ANNUAL REPORT

Bringing Ideas to Life

22

VCU TechTransfer and Ventures

Office of the Vice President
for Research and Innovation

Bringing *Ideas to Life*

22 *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: *A CLOSEUP OF THE DEVICE USED TO TRAIN SURGEONS. SEE MORE ON PAGE 8.*

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Last year, VCU Innovation Gateway became VCU TechTransfer and Ventures. The name better reflects and reinforces our mission of protecting and commercializing university IP and supporting our startup companies.

Dear Colleagues and Friends,

This past December, Virginia Commonwealth University broke into the Top 50 of the nation's public research universities. It is a goal we accomplished for the first time, and many years ahead of schedule.

But this is more than a number. It is a ranking from the National Science Foundation reflecting a testament to the talented scholars conducting innovative, collaborative and transformational research across disciplines within our laboratories, out in the field, inside our classrooms, and in our ERs, ICUs and operating rooms.

Most importantly, it is a credit to the engagement of the dedicated research faculty, postdoctoral trainees, staff and students who are addressing some of our most important societal challenges. In doing so, they are also growing VCU's regional, national and global prominence.

Research and innovation are the pipelines into VCU TechTransfer and Ventures (previously Innovation Gateway), where our team of licensing professionals and dedicated staff is responsible for propelling ideas, discoveries and inventions from the university and the health system and translating this intellectual property into real-world applications that impact the economic, social and physical health and well-being of our communities.

Since 2021, we have also been responsible for supporting VCU startup companies, and internally have built a team of professionals dedicated to guiding many of our researcher-entrepreneurs.

Today, VCU is among the top of comparable research universities in the number of new invention disclosures, patent applications and startups. We are one of the leading offices in Virginia advancing technology transfer, and the main division within VCU driving the economic and innovation engine of the region. Between VCU and VCU Health, we generate $9.5 billion in economic activity and create or support 58,000 jobs in Virginia.

For an institution of our size and diversity, it is critical that we are strategic in how we prioritize our research. As a university, we have outlined four key strategic research initiatives that encapsulate all that we do at VCU: enriching the human experience, achieving a just and equitable society, optimizing health, and supporting sustainable energy and environments – with the ultimate goal of improving the human condition.

On these pages, you'll meet some of the faces behind these initiatives and get to know the groundbreaking work taking place here. Thank you for your continued support to evolve our culture of innovation and entrepreneurship at VCU, in Central Virginia, and beyond.

With sincere gratitude,

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

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

22 FISCAL YEAR AT A GLANCE

122 Invention Disclosures

27 Options/ Licenses

10 Start-Ups

144 Patents Filed

18 Patents Issued

117 Industry Engagements

$3.12 Licensing Revenue (millions)

DEPARTMENTS WITH TEN OR MORE INVENTION DISCLOSURES

- **34** Medicinal Chemistry
- **11** Mechanical and Nuclear Engineering

DEPARTMENTS WITH FIVE TO NINE INVENTION DISCLOSURES

- **8** Internal Medicine
- **8** Chemistry
- **6** Center on Health Disparities
- **6** Surgery
- **5** Biomedical Engineering
- **5** Chemical and Life Science Engineering
- **5** Electrical and Computer Engineering

Distribution of Invention Disclosures

Medicine	40
Pharmacy	38
Engineering	28
Humanities and Sciences	13
Health Professions	5
The Arts	2
Dentistry	2
Education	2
Business	1
Nursing	1

10 YEARS OF IMPACT

>$30M Licensing revenue

New products to market 49

1,550 Patents filed

Invention disclosures 1,224

194 Patents issued

Licenses/options 189

588 Industry engagements

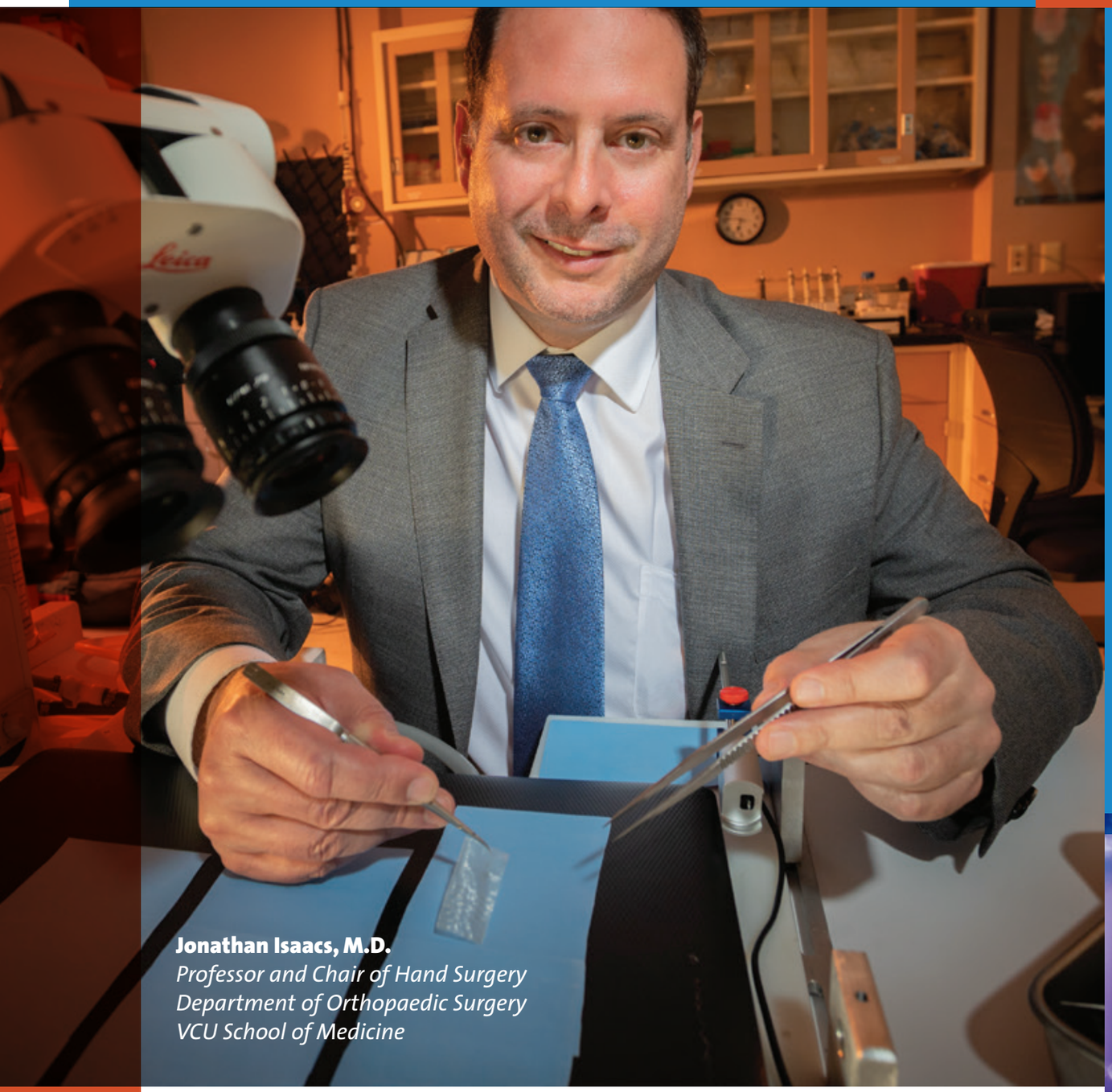
Start-ups 60+

VCU was recognized in 2022 with a special innovation designation from the Association of Public and Land-grant Universities (APLU) as one of about 80 "Innovation & Economic Prosperity" universities. It's the APLU's acknowledgement that VCU and institutions like ours play a central role in economic development, fostering talent, translating research, and supporting entrepreneurship.

Holding the APLU's Innovation & Economic Prosperity plaque: Michael Mancini, Ph.D., director of project outreach and professor of the practice at the VCU College of Engineering; Shari Garmise, Ph.D., executive director for collective urban and regional impact; VCU President Michael Rao, Ph.D.; and Ivelina Metcheva, Ph.D., MBA, assistant vice president for innovation at VCU.

"Because surgeons are practicing, they know best the pain in the market. They can come up with something really useful to address unmet needs in clinical care."

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



Jonathan Isaacs, M.D.
Professor and Chair of Hand Surgery
Department of Orthopaedic Surgery
VCU School of Medicine

Fotis Sotiropoulos, Ph.D., VCU's provost and senior vice president for academic affairs; Ivelina Metcheva, Ph.D., MBA, assistant vice president for innovation; Jonathan Isaacs, M.D., professor and chair of VCU's Division of Hand Surgery; VCU President Michael Rao, Ph.D.; and P. Srirama Rao, Ph.D., vice president for research and innovation, at the Inventor of the Year ceremony at the Virginia Museum of the Fine Arts in November.

The 2022 Billy R. Martin Innovator of the Year

Surgeon-scientist's nerve healing tape on cusp of first human use

Aside from breaking his shoulder in a cycling accident, it was a good year for Jonathan Isaacs, M.D.

He's the clinical and creative force behind Nerve Tape, a tiny biologic wrap used to repair severed peripheral nerves. After more than a decade of research into creating a product that could literally tape (and hold) together severed nerves and aid in regeneration, the product received clearance from the U.S. Food and Drug Administration in 2022. It's a critical milestone in anticipation of the first human use next year.

For his efforts, Isaacs was honored in November with VCU's 2022 Billy R. Martin Innovator of the Year Award, bestowed by VCU TechTransfer and Ventures.

"We all enjoy being recognized for our successes," he says. "This is years and years of me believing in the idea a lot more than anybody else believed in it. And then all of a sudden in the last year, it has just exploded."

Through the years, Isaacs built dozens of prototypes starting early on with tiny hooks used in jewelry making. He was introduced to an Atlanta company, Axion, which had created a metal disc with tiny micro-needles used for measuring electrical signals in muscles. That tech was eventually incorporated into the current (and final) iteration of the product, a tape that uses flexible nitinol metal alloy hooks attached to a tissue-like material derived from pig intestines, which also helps human tissue heal.

Seeing the huge potential of Nerve Tape, in 2016 Axion spun off BioCircuit Technologies to focus on Isaacs' work and other fixes to the body's nerves (i.e., its biological circuitry).

"Big medical centers say 'I wish we'd thought of that. We can't wait to use it,'" says Isaacs, who chairs VCU's Division of Hand Surgery. "We've got great data, we've got surgeons buy-in, we've got patents, and we've got FDA clearance. We've maintained momentum."

Ivelina Metcheva, Ph.D., MBA, assistant vice president for innovation at VCU, says Isaacs is an excellent example of a surgeon-scientist who identifies treatment opportunities through their medical practice.

BioCircuit's Dawson Reimer says Nerve Tape has greater potential beyond microsurgery, such as helping people who have paralysis or numbness following tumor removal. Indeed, Isaacs and senior orthopaedic research scientist Geetanjali Bendale, Ph.D., are exploring new uses for Nerve Tape and other ways to improve patient outcomes following nerve injury.

"Jonathan is more engaged than the average clinical scientist who has founded a company," Reimer says. "He loves the product and treats it like his baby."

And if there's any question about Issacs' passion for the product, just check his car's license plates: "NRVTPE."

Beating the heat with Engineering students' robotic gripper

The formal name for a robotic arm and gripper invented by a team of VCU College of Engineering students is the "Adaptive High-Temperature End Effector."

And given the robot's planned role in collaborating with humans during the additive manufacturing process, it's also called a "cobot."

"These are designed to work safely, side-by-side with humans," explains Logan Schorr, a VCU graduate student who helped invent the gripper.

Schorr and fellow students Bradley Johnson and Jesse McFall created the alloy steel gripper with a pair of ceramic casts on its "fingers" that allow the cobot to handle extremely hot objects during the process of molding metal parts for a wide range of applications.

The team's invention was one of the finalists in the 2022 Collegiate Inventors Competition, which notes the gripper is designed to lower production time while reducing the cost of the part-making process. At the event, the VCU students' project competed with inventions from Harvard, Johns Hopkins, the University of California Santa Barbara, and other institutions.

"It was a really cool experience, especially because things like this robot are generally not what you see at those sorts of events," Schorr says. "A lot of the focus was on agricultural or medical inventions."

The gripper was the students' senior capstone project overseen by advisor Ravi Hadimani, Ph.D., who says the invention melds the fields of robotics and additive manufacturing (also known as 3D printing).

"As a mechanical engineering department, we need to be able to use robots in our additive manufacturing. That is the way forward," says Hadimani, an associate professor of mechanical engineering and director of VCU's Biomagnetics Laboratory. "Robots will bring a lot of advantages and remove many of the health and safety issues associated with additive manufacturing and automate a large part of that field."

Hadimani adds the gripper will be used to handle a range of manufactured products, from medical devices to rocket parts made using a 3D metal printer at VCU. VCU TechTransfer and Ventures has been supporting the gripper project and has filed a patent application.

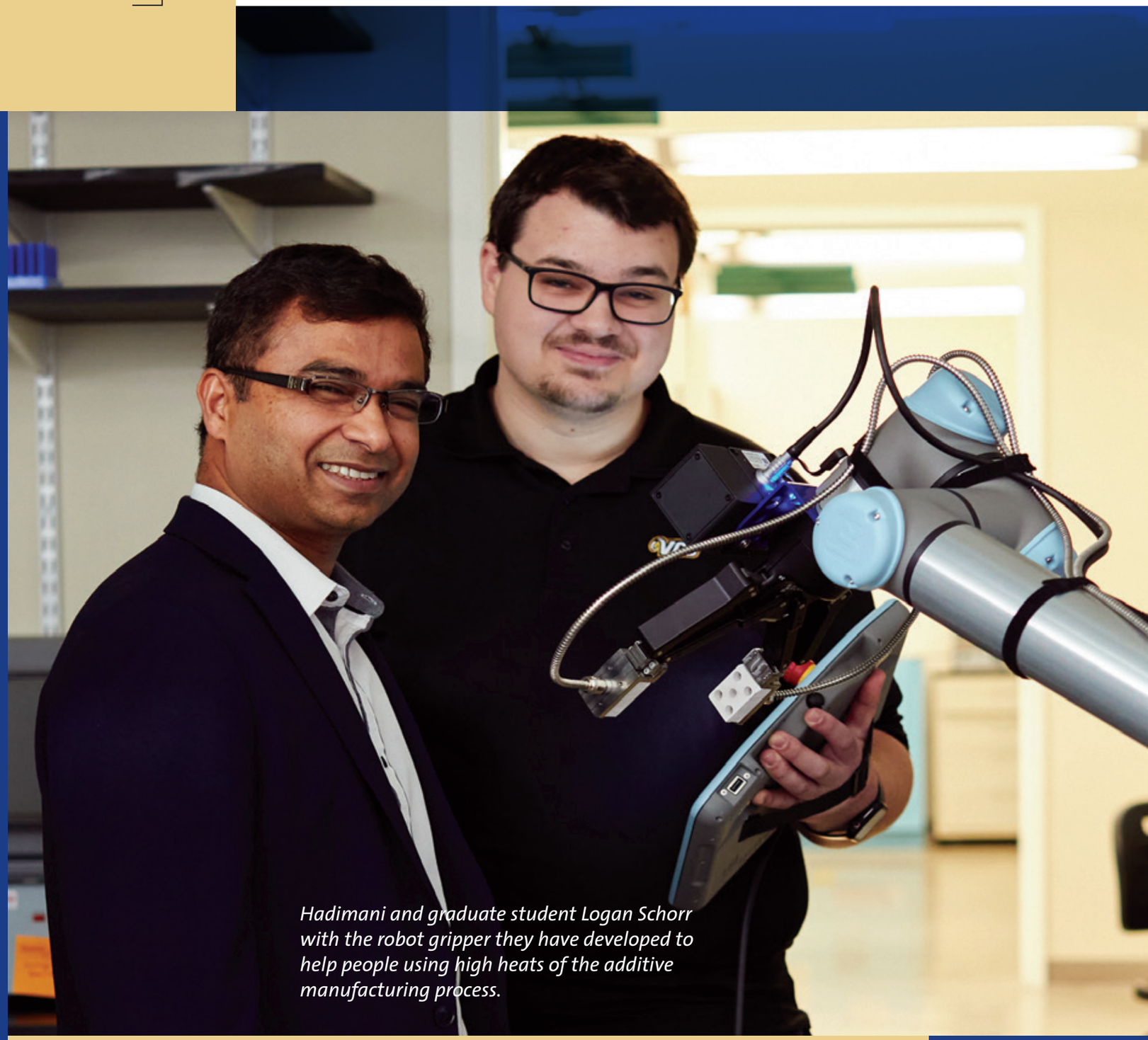
The VCU robot's specialized gripper can handle and move metal objects heated to temperatures upwards of 1,800 degrees Fahrenheit.

For a human to handle such heat, the part would have to cool down first or be moved using tongs that could create inaccuracies, Schorr says. The gripper could move the part much more quickly without putting a human at risk.

"You still need to get the part from point A to point B," Schorr says. "With a robot, you're able to put it exactly in the spot that you need it."

"Robots will bring a lot of advantages and remove many of the health and safety issues associated with additive manufacturing and automate a large part of that field."

Ravi Hadimani, Ph.D.
Associate Professor and Director of Biomagnetics Laboratory
Department of Mechanical and Nuclear Engineering
Department of Biomedical Engineering, VCU College of Engineering



Hadimani and graduate student Logan Schorr with the robot gripper they have developed to help people using high heats of the additive manufacturing process.

Manic in his lab with students Victor Cobilean (left) and Harindra Sandun Mavikumbure.

How VR can help train tomorrow's surgeons

Could virtual-reality training improve the way surgeons prepare to face the real thing?

Collaborators across VCU's School of Medicine, College of Engineering, College of Health Professions and Central Virginia VA Health Care System think so. Urogynecologist Lauren Siff, M.D. leads a team building a VR training application that could change the way surgeons treat female urinary incontinence.

Siff, an adjunct assistant professor in the Department of Obstetrics and Gynecology, notes one in three women experience urinary incontinence that can be treated with a minimally invasive procedure. The surgery implants a device called a midurethral sling, which can stop uncontrolled urination during physical activity.

However, the surgery is performed blindly, by feel, with surgeons estimating angles based on external anatomic landmarks and taking note of subtle, tactile changes in tissue response as the sling is placed under the urethra with a tool called a trocar. The blind nature can result in up to a 13% complication rate.

"Unfortunately, there's no universal proficiency standards for surgeon credentialing" for midurethral slings, said Siff, who practices at the VA. "We know that surgery is effective, but our current training methods are either an apprenticeship, where you're learning on live patients working with an expert surgeon, cadaver labs or a static, plastic model."

To build the application, computer science professor Milos Manic, Ph.D. and his doctoral students created a highly accurate virtual 3D model from deidentified patient scans and algorithms.

Next, James Thomas, Ph.D., a researcher, physical therapist and director of the Launching Excellence in Virtual Reality (LEVR) Center in the College of Health Professions' Motor Control Lab, with lead developer Jason Arhin, further refined the system to integrate high-resolution haptics and visual alerts to provide real-time feedback and competency scoring during the procedure.

Users wear a VR headset and hold a stylus, custom-designed with a surgical handle to perform the procedure.

As the surgeon-in-training moves the stylus, so too does the on-screen trocar within the virtual pelvis. Siff has helped the system's developers code "an example of the ideal pathway" to implant the sling within the pelvic floor. Manic's team programmed the pelvis to detect the surgeon's position to critical anatomy at risk of damage in the procedure.

Visual cues assist the surgeon, and haptics – the same technology found in phones – cause the stylus to vibrate or push back and give the user the physical sensation of touching bone or bladder. The team, with help from Anna George at VCUarts, has started adding layers and textures to make the skin, muscles and soft tissues more lifelike and design key elements of the procedure. They're even adding distractions and emergencies that can pop up in a real OR setting and throw off a surgeon's focus. "That increases training simulation realism," Siff said. "We are constantly working on evaluation, design improvement and user feedback."

If successful, the VR trainer could improve an otherwise expensive and time-intensive training process in the real world.

The transdisciplinary team also includes Franklin Bost of the VCU Institute of Engineering and Medicine and his expertise in medical device development and project management, and Moshe Feldman, Ph.D., VCU School of Medicine's Director of Evaluation for UME and Human Factors for education, evaluation and testing.

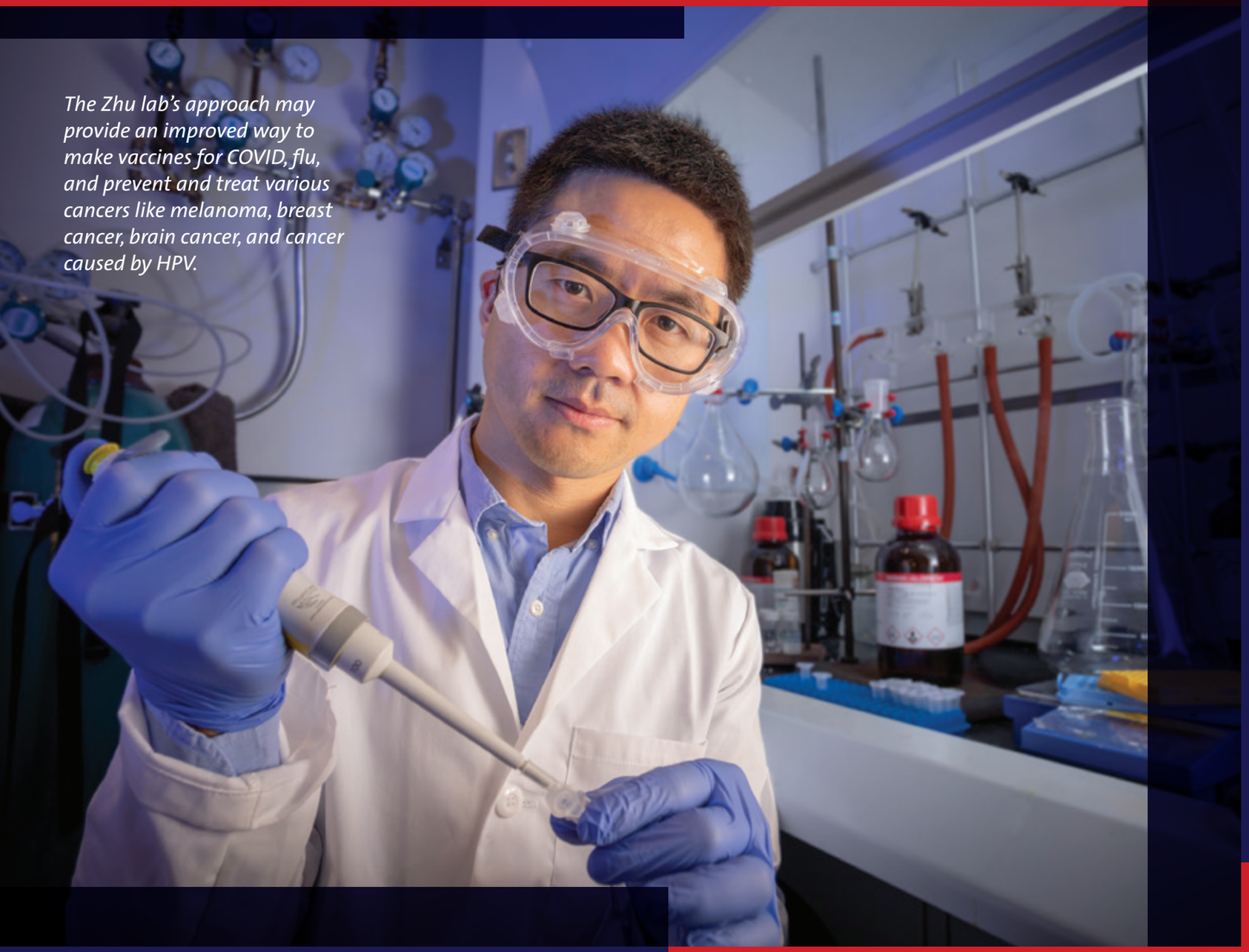
And, those involved say, the VR trainer has the potential to change how surgical training is done across a number of specialties beyond OB-GYN.

Says Siff: "This will hopefully become a training system that allows fellows and training surgeons to say, 'Put me in coach, I'm ready to play.'"

"This will hopefully become a training system that allows fellows and training surgeons to say, 'Put me in coach, I'm ready to play.'"

Lauren Siff, M.D.
Urogynecologist
Central Virginia VA Health System
Adjunct Assistant Professor
Department of Obstetrics and Gynecology
VCU School of Medicine

Changing the shape of the fight against disease



The Zhu lab's approach may provide an improved way to make vaccines for COVID, flu, and prevent and treat various cancers like melanoma, breast cancer, brain cancer, and cancer caused by HPV.

Messenger RNA (also known as mRNA) molecules have attracted lots of attention in recent years as the foundation of the Pfizer and Moderna vaccines that unlock the body's immune response to fight COVID-19.

Although they've been effective at preventing the virus, the VCU School of Pharmacy's Guizhi (Julian) Zhu, Ph.D. notes mRNA molecules used in those vaccines still have room for improvement: their linear shape makes them more susceptible to being broken down over time, he says.

"They're easily degraded, and being easy to degrade can cause a lot of other problems," explains Zhu, an assistant professor in the Department of Pharmaceutics. "The current COVID mRNA vaccines have to be frozen to prevent rapid degradation during storage and transportation. Also, when you get a COVID mRNA shot, you need to get another one in about six months. And that's partially due to degradation."

Zhu and Yu Zhang, Ph.D. are pursuing a project supported by VCU TechTransfer and Ventures seeking to improve on RNA immunotherapy technology by developing a method that instead produces the molecules with a circular shape. That makes them more durable, with a stronger immune response.

"By circularization, we make these molecules more stable so they're not easily broken up," Zhu says. "They can stay in the body and in a vial for a longer time and thus have a longer-lasting response."

The approach may provide an improved way to make vaccines not just for COVID, but to combat the flu and prevent and treat various cancers like melanoma, breast cancer, brain cancer, and cancer caused by HPV infections.

Studies on mice show the circular RNA method is effective at launching a robust immune response and limiting the progression of tumors. This approach could also lead to a more cost-effective way to produce RNA vaccines and therapeutic treatments.

The research into the circular RNA project is supported by more than $3 million from the National Institutes of Health, the U.S. Department of Defense, and other sources.

TechTransfer and Ventures, meanwhile, contributed $50,000 to the research from its Commercialization Fund as well as the patenting, marketing, and licensing of the intellectual property. VCU Massey Cancer Center's Molecule to Medicine program is also backing Zhu.

He says researchers are now working on attracting additional money, including investor funding, as they seek to take the project to human clinical trials initially as a cancer treatment. He notes VCU's contribution to the research goes well beyond monetary support. "It's the recognition," Zhu says. "It's the audience that they can bring us to."

"Making mRNA more stable and less degradable will allow vaccines to stay in the body and in a vial for a longer time."

Julian Zhu, Ph.D.
Assistant Professor, Department of Pharmaceutics
VCU School of Pharmacy

How VR could help at-risk youth

Can virtual reality prevent kids with behavioral issues who are at risk of causing violence from going down the wrong path?

Nick Thomson, Ph.D. believes so. The forensic psychologist and associate professor at VCU is leading a series of studies that use VR environments, intertwined with science, to provide evidence-based therapies for adolescents. The attempt is to prevent bullying, violent behaviors, and retaliatory violence. The youth Thomson sees in his lab show signs of externalizing disorders that could cause serious legal issues or violent episodes later in life.

"These kids are playing games, all while they're learning violence-prevention strategies," says Thomson, director of research for the Injury and Violence Prevention Program at VCU Health. His work centers on improving mental health and our understanding of the development of mental and behavioral disorders, and is based on his own VR research from more than a decade ago.

With the support of VCU TechTransfer and Ventures, he founded Arche VR ("arkee VR"), a startup that provides a series of VR mental health treatment and psychological assessments. One game (or, "intervention" as clinicians say), Resilience VR, exposes youth to common bullying scenarios using immersive storylines within the VR headset. Funded in part by the Centers for Disease Control, researchers can watch the reactions of participants, then direct intervention strategies to them.

A psychological assessment, funded by the National Institute of Mental Health (NIMH), uses VR to test for "acute threats" or fear. Wearing the headset, kids are immersed inside scary scenarios — being in a crowded elevator or public speaking, for example while being plugged up to electrodes. Thomson and his team analyze their physiological reaction driven by the autonomic nervous system, and also ask the adolescent how they feel. "We can look at how they respond to fear, and how that contributes to the stability of conduct disorder over time," he says.

For a researcher, Thomson says, VR offers a controlled environment and a number of scenarios that would be too costly and variable to construct in the real world.

"Our goal as psychologists is to understand what drives behavior or the development of disorders. We want to make the virtual stimuli as real and ethical as possible," Thomson says. "What we're able to do with VR is really immerse the participant into research environments where we're getting authentic responses."

But, he notes, VR is merely a tool in the chest. "Virtual reality will never replace having clinicians and psychologists," he says. "But what it does do is makes standard practice of mental health available to a large number of individuals."

"Virtual reality makes standard practice of mental health available to a large number of individuals."

Nicholas D. Thomson, Ph.D.
Associate Professor
Departments of Surgery and Psychology
Director of Research, VCU Health Injury and Violence Prevention Program

Thomson in his laboratory at VCU

A helping hand for new mothers

It's a problem only a new mom knows, with a solution born by three VCU Health nurses and a pediatrician to solve it.

Their creation: the Nuzzi, a sling-like, rice-filled pouch to help position the breast and free up a hand while easing the sometimes challenging process of breastfeeding. Supported by VCU TechTransfer and Ventures, the product is patented and available to moms through its own website and on Amazon.

"Our tagline is 'We hold mom, so mom can hold the baby,'" says Kristie Bonovich, one of the nurses who helped develop the Nuzzi. "Our hope is to increase the duration of breastfeeding and ultimately improve the health of both mom and baby."

Bonovich created the Nuzzi with VCU pediatrician Gauri Gulati, M.D., and nurses Sharon Brinkley and Lisa Hileman. VCU TechTransfer helped the team bridge the gap between the healthcare and business worlds, researching whether there was another product like it on the market and securing a patent.

"There really wasn't much out there," Gulati says. "VCU helped us obtain grants and get some money into our product, so that we could then offer it to these mothers and families in hopes that their breastfeeding journey will be smoother."

Mothers report the Nuzzi makes breastfeeding more comfortable, Hileman says. The product frees up a hand to allow mothers to achieve a deeper latch. "If you have the Nuzzi holding your breast, you have two hands to work on the latch," Hileman says.

The Nuzzi team has decades of experience as lactation consultants, noting that breastfeeding leads to decreased risk of obesity, diabetes, and cancers in babies later in life and a lower risk of certain types of breast cancer in moms.

Mothers generally use the Nuzzi for up to one to two months following childbirth. The idea behind the Nuzzi is to provide an early start of a smooth breastfeeding routine that becomes long-lasting. "Over the long term, our goal is for the Nuzzi to provide moms with the opportunity to breastfeed for as long as they desire," Gulati says.

Meet the Nuzzi team and see the product in action. Scan the QR code for more.

"Our tagline is 'We hold mom, so mom can hold the baby.'"

Kristie Bonovich, R.N.
VCU Health

Team Nuzzi
Kristie Bonovich, R.N., Gauri Gulati, M.D., Lisa Hileman, FNP. Not pictured: Sharon Brinkley, R.N.

"I'm passionate about healing any muscle injury or disease that exists because of the devastating functional losses these patients experience. This is about providing basic human function, to help somebody get back to a more normal lifestyle from whatever happened to them."

Michael J. McClure, Ph.D.
Assistant Professor
Department of Biomedical Engineering
VCU College of Engineering

Scaffolding in place for a startup with immense health impact

Michael McClure, Ph.D. knows a lot about treating muscle injuries.

But how about forming a company? "Not much," says the assistant professor in the College of Engineering's Department of Biomedical Engineering. "That's why I have a lot of support." His company, Sarcogenics, is one of the 10 startups born out of VCU in 2022 with guidance from VCU TechTransfer and Ventures.

Dating back to his post-doc days, McClure has studied muscle loss and regeneration and in recent years honed in on treating a common muscle injury: the shoulder's rotator cuff.

Patients with rotator cuff injuries lose the "bridge" between the muscle and tendon, McClure explains, hindering their ability to complete simple tasks and limiting their range of motion. In McClure's lab, he and the team have developed a collagen-based scaffolding material from the webbing that surround muscle cells. The scaffold can be used to bridge that gap, reconnecting muscle and tendon and even regenerating new tissue. They'd originally used technology from an outside company, but the scaffolding was for tendons, not muscles. So, McClure built and is evolving his own proprietary muscle-specific scaffolds.

"Since we started developing our own material, I was geared toward forming a startup," McClure says. He formed a LLC, and is looking at ways to raise money to get the technology cleared by the FDA and into the hands of surgeons.

Working under a $500,000 U.S. Department of Defense grant and an award from TechTransfer and Ventures' Commercialization Fund, McClure is improving the quality and characteristics of the scaffolding, and gaining a better understanding of how a human body will fare when the technology is implanted.

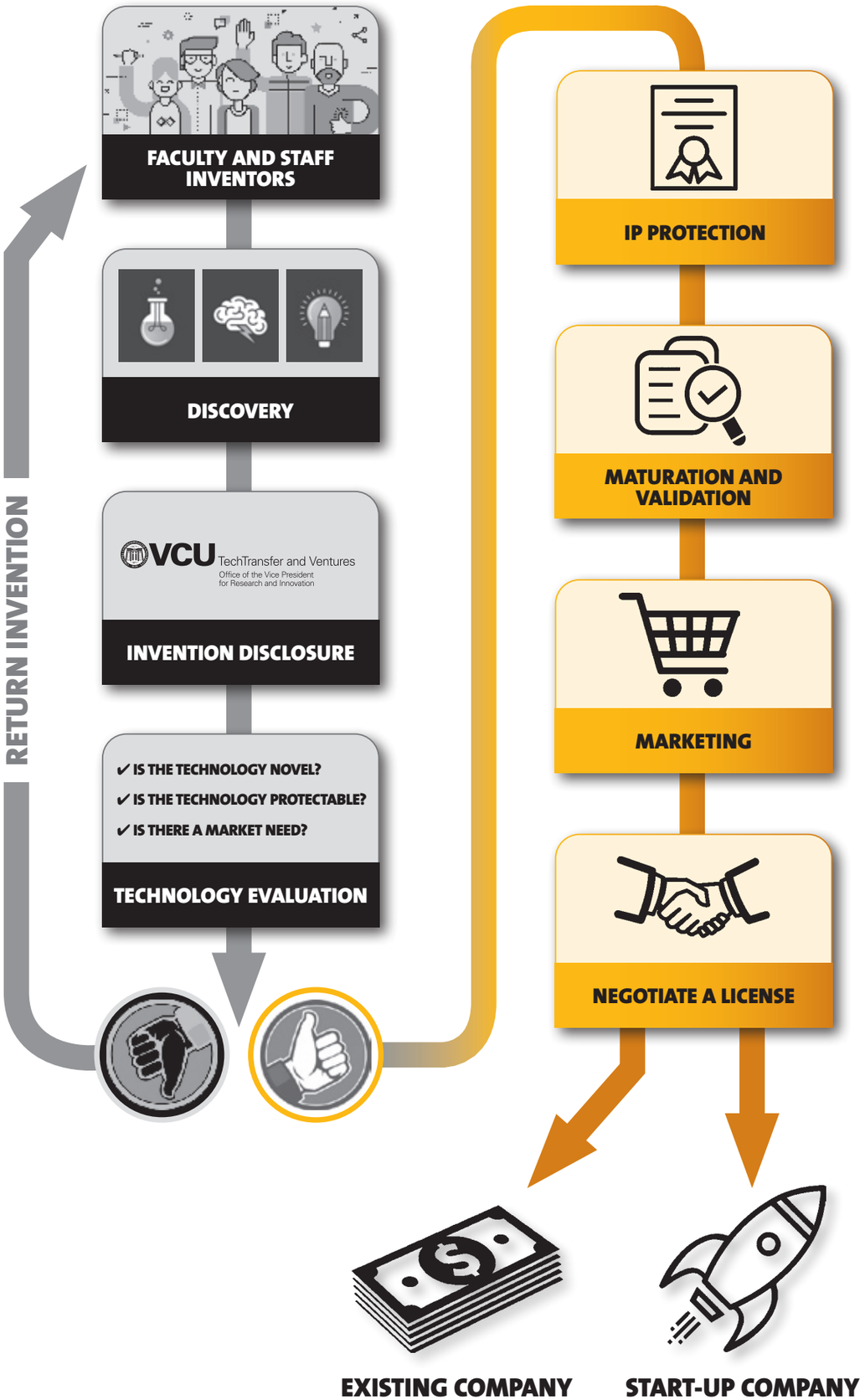
McClure has tested the scaffolds using stem cells and in vivo. The results? "We've seen significant regeneration," he says.

"There are other muscle scaffolds out there, but they miss the key ingredients Michael has used. This could be the first of many types of muscular scaffolds to come from the McClure lab," says Gerard Eldering, TechTransfer and Ventures' Entrepreneur-in-Residence. "If Michael is right about the science and the business is executed well, this could make a huge impact on the world."

Indeed, for McClure, an athlete himself who played baseball in college (where rotator cuff injuries are common), fixing the shoulder is only the start.

"I'm passionate about healing any muscle injury or disease that exists because of the devastating functional losses these patients experience," McClure says. "You could have an injury so bad that you can't play golf anymore, or throw a ball with your son or daughter. Or injuries to the legs, where you can barely walk or climb stairs. This is about providing basic human function, to help somebody get back to a more normal lifestyle from whatever happened to them."

The VCU Technology Transfer Process



VCU ISSUED PATENTS

7/13/2021 US Patent No. 11,059,788

B. Frank Gupton, Ph.D., Perrer Tosso, Ph.D.
Streamined Syntheses of Fluoroquinolones

7/28/2021 Europe Patent No. 3,102,234

Jason Carlyon, Ph.D.
Anaplasma Phagocytophilum Surface Proteins OmpA, Asp14, and AipA as Vaccine/Diagnostic Targets for Anaplasma Phagocytophilum Infection

8/31/2021 US Patent No. 11,108,087

Puru Jena, Ph.D.
Electrolytes Containing Superhalogens for Metal Ion Batteries

8/31/2021 US Patent No. 11,104,632

Martin K. Safo, Ph.D.
Metabolically Stable Vanillin Derivatives for the Treatment of Sickle Cell Disease

10/12/2021 US Patent No. 11,141,989

Daren Chen, Ph.D., Hong Zhao, Ph.D.
Electrohydrodynamic (EHD) Jet Printing with Multi-Channel Jetting Apparatuses and Systems

10/19/2021 US Patent No. 11,149,012

Martin K. Safo, Ph.D.
Metabolically Stable 5-Hmf Derivatives for the Treatment of Sickle Cell Disease

11/2/2021 US Patent No. 11,162,000

Wei Zhang, Ph.D., Kenneth J. Wynne, Ph.D.
Ice Release Coating

11/9/2021 US Patent No. 11,167,131

Jonathan Isaacs, M.D.
Devices and Methods for Repairing Damage to a Tissue

11/23/2021 US Patent No. 11,179,451

Youngman Oh, Ph.D., Qing Cai, M.D., Ph.D.
Treatment of Diseases Related to IGFB3 and its Receptor

1/11/2022 US Patent No. 11,219,892

B. Frank Gupton, Ph.D., Stanley Eugene Gilliland Ph.D., Carlos E. Castano Londono, Ph.D.
Carbon Based Materials as Solid-State Ligands for Metal Nanoparticle

1/14/2022 Japan Patent No. 7,009,059

Shunlin Ren, M.D., Ph.D.
Uses of Oxygenated Cholesterol Sulfates (OCS)

2/22/2022 US Patent No. 11,253,554

Jasmohan Bajaj, M.D.
Bacterial Profile to Detect Fungal Taxa Abundance in the Gut

2/22/2022 US Patent No. 11,253,597

Zvi Schwartz, D.M.D., Ph.D., Barbara D. Boyan, Ph.D.
Polymer Hydrogels for In Vivo Applications and Methods for Using and Preparing Same

3/15/2022 US Patent No. 11,273,213

Richard T. Marconi, Ph.D., Jason Carlyon, Ph.D.
Chimeric Vaccine Antigens for Anaplasmosis

5/10/2022 US Patent No. 11,324,709

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

5/11/2022 Europe Patent No. 3,086,793

Shunlin Ren, M.D., Ph.D.
Use of Oxygenated Cholesterol Sulfates (OCS)

5/24/2022 US Patent No. 11,341,585

Thang N. Dinh, Ph.D., Hung T. Nguyen, Ph.D.
Importance Sketching of Influence Dynamics in Massive-Scale Networks

5/24/2022 US Patent No. 11,337,760

Jennifer S. Wayne, Ph.D., Nathan J. Veilleux, Ph.D., Niraj V. Kalore, M.D.
Automated Hip Analysis Methods and Devices

6/28/2022 US Patent No. 11,373,552

Ravi L. Hadimani, Ph.D., Ahmed A El-Gendy, Ph.D., Hamza Magsood, Ph.D., Ciro H. Alcoba Serrate
Anatomically Accurate Brain Phantoms and Methods for Making and Using the Same

6/28/2022 US Patent No. 11,369,575

Qingguo Xu, Ph.D.
PPARπ Agonist Compositions and Methods of Use

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Vice President of Entrepreneurship
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VP and General Manager (Retired)
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Vida Williams
Chief Digital and Branding Officer
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VCU TechTransfer and Ventures Team

Standing from left:

Rachel DeNapoli; Bob Lloyd; Heyshia Tillman
Gerard Eldering, MBA; Ivelina Metcheva, Ph.D., MBA
James Redden; Ellie Linkous; Santosh Kumar T K

Sitting from left:

Christine Benedict; Brent Fagg, MS
Brittaney Ritchie, MS
Magdalena K. Morgan, Ph.D.

Not pictured: Parthay Patel, Jeff Kelley

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