

Bringing Ideas to Life

Annual Report 2007



Mission

VCU Tech Transfer’s mission is to commercialize inventions and other valuable intellectual property developed from scholarly activity by university members, for the benefit of the university, its members, and the public.

Vision

VCU Tech Transfer’s vision is to bring world-class recognition and value to VCU and its members through commercialization of intellectual property developed at the university.

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Letter From the Director

Dear Friends:

As one of the premier research universities in the nation, Virginia Commonwealth University stands out as an incubator of innovation in medicine, life sciences, engineering, the arts, and many other disciplines. Our discoveries improve the quality of life for countless people at home and abroad.

Innovation has its genesis in imagination, and VCU Tech Transfer helps translate these concepts into practical applications capable of transforming our world. In 2007, we made significant progress: \$2.66 million in licensing and investment revenues; 76 invention disclosures; more than 50 patents filed; more than a dozen new licensing deals; 142 material transfer agreements; and more than \$650,000 in royalty payments to inventors.

This Annual Report features the faces and stories of some of the individuals who made these impressive numbers possible. You will find within extraordinary examples of creativity, intellect, and perseverance.

We at VCU Tech Transfer are immensely proud of these inventors, and we embrace the collaborative spirit they bring to the university. They not only reach across disciplinary lines to solve problems together, but also work shoulder to shoulder with us so the full potential of their ideas can be realized. This team spirit flows at all levels of the university, with particularly strong institutional leadership from VCU President Dr. Eugene P. Trani and Dr. Francis L. Macrina, vice president for research.

VCU Tech Transfer is also very fortunate to have strong partnerships with the Virginia Bio-Technology Research Park and the Virginia Biosciences Development Center.



Together, we celebrate and promote entrepreneurship throughout the university through our annual "Invented at VCU" reception and many seminars conducted at departments and schools on both campuses. We seek not only to enhance the rich spirit of cooperation but also to provide the knowledge and tools necessary to help inventors achieve their dreams.

VCU Tech Transfer serves as the bridge between our investigators' ideas and the commercialization and dissemination of these ideas. As the university and its inventors continue to push the boundaries of exploration and develop innovative solutions to a range of challenges, we look forward to helping move these ideas to the marketplace with the same care, diligence, and hard work through which they were born.

With sincere gratitude and best wishes to our innovators and supporters,



Ivelina Metcheva, Ph.D., M.B.A.
Director, VCU Tech Transfer

How It Works



VCU Tech Transfer Process

VCU Tech Transfer was formed in 1994 to protect and commercialize intellectual property created at the university. It consists of two entities: Office of Technology Transfer, residing within the VCU Office of vice president for research, and Intellectual Property Foundation, a not-for-profit foundation that acts as its commercial arm. VCU's intellectual property policy requires inventions made by VCU members, or made using facilities or funds of VCU, to be assigned to the university and managed by VCU Tech Transfer.

Invention Disclosure. The invention disclosure form is at www.research.vcu.edu/forms/InventionDisclosure.doc. Receipt of disclosure creates a record of invention and it is used by VCU Tech Transfer to evaluate the intellectual property. The office reviews the disclosure and makes a preliminary decision about ownership, potential commercial value, and patentability. VCU Tech Transfer seeks quality disclosures that include related grant proposals, publication manuscripts, or abstracts which aid in technology evaluation and in patent preparation or copyright registration.

Technology Assessment. Following completion of a formal assignment of ownership by the inventors to VCU, the invention disclosure is assigned to a technology manager. The technology manager reviews and assesses the technology for patentability and commercial potential.

Protection and Marketing. The inventions selected for commercialization are protected through patent, copyright, or trademark applications. Following protection, the technology managers begin to market the inventions. Potential licensing partners may be identified from discussions with the inventors, from VCU Tech Transfer commercial networks, or from internal or external market analysis. If VCU Tech Transfer staff determines that the technology may be suitable for a new company spin-off, the disclosure is marketed to venture capitalists, angels, and potential managers.

Licensing. It is standard for VCU to transfer intellectual property through royalty-bearing licenses, rather than patent title assignment. By maintaining control of its patents, the university allows commercial use and reserves the rights for educational, research, and other internal purposes. Two major factors determine the licensing decision: (1) which license is most likely to lead to rapid commercialization; and (2) which license is in the public interest. VCU Tech Transfer monitors licensees' compliance with the commercialization milestones and other licensing terms. Any revenues received from licensing are shared according to the VCU intellectual property policy as follows:

- 40% to inventors
- 40% to VCU Tech Transfer
- 10% to inventors' department
- 10% to inventors' school

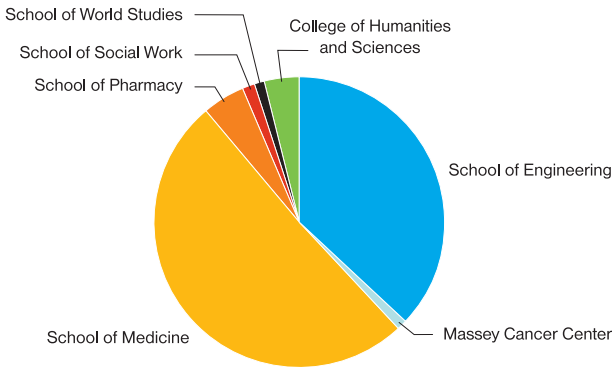
VCU Patents Issued In Fiscal Year 2007

Date Issued	Patent Number	VCU Inventors	Title
8/15/06	US 7,091,207	Rakesh Kukreja	Method of treating myocardial infarction with PDE-5 inhibitors
9/14/06	US 7,135,134	Gary Tepper Royal Kessick	Method for forming microscopic polymer interconnections
9/26/06	US 7,113,814	Kevin Ward R. Wayne Barbee James Turner Rao R. Ivatury Fred Hawkridge	Tissue interrogation spectroscopy
10/3/06	US 7,115,685	Kenneth Wynne	Fluoropolymer-carbon dioxide compositions and methods of processing fluoropolymers
10/9/06	US 7,279,500	Billy R. Martin	Sulfonamide cannabinoid agonists and antagonists
10/10/06	US 7,118,534	Kevin Ward R. Wayne Barbee Rao R. Ivatury James Arrowood	Methods for monitoring and optimizing central venous pressure and intravascular volume
10/10/06	US 7,119,208	Martin K. Safo Richmond Danso-Danquah Donald J. Abraham	Anti-sickling agents
10/13/06	HK 1,042,846	Joanne Peart Peter R. Byron Aron H. Lichtman Billy R. Martin	D 9 tetrahydrocannabinol (D 9 THC) solution metered dose inhalers and methods of use
1/30/07	US 7,169,857	Mark A. McHugh	Homogenous compositions of fluoropolymers and crystalline solids or cross-linking agents and methods of making the same
2/3/07	IN 202,523	Joanne Peart Peter R. Byron Aron H. Lichtman Billy R. Martin	D 9 tetrahydrocannabinol solution metered dose inhalers and methods of use
2/20/07	US 7,179,800	Billy R. Martin	Cannabinoids
3/20/07	US 7,192,995	Mark A. McHugh	Homogenous compositions of polymers and crystalline solids or cross-linking agents and methods of making the same
3/20/07	AT 1,149,078	Richard A. Glennon	Selective 5-HT 6 receptor ligands
3/27/07	AT 1,011,672	Billy R. Martin Mohamad Damaj	Compounds and pharmaceutical compositions thereof
3/27/07	DE 6,983,959	Billy R. Martin Mohamad Damaj	Compounds and pharmaceutical compositions thereof
3/27/07	GR 3,056,184	Billy R. Martin Mohamad Damaj	Compounds and pharmaceutical compositions thereof
6/25/07	MX 246,662	Richard A. Glennon	Selective 5-HT 6 receptor ligands

Fiscal Year 2007 at a Glance

Gross Revenues	2.66 million
Invention Disclosures	76
License Agreements	13
Patents Filed	52
Patents Issued	17
Copyrights Registered	5
Trademarks Registered	1
Material Transfer Agreements	142
Inter-institutional Agreements	4
Marketing Agreements	1
Start-up Companies	1

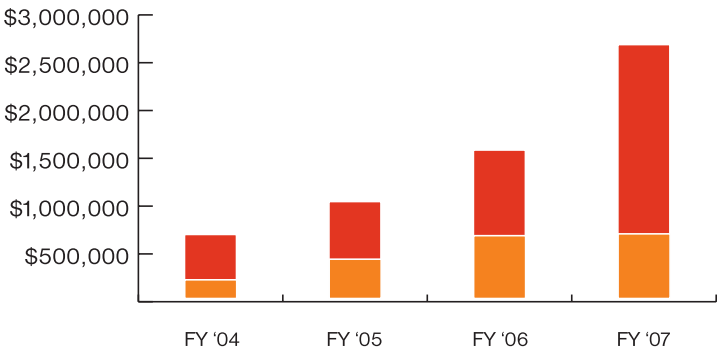
Distribution of Invention Disclosures



Revenues & Distributions

Revenues	
Royalty and License Fees	\$1,205,631
Distributions	
VCU Inventors	\$676,293
VCU Schools and Departments	\$57,383

Revenues & Distributions



	FY '04	FY '05	FY '06	FY '07
Distribution to Inventors	\$195,674	\$411,292	\$657,236	\$676,293
Gross Revenues	\$670,007	\$1,014,138	\$1,552,936	\$2,656,059
Growth Rate		51%	53%	71%



Cheers!

Tech Transfer Toasts Inventors at Inaugural Reception

Trading test tubes for wine glasses, patents for pâté, several dozen VCU inventors toasted their collective achievements at Tech Transfer's inaugural "Invented at VCU" reception. Dr. Francis L. Macrina, vice president for research at VCU, and Dr. Ivelina Metcheva, director of VCU Tech Transfer, were on hand to honor the myriad inventors whose work made significant strides toward the marketplace.

The reception was co-sponsored with VCU Tech Transfer's close partner, the Virginia Biosciences Development Center, which has established itself as an incubator of entrepreneurship in Central Virginia.

While Dr. Eugene P. Trani, VCU president, was unable to attend, he sent his best wishes and congratulations to the gathering, including this excerpt:

"I want you to know how very much I value—and the university values—the work that all of you are doing. As you know, VCU's reputation as one of America's premier research universities continues to grow. And for good reason. Our commitment to research, to unlocking innovation, and to seeking out new discoveries in the sciences, medicine, and technology is paying incredible dividends, not only for the university but truly for the benefit of mankind. All of us can be rightfully proud of that fact."

Billy R. Martin, Ph.D.



“VCU has provided a wonderful environment for development of intellectual property,” says Dr. Martin. “The aspect that has been most rewarding to me is the collaborators who have worked so harmoniously over the years. It is, indeed, an exciting time for the research team.”

Distinguished Inventor of the Year

2007

With so many light bulbs of inspiration going off within the ranks of VCU’s scholars, the university could well be lit by a canopy of chandeliers. Bright ideas are illuminating a range of departments and shining a national spotlight on VCU’s cadre of inventors. And so, when VCU Tech Transfer decided to select its first-ever Distinguished Inventor of the Year—to single out one among many for the inaugural honor—it suspected that the choice would be a difficult one.

Until it reached the nomination of Billy R. Martin, Ph.D.

Chairman of the 170-year-old Department of Pharmacology and Toxicology since 2000, Dr. Martin has distinguished himself, first, by way of the prodigious nature of his work. He holds more than 30 U.S. and foreign-issued patents and patent applications. The licensing revenues from his inventions in the 2006-07 fiscal year totaled \$530,000, representing 20 percent of gross revenue and 44 percent of licensing revenue for the year. More significant than his monetary contributions has been the profound impact his work has had on the lives of countless people. He is an internationally renowned scholar in the field of central nervous system pharmacology, focusing on the biological basis of drug addiction and the effects that drugs of abuse have on the brain. He has made meaningful strides toward understanding pain, and his inventions have the potential to help many patients throughout the world deal with the otherwise debilitating effects of pain, inflammation, cancer, and autoimmune disease, among other afflictions.

An avuncular, energetic, and generous leader, Dr. Martin is a native of North Carolina, earning his bachelor’s and doctorate degrees at the University of North Carolina at Chapel Hill. He arrived at VCU in the early 1970s after completing post-doctoral work at Uppsala University in Sweden and Oxford University in England. One of the nation’s foremost authorities on the addictive nature of certain drugs, Dr. Martin is an advisor to the World Health Organization and consultant to the Partnership for a Drug Free America.

The award is the latest in a long line of honors that Dr. Martin has received over the years. He received the Virginia Outstanding Scientist Award, the Raphael Mechoulam Award for outstanding contributions to cannabinoid research, the VCU Distinguished Scholarship award, and the National Institutes of Health’s prestigious MERIT award for research in drug dependence.

A Laser Focus: Spectrometer Sheds Light on Life Threatening Conditions



Dr. Ivo Torres



Dr. James Turner



Dr. Kevin Ward

Heading to Market

Kevin Ward, M.D. lives in a world where indecision for just a few minutes can have fatal consequences. As an emergency physician in the VCU Medical Center's Emergency Department, Dr. Ward and his colleagues daily confront many critically ill and injured patients, including those suffering from trauma, sepsis, and severe heart failure—conditions that require speedy but accurate diagnoses.

“Unfortunately, the tools we have for rapid diagnosis are really no different than what has existed for 100 years,” Dr. Ward says. “The problem is even bigger for civilian paramedics and combat medics.”

It was a problem that called for a solution—a collaborative one—and so Dr. Ward assembled a team of faculty from a cross-section of VCU departments. Coordinating such problem-solving groups was nothing new. For almost 10 years, Dr. Ward has served as the director of research for VCU's Department of Emergency Medicine and associate director at VCU's Reanimation Engineering Shock Center (VCURES). The Center's focus is to discover and implement new therapeutics and diagnostics to save the lives of the critically ill and injured, and it does so by working collaboratively.

In this case, the team decided to explore the innovations occurring in the field of optical spectroscopy. By using special lasers, detectors, and other instrumentation, the researchers sought to discern the characteristics and relationship of oxygen and hemoglobin in the red blood cell as it passes through tissues. (Hemoglobin is the main carrier of oxygen to cells in the body.) They ultimately determined that, by using a special laser technique called Raman spectroscopy on an area of the patient's oral cavity, they could measure the oxygenation in tissues for the entire body, giving them an exact fingerprint of oxygenated hemoglobin and a means for finding out whether tissues were being supplied enough oxygen to remain healthy. For physicians, nurses, and paramedics, the information could be critical for quickly and accurately determining the best course of treatment.

Given the many advances in the field of spectroscopy over the past few years, the innovation created by Dr. Ward and his VCURES' colleagues, including Drs. James Turner, Wayne Barbee, Ivo Torres, Rao Ivatury, Roland Pittman, and Fred Hawkridge, is moving quickly from the conceptual stage to the marketplace. Recently, a technology company in the Northeast licensed the IP and is proceeding to make prototypes for testing the device in a wide variety of emergency settings.

“We are dealing with issues that are too complex to be solved by one individual or specialty, which is why VCURES was developed,” says Dr. Ward. “This collaborative process allows us to harness the innovative energy and talents at VCU and direct them to a solution. This breakthrough in Raman spectroscopy may ultimately impact millions of lives a year.”

“In an era when bioterrorism is a major concern and when new infectious agents are emerging, it is highly desirable to make safe and efficacious vaccines rapidly. This technology represents a major step in making rapid vaccine assessment possible.”

Dr. John Tew

Model Science: Clinical Trials in Test Tubes



Dr. Mobey Eldin El Shikh and John G. Tew, Ph.D.

Despite the fact that the company that has licensed his technology is based in Orlando, Fla., VCU professor Dr. John G. Tew's laboratory is no Mickey Mouse operation. In fact, Dr. Tew's work involves no mice at all, and that's the point.

A professor of Microbiology and Immunology in VCU's School of Medicine since the 1970s, John Tew, Ph.D., has engineered replicas of the body's immune functions, a breakthrough that now gives drug companies the capacity to measure the effectiveness of new drugs and vaccines without having to test them in humans or, for that matter, laboratory mice.

By melding immunology and engineering, Dr. Tew, together with Dr. Mohey Eldin El Shikh, a post-doctoral research associate, developed in vitro models of human immunity functions that are equivalent to the real thing. The discovery has far-reaching implications. For one, this "clinical trial in a test tube" can significantly speed the rounds of testing necessary to prove a drug's efficacy and safety, thus reducing costs and the time it takes to bring to market. But just as noteworthy, the models reduce the risk associated with animal and human clinical trials.

While his research interests are broad, Dr. Tew has had a particular focus on the study of the immune response to pathogens and cancer cells, particularly how vaccines can remain effective long after a pathogen has been removed from the body. His work with VaxDesign, the Orlando-based company that has licensed Dr. Tew's inventions, was propelled through a major research grant from the Department of Defense and its Rapid Vaccine Assessment Program.

Through Dr. Tew's collaborations with VaxDesign, VCU and the company jointly own three patent applications. You might call it a model partnership—a public-private partnership, that is.

A Splash in the Market

Underwater MP3 Player Is Hit With Swimmers

It may not qualify as a stroke of genius, but the practical implications of the idea has meant more rhythmic strokes—and kicks—in the pool.

The invention is an underwater MP3 player sold under the trade name SwiMP3. It's an iPod of sorts that ends a swimmer's lament—the silent underwater monotony that comes with lap after lap. The inspiration for the idea came from Sheldon M. Retchin, M.D., chief executive officer of the VCU Health System and a long-distance swimmer for more than 30 years. "I wanted the same ability to listen to music while I swam laps," he says, "just like joggers have when they run."

In a quest to overcome his aqua-tedium and inject some music into his routine, Dr. Retchin experimented with an assortment of gadgetry, but nothing quite worked. Then he recalled from medical school that bone-conducted sound is used as a diagnostic tool at the bedside to evaluate hearing impairment—the Weber test. So, he sought out a VCU colleague, Martin Lenhardt, Ph.D., whose expertise in how sound frequencies pass through bones, well, *sounded* encouraging.

The director of the Biomedical Engineering Bioacoustics Laboratory, Dr. Lenhardt's primary focus had been on the effects of manmade noise on fish, reptiles, birds, and mammals. But he was intrigued by Dr. Retchin's concept, and the physician and the biomedical engineer began a collaboration. The result was the creation of an underwater MP3 player.

In 2003, VCU Tech Transfer filed a patent (which was issued four years later) and then licensed the technology to Finis, Inc., which sells the player on its Web site as well as through such major retailers as Amazon.com, Dick's Sporting Goods, and Wal-Mart. The player has a capacity of 250Mb and can hold up to 60 songs. While the sound is transmitted through bone conductivity, it works best using earphones, immersing the swimmer in stereo sound.

In addition to discovering the SwiMP3, Drs. Retchin and Lenhardt discovered something else: together they can make beautiful music.



Sheldon M. Retchin, M.D.



Martin Lenhardt, Ph.D.

In the Market



Dr. Retchin enjoying the SwiMP3 at the pool

Allergic Reaction?

VCU Scientist's Discovery Takes Guesswork Out of Diagnosis

Long before Lawrence B. Schwartz, M.D., Ph.D. was lured to VCU from his Harvard laboratory in 1983, he had already begun earning a reputation as one of most highly regarded researchers in the area of allergy and immunology. And for good reason. His work in identifying tryptase—and the potentially critical role that tryptase plays in helping physicians determine whether a patient is having an allergic reaction, anaphylaxis, due to mast cell activation, or whether a patient has the rare disease called systemic mastocytosis, a disease of having too many mast cells—has led to protocols that more precisely define these conditions through a simple blood test.

For more than a quarter century, Dr. Schwartz has focused his research on human mast cells, the cells that grow in number during allergic reactions (especially anaphylactic reactions) caused by drugs, insect venom, or food. During periods of inflammation, scientists had long known that mast cells release histamine, but because histamine metabolizes so quickly—in just a matter of minutes—doctors typically cannot draw and test a patient's blood in time to measure a discernible increase in histamine levels.

Then a breakthrough. Dr. Schwartz discovered that histamine had some telling company in mast cells. He detected the presence of tryptase, a protease enzyme selectively made in large amounts uniquely by mast cells and one that remains in the bloodstream far longer than histamine. His identification of tryptase finally gave doctors a practical indicator for assessing the severity and perhaps the risk of allergic reactions. Later, by measuring a different form of tryptase, Dr. Schwartz and his colleagues were able to use this test for assessing the total body burden of mast cells, which then became one of the World Health Organization's criteria for diagnosing systemic mastocytosis.

Phadia, a Swedish-based biomedical company specializing in blood test systems that support clinical diagnoses, has licensed Dr. Schwartz's findings through VCU Tech Transfer. Today, the company markets the testing protocol under the name ImmunoCAP Tryptase. The product is available through some 3,000 laboratories in 60 countries around the world and has become a convenient and reliable means for testing whether a patient's symptoms are due to an allergic reaction, i.e. anaphylaxis, and whether a patient has too many mast cells, namely, systemic mastocytosis.

"I have been gratified to see the growing use of these tryptase tests throughout the world because they bring greater accuracy to the diagnosis of anaphylaxis and mastocytosis, two diseases in which mast cells are the key player," says Dr. Schwartz.

Laurence B. Schwartz, M.D., Ph.D.



“I am pleased to be involved in creating a product that contributes to improving the quality of higher education,” says Jim Yucha.



WEAVEonline team: Jim Yucha, Jean M. Yerian, Donna Jovanovich, Donghai Huangfu

In the Market

WEAVEonline Streamlining Internal Process Spawns New Company for VCU Administrators

Turning bright ideas into marketable products is not simply the sole province of scientists. In the case of WEAVEonline, currently used by more than 90 colleges and universities across the country, the inventors were university administrators whose software innovation was designed initially just to help them through the onerous re-affirmation of accreditation process.

In 2001 a team of VCU administrators—including Jean M. Yerian, at the time VCU’s director of Assessment, and Jim Yucha, director of VCU Web Services—began preparing to demonstrate “institutional effectiveness” for the university’s accreditation by the Southern Association of Colleges and Schools. (The certification process is required every 10 years, although recent changes focus on a process of continuous improvement.) The in-house team created an online avenue to gather the massive amounts of information needed from a broad cross-section of faculty and administrators.

This software program—dubbed WEAVEonline (an acronym for Write, Establish, Access, View, and Effect)—not only

streamlined the process but made the team instant heroes within the university when VCU was reaffirmed with no recommendations. In the months to follow, the inventors recognized the software’s appeal when their counterparts at other colleges and universities asked how to get the program. And so the team began marketing the technology. In less than a year, the new venture, still being developed and incubated at VCU, had close to 20 subscribers from higher education institutions throughout the Southeast.

In 2006, Centrieva the company was born, and since then version 4.0 of WEAVEonline has been released. The hosted service now has subscribers from coast to coast and in the Caribbean, including UNC Chapel Hill, Duke, University of Virginia, George Mason, Virginia Tech, Kent State, University of Puerto Rico, and Texas A&M.

With close to 100 customers, WEAVEonline is proving that the “mother of invention” can be a profitable one.

VCU Tech Transfer Team



Ivelina Metcheva, Ph.D., M.B.A.
Director



Maureen C. Kelly, Ph.D.
Licensing Associate



T. Allen Morris, Ph.D., M.B.A.
Licensing Manager



Clara A. Sine
Office Manager

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Founder, Seven Consulting

Ex-officio Members

Francis L. Macrina, Ph.D.
Vice President for Research
Virginia Commonwealth University

Ivelina S. Metcheva, Ph.D., M.B.A.
Director, VCU Tech Transfer
President, Intellectual Property Foundation
Virginia Commonwealth University

About VCU

Virginia Commonwealth University is the state's largest university, with 32,000 students. Located on two campuses in historic downtown Richmond, Virginia, this vibrant, urban university offers more than 200 undergraduate, graduate, and professional programs in 15 schools and one college. VCU also is home to one of the nation's leading academic medical centers and has received recognition from the Carnegie Foundation for its research activity and community engagement.

VCU ranks among the top 100 universities in the country in sponsored research, with awards of \$227 million in fiscal year 2007. Twenty-three of the university's graduate and professional programs are ranked among the best in the nation in *U.S. News & World Report's* "America's Best Graduate Schools."

Many of VCU's 2,000 full-time instructional faculty are recognized nationally and internationally for excellence in the humanities, arts, sciences, engineering, education, social work, business, and all of the health care professions. Dr. John B. Fenn was one of three international scientists to be awarded the 2002 Nobel Prize in chemistry.

The VCU Medical Center is the only academic medical center in Central Virginia and offers state-of-the-art care in more than 200 specialty areas, including organ transplantation, head and spinal cord trauma, burn healing and cancer treatment at the VCU Massey Cancer Center, Virginia's first NCI-designated cancer center.

Together, VCU and the VCU Medical Center are the largest single employer in the Richmond area with 17,000 employees and combined budgets of \$1.9 billion. As an economic engine and urban leader, VCU has forged ties with business, industry, and government in such innovative projects as the VCU School of Engineering and the Virginia BioTechnology Research Park, which encompasses more than 1.2 million square feet of space that house 2,000 scientists, researchers, engineers, and technicians in fields like drug development, medical diagnostics, biomedical engineering, forensics, and environmental analysis.





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