ANNUAL REPORT

Bringing Ideas to Life

24

TechTransfer and Ventures

VCU Research

Bringing Ideas to Life 24 Annual Report

Mission

Our mission is to facilitate commercialization of university inventions for the benefit of the public, to foster a culture of innovation and entrepreneurship at the university, and to promote industry collaborations and new venture creation.

COVER PHOTO:
Targeted photodynamic therapy device.
See story on page 6.

Design: BN Design & Advertising
Photography: Karl Steinbrenner
Content: Jeff Kelley and Dan Carrigan

An UNmatched Year Defined by Vision and Dedication

This year was truly history in the making. In many ways, 2024 reflects the deliberate and collaborative efforts of our VCU community to transform research into real-world impact. It's a collective ethos that's simply unmatched.

This year, VCU achieved a historic milestone: surpassing **$500 million in sponsored research funding** for the first time in our history. This represents an 86% growth over the past six years, a testament to the bold vision and dedication of our faculty, staff and students. Together, they are driving advances across the arts, humanities, social sciences, STEM, and health sciences — a breadth of impact that truly defines innovation without limits.

Our accomplishments showcase the strength of a community dedicated to innovation. VCU is now a **Top 50 public research university**, with nearly 20 health sciences schools and departments ranked in the Top 50 nationally. We've also maintained our standing as a **top 100 university for utility patents** for the second consecutive year, a reflection of the groundbreaking discoveries happening right here on our campuses.

At the heart of this success is **VCU TechTransfer and Ventures**, the keystone of our innovation ecosystem. Often working behind the scenes, our team works tirelessly to ensure that the discoveries made in the labs are translated into real-world applications that improve and save lives. In the past year alone, the team managed **130 new inventions**, filed more than **150 patent applications** and generated over **$3.7 million in licensing revenue**. These efforts resulted in **13 licenses to startups**, further cementing VCU's leadership in entrepreneurship and commercialization.

Programs like the **Entrepreneurs-in-Residence** have paired experienced serial entrepreneurs with VCU researchers, guiding their discoveries toward market-ready solutions. This culture of innovation has helped VCU lead among Virginia universities in number of new ventures and in royalty revenues, with our ventures raising more than **$100 million in startup funding** over the past decade.

One shining example of this progress is **Nerve Tape**, a revolutionary surgical tool developed by Dr. Jonathan Isaacs. This groundbreaking technology, which streamlines complex nerve repair surgeries, was featured in the **2024 Congressional Budget Justification for the National Institute of Neurological Disorders and Stroke** as an example of impactful research funded by the National Institutes of Health. Now in use at leading institutions across the country, Nerve Tape exemplifies VCU's ability to turn innovative ideas into transformative solutions.

These successes are about people. The innovative researchers and leaders at VCU are the driving force behind our progress. They are the faces of Central Virginia's innovation movement, raising our prominence as a research and innovation hub and making meaningful contributions not only to Virginia but also to the world.

On the following pages, you'll meet the individuals behind these milestones. They embody the spirit of curiosity and determination that drive us forward. As we celebrate this year's accomplishments, we remain focused on what's ahead. Together, we are shaping a future defined by discovery. The potential of this community is truly **UNmatched**.

With sincere gratitude,

P. Srirama Rao, Ph.D.
Vice President for Research and Innovation

Ivelina Metcheva, Ph.D., MBA
Assistant Vice President for Innovation

24 FISCAL YEAR AT A GLANCE

106 Invention Disclosures

169 Patents Filed

28 Options/ Licenses

29 Patents Issued

$3.7M Licensing Revenues

13 Licenses to startups

7 Copyrights & Trademarks

DEPARTMENTS WITH 10 OR MORE INVENTION DISCLOSURES

- **13** Mechanical and Nuclear Engineering
- **13** Medicinal Chemistry

DEPARTMENTS WITH FIVE TO NINE INVENTION DISCLOSURES

- **8** Internal Medicine
- **6** Chemical and Life Science Engineering
- **6** Chemistry
- **6** Electrical and Computer Engineering
- **6** Pharmacotherapy & Outcomes Science
- **6** Physics
- **5** Oral and Craniofacial Molecular Biology
- **5** Pharmaceutics

Distribution of Invention Disclosures (by School/College)

Medicine	42
Engineering	30
Pharmacy	24
Humanities & Sciences	13
Dentistry	5
College of Health Professions	2
Business	1
Life Sciences	1
Nursing	1
The Arts	1

Photo: Clement Britt

From left: P. Srirama Rao, Ph.D., vice president for research and innovation; Massimo Bertino, Ph.D., professor in the Department of Physics in the College of Humanities and Sciences; Ivelina Metcheva, Ph.D., assistant vice president for innovation at VCU TechTransfer and Ventures; and Fotis Sotiropoulos, Ph.D., VCU provost and senior vice president for academic affairs, at the Innovator of the Year ceremony on Nov. 21 at the Virginia Museum of Fine Arts. (Photo: Clement Britt)

The 2024 Billy R. Martin Innovator of the Year

"VCU, and TechTransfer and Ventures specifically, has really given us the experts and guidance to help us understand what is required to bring our aerogel materials to market. VCU has given me the freedom to realize my dreams."

Massimo Bertino, Ph.D.
Professor in the Department of Physics in the College of Humanities and Sciences

VCU Innovator of the Year is a 'proof of pathway' to success for physicists

When he learned of his selection as VCU's 2024 Billy R. Martin Innovator of the Year, physics professor Massimo Bertino, Ph.D., was met with more surprise than most honorees.

"Recognizing physicists as a success story doesn't happen all the time," said Bertino, a professor in the Department of Physics in the College of Humanities and Sciences and director of the Nanoscience and Nanotechnology Ph. D. Program. "Everybody thinks of physicists as the people wearing mismatched socks and having wild theories and doing experiments all day, but we get down to earth and we get things done."

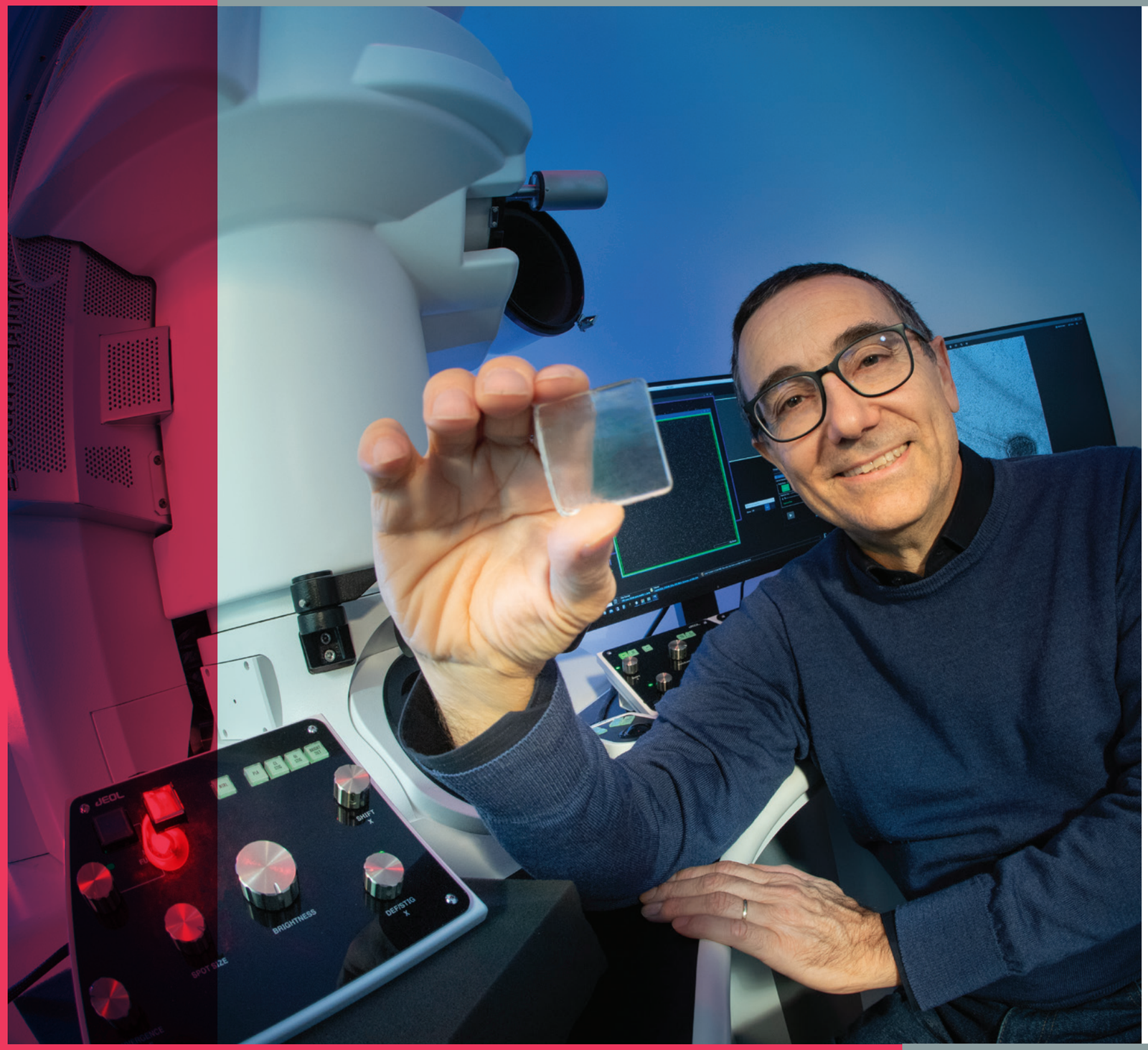
Bertino is the first physicist to earn the Innovator of the Year in the 17-year history of the award. He spent his career researching aerogels, porous solids first used by NASA in the 1960s that have long been accepted as the world's best insulators.

The problem: Traditional aerogels are expensive and rather dangerous to make. An onerous step in existing production is a process known as supercritical drying, which pumps carbon dioxide into a high-pressure reactor to remove fluids from the pores of the wet gel. Explosions are possible if not done properly.

Bertino and his team found a way to bypass that expensive and potentially explosive procedure, producing aerogels more easily, at less cost and more safely using readily available chemicals and traditional processes. Currently, he is working to scale up and commercialize the aerogels.

Bertino says his aerogels are thinner, lightweight, flame-proof and moisture proof and are far superior to conventional insulation materials. In fact, they offer the same insulation value as expanded styrofoam insulation boards (common in homes and commercial construction), but at one-fifth of the thickness. Bertino believes the insulation could heavily reduce greenhouse gas emissions, too.

"Max has done something that is very hard to do in physics, which is to use science to create not only a product, but something that can really change the world," said Ivelina Metcheva, Ph.D., assistant vice president for innovation at VCU TechTransfer and Ventures, whose office bestows the Innovator of the Year award.



See video with Massimo Bertino online.

In treating liver cancer, young researcher sees the light

Kush Savsani is the definition of VCU's "Every Ram's a Researcher" initiative.

In the gap years between finishing as a VCU Honors College biology undergrad and starting at the VCU School of Medicine, Savsani began working with VCU Health Hume-Lee Transplant Center robotics surgeon Seung Duk Lee, M.D., Ph.D. There, Savsani researched hepatocellular carcinoma or HCC, one of the most aggressive forms of liver cancer and the fifth-most prevalent cancer in the world.

In its early stage, HCC is treated through transplant or liver resection. But in later stages, chemotherapy is required. Specifically: transarterial chemoembolization, or TACE. The minimally invasive procedure delivers chemo drugs to the tumor through a catheter in the groin, depleting cancer cells of blood, oxygen and nutrients.

"Those treatments are somewhat effective, but usually they would require a sort of re-treatment, because the cancer recurs," he says.

So the 22-year-old, under Lee's leadership, began to look into "a different style of treatment" for liver cancer that could be used in conjunction with traditional means, leading to greater efficacy.

That treatment: Light.

Targeted photodynamic therapy, or PDT, works by injecting a well-known photosensitizer called indocyanine green (ICG) into the patient, which accumulates in cancerous liver cells. While traditionally only used for imaging, Lee and Savsani realized that when ICG is exposed to a specific wavelength of light, the cancer cells die while leaving healthy tissue unharmed.

"We attack disease on two fronts," Savsani says. "We can administer the light at the same time as transarterial chemoembolization while we still have arterial access. It can increase the treatability of patients."

Savsani, who also holds an MBA, emphasizes that the work is multidisciplinary: "We have a big group of people— liver transplant surgeons, basic science researchers, engineers, vascular surgeons and interventional radiologists—all working together to make this possible," he says.

His work has been backed by the VCU Commercialization Fund, overseen by VCU TechTransfer and Ventures and the Office of the Vice President for Research and Innovation. The team's current focus is testing and improving the product to eventually move into clinical trials.

"VCU is very unique," he says. "Because we have researchers and clinicians working hand-in-hand, we're able to do pretty unique research that maybe other centers aren't able to. Without the support from the community, VCU TechTransfer and administrative leaders, we wouldn't have been able to get this far."

Kush Savsani, MBA
Student, VCU School of Medicine

Seung Duk Lee, M.D., Ph.D.
Associate Surgical Director of Liver Transplant & Living Donor Liver Transplant, Department of Surgery, VCU School of Medicine

Pioneering gene replacement therapies for muscular dystrophy

Nick Johnson, M.D.
Vice Chair for Research and Director, VCU Department of Neurology Center for Inherited Muscle Research (CIMR)

Melissa Hale, Ph.D.
Assistant Professor, CIMR

Nick Johnson, M.D. and Melissa Hale, Ph.D. are moving fast to combat a debilitating and incurable disease.

Their research effort at the Center for Inherited Myology Research targets limb-girdle muscular dystrophy. LGMD is the fourth most common form of muscular dystrophy (MD), a group of genetic diseases causing muscles to progressively weaken and break down. LGMD impacts muscles in the arms, legs and hips.

"I'm a clinician first, and I can see the urgency at which we need to develop these therapies here in Richmond and around the world," says Johnson, who directs the Center and is the George Bliley Research Chair in the Department of Neurology at the VCU School of Medicine. Hale is an assistant professor of neurology and one of Johnson's partners at the Center.

There are 32 genetic forms ("subtypes") of LGMD, and about half are amenable to gene-replacement therapy, the team says. The cutting-edge treatment can fix problems caused by faulty or missing genes in the body. Current experimental gene-replacement therapies can be toxic, especially to the liver—and risk of potentially fatal damage increases with age and weight.

Johnson and Hale are taking an innovative approach, using synthetic viruses to deliver healthy genes into affected muscle cells. Their synthetics are designed to target muscle cells and reduce harmful side effects. Their invention forms the basis of MyoGene Therapies, a startup they hope will help them attract investors and move through FDA clinical trials.

"I'm very motivated to move our work into the clinic," Johnson says. "It became clear that the best way to do that is to form a startup to get the necessary investment, to develop the technology into approved clinical therapy."

MyoGene is taking advantage of FDA efforts to allow flexibility for ultra-rare diseases. "It's an efficient approach to get to clinical trials for something like MD," he says.

Hale, Johnson's business and research partner, said her work is focused on "bridging the gap" between lab research and patient impact. "MyoGene is a direct extension of that mission, and we want to create a future where the debilitating effects of muscular dystrophy can be mitigated — or even reversed," she says. "By leveraging the translational research we perform in the Center, we're working to develop and deliver safe, effective therapies for patients."

Johnson says the support from VCU has been transformative. "They have helped us with our clinical and lab research, the recruitment of faculty, and support of our startup," he says. "And our intention is to use that support and our expertise to bring our treatments to patients worldwide."

Hear from Dr. Johnson in our online video.

"Nick and Melissa's work exemplifies how VCU is committed to fostering innovation and translating groundbreaking research into real-world solutions. Their work offers hope for a future where patients can experience increased mobility and improved quality of life."

Brent Fagg, M.S.
Assistant Director for Innovation, VCU TechTransfer and Ventures

Next step, commercialization

Ingrid Pretzer-Aboff, Ph.D., RN, and her team are on the doorstep of commercializing technology that will help a tough-to-treat patient population. Her research — and now her company — are focused on creating a device that will help patients with Parkinson's disease. The plan: real-world impact for those struggling with what is known as freezing of gait. Freezing of gait often leads to falls or forces patients to remain homebound out of fear of falls or becoming "stuck".

It all follows a commitment she made at the beginning of her career.

"I've worked with patients early on that looked me straight in the eyes and said, 'Don't give up on us,'" said Pretzer-Aboff, a professor at VCU's School of Nursing. "I promised I wouldn't give up. It's ingrained in me to help people that can't help themselves."

Pretzer-Aboff has spent years developing the VibeForward device, which delivers targeted vibrations to the patients' feet and ankles. "Our research testing the vibration technology revealed that it helped the most patients with freezing of gait," Pretzer-Aboff said." So that's very exciting."

The device itself includes a control box with a gyroscope, accelerometer and other components to customize vibration frequency and amplitude. Through her research, Pretzer-Aboff discovered an ideal "dose" for the therapy: a specific frequency and amplitude.

Navigating the leap from research to commercialization has been a learning experience, but Pretzer-Aboff credits VCU TechTransfer and Ventures for its critical role in helping her company progress.

"My education does not include training for navigating commercialization," she said. "The support I received from the VCU TechTransfer has been invaluable because I would not have known what to do next."

TechTransfer helped Pretzer-Aboff with connections to venture capitalists and guidance on contracts, intellectual property and starting and managing a business. Grants from the Michael J. Fox Foundation, the National Institutes of Health and the National Science Foundation have also played a vital role in advancing her team's research and preparing the device for real-world use.

"So when a nurse or anybody in the health care arena — physical therapists, dentists, physicians, etc. have a great idea for a product, procedure, or treatment for patients, they don't have to just dream about it," Pretzer-Aboff said. "They can actually take that idea and work with their tech transfer office to move it forward to reality."

As Pretzer-Aboff works to bring the VibeForward device to patients, she remains focused on the goal that started it all: creating meaningful change for those living with Parkinson's disease.

"This is a very difficult disease to deal with," she said. "This technology is giving hope to those who deal with freezing of gait every day."

Ingrid Pretzer-Aboff, Ph.D., RN
Professor in the School of Nursing

Meet Dr. Pretzer-Aboff in our online video.

"Our research is driven by the desire to reduce suffering and improve the quality of life for those affected by scarring diseases."

Patricia J. Sime, M.D.
Chair, Department of Internal Medicine
Division of Pulmonary Disease and Critical Care Medicine
VCU School of Medicine

Thomas Thatcher, Ph.D.
Assistant Professor, Internal Medicine

Patricia Sime, M.D.
Chair, VCU Department of Internal Medicine

Maggie Thomas Freeberg, Ph.D.
Post-doctoral research fellow

Creating better therapies for patients with lung fibrosis

Patricia J. Sime, M.D., chair of the Department of Internal Medicine at the VCU School of Medicine, is a dedicated clinician and researcher leading efforts to develop new therapies for interstitial lung disease, specifically fibrosis.

Lung fibrosis is a devastating disease that causes progressive scarring in the lungs, making it increasingly difficult for patients to breathe. As the scarring worsens, oxygen intake becomes limited, severely impacting quality of life.

In her lab at VCU, Dr. Sime and her team, including post-doctoral trainee Margaret Freeberg, Ph.D. made a breakthrough discovery: a receptor that can sense stiffness in scarred tissue. This finding, linked to a Nobel Prize-winning discovery, could hold the key to halting the fibrosis process. In a healthy lung, the tissue is flexible and able to expand and contract with breathing, but in fibrosis, the lung tissue becomes stiff and less able to function.

Sime and her team are examining the presence of the protein Piezo2 in fibrotic lung tissue. Piezo2 is a "force-sensitive ion channel" that acts as microscopic gates on cell surfaces, allowing them to detect and respond to mechanical stimuli such as pressure, stretch and touch.

"By targeting this receptor, we hope to stop or even reverse the scarring process," Dr. Sime explains. "We are using a 3D computer model to screen chemical compounds that might block Piezo2's activation. Our goal is to identify potential drug candidates to treat fibrosis, focusing on inhibitors."

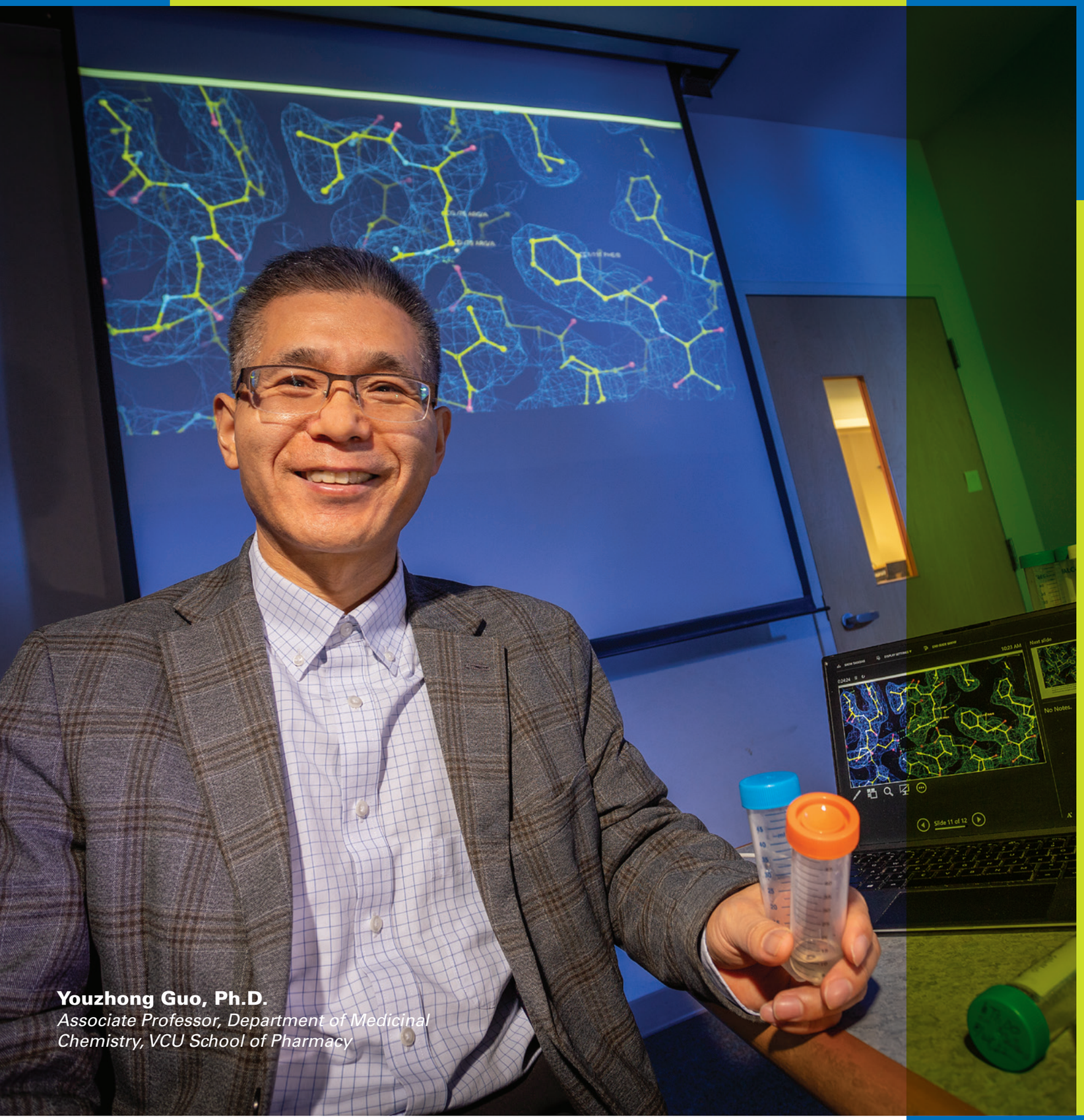
With support from VCU TechTransfer and Ventures, Dr. Sime's team has secured funding and is pursuing additional support from the National Institutes of Health. "Our research is driven by the desire to reduce suffering and improve the quality of life for those affected by scarring diseases," she says.

The next steps for Dr. Sime and her team are to explore how this receptor could be applied to treat fibrosis in other organs, such as the heart. The team is at the center of a cross disciplinary group of clinicians, researchers and students both locally and internationally focused on finding cures for scarring diseases.

"Our ultimate goal is to improve the lives of patients by preventing the debilitating effects of lung fibrosis and potentially offer a cure," Sime says.

Meet Dr. Sime and her team in our online video.

A new biopharma blueprint



Youzhong Guo, Ph.D.
Associate Professor, Department of Medicinal Chemistry, VCU School of Pharmacy

A commitment to membrane proteins has rendered technology that has placed Youzhong Guo, Ph.D., on the radar of some of the largest players in the biopharmaceutical industry — capping off a 2024 that included a startup formation and one very large research publication.

"This technology has huge potential for new drug discovery," said Guo, an associate professor in the Department of Medicinal Chemistry in the VCU School of Pharmacy. "With our technique, many drug targets can now be explored to develop new medicines, including small molecules and therapeutic antibodies."

Guo's innovative Native Cell Membrane Nanoparticles (NCMN) system offers a unique solution to one of biopharma's biggest bottlenecks: stabilizing membrane proteins. Membrane proteins are notoriously difficult to study using traditional detergent-based methods, which often destabilize the proteins and their essential lipid interactions. The NCMN system, by contrast, uses membrane-active polymers to extract these proteins in their natural state, preserving their structure and functionality.

This breakthrough has already gained attention from major biopharma companies, including Bayer, Pfizer, Sanofi and has positioned Guo's startup as a potential partner for other industry leaders. Additionally, this year his research was featured in a leading scientific journal, *Nature Communications*, for contributions to solving decades-old challenges in structural biology. In collaboration with Professor Amin Arnaout of Harvard Medical School, the study demonstrated how the NCMN system could unlock new therapeutic possibilities by stabilizing integrin allbß3, a critical membrane protein involved in blood clotting and targeted by existing FDA-approved drugs.

"Others worked on this integrin for 30 years, but could not get the full structure," Guo said. "With our technology, we solved that issue, which is very important for understanding function and structure-based drug strategies. The successful structure determination demonstrated the power of the NCMN system in membrane protein structure-based drug discovery."

"The progress we made would not have been possible without the ongoing support from VCU TechTransfer and Ventures" Guo said. "They gave me financial support through the VCU Commercialization Fund to develop this technology. They also filed three patents with the USPTO, facilitated critical connections with industry partners, and introduced me to business advisors to help launch a startup company."

Guo and his team have ambitious plans for 2025. They aim to refine the NCMN system, making it more robust and versatile. "We want to make this technology more broadly applicable for all membrane proteins," Guo said. "It's not only for drug discovery but also for basic research, because membrane proteins play important roles in all living organisms."

VCU startup on the path to treat massive blood loss and more

Perfusion Medical Inc. is a VCU startup working to commercialize a drug called PM-208, an **intravenous solution that its VCU inventor says can treat massive blood loss in trauma patients.**

"For a person who is bleeding out, PM-208 may take survival time from minutes to a day or more," said **Martin J. Mangino, Ph.D.**, a professor of surgery and of physiology and biophysics in the School of Medicine.

Perfusion was formed in 2020 to navigate the comprehensive process of moving a new drug through the Food and Drug Administration's clinical trials. In 2024, Perfusion received a federal Small Business Innovation Research contract from the Air Force's venture arm, AFWERX. Under terms of the award, Perfusion is working with an Air Force lab and medical group to develop an investigational new drug application. Once accepted by the FDA, Perfusion can begin Phase I clinical trials to evaluate the drug's safety in humans.

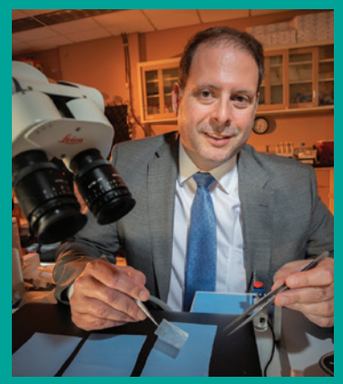
When a person is losing blood — think auto accident, gunshot and military combat — first responders treat the patient with intravenous solutions like whole blood or saline. The goal is to raise blood pressure and ensure there's enough hemoglobin to transport oxygen through the body. Treatment isn't always effective, and patients may suffer severe organ damage or die.

When cells can't receive oxygen, they shut down and swell with water. PM-208's active ingredient is polyethylene glycol; given via IV, it attracts water and moves fluid out of swollen tissues and into blood vessels where it belongs, reducing pressure on capillaries and helping blood flow resume.

In 2023, U.S. Sen. Mark Warner toured the the VCU School of Medicine's Cottrell Surgical Innovation Suite, where Martin Mangino, Ph.D., conducts research. His findings led to the creation of Perfusion Medical. (Photo: VCU Enterprise Marketing and Communications)

"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."

In addition to the grant to aid clinical trials, AFWERX awarded Perfusion an additional $1.8 million to fund work on creating a smaller package for the drug, necessary for use in military field environments. That award follows two others from AFWERX and come on top of a $2.9 million grant from the Defense Health Agency and more than $12 million awarded to VCU from the Department of Defense over the past decade.



Jonathan Isaacs M.D., professor and chair of VCU's Division of Hand Surgery, shows off Nerve Tape. Isaacs is internationally recognized in the relatively niche field of nerve repair. (Photo: Karl Steinbrenner) Meet Dr. Isaacs and see research in action in our online video.

Nerve tape breaks new ground in surgery

Developed by **Jonathan Isaacs, M.D.**, professor of orthopaedic surgery and chair of VCU Health's Division of Hand Surgery, Nerve Tape is redefining nerve repair. This biologic wrap simplifies the complex process of reconnecting severed peripheral nerves, offering surgeons a quicker and more effective alternative to traditional sutures. In 2024, the innovation was released commercially and reached national prominence, earning a feature in the **2024 Congressional Budget Justification for the National Institute of Neurological Disorders and Stroke** and seeing widespread adoption at leading institutions like the Mayo Clinic.

Dr. Alanna Rebecca, a plastic surgeon at Mayo Clinic, described Nerve Tape as "one of those straightforward ideas that works really well. It just makes logical sense." After becoming one of the first surgeons to use it, she noted its potential to save up to 45 minutes per procedure, improve outcomes and expand possibilities for reconstructive surgeries.

A collaboration between Dr. Isaacs and **BioCircuit Technologies**, with support from VCU TechTransfer and Ventures, has positioned Nerve Tape as one of VCU's most promising licensing ventures.

Evizia receives grant to transform DNA analysis

Evizia, a Richmond-based biotech startup with strong ties to Virginia Commonwealth University, is working to transform DNA analysis. Co-founded by **Jason Reed, Ph.D.**, a professor of physics and researcher at VCU Massey Comprehensive Cancer Center, and **Sheila Corcoran**, the company is developing **PRECYSE**, a single-molecule imaging tool.

This year, Evizia received an **$800,000 grant from Virginia Catalyst**, a prestigious state award that accelerates commercialization efforts by enabling collaboration with researchers in the Commonwealth. Supported by VCU TechTransfer and Ventures, the grant underscores the collaborative innovation behind PRECYSE.

"Their team is in a very strong position to be successful," said **Magdalena Morgan, Ph.D.**, director of licensing at TechTransfer and Ventures. "Jason's scientific expertise paired with Sheila's business acumen creates a powerful synergy."

Evizia's platform is working to improve the quality control steps required in complex workflows associated with DNA analysis. Longer term, building on Reed's published work at VCU, Evizia aims to support researchers and clinicians with a better analytical approach for identifying structural variants and diseases like inherited neurological disease and some blood cancers.

VCU-backed startup Evizia co-founders Sheila Corcoran, left, and Jason Reed, Ph.D., professor, VCU Department of Physics and Massey Comprehensive Cancer Center, right, are photographed at the company's Richmond office. (Photo: Dan Carrigan/Kelley)

Designing a game-changer in women's cancer treatment

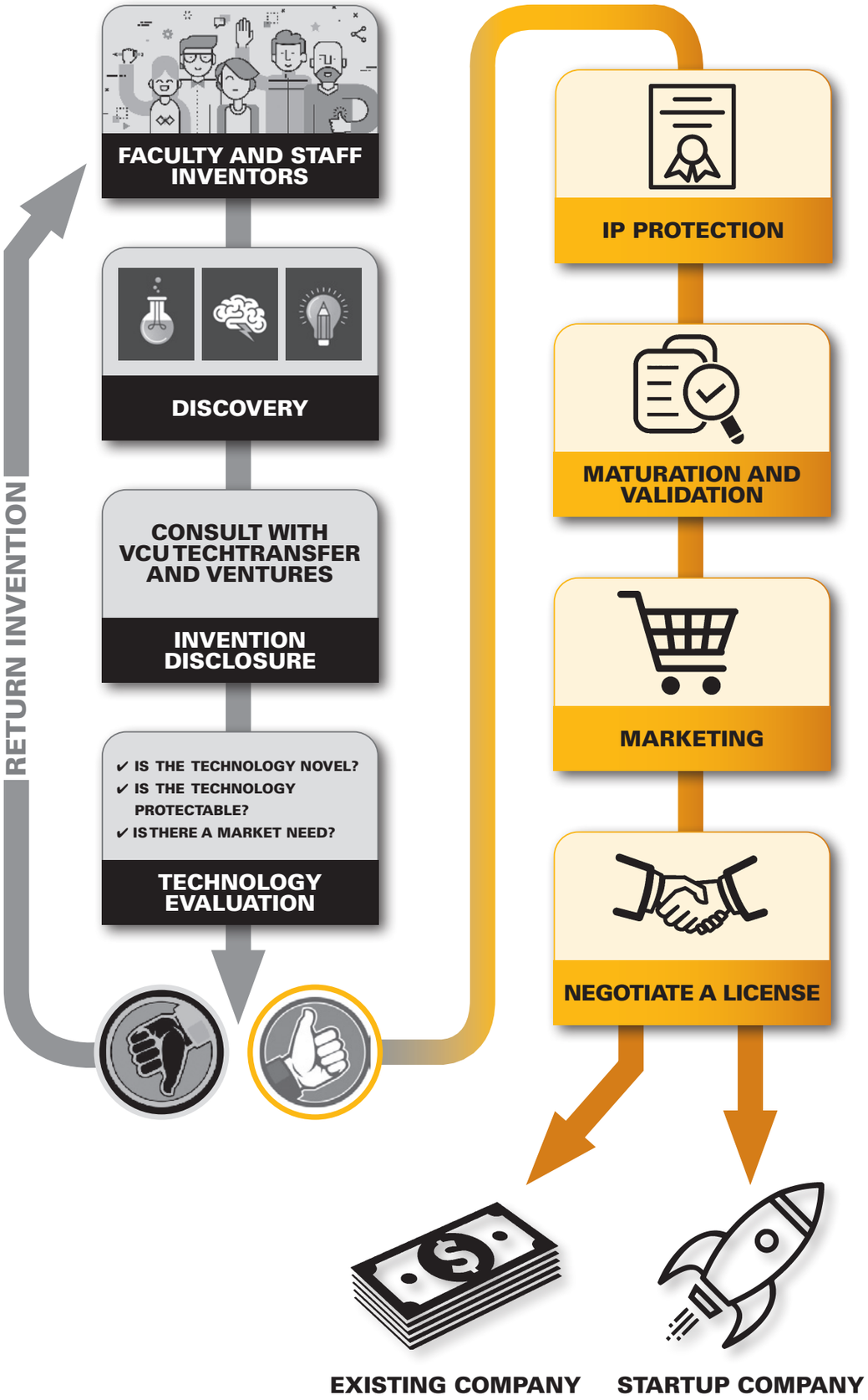
Members of the VCU team developing the novel brachytherapy tandem applicator include, from left: Tianjun Ma, Ph.D., assistant professor, radiation oncology, VCU School of Medicine; Emma Fields, M.D., professor and radiation oncology residency program director, VCU School of Medicine and VCU Massey Comprehensive Cancer Center; Navid Fallahi, M.D., radiation oncology clinical resident, VCU School of Medicine; and A. Dorin Todor, Ph.D., professor and director of brachytherapy physics service, VCU Massey Comprehensive Cancer Center (not pictured). (Photo: Dan Carrigan/Kelley)

With a bold vision for improving gynecological cancer treatment, **Navid Fallahi, M.D.**, a clinical resident in radiation oncology at VCU School of Medicine, and his team have designed a **steerable tandem applicator** to enhance the precision of brachytherapy for cervical and uterine cancers. This innovative device adjusts to each patient's anatomy, addressing a critical need to improve radiation delivery while minimizing exposure to healthy tissues.

Supported by a **2024 Commercialization Fund award** from VCU TechTransfer and Ventures, the project has advanced rapidly, with collaborations that supported development of a fully functional prototype and patent filing. "The funds meant everything to us," Fallahi said. "This funding has truly launched everything."

The potential impact of the device is significant, with applications for universities, clinics and radiation oncology companies. "This is a huge step in a positive direction for women's health to move away from a one-size-fits-all environment," said **Brittaney Ritchie**, business development and medical devices licensing manager at TechTransfer and Ventures.

The VCU Technology Transfer Process



VCU Issued Patents

7/4/2023 — **US Patent No. 11,690,964**
Michael Hindle, Ph.D., P. Worth Longest, Ph.D., Dale Farkas, Ph.D.
Devices, Systems, and Methods for Dry Powder Therapies

7/25/2023 — **US Patent No. 11,707,526**
Barbara D. Boyan, Ph.D., Zvi Schwartz, D.M.D., Ph.D.
Polymer Hydrogels for in vivo applications and methods for using and preparing same

8/14/2023 — **Korea Patent No. 10-2568036**
Shunlin Ren, M.D., Ph.D., Leyuan Xu, Ph.D.
Use of Oxygenated Cholesterol Sulfates (OCS) to treat inflammatory skin disease and skin lesions

8/29/2023 — **Brazil Patent No. BR122022016077-8**
Shunlin Ren, M.D., Ph.D.
Uses of Oxygenated Cholesterol Sulfates (OCS)

9/21/2023 — **Taiwan Patent No. I816417**
Shunlin Ren, M.D., Ph.D.
Uses of Oxygenated Cholesterol Sulfates (OCS)

9/21/2023 — **Taiwan Patent No. I815796**
Shunlin Ren, M.D., Ph.D., Leyuan Xu, Ph.D.
Compositions comprising 5-cholesten-3, 25-diol, 3-sulfate (25HC3S) or pharmaceutically acceptable salt thereof and at least one cyclic oligosaccharide,and methods for their use

10/10/2023 — **Japan Patent No. 7364759**
Shunlin Ren, M.D., Ph.D.
Uses of Oxygenated Cholesterol Sulfates (OCS)

10/17/2023 — **US Patent No. 11,786,585**
Youngman Oh, Ph.D., Qing Cai, M.D., Ph.D.
Treatment of diseases related to IGFB3 and its receptor

10/20/2023 — **Korea Patent No. 10-2593667**
Shunlin Ren, M.D., Ph.D., Leyuan Xu, Ph.D.
Compositions Comprising 5-Cholesten-3, 25-Diol, 3-Sulfate (25HC3S) or Pharmaceutically Acceptable Salt Thereof And at Least One Cyclic Oligosaccharide

10/24/2023 — **Korea Patent No. 10-2594780**
Imad Damaj, Ph.D., Aron H. Lichtman, Ph.D.
Fatty acid amides and uses thereof in the treatment of addiction disorder and addiction related conditions

10/24/2023 — **Korea Patent No. 10-2594780**
Youngman Oh, Ph.D., Qing Cai, M.D., Ph.D.
Treatment of Diseases Related to IGFB3 And Its Receptor

10/31/2023 — **US Patent No. 11,801,309**
Hu Yang , Ph.D., Shobha Ghosh, Ph.D.,Hongliang He,Ph.D., Michael Lancina, Ph.D.
Carbohydrate-functionalized nanoparticles and uses thereof

11/14/2023 — **US Patent No. 11,814,519**
Hong Zhao, Ph.D., Xuewei Wang, Ph.D., Yuanhang Yang, Ph.D., Wuwei Li, Ph.D.
Nitric oxide-releasing 3D-printing compositions and uses thereof

11/20/2023 — **India Patent No. 470748**
Shunlin Ren, M.D., Ph.D., Leyuan Xu, Ph.D.
Compositions Compromising 5-Cholesten-3, 25-Diol, 3-Sulfate (25HC3S) or Pharmaceutically Acceptable Salt Thereof And at Least One Cyckuc Oligosaccharide

12/19/2023 — **US Patent No. 11,845,741**
Hu Yang, Ph.D., Juan Wang, Ph.D.
Pilocarpine ionic liquids for treatment of glaucoma

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Martin J. Mangino, Ph.D., Loren Liebrecht, M.D.
Compositions and methods for restoring or increasing tissue perfusion

2/6/2024 — **US Patent No. 11,891,399**
Paul B. Fisher M.Ph. Ph.D.; Swadesh K. Das, M.Sc., M.Agg., Ph.D.; Mitchell E. Menezes, Ph.D.; Luni Emdad, Ph.D., M.B., M.S.
MDA-9/Syntenin (SDCBP) enhances epithelial mesenchymal transition in breast cancer

2/13/2024 — **US Patent No. 11,899,015**
Richard T. Marconi, Ph.D.
Chimeric recombinant proteins and recombinant protein panels for the diagnosis of lyme disease in animals and humans

3/5/2024 — **US Patent No. 11,918,801**
Jonathan Isaacs, M.D.
Devices and methods for repairing damage to a tissue

3/27/2024 — **European Patent No. 3743094**
Paul B. Fisher, M.Ph. Ph.D.; Swadesh K. Das, M.Sc., M.Agg., Ph.D.; Mitchell E. Menezes, Ph.D.; Luni Emdad, Ph.D., M.B., M.S., Praveen Bhoopathi, Ph.D.
MDA-7/IL secretory variants and methods of use

4/3/2024 — **China Patent No. 110139661**
Youngman Oh, Ph.D., Qing Cai, M.D., Ph.D.
Use of TMEM219 agonists for the treatment of cancer, metabolic syndrome, obstructive respiratory disorders and related diseases

4/4/2024 — **Korea Patent No. 10-2655918**
Shunlin Ren, M.D., Ph.D.
Uses of Oxygenated Cholesterol Sulfates (OCS)

5/10/2024 — **Japan Patent No. 7487264**
Shunlin Ren, M.D., Ph.D., Leyuan Xu, Ph.D.
Compositions Comprising 5-Cholesten-3, 25-Diol, 3-Sulfate (25HC3S) or Pharmaceutically Acceptable Salt Thereof And at Least One Cyclic Oligosaccharide

5/21/2024 — **US Patent No. 11,986,822**
Tracey Dawson Green, Ph.D.
Microdevice for Differential Separation, Purification and Amplification of Forensic Samples

5/21/2024 — **Brazil Patent No. BR112019001198-6**
Shunlin Ren, M.D., Ph.D., Leyuan Xu, Ph.D.
Compositions Comprising 5-Cholesten-3,25-Diol,3-Sulfate(25HC3S) or Pharmaceutically Acceptable Salt Thereof and at least One Cycle Oligosaccharide and Methods for their Use

5/21/2024 — **US Patent No. 11,986,361**
Shane Diller, M.Sc., Dennis Rivet II, M.D.
Stent retriever cleaning devices and methods

5/22/2024 — **European Patent No. 3534932**
Youngman Oh, Ph.D., Qing Cai, M.D., Ph.D.
Treatment of Diseases Related to IGFB3 and its Receptor

6/11/2024 — **US Patent No. 12,006,574**
Gary Tepper Ph.D., Gilbert Annohene, Ph.D.
Low temperature formation of perovskite films in supercritical fluids

6/20/2024 — **European Patent No. 3630239**
Michael Hindle, Ph.D, P. Worth Longest, Ph.D., Dale Farkas, Ph.D.
Devices, Systems, and Methods for Dry Powder Therapies

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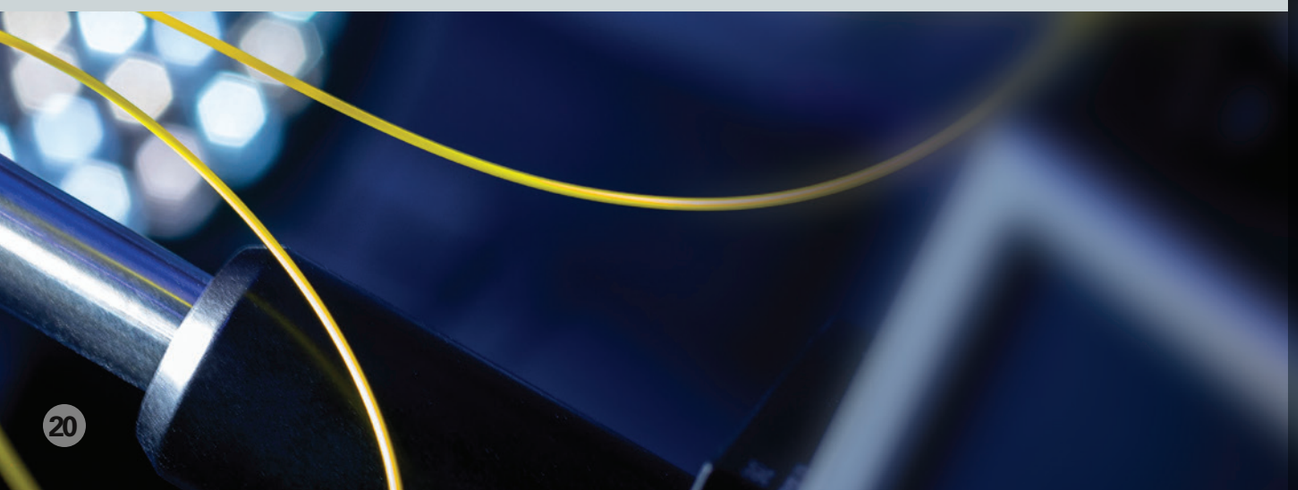

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From left: Eliah Linkous, Brent Fagg (sitting), Gerard Eldering (standing), Brittaney Ritchie, Magdalena Morgan, Ph.D., Thomasine Isler, Ivelina Metcheva, Ph.D., MBA, Jeff Kelley, Rachel McKenna, Christine Benedict

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800 East Leigh Street, Suite 3000
Box 980568
Richmond, VA 23298-0568
techtransfer.research.vcu.edu
(804) 828-5188

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232 *Patents Issued*

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$105 million *Startup Funding*

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