

onevcu

RESEARCH

# UNSTOPPABLE INNOVATION

Annual Report

22

# oneVCU

## RESEARCH



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

# NO. 50

AMONG U.S. PUBLIC  
RESEARCH UNIVERSITIES

In 2022, VCU crossed a milestone, becoming one of the top 50 public universities in the country for sponsored research. This ranking from the National Science Foundation survey reflects how far and fast we've come: in just five years, our sponsored funding grew 49%, from \$271 million to \$405 million.

VCU earned other honors in 2022. We were named among the top 30 most innovative public research universities in the country. VCU also earned a special innovation designation as an "Innovation & Economic Prosperity" university from the Association of Public and Land-Grant Universities for our support of economic engagement through innovation and entrepreneurship, technology transfer, talent and workforce development and community development. VCU launched 10 new startups, a record high and much above the national median among our peer universities. VCU now has Minority Serving Institution eligibility from Department of Education. At a global level, while a recent annual survey published by Stanford University listed over 200 of our faculty in the top 2% of most-cited scientists in the world, the U.S. News and World

Report ranked VCU among the top 20% in the best global universities.

As indicated by many recent honors outlined in this report, our impact is growing rapidly, reflecting VCU's deep commitment to knowledge creation and the ability to conduct transformative research that makes discoveries, tackles our greatest challenges, addresses opportunities for all people, connects with our community, reduces disparities and lifts lives. Our dedicated and talented faculty, fellows, staff and students are innovating and inventing, taking our solutions and discoveries to the communities, the marketplace and out into the world.

At VCU, we foster a culture of collaboration and training the next generation of researchers. We are working on increasing access to education for the "missing millions" of people, especially from under-represented backgrounds across racial, ethnic and genders who have the potential to excel in the sciences, technology, engineering, medicine and the arts, but don't have easy access to the pathways to reach those careers. We continue to build the research infrastructure needed to give our students the best education possible, and to support our researchers in making new discoveries that will benefit people here in the Richmond community and beyond.

As our One VCU Research Strategic Plan enters its third year, VCU has committed two rounds of internal funding into various innovative and high impact teams among our campuses in Richmond and Doha, Qatar. The research projects span across the STEM and health fields, the arts, humanities and social sciences. The groundwork has been laid, and we expect 2023 to be a year of continued growth, knowledge creation, discovery and societal impact.

Our research is innovative and transformative, and we remain **UNstoppable**.

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

# NATIONAL RANKING

among public  
universities

**VCU was ranked No. 50 among the nation's top public research universities.**

Based on externally financed research and development expenditures for FY21, VCU was **ranked No. 50** among public research universities. Several specific research areas featured in the top 100 of the national rankings among all public research universities and include:

### VCU national rankings

- 1** Visual and performing arts
- 7** Non-science / engineering fields  
e.g., humanities, social sciences, art
- 14** Education
- 27** Social work
- 34** Health sciences
- 34** Psychology
- 37** Biological and biomedical sciences
- 45** Life sciences
- 66** Computer and information sciences
- 82** Engineering

 **VCU**  
Office of the Vice President  
for Research and Innovation

**Editor:**  
A.J. Hostetler  
OVPR communications director

**Editorial Assistant:**  
Emily Komornik  
OVPR communications specialist

**Design:**  
Brent Nultemeier  
BN Design & Advertising

**Photos:**  
courtesy VCU colleagues  
VCU Enterprise Marketing and Communications  
Karl Steinbrenner Photography  
Clement Britt Photography

# 22

## EXTERNAL SPONSORED FUNDING

Year after year, VCU research breaks our own external sponsored funding records



LINKS

**12%** increase over previous year

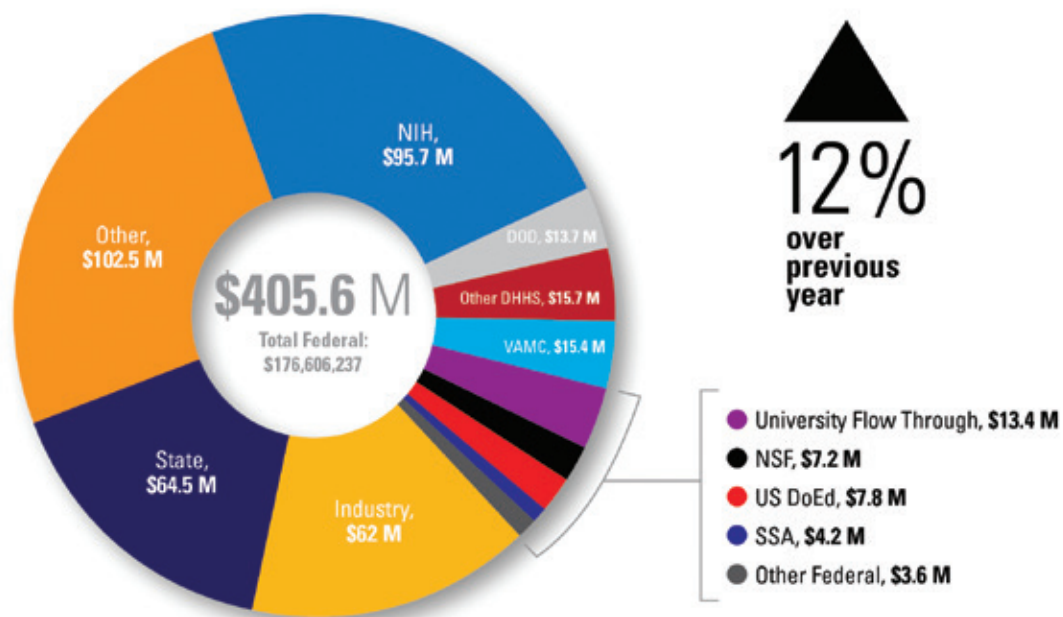
**\$405.6 million** - Sponsored program awards

**\$64.5 million** - State awards

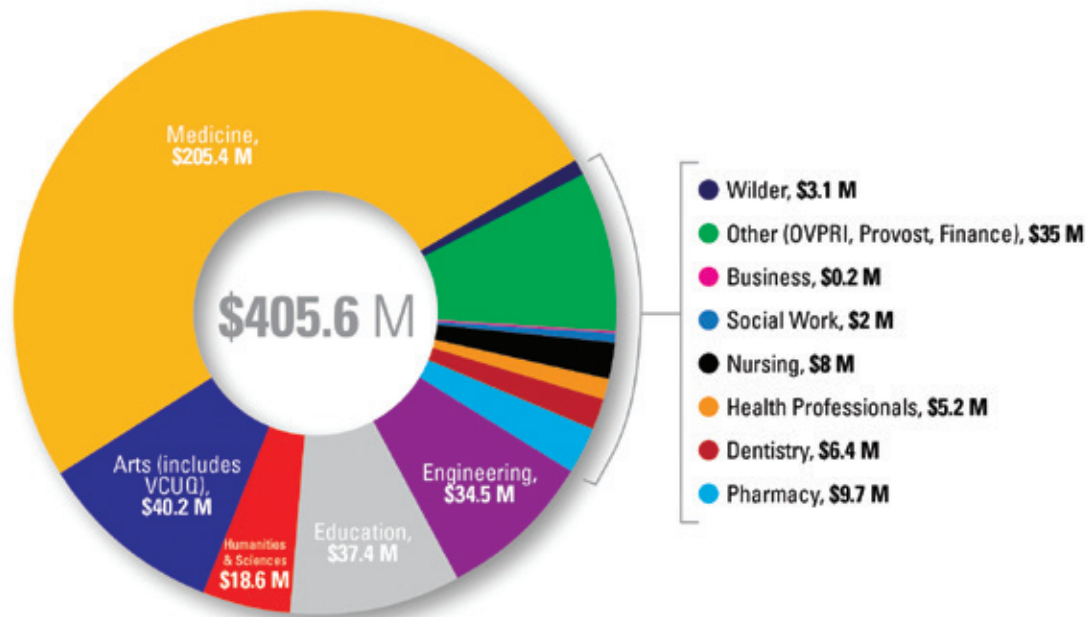
**\$62 million** - Industry awards

**\$176.6 million** - Federal awards NIH, \$95.7 million

**\$102.5 million** - Other (foundation, gifts)

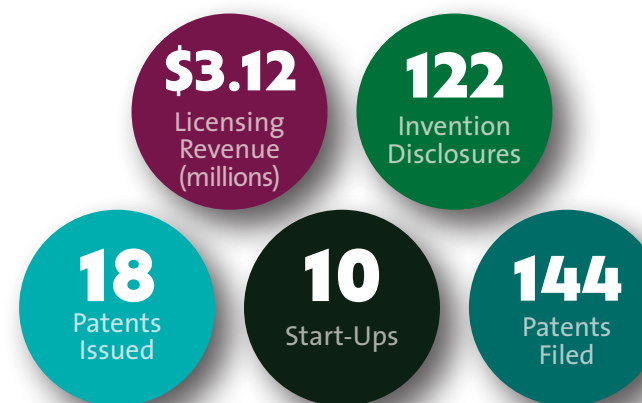


**12%**  
over  
previous  
year



## VCU TECHNOLOGY COMMERCIALIZATION IMPACT FY2022

# oneVCU RESEARCH



### CLINICAL RESEARCH

- \$61.8 million**
- 5,000+** total active participants enrolled in clinical research
- 1,553** enrolled across all active clinical trials
- 357** faculty-led, VCU designed clinical trials
- 672** active clinical trials at VCU/VCUHS
- 1,200** clinical research studies

### INNOVATION GATEWAY BECOMES TECHTRANSFER AND VENTURES



LINK

VCU's Innovation Gateway has a new name and updated mission. VCU TechTransfer and Ventures' 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. Explore the 2022 VCU TechTransfer and Ventures Annual Report and meet the innovative colleagues who impact the well-being of our communities. Ivelina Metcheva, Ph.D., MBA, remains assistant vice president for innovation within the OVPRI and heads the new VCU TechTransfer and Ventures.

### VCU AMONG U.S. NEWS & WORLD REPORT'S MOST INNOVATIVE SCHOOLS

In 2022, U.S. News asked top college officials to identify institutions in their "Best Colleges" ranking category that are making the most innovative improvements in terms of curriculum, faculty, students, campus life, technology or facilities. VCU was among the 30 public universities that the academic leaders said the public should be watching because of cutting-edge changes these colleges are making.

### BLUE RIDGE INSTITUTE FOR MEDICAL RESEARCH RANKINGS AMONG PUBLIC UNIVERSITIES, based on 2022 NIH funding

School of Pharmacy:	12
School of Dentistry:	13
School of Nursing:	25
School of Medicine:	36

Pharmacology:	10
Psychiatry:	11
Family Medicine:	12
Genetics:	18
Neurosurgery:	30
Biochemistry:	32
Anatomy/Cell Biology:	33
Surgery:	33
Pediatrics:	35
Obstetrics and Gynecology:	38
Pathology:	38
Microbiology:	39
Neurology:	39
Internal Medicine:	41
Physiology:	45

## EL-SHALL SERVES AS NSF PROGRAM DIRECTOR



Samy El-Shall, Ph.D.

**Samy El-Shall, Ph.D.**, professor and the Mary Eugenia Kapp Endowed Chair in Chemistry in the College of Humanities and Sciences, is rotating in as a program director of the Chemical Structure, Dynamics and Mechanisms Program in the Division

of Chemistry at the National Science Foundation.

The NSF's Division of Chemistry is responsible for roughly \$250 million in federal funds that support chemistry research in the United States. Each program director in the division is responsible for managing the evaluation process of research proposals submitted in the specific program and to make recommendations for funding the top selected proposals, as well as to evaluate the progress made of all the funded projects.

Dr. El-Shall's research at VCU has been funded by the NSF since 1990 in areas of gas phase cluster reactions leading to the formation of complex organics in space and heterogeneous catalysis for energy and environmental applications. He also has long been involved with NSF in reviewing proposals and participating in panel reviews and committees. El-Shall joined VCU's Department of Chemistry in 1989 and served as department chair from 2015-2021.

## VCU RESEARCHERS AMONG TOP 2%

Stanford University annually publishes a list of all the researchers from all over the world who are in the top 2% of the most-cited researchers, both currently and throughout their careers. VCU has over 200 faculty on that list.



Kenneth S. Kendler, M.D.

**Kenneth S. Kendler, M.D.**, who is VCU's most-cited researcher, is listed 66th overall for career and No. 233 for 2022. He is the world's second-most-cited psychiatrist and first in the subfield of neurology/neurosurgery.



Arun Sanyal, M.D.

Likewise, the director of the Stravitz-Sanyal Institute for Liver Disease and Metabolic Health, **Arun Sanyal, M.D.**, is another VCU faculty member among the top researchers in the world when it comes to citations, at No. 870 for career and 262 for 2022.

**Steven Woolf, M.D.**, director emeritus of VCU's Center on Society and Health, is VCU's third most-cited researcher for career, at No. 2,365, while liver specialist **Jasmohan Bajaj, M.D.**, was the third-most cited VCU researcher in 2022, at 950.

## NEW ASSOCIATE DEANS FOR RESEARCH



S. Douglas Pugh, Ph.D.

**S. Douglas Pugh, Ph.D.**, is associate dean, academic affairs and research, and professor of management of the VCU School of Business. Previously, he served as interim dean of the school and chair of its department of management and entrepreneurship.

He received his doctorate in organizational behavior from Tulane University. His research focuses on organizational climate in service organizations, the emotional labor demands of service work and the inter-organizational drivers of customer satisfaction. He conducts training in the areas of negotiation, conflict management and leadership development.



Gary S. Cuddeback, Ph.D.

**Gary S. Cuddeback, Ph.D.**, is associate dean for research and professor in the School of Social Work. He previously served as the Berg-Beach Distinguished Professor of Community Social Work at the University of North Carolina at Chapel Hill. He has

been involved in dozens of projects focused on individuals with severe mental illnesses, especially those who are involved in the justice system. His areas of expertise include: individuals living with severe mental illness, mental health services research, mental health and criminal justice involvement and evidence-based interventions. He received his doctorate at the University of Tennessee, Knoxville.

## ROBERT A. WINN DIVERSITY IN CLINICAL TRIALS AWARD PROGRAM

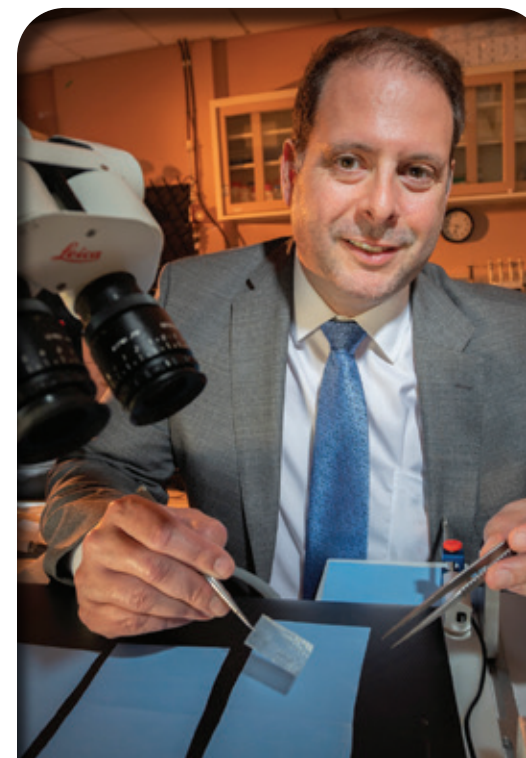
VCU is partnering with the Bristol Myers Squibb Foundation and working alongside the American Association for Cancer Research and Gilead Sciences Inc. to lead the implementation of the Robert A. Winn Diversity in Clinical Trials Award Program, a national program created to transform the clinical research landscape with the goal of increasing diversity in clinical trials. Initiated in 2020, this five-year program was established by the BMSF with a \$100 million commitment to train and develop community-oriented clinical trialists. Gilead Sciences joined in 2021 as a program supporter with a funding commitment of \$14 million. The awards program is based out of VCU Massey Cancer Center under the direction of **Robert A. Winn, M.D.**, the center's director and Lipman Chair in Oncology.

Originally launched as the BMSF Diversity in Clinical Trials Career Development



Robert A. Winn, M.D.

Program, the program was renamed in honor of Dr. Winn, a leader in establishing a 21st century model for promoting diversity, equity and inclusion in the oncology workforce. He has been nationally recognized for community engagement efforts in promoting new approaches to building trust among populations previously disenfranchised from health care or excluded or abused by research. Dr. Winn was the only Black director of a National Cancer Institute-designated cancer center when he was appointed in 2019.



Jonathan Isaacs, M.D.

## VCU INNOVATOR OF THE YEAR

**Jonathan Isaacs, M.D.**, a professor in the Department of Orthopaedic Surgery in the School of Medicine and chair of VCU Health's Division of Hand Surgery, won the 2022 Billy R. Martin VCU Innovator of the Year Award for his work on Nerve Tape.



LINK

Nerve Tape is a tiny biologic wrap used to repair severed peripheral nerves. Like a piece of high-tech tape with tiny, flexible embedded hooks, the wrap loops around and seals the nerve's outer connective tissues — improving nerve alignment and promoting regeneration. In 2022, the device received clearance from the U.S. Food and Drug Administration and could be used in patients in 2023. His idea began in 2012 using fishing hooks used in jewelry design as the basis for his concept of a tape with tiny, embedded hooks that could be used to secure nerves back together.

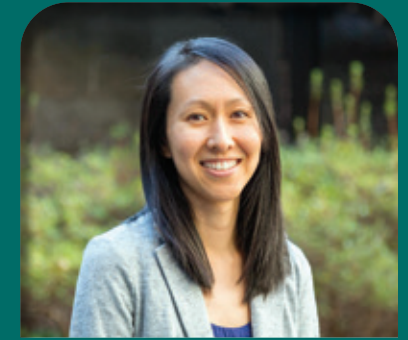
# Notable RESEARCH HONORS AND AWARDS



**Susan T. Gooden, Ph.D.,**  
president and immediate past-president,  
Network of Schools of Public Policy,  
Affairs and Administration



**Mignonne C. Guy, Ph.D.,**  
committee member, Food and Drug  
Administration's Tobacco Products  
Scientific Advisory Committee



**Priscilla Hwang, Ph.D.,**  
National Science Foundation Faculty Early  
Career Development (CAREER) Award



**Jay Albanese, Ph.D.,**  
ASC Freda Adler Distinguished Scholar  
Award, American Society of Criminology



**RaJade M. Berry-James, Ph.D.,**  
vice president/president-elect,  
Network of Schools of Public Policy,  
Affairs and Administration



**Massimo F. Bertino, Ph.D.,**  
senior member, National Academy  
of Inventors



**Kyeongmo Kim, Ph.D.,**  
faculty achievement award, Association for  
Gerontology Education in Social Work



**Martin J. Mangino, Ph.D.,**  
senior member,  
National Academy of Inventors



**Catherine Roach, Ph.D.,**  
fellow, National Humanities Center



**Jason Carlyon, Ph.D.,**  
MERIT (Method to Extend Research in Time)  
Award, National Institutes of Health



**Richard Costanzo, Ph.D.,**  
Max Mozell Award for Outstanding  
Achievement in the Chemical Senses,  
Association for Chemoreception Sciences



**Ana Diallo, Ph.D.,**  
scholar, Building Interdisciplinary Research  
Careers in Women's Health, National  
Institutes of Health



**Patricia W. Slattum, PharmD, Ph.D.,**  
fellow, Gerontological Society of America



**Colleen A. Thoma, Ph.D.,**  
fellow, American Association for Intellectual  
and Developmental Disabilities



**Leland "Bert" Waters, Ph.D.,**  
fellow, Gerontological Society of America



**Carolyn Eastman, Ph.D.,**  
fellow, public scholar,  
National Endowment for the Humanities



**Bernard F. Fuemmeler, Ph.D., M.P.H.,**  
president-elect,  
Society of Behavioral Medicine



**Donna M. Gibson, Ph.D.,**  
fellow, American Counseling Association



**Robert A. Winn, M.D.,**  
director, American Cancer Society  
Board of Directors

Congratulations to VCU mathematics professor **Richard Hammack, Ph.D.,** for winning the Joint Mathematics Meetings juried mathematical art exhibit. The exhibit featured works by 70 artists. Dr. Hammack won the prize for best photo/painting/print for his work, "Topological Envelopes."



**STRATEGIC  
PRIORITIES  
PLAN**

**FY 2022  
PROGRESS**

*Who we are – inclusive, innovative and true to our public impact mission – is reflected in our four strategic priorities and our culture of collaboration.*

**OPTIMIZING HEALTH**

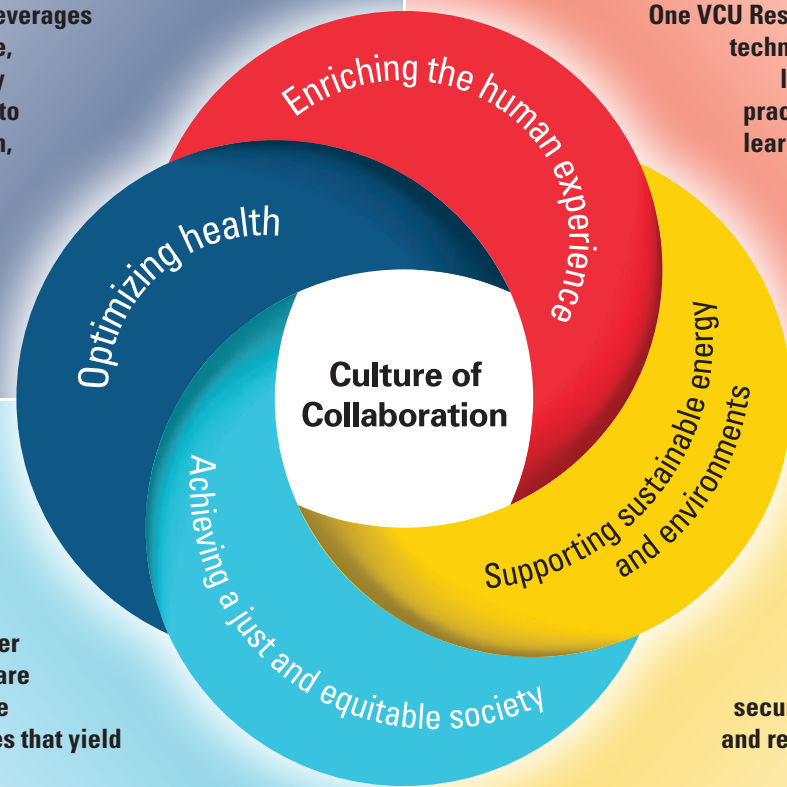
**ENRICHING THE HUMAN EXPERIENCE**

One VCU Research leverages all areas of expertise, from nanotechnology to population health to improving prevention, diagnosis, treatment and cures.

One VCU Research advances future technologies and securities leveraging the creative practice, furthering human learning and development, and enhancing the capabilities of human performance and quality of life in the knowledge economy.

One VCU Research elucidates inequity in all its forms and collaborates with all voices and experiences to deliver new approaches, share results, and influence policies and priorities that yield measurable results.

One VCU Research launches new approaches to harnessing, storing and securing energy, addressing urban heat energy, storage, security, urban heat islands and restoring and preserving Virginia's largest fresh water source and its species.



**ACHIEVING A JUST AND EQUITABLE SOCIETY**

**SUPPORTING SUSTAINABLE ENERGY AND ENVIRONMENTS**

Converging strengths across disciplines and communities is what we were founded to do. At VCU, our students, faculty and community are at the heart of how we set our research priorities. Our diverse voices and experiences help us deliver change that matters to our community and communities like ours around the globe.

*In doing so, VCU does the research that others won't or cannot.*

**One VCU Research is inclusive, innovative and impactful.**

One VCU Research unleashes talent across three campuses in two cities on opposite sides of the globe. But it doesn't stop there. One VCU Research involves community, corporate, foundation and governmental partners touching nearly every continent as we work with collaborators to find novel ways to explore, evaluate and effect change.

VCU is where research, scholarship and creative practice intersect. It is where the community, students, trainees, postdocs and faculty collaborate. It is where policymakers seek guidance. It is where change happens, where knowledge is acquired, expanded and reformed, shaped by practice.

In June 2022, new internal funding went to 55 transdisciplinary projects led by faculty innovators and scholars to address societal grand challenges. The funds came with stipulations for the investigators to leverage the new funds to not only advance the goals of VCU's research priorities but also to garner extramural funding to further advance research in these fields. While embracing VCU's diverse strengths for inclusive excellence, applicants were encouraged to include junior faculty, students (graduate and undergraduate) and trainees from backgrounds underrepresented in the research enterprise.

Read about the 55+ transdisciplinary projects undertaken in 2022 by faculty innovators and scholars to address societal grand challenges:



LINK

**DECEMBER 1, 2021**

**Largest-scale internal RFA release in VCU history**

Requests for Applications (RFAs) released from OVPRI:

- Accelerate Fund
- VCU Breakthroughs Fund
- Arts, Humanities and Social Sciences Fund
- Commercialization Fund

**JULY 1, 2022**

**Advisory Strategy**

Launched with FY 2022 Advisory Council comprised of faculty, staff, students and community partners representing every school and college.

**FY 2020**

**Collaborative Design**

300+ participated in the design, identifying research strengths aligned with complex challenges impacting the community we serve and urban communities across the globe.

**JUNE 30, 2022**

**>\$4.4 million awarded**

For single and multi-principal investigator-led transdisciplinary research teams addressing societal grand challenges under each of the four strategic priorities.

**OCTOBER 20, 2021**

**STRATEGIC PRIORITIES PLAN Enterprise-wide launch with President Michael Rao, Ph.D.**



"The success of this plan is going to have a huge impact on our faculty. That will include their professional development and their ability to work across disciplines and do problem solving."

— P. Srirama Rao, Ph.D.

**FY 2021**

**Implementation Plan**

Key performance indicators linked to individual schools and colleges and determined projections for return on investment by FY 2028.

**Exploring how human-robot creative collaborations might benefit society**

Assistant professor of dance and media technologies at the VCU School of the Arts **Kate Sicchio, Ph.D.**, is collaborating on an effort with the Commonwealth Cyber Initiative, of which VCU is a partner university. The project brings together artists and researchers to show how cybersecurity is woven into daily life. Dr. Sicchio leads a choreography project in which she collects movement data to see how the research team can train artificial intelligence (AI) robots, while protecting the identity of the dancers. Sicchio also collaborates with VCU School of Engineering's **Patrick Martin, Ph.D.** This team is using control theory and AI to teach autonomous robots to adapt to each other in real-time by mimicking dancers' movements. This research will promote the integration of autonomous robots into situations where humans and robots are able to work together to achieve complex mission goals, while seeking to maintain safety.



LINK



VIDEO



**Improving outcomes for children with significant disabilities and their families**

A transdisciplinary team is collaborating to prepare early intervention personnel and special educators as well as social workers to use evidence-based practices to improve mental health for children from high-need communities. **Yaoying Xu, Ph.D.**, a professor in the Department of Counseling and Special Education in the School of Education, leads this effort along with the School of Social Work, Department of Pediatrics, the Virginia Department of Education and community partners. They build and strengthen the path between high-quality early intervention personnel and optimal outcomes of young children with significant disabilities and their families, particularly children from high-need communities and children who experience emotional or behavioral difficulties.



LINK

**Boosting security of Virginia's NextG, medical devices and smart cities**

Three new test beds at the College of Engineering are helping researchers and industry partners analyze the security of medical devices, NextG applications and "smart city" operations. The test beds were developed under the leadership of **Erdem Topsakal, Ph.D.**, a professor and chair of the Department of Electrical and Computer Engineering. Dr. Topsakal, director of the Commonwealth Cyber Initiative's Central Virginia regional node, says the test beds will help support and inspire innovation, entrepreneurship and spin-off companies. The cyber initiative aided in funding the test beds.



LINK

**Using VR to help train surgeons to treat female incontinence**

For women who experience urinary incontinence, an implanted device called a midurethral sling can help stop uncontrolled urination during physical activity, such as lifting or laughing. A collaboration across the School of Medicine, College of Engineering and Central Virginia VA Health Care System looks to replace the time-intensive training process for the sling's surgical procedure through the use of virtual reality. Using an application developed by computer science professor **Milos Manic, Ph.D.**, and his doctoral students, urogynecologist **Lauren Siff, M.D.**, an adjunct assistant professor in the School of Medicine, and her team are building a VR training application that could change the way the sling procedure is taught in the future.



LINK

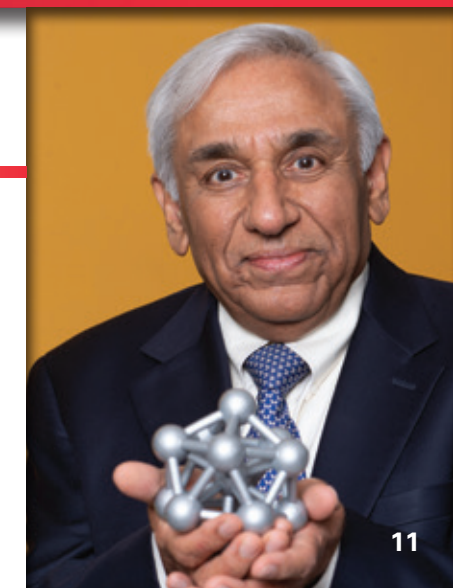


**Creating a new stable, magnetic superatom that could power innovations in nanomaterials**

Physicist **Shiv Khanna, Ph.D.**'s theoretical structure for a superatom now serves as a building block for creating new materials for semiconductors, microchips, cellphones and more. Dr. Khanna, Commonwealth Professor and chair of the Department of Physics in the College of Humanities and Sciences, and his colleagues created this new stable, magnetic superatom that could change how magnetic materials are made at the smallest level. Superatoms are clusters of atoms that can not only act like known elements but behave in a way that is difficult to replicate using elements found in nature.



LINK





(From left) Rhea Arya, Morgan Eaton, Samy Pemmasani, Brittany Hudson with Tracy Dawson Green, Ph.D., in the center

## Streamlining rape kit testing using an automated device

A VCU forensic scientist's invention may help reduce the time needed for testing rape kits and reducing the nationwide backlog. **Tracey Dawson Green, Ph.D.**, hopes that her device will streamline that process. Her invention is a closed, plastic, multilayer device that can run tests based on just a portion of a cotton swab from a kit, while also separating out the different types of samples in the kit. The automated device reduces the overall rape kit processing time from up to 6.5 hours down to 90 minutes. It also reduces forensic examiners' hands-on time from 2.5 to 3.5 hours to just 10 minutes, and allows for multiple kits to be tested simultaneously.



LINK



## Leading the way to reducing racial disparities in cancer genetic counseling

VCU associate professor of health psychology **Nao Hagiwara, Ph.D.**, of the College of Humanities and Sciences, leads a project to provide a comprehensive assessment of how genetic counselors' training, demographics, attitudes and beliefs factor into aspects of the cancer genetic counseling process. This project aims to reduce racial cancer disparities in the U.S. and reduce the higher death rates in Black/African American individuals for many types of cancer.



LINK



## Reducing the risk of recidivism in Virginia's youth

A study from the Wilder School of Government and Public Affairs provides insight for policymakers on ways to reduce recidivism among youth in Virginia. Five years of data from the state's juvenile justice department revealed that Virginia juveniles from areas with high rates of crime and economic disadvantage are at the highest risk of recidivism, with the most pronounced effects were among Black youth. Additionally, prior contact with the most punitive punishments in the juvenile justice system — such as incarceration — were significantly associated with recidivism, with the effects being strongest for Black youth. The study's findings provide insight for policymakers looking to reduce recidivism among youth. **Patrick Lowery, Ph.D.**, is a criminologist in the L. Douglas Wilder School of Government and Public Affairs. Together with his research team, he studies the intersection of race, poverty, law and juvenile justice.



LINK



## Seeking to eliminate health-related inequities among Black tobacco users

Tobacco remains the leading cause of preventable death and disease in the U.S., and, among all racialized and ethnic groups, Black people continue to bear the greatest burden. **Mignonne C. Guy, Ph.D.**, is a member of the Cancer Prevention and Control research program at VCU Massey Cancer Center and an associate professor and chair of the Department of African American Studies in the College of Humanities and Sciences. With colleagues from Massey and the National Institutes of Health, she leads a three-year project funded by the Robert Wood Johnson Foundation to develop and disseminate an antiracist and equity-centered research agenda and road map focused on eliminating tobacco-related inequities among Black tobacco users.



LINK





## Transforming the lives of people with liver disease

VCU is radically expanding its research for treatment options for liver and liver-related metabolic diseases, thanks to a historic, transformational \$104 million gift, the largest in VCU's history. Leading the new Stravitz-Sanyal Institute for Liver Disease and Metabolic Health at VCU is **Arun Sanyal, M.D.**, a professor in the Division of Gastroenterology, Hepatology and Nutrition, who is internationally known for his research in the development of therapeutics for reducing liver disease. Focused on translational science, the institute will expand research for liver-related clinical specialties, such as nonalcoholic fatty liver disease, end-stage liver disease, liver transplantation, liver cancer and rare diseases in hepatology. The institute's inaugural academic symposium brought together renowned researchers and partners from around the world to discuss new discoveries, collaborative initiatives and emerging strategies for advancing liver care.



Arun Sanyal, M.D., and philanthropist R. Todd Stravitz, M.D.



LINK



LINK



LINK



## Analyzing how microbe transplants could curb alcohol cravings

Could changing the bacteria inhabiting your gut change your drinking behavior? **Jamoshan Bajaj, M.D.**, a gastroenterologist and liver specialist with the School of Medicine, wants to harness gut bacteria to help patients manage their alcohol addiction. Building on promising results from prior research, he is leading a four-year clinical trial to examine how transplanting these microbes could help people overcome their addiction to alcohol. Some research has found that our digestive system's diverse ecosystem of microbes, which play key roles in maintaining our health and helping our bodies function, may also play a part in regulating our brain and behavior.



LINK



## Using DNA responses to childhood trauma to identify risk of long-term health issues

School of Pharmacy researchers bring the medical community closer to identifying children with the highest need for treatment and intervention following traumatic events. Their work finds that epigenetic traces of childhood trauma could be used as biomarkers to predict the risk of depression, nicotine dependence, alcohol use disorder and other health issues in people nearly 17 years later. A research team led by **Edwin van den Oord, Ph.D.**, professor and director of the Center for Biomarker Research and Precision Medicine, looked at epigenetics, when adverse experiences trigger molecular modifications to one's DNA. These changes could help capture the personal impact of trauma on a child.



LINK

## Developing a new measure of prosthesis awareness

**Benjamin Darter, Ph.D.**, an associate professor in the College of Health Professions' Department of Physical Therapy, focuses on ways to improve the understanding of a prosthesis user's mobility. His team, which includes colleagues from the University of Washington and the Hanger Institute for Clinical Research and Education, received a grant from the U.S. Department of Defense to implement a newly developed measure of prosthesis awareness to further explain the clinical benefits of microprocessor-controlled knees. Dr. Darter's research team intends for their new way of measuring prosthesis awareness will assist clinicians to improve the walking ability of individuals with lower extremity amputation.



LINK



**Assessing military-relevant chronic effects of neurotrauma**



VCU, with financial support from the Department of Defense and Veterans Affairs, heads the world's largest prospective longitudinal cohort and largest mega-dataset of combat-exposed service members and veterans to understand the short-term recovery and long-term effects of combat.

**David X. Cifu, M.D.**, a professor and chair of the Department of Physical Medicine and Rehabilitation in the medical school, leads the Long-term Impact of Military Relevant Consortium-Chronic Effects of Neurotrauma Consortium (LIMBIC-CENC). This \$116.4 million project has enrolled more than 2,500 active participants across 11 VAMCs and nine military bases, add a data set of more than 2.5 million service members and veterans to study traumatic brain injury, post-traumatic stress disorder, pain, depression, suicidality and other military impacts by more than 75 researchers at 30 universities. Recently, the LIMBIC-CENC team have initiated a long COVID assessment program for the 11% of participants with COVID-19 infections.



**Collaborating with sister public universities on clinical-translational science**



**Wright Regional Center**  
for Clinical and Translational Science

The VCU C. Kenneth and Dianne Wright Center for Clinical and Translational Research accelerates the science that promotes healthy communities. It provides the commonwealth with infrastructure and resources that promote interdisciplinary human health research. As the first federally funded clinical and translational research center in Virginia, the Wright Center fosters research collaborations across the state and accelerates the translation of scientific discoveries to patient care. The Wright Center now partners with sister universities in the Wright Regional CCTS to grow community engagement, diversify patient populations and encourage greater diversity among new clinician researchers entering the workforce. These partners include Eastern Virginia Medical School, Old Dominion University, and Virginia State University, a historically Black college and university.



**Building sustainable fashion in Qatar**

**Khaled Saoud, Ph.D.**, physics professor at VCUarts Qatar, is exploring nanotechnology's role in enabling absorption of Vitamin D through fabrics, such as those used in creating traditional abayas that cover a woman's body, to promote health and well-being. He's created a prototype of a "vitamin D-friendly Preamble Abaya" that helps prevent vitamin D deficiency.

The effort involved designing an abaya from specially coated material that absorbs the sun's UVB rays to improve the synthesis of vitamin D by the skin while blocking the sun's harmful rays in extreme summer climates.



**Reducing disparities among Black patients in cancer outcomes**

**Vanessa B. Sheppard, Ph.D.**, associate director for community outreach and engagement and health disparities research at VCU Massey Cancer Center, is a leading expert in health disparities research, particularly disparities in breast cancer outcomes. Her research team seeks to change to improve the chemotherapy and adjuvant hormone therapy used to treat Black breast cancer patients; Black breast cancer patients, who have a 40% higher chance of dying from their cancer than white women. Dr. Sheppard's approach embeds clinical research in the community to achieve equity, using community navigators to educate and support people through their cancer care and to improve access to treatments and clinical trials. She also serves as the associate vice president of population and public health strategic initiatives and the Theresa A. Thomas Memorial Chair in Cancer Prevention and Control at the School of Medicine.



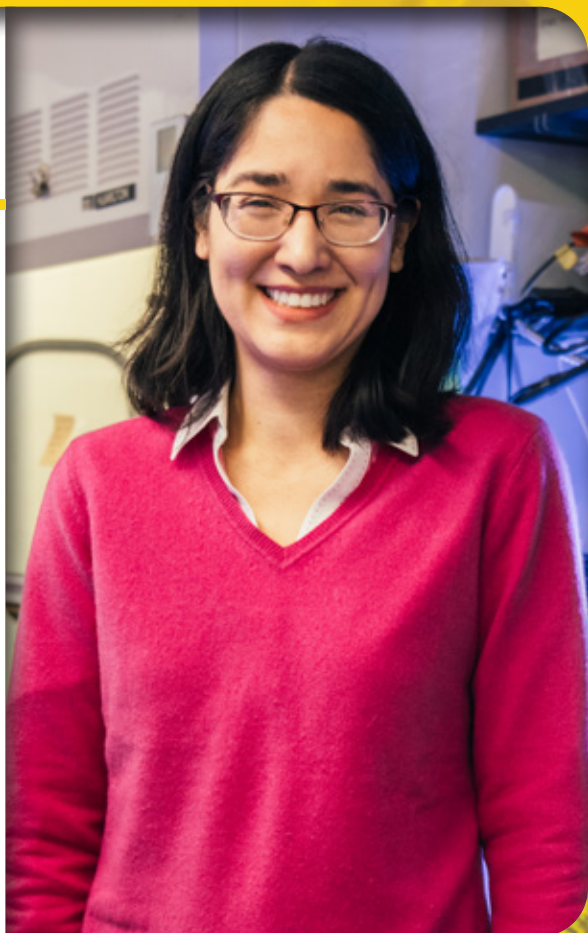


### Investigating how environmental stress affects coral wound healing

We know little about how environmental stress affects the ability of fragile corals to heal after suffering physical damage. **Nastassja Lewinski, Ph.D.**, an associate professor of chemical and life science engineering in the College of Engineering, and colleagues from the College of Humanities and Sciences, are investigating coral resilience by developing and testing mathematical models of coral wound healing. This will help determine how immune cell activity and energy use prioritization can predict the rate and success of wound healing in the presence and absence of chemical interventions.



LINK



### Producing photons on demand for energy efficiency

Today's communication technologies rely on transferring information through fiber optical channels, while processing of information is still achieved by the traditional electronics, which limits the transfer speeds and energy savings. Highly efficient single-photon nanoemitters producing photons "on demand" at a high rate is key to transition to ultra-fast and energy efficient all-optical information manipulation. However, typical emission rate of the nanoemitters is about 1,000 times lower than that required for commercial communication links. A team led by **Vitaliy Avrutin, Ph.D.**, an associate professor in the College of Engineering's Department of Electrical and Computer Engineering, seeks to address this challenge by employing state-of-the-art nanofabrication and placing aluminum plasmonic nanoantennas on top of a silicon waveguide.



LINK



### Improving the efficiency of solar technology

A new material developed at VCU could drastically improve the efficiency of solar technology, making solar electricity significantly cheaper to use and more accessible. The material, developed by a team led by **Indika U. Arachchige, Ph.D.**, an associate professor in the Department of Chemistry in the College of Humanities and Sciences, will greatly enhance the light-harvesting ability of solar cells, while radically reducing the material costs. The new technology combines the unique advantages of nanoscale materials design and fabrication with attractive technological features of nontoxic, abundant and silicon-compatible titanium group elements.



LINK



(From left) Reza Mohammadi, Ph.D., Carlos Castano, Ph.D., Jessika Rojas, Ph.D., and Braden Goddard, Ph.D.

### Investigating advanced materials for improved reactor safety

The Nuclear Regulatory Commission has aggressively moved to support research to create accident-tolerant fuels and developing more resilient nuclear reactor designs and materials. The agency funded a College of Engineering research team led by **Jessika Rojas, Ph.D.**, an associate professor who specializes in nuclear materials, nanomaterials and radiation processing, with the aim of improving the safety and performance of the U.S. nuclear powered fleet. The project focuses on analyzing the behavior of candidate materials being considered for fabrication of nuclear fuel claddings in future reactor designs.



LINK

# STUDENT RESEARCH AT VCU

## VCU receives \$1 million grant to increase STEM Ph.D. access for underrepresented populations



A \$1.08 million grant from the National Science Foundation (NSF) will fund an effort to increase the number of students completing their doctorates in STEM disciplines. Starting in the 2023-24 academic year, 12 first-year doctoral students in STEM fields will receive a stipend and funding to pay for tuition for two years through the Louis Stokes Alliance for Minority Participation Bridge to the Doctorate program. The program's goal is to assist universities in diversifying the nation's science, technology, engineering and mathematics workforce by increasing

the number of STEM degrees awarded to populations historically under-represented in these disciplines. **Mychal Smith, Ph.D.**, an assistant professor in the Department of Chemistry in the College of Humanities and Sciences, will oversee the project at VCU.

## Undergraduate research at VCU is REAL



The VCU Undergraduate Research Opportunities Program, part of the REAL program in the Office of the Provost, works with undergraduate students to engage in research projects led by outstanding faculty in laboratories, libraries, studios and classrooms throughout the university. These mentored projects involve critical reflection and communication of results of an intellectual or creative contribution to a discipline. Roughly 5,000 VCU undergraduate students participate in credit-bearing REAL research courses and experiences annually.

One of those students is **Lesly Turcios-Hernandez**. A biology major in the College of Humanities and Sciences who is on track to earn her bachelor's degree in May 2023, Turcios-Hernandez first landed a summer fellowship in the lab of **Alaattin Kaya, Ph.D.**, an assistant professor of biology who studies aging.

Turcios-Hernandez started off applying molecular and cell biology methods to analyze the cellular pathways regulating lifespan in budding yeast and nematode worms. The project aims to understand why altered expression of certain conserved genes enable a cell or organism to live longer. In Kaya's lab, Turcios-Hernandez developed crucial wet lab skills that are a necessary foundation for graduate school, where she hopes someday to further study the causes of aging and age-related diseases such as Alzheimer's and cancer in her own research lab.

## New institutes, centers to enrich VCU innovation, scholarship and creativity

Six new university-level research institutes and centers were added to the VCU research community, bringing the total to 16. These transdisciplinary hubs foster increased collaborative, unique research beyond the scope of what can be accomplished by an individual department, school or college. They add value to the university's intellectual power, resources and collaborative potential and resource development, align with the key initiatives of the One VCU Research Strategic Priorities Plan and address critical scientific or societal problems and needs not already met within VCU.

In the past two years, the OVPRI has invested about \$2 million in equipment and personnel in support of VCU research strengths across multiple disciplines and the three campuses.

### The new institutes and centers are:

- **The Center for Drug Discovery** (director, Saïd Sebtî, Ph.D., School of Medicine and the Massey Cancer Center; deputy director, Martin Safo, Ph.D., School of Pharmacy)
- **The Center for Microbiome Engineering and Data Analysis** (co-directors Tomasz Arodz, Ph.D., College of Engineering, and Gregory Buck, Ph.D., School of Medicine)
- **The Humanities Research Center** (director, Cristina Stanciu, Ph.D., College of Humanities and Sciences; associate director, Jesse Goldstein, Ph.D., College of Humanities and Sciences)
- **The Institute for Creative Research** (director, Diane Derr, Ph.D., VCUarts Qatar)
- **The Institute for Drug and Alcohol Studies** (director, F. Gerard Moeller, M.D., School of Medicine)
- **The Institute for Sustainable Energy and Environment** (director, Puru Jena, Ph.D., College of Humanities and Sciences; associate directors, Jayasimha Atulasimha, Ph.D., College of Engineering, and Damian Pitt, Ph.D., L. Douglas Wilder School of Government and Public Affairs)

onevcu  
RESEARCH



LINK

Find more stories  
about VCU research  
and knowledge  
creation at



VCU News



VCU Health News

# VCU RESEARCH EXCELLENCE

## 1 OF 73

*public, 4-year universities  
with MSI eligibility from  
the U.S. Department of  
Education*

## \$405 million

*in combined awards  
for sponsored programs  
for research*

## \$176.6 million

*total federal funding*

## 50TH

*in R&D expenditures  
among public  
institutions*

## 1 OF 80

*APLU's "Innovation &  
Economic Prosperity"  
universities*

## 1 OF 64

*public institutions designated  
"Community Engaged" and  
"Very High Research Activity"*

## 1 OF 30

*most innovative public universities*



# VCU

Office of the Vice President  
for Research and Innovation

800 East Leigh Street  
Richmond, VA 23298  
Phone: (804) 827-2262  
ovpri@vcu.edu | research.vcu.edu

VCU Office of the Vice President for Research and Innovation

@VCUresearch



@VCUresearch



vcuresearch

