connected with surgical teams across the campus to create a network in which everyone was addressing patient needs using standardized care practices, including those created years before by Dr. Kates.



Today, that means orders are activated when patients arrive in the emergency department. Several things happen simultaneously.

Anesthesiologists administer nerve blocks to the patients. Nerve blocks are localized anesthesia that reduce the patient's pain and are used as an alternative to strong pain medicines. At the same time, Dr. Hobgood's team gets involved in presurgical evaluations as well as pain management plans.

It is a streamlined process that ensures patients get into surgery quickly without being subjected to unnecessary presurgical tests or lots of heavy drugs that could make them sicker. Conversely, if they have other existing medical issues that need attention, those are incorporated into the plans.

"The longer they are not fixed, the worse the outcomes," Dr. Hobgood said. "We do our due diligence, but as geriatricians, we do not want to delay people going to the operating room. As much as possible, we want to avoid unnecessary testing."

While the national standard for getting geriatric fracture patients into surgery is 48 hours, which isn't consistently followed across the country, VCU Health aims for 24 hours.

"Having everyone go directly or as quickly as possible to the operating room was a big cultural shift," she said. It required educating all parties on the changing models of care related to preoperative categories, which for many years included only two buckets for injuries: emergencies or elective care.

"A broken hip is not an elective surgery," Dr. Hobgood said, but nor was it an emergency in the sense that the patient would die without immediate intervention.

Thankfully, she said, the two categories expanded about 10 years ago to include a third bucket for urgent care for injuries that were serious enough to need surgery but not emergency surgery.

"That was a huge lift, but it took a lot of education," she said. Hospitals in particular were concerned about striking a balance between not adding unnecessary burdens to the emergency department and not allowing geriatric patients to wait too long for their surgeries.

Stephen Kates, M.D., chair of the VCU School of Medicine Department of Orthopaedics and the John A. Cardea Chair in Orthopaedic Surgery, standardized care for geriatric fracture patients around the world.

Additionally, the consultation team initiates connections for rehabilitation services even before the patients are in surgery.

Roughly 90% of patients will go to a skilled nursing facility to complete their rehab, so part of VCU Health's multidisciplinary approach engages social workers, physical therapists and occupational therapists from the beginning.

"Ideally, the patient should be ready to go to that rehab facility and not have to spend extra nights in the hospital while someone is looking for a place for them to go," Dr. Hobgood said. "We try to get everyone on board as quickly as possible, lining up all the pieces of that interdisciplinary puzzle to provide patients with a continuum of care that wasn't there before."

A new hip does wonders, but making sure falls don't happen again is key. Many people, however, do not think about their bone health until it's too late.

VCU Health has incorporated bone health education into its comprehensive care, said Katherine Vita, an orthopaedic trauma surgery physician's assistant in the VCU Health Department of Orthopaedics. The greatest predictor of another fall is the first fall.

To curb that, Vita said, when patients follow up with their surgeons after surgery, they are also meeting with advanced practice providers, who can help them identify risks and keep them safe.

"We want to prevent the next fracture, so we're putting all of these things in motion to identify those at high risk and then help them avoid future falls," Vita said. They want patients to view this like prevention for other conditions such as heart attacks.

Stephen Kates, M.D. (center), standardized practices such as reduced wait times for geriatric fracture surgeries and avoiding unnecessary medications.



Dr. Hobgood also noted that since she started, it has become mandatory for orthopaedic interns to spend a one-month rotation with geriatric patients.

“The public doesn’t always recognize how important bone health is to their overall health,” she said. “People are living longer, and they’re staying active longer, but that also means they’re hurting themselves as they age.”

VCU Health’s program is a cohesive network of healing and education.

“Here at VCU, we have all these specialists and experts who weigh in and bring it all together,” Vita said. “It really is a meeting of the minds.”

TIP OF THE ICEBERG

Dr. Kates laid titanium hardware on the table, explaining how the sturdy ball-and-socket mechanism is used in hip replacements. If the patient’s bones are brittle, sometimes they will also use cement — the same material found in some kitchen counters. Unless the individual falls again or sustains another major injury, the hardware lasts a lifetime.

Dr. Kates, who created and then taught courses on his standardized care practices, said health systems around the world that have adopted them have seen reduced readmission rates, reduced death rates and reduced costs, both for patients and the hospitals. He said about 90% of U.S. hospitals today use standardized care for hip fracture surgeries.

He considers it a good start.

“We’re just addressing the tip of the iceberg,” Dr. Kates said. “The parts that you can see above the water are the people who’ve already had a fracture and don’t want another one.”

He said that while the vast majority of U.S. women will have a mammogram, a fraction of those — maybe 5% or 10% — will check their bone health well before they’re 65.

Doing so can be as easy as using online calculation tools, like FRAX, a fracture risk assessment tool developed by the University of Sheffield in England. Individuals enter basic information such as age, weight, height, whether they’ve had previous fractures, and a few extra points. The tool calculates the likelihood of a fall within 10 years.

“The large mass under the water that we can’t see, those are the people who haven’t fallen but are high risk,” Dr. Kates said. “We have the tools, we have the medicines, but the final part is fall prevention and bone health.”

If you would like to support the Department of Orthopaedics at the VCU School of Medicine, please contact Andrew Hartley, senior director of development in the VCU Office of Medical Philanthropy and Alumni Relations, at 804-628-5312, or aphartle@vcu.edu. To give to the Division of Geriatric Medicine, please contact Nathan Bick, executive director of development for the Department of Internal Medicine, at 804-827-0387, or ngbick@vcu.edu.

“Here at VCU,
we have all these
specialists and
experts who weigh
in and bring it all
together. It really
is a meeting of
the minds.”

Katherine Vita, orthopaedic
trauma surgery physician’s
assistant, VCU Health
Department of Orthopaedics

Global Model, Local Impact



Chuck Marsh's future is bright following hip fracture surgery at VCU Health.

Darn those comfy old slippers. Should've gotten rid of them years ago.

New Kent County, Va., resident Chuck Marsh sat in his room on the 11th floor of Main Hospital at VCU Medical Center last fall, lamenting about his footwear selection on a particular day back in September.

Marsh, 91, fell in his kitchen. He was making his morning coffee, and he had rested his cane against the countertop. When he proceeded to the other side of the counter without it, the grip on the bottom of his old slippers caught on the floor.

He hit the ground on his side, catching a kitchen chair on the way down, which fell with him. His legs were twisted under him, he said, and his head rested against his refrigerator.

"That was the worst pain I've ever had," he said.

Marsh, a retired electronic engraver, is one of the hundreds of thousands of people over the age of 65 who suffer hip injuries each year from falls and accidents.

Marsh said that September morning started like any other. It was chilly, so he put on his shirt before making his way to the kitchen. As a matter of habit, he had slid his cellphone into his shirt pocket.

When he fell, he wasn't able to move himself, but he called his neighbor, who called 911.

Marsh was in pain on the floor until medics arrived from a neighboring locality. They took him to the nearest local airport, from which he was airlifted to VCU Health via helicopter. By then, he said, he had passed out.

He arrived at the hospital, and he was swept into surgery later that same day.

VCU Health's standard of care prioritizes getting these patients into surgery within 24 to 48 hours of admission. In fact, from the moment patients arrive, a multidisciplinary team jumps into action to create a plan that incorporates every step of care, from initial evaluations and the surgery itself to rehab and preventive bone health education following surgery.

New Kent County, Va., resident Chuck Marsh completes postoperative physical therapy exercises at VCU Health's Main Hospital with Joshua Stallings, D.P.T.
Photos: Daniel Sangjib Min, MCV Foundation

Marsh said he remembers waking up in the hospital room. He remained there for nearly a week as doctors and others pushed him to start walking. Only a few days after surgery, he went from barely being able to stand on his new hip to walking down the hall.

"I look out the window, and I just feel different about everything," Marsh said — acknowledging how different he felt lying on his kitchen floor. Marsh, who lives alone but has children nearby, said he feared he would lose his independence.

"I was sure I'd have no future," he remembers thinking as he waited for emergency personnel to help him.

"I won't be able to do anything for myself."

To the contrary, Marsh is all smiles — and a few happy tears — these days.

"My family and these people," he said, choking up as he gestured around his hospital room, "I love them

to death." Nearby was Joshua Stallings, D.P.T., who worked with Marsh in the days after surgery, including initially helping him move from his bed to his room chair postsurgery so Marsh could begin his physical therapy.

"He was the first person to give me a bear hug, and I'll never forget it," Marsh said about Dr. Stallings.

Marsh said he had very little pain after surgery. He was looking forward to being back home, in his own bed, doing all of the things he took for granted before he fell.

But this time, he'd be ditching the slippers.

"They worked on me, they operated on me, and I love them to death," Marsh said about his VCU Health team. "Every day now I wake up, I can look out the windows, and it's just beautiful."

Marsh said he had very little pain after surgery. "Every day now I wake up, I can look out the windows, and it's just beautiful."

Chuck Marsh holds his great-grandson, Henry, following his return home after a September 2024 hip surgery at VCU Health.



follow-ups

Checking in with researchers on the latest developments

VCU Surpasses \$500 Million in Sponsored Research Funding for the First Time

The milestone represents the sixth consecutive year of record-setting funding.

VCU is marking a milestone achievement in its renowned research enterprise. Highlighting ongoing and dramatic growth, the university has surpassed the \$500 million mark in sponsored research funding for the first time.

The fiscal year 2024 total of \$506 million represents the sixth consecutive year of record-setting funding, and it reflects an 86% increase over six years and 9% over last year. The rapid growth of VCU's research enterprise continues the university's growing national distinction as a top urban, public research university.

"I am so incredibly proud of this research milestone, and I extend my sincerest thanks and congratulations to the entire VCU research community," said P. Srirama Rao, Ph.D., vice president for research and innovation. "A few years ago, we decided as a university that in order to achieve sizable growth in research, we had to commit to being strategic; invest in resources; and directly engage our faculty, staff and students. In addition to these efforts, the leadership within our schools and colleges on all our campuses has ensured that research now permeates through everything that we do at VCU and continues to take us to new heights."

The annual increase in both quantity and size of the grants won by VCU faculty across the MCV and Monroe Park campuses over the past six years has been spurred through the university's commitment to its research strategic

priorities plan and investments in four key research initiatives led by innovative and high-impact teams. The priorities leverage the university's growing national and international leadership.

"The impactful research conducted at VCU and our transdisciplinary approaches to problem-solving, are lifting lives," Dr. Rao said. "Our research addresses societal issues ranging from confronting disparities to tackling climate change and curing chronic diseases. We are perfectly poised to continue to address the challenges faced here in Richmond, across the country and around the world."

— David Oglethorpe, Ed.D., VCU News



Air Force Awards \$1.8M to VCU Startup to Advance Development of Drug Treating Massive Blood Loss

A Perfusion Medical product, based on professor Martin Mangino's research, could soon start clinical trials.

Researchers at VCU could soon launch a clinical trial to test an intravenous solution that its inventor, Martin J. Mangino, Ph.D., a professor of surgery and of physiology and biophysics in the VCU School of Medicine, says might treat massive blood loss in trauma patients.

Perfusion Medical Inc., a VCU startup working to commercialize the drug called PM-208, has received \$1.8 million from the U.S. Air Force, which moves the company a step closer to starting clinical trials.

"For a person who is bleeding out, PM-208 may take survival time from minutes to a day or more," Dr. Mangino said.

NEXT first covered Dr. Mangino in 2021, shortly after he co-founded Perfusion specifically to navigate the comprehensive process of moving a new drug through the Food and Drug Administration's clinical trials process, which may take several years. The invention, and work to develop it for market, has been an entirely homegrown process at VCU.

In spring 2024, Perfusion received a federal Small Business Innovation Research contract from the Air Force's venture arm, AFWERX. Under the terms of the award, Perfusion will work with the Air Force Research Laboratory's human performance division and the 99th Medical Group to develop an investigational new drug application.



When it is accepted by the FDA, Perfusion can begin Phase I clinical trials, which evaluate a drug's safety in humans. The FDA requires any drug to go through multiple phases of clinical trials to determine safety and effectiveness, especially in comparison with current standards of treatment, before granting approval for use in medical settings.

"Our goal is to see this used worldwide, not only for severely injured soldiers on the battlefield but also by first responders and in hospitals, and for a wide range of conditions," said Gerard Eldering, CEO of Perfusion. "PM-208 has a broad market that may save many lives, and we are working hard to get it into the hands of health care professionals who can make that happen."

— Jeff Kelley,

VCU TechTransfer and Ventures

NEXT is published by the MCV Foundation to share the latest breakthroughs occurring at VCU Health and the positive impact these exciting innovations have on patients.

VICE PRESIDENT FOR COMMUNICATIONS

Eric M. Peters

EDITOR

Paul Brockwell Jr.

GRAPHIC DESIGN

Big River Advertising

SCIENTIFIC ADVISORY PANEL

Joseph T. DiPiro, Pharm.D.

Susan G. Kornstein, M.D.

F. Gerard Moeller, M.D.

Patricia J. Sime, M.D.

The MCV Foundation supports and fosters VCU Health and VCU Health Sciences through philanthropy, stewardship, innovation, communications and collaboration.

Established in 1949, the MCV Foundation manages more than \$1 billion in assets to ensure VCU Health remains at the forefront of excellence and innovation in patient care, research and education as one of the top academic health systems on the East Coast. Through more than 2,000 funds, the MCV Foundation provides scholarships, professorships, research and programs to support the lifesaving work occurring at VCU Health every day. The MCV Foundation's campus partners include VCU College of Health Professions, VCU School of Dentistry, VCU School of Medicine, VCU School of Nursing, VCU School of Pharmacy, VCU School of Public Health, VCU Massey Comprehensive Cancer Center and VCU Medical Center.

To learn more, visit:

www.mcvfoundation.org

Please address comments or subscription requests to:

MCV Foundation

Attention: Communications Department

1021 East Cary Street, Suite 1100

Richmond, VA 23219

info@mcvfoundation.org

MCV Foundation



1021 East Cary Street, Suite 1100
Richmond, VA 23219

NONPROFIT
ORGANIZATION
U.S. POSTAGE
PAID
PERMIT NO. 1182
RICHMOND, VA



next

A PUBLICATION OF THE MCV FOUNDATION