Letter from the Director

Dear Colleagues and Friends,

This past year marked the 15th anniversary of VCU Tech Transfer. Born of modest beginnings and few resources in 1994, this office has evolved considerably over the years, helping undergird VCU’s reputation as among the finest research universities in the nation. Over the years, we have become a valued partner and critical springboard to help bring the best innovations from the drawing board to the marketplace.

The numbers tell part of the story: $14 million in licensing revenue, more than 1,000 invention disclosures, over 200 licensing deals, and 32 startup companies since our creation. This past year, despite a challenging economic environment, our work continued apace. While the number of invention disclosures (93) was down modestly, licenses jumped significantly (from 10 to 18) as did new patent applications (from 81 to 110). Licensing revenues are near $1 million.

Those statistics reflect the extent of our activity, but our work is in many ways less about numbers and more about the talented and dedicated people that make it possible. To celebrate their achievements, we have christened a VCU Inventors Hall of Fame and again this year held our annual “Invented at VCU” reception, where new VCU president Dr. Michael Rao presented the annual Billy R. Martin Innovation Award. The 2009 award went to the team that created WEAVEonline, the software program now used by more than 140 colleges and universities.

The spirit of collaboration that was at the genesis of WEAVEonline is alive throughout the university, both among and across various departments and disciplines. More and more, we are witnessing collaborative explorations that know no boundaries. Researchers in the Medical, Nursing and Pharmacy Schools are working closely with those in the School of Engineering. Cross-disciplinary teams are tackling problems together in ways that create opportunities for innovative solutions. Such is certainly the case with VCURES (VCU Reanimation Engineering Shock Center), which teams together physicians and engineers, clinicians and basic scientists in research that improves survival among trauma patients.

This annual report showcases some of the fruits of that kind of collaboration as well as a diversity of other inventions that have been spawned by the dual necessities of inspiration and perspiration. They represent breakthroughs that help education or improve the lives of countless people. They are as well the source of great pride to the entire VCU community. To these innovators and to the university’s leadership that makes this work possible, we remain both grateful and inspired.

With gratitude,

Ivelina Metcheva, Ph.D., M.B.A.
Director, VCU Tech Transfer
FISCAL YEAR AT A GLANCE

Licensing Revenues $964,033
Invention Disclosures 93
License Agreements 18
Other Research Support Agreements 7
Patents Filed 110
Patents Issued 7
Copyrights Filed 1
Material Transfer Agreements 153
Non-Disclosure Agreements 81
Start-up Companies 1

DEPARTMENTS WITH 10 OR MORE INVENTION DISCLOSURES

Computer Engineering
Emergency Medicine
Mechanical Engineering

DEPARTMENTS WITH 5-9 INVENTION DISCLOSURES

Chemical and Life Science Engineering
Internal Medicine
Biomedical Engineering
Medicinal Chemistry
Anatomy and Neurobiology
Microbiology and Immunology

2009 VCU PATENTS ISSUED

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<tr>
<th>Issue Date</th>
<th>Patent No.</th>
<th>VCU Inventors</th>
<th>Title</th>
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<tbody>
<tr>
<td>7/8/08</td>
<td>US 7,396,590</td>
<td>Kenneth J. Wynne, Ph.D.</td>
<td>Soft Block with Repeat Units that Favor Migration to a Surface and Repeat Units with an Activity of Interest, and Polymeric Articles or Coatings Using Same</td>
</tr>
<tr>
<td>07/22/08</td>
<td>US 7,402,594</td>
<td>Umesh R. Desai, Ph.D. Gunnar T. Gunnarsson, Ph.D.</td>
<td>Sulfated Bis-Cyclic Agents</td>
</tr>
<tr>
<td>10/1/08</td>
<td>MX 260,974</td>
<td>Aron H. Lichtman, Ph.D. Billy R. Martin, Ph.D. Joanne Peart, Ph.D. Peter R. Byron, Ph.D.</td>
<td>Tetrahidrocanabinol THC Solution MDIs and Method of Use</td>
</tr>
<tr>
<td>10/28/08</td>
<td>US 7,442,754</td>
<td>Gary C. Tepper, Ph.D. Dmitry Pestov, Ph.D. Natalia Levit, Ph.D. Gary E. Wnek, Ph.D.</td>
<td>Molecular Imprinting of Small Particles, and Production of Small Particles from Solid State Reactants</td>
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<tr>
<td>10/30/08</td>
<td>AU 2003257031</td>
<td>Sheldon M. Retchin, M.D., MSPH Martin L. Lenhardt, Au.D., Ph.D.</td>
<td>Recreational Bone Conduction Audio Device, System</td>
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<tr>
<td>12/23/08</td>
<td>US 7,468,067</td>
<td>Kevin R. Ward, M.D. Marcus E. Carr, Jr., M.D., Ph.D.</td>
<td>One Hand Tourniquet with Locking Mechanism</td>
</tr>
<tr>
<td>5/1/09</td>
<td>IN 227,207</td>
<td>Martin K. Safo, Ph.D. Richmond Danso-Danquah, Ph.D. Samuel Nokuri Faik N. Musayev, Ph.D. Gajanan S. Joshi, Ph.D. James C. Burnett Donald J. Abraham, Ph.D.</td>
<td>Anti-Sickling Agents</td>
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The year was 2001, and VCU administrators were facing the once-in-a-decade task of assembling vast amounts of data needed for reaffirmation of the university’s accreditation.

Fast-forward to 2009. The Billy R. Martin Innovation Award is bestowed on Yerian, Yucha, Jovanovich, Houngfu and Downing, the team that created WEAVEonline. This assessment and planning system that streamlines the burdensome task of preparing for accreditation was used by VCU in its re-accreditation by the Southern Association of Colleges and Schools. At present, WEAVEonline has been adopted by some 140 colleges and universities across the U.S. and in the Caribbean. Centrieva Corporation was spun off in 2006 to exclusively market, license and further develop WEAVEonline. With more than ten employees, the company is now a thriving business in Glen Allen, Virginia, returning profit to the inventors and the university.

“I’m certain that WEAVEonline never would have left the university without the encouragement and support of VCU Tech Transfer. I’m sure there are many more ‘born of necessity’ efforts at the university now that could possibly become solutions for people outside VCU.”

— JEAN YERIAN

The Billy R. Martin Innovation Award

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Histology, a very visual discipline, requires extensive interaction between teacher and student. To provide students with accurate, individual instruction, associate professor Alice “Dolly” Pakurar compiled digital images from microscopic slides, organizing them into laboratory units for several histology courses. When histology laboratories were eliminated in the medical school, Pakurar teamed with professor John Bigbee to expand the software to meet this void.

With Carole Christman, John Priestly, Chris Stephens and Jeanne Schlesinger, Pakurar and Bigbee organized 1200 images, illustrations, quizzes and study tools into a comprehensive package that became an integral part of the VCU medical, dental, graduate, pharmacy and dental hygiene curricula. Digital Histology offers students a realistic alternative to time spent in the lab, while allowing VCU to save money on microscopes and slides. VCU Tech Transfer licensed the software and the textbook to publisher John Wiley and Sons, Inc. in 2004, with a second edition published in 2009.
George Leichnetz, a professor in the VCU Department of Anatomy & Neurobiology, began by taking photomicrographs of brain tissue to develop a six-part slide presentation known as *Essential Neuroanatomy*. The work covered light and electron microscope neurohistology, skull, spinal cord, and brain imaging to guide medical and graduate students’ learning of neuroanatomy. With help from Canh Doan, a computer science student, Leichnetz then used this presentation as the basis for the development of an interactive computer program supported by a VCU Teaching Excellence Award.

The material proved to be such a successful supplemental teaching aid that Leichnetz was approached by John Wiley and Sons, Inc. with the request to expand the program into a CD with an accompanying manual. The former *Essential Neuroanatomy* thus became *Digital Neuroanatomy* and was licensed to John Wiley and Sons, Inc. by VCU Tech Transfer in 2006.

“A few years ago, VCU had the prescient vision to start highlighting the work of innovative faculty that not only includes publications like *Digital Neuroanatomy*, but also potential cutting-edge therapeutics and novel medical devices. Our collective work demonstrates how VCU is leading the way in many areas of medical education, research, and innovation.”

— George Leichnetz
Sickle cell disease (SCD) is a hereditary blood disorder, affecting over 75,000 people in the United States and millions of people in India, Africa and the Middle East. In an SCD patient, the red blood cells form rigid “sickle” shapes that block capillaries and other small blood vessels, leading to anemia, stroke and cumulative damage to tissues and organs.

In the U.S., people with SCD have an average life expectancy of forty years, poor quality of life and high medical costs. The only drug approved for SCD is hydroxyurea. However, not all patients respond to hydroxyurea, which could also cause life-threatening side effects. Investigators led by professor Donald Abraham (now professor emeritus) and assistant professor Martin Safo have discovered a new, safer and more effective anti-sickling agent, 5HMF. This compound has a potent anti-sickling effect when it binds with intracellular sickle hemoglobin. Preliminary studies in mice show that orally administered 5HMF inhibits the formation of sickled cells in the blood, while carrying a minimal risk. With the patent already issued and the potential for a quick FDA approval, look for this VCU discovery to make medical headlines in the near future.

Martin Safo and Richmond Danso-Danquah are enthusiastic about 5HMF that could help patients with sickle cell disease.

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Each year, the VCU School of Social Work places several hundred student interns in Richmond social service agencies. While the internship learning experience is highly valued, the manual process of matching student applications with agency firms was both costly and labor-intensive.

No wonder Student Intern Connect (SINC) has won high praise for its developers. Tim Davey, Rob Downs, Kimberly Witt, Pamela Arnold, Morgan Huff and Jessica Foster from the VCU School of Social Work worked together to develop an efficient software program that automates the information gathering and matching of student to agencies and completely eliminates the need for copying and mailing. The program is easily accessed from any Internet-connected computer and meshes seamlessly with VCU web page templates and systems. In addition, SINC provides the university with the comprehensive internship data required for annual reporting to the Council on Social Work Education. In fact, SINC has been so well-received at the university that VCU Tech Transfer is currently working with other schools to adopt the software to their internship needs.

Tim Davey is proud of the way SINC has created a successful match between School of Social Work students and social service agencies in Richmond and across Virginia.

Tim Davey, Ph.D., MSW
Associate Dean for Field Studies
School of Social Work

VCU Creative Services Developers:
Rob Downs
Kimberly Witt
Pamela Arnold
Morgan Huff
Jessica Foster

“The SINC system not only helps us to effectively manage the internships of our 600 plus students each year, but it also increases our capacity to more efficiently communicate with the 500 agency sites throughout the state, at a fraction of the cost.”

— Tim Davey
Inventors of the Non-Invasive CVP Monitor are proud their new device will lead to improved patient outcomes and fewer complications. Here they gather in VCURES, the VCU Reanimation Engineering Shock Center, where their idea came to fruition.

Seven VCU researchers have developed a central venous pressure (CVP) measurement device that eliminates the need for a catheter. The implications are far-reaching: more rapid treatment decisions for health care workers and fewer potential complications for patients.

The standard technique for measuring blood pressure inside the heart requires inserting a catheter into a subclavian or internal jugular vein. This method can result in punctured lungs, infection, bleeding and arrhythmias. The new device measures blood volume changes in the brachial vein in the arm and sends that information to a computer, which then determines the CVP. VCU Tech Transfer has licensed the invention to a Pennsylvania start-up company called NeuMeDx, Inc. Now, inventors Kevin Ward, Wayne Barbee, Mohammad Tiba, James Arrowood, Bruce Spiess, Rao Ivatury and Russell Hummel are eagerly awaiting its market release in late 2010.
What is intellectual property?
The term “intellectual property” or “IP” may mean different things to different people. However, for VCU Tech Transfer, the meaning is clear: it is the innovations developed by VCU employees and students that may be valuable to industry or to other academic institutions. This includes inventions, such as new drugs, devices or processes. Intellectual property may also be in the form of computer programs, microscopic images and written materials that are protected by copyrights.

In addition to patentable inventions and copyright-protected IP, there are other types of intellectual property that you should consider disclosing to VCU Tech Transfer:

1. Tangible research materials, which may include antibodies, cell lines, plasmids, transgenic animals, devices and equipment, may also be transferred to industry and other institutions through the technology transfer process.
2. Know-how may also be of great value to industry or to others. A patent may not be worth much more than the value of the paper it is printed on without the knowledge and expertise of the researchers behind it.

The definition of intellectual property is listed in the VCU Intellectual Property Policy (http://www.research.vcu.edu/p_and_G/appolicy.htm). The Policy also details when IP is owned by VCU and when it is owned by the inventors.

What is patentable?
• New chemical compounds, formulations or mixtures
• New uses for existing compounds
• New or improved device or machine
• Method of doing business (by software, algorithm, etc)
• Methods for synthesizing a compound or treating a disease

What is copyrightable?
• Software
• Images
• Books or chapters
• Literary and artistic works

What are tangible research materials?
• Antibodies
• Transgenic mice
• Cells
• Plasmids
• Compounds
• Devices

When should you submit an invention disclosure?
• You can fully describe your discovery and how it works; or
• You plan to give a talk or publish a manuscript or abstract; or
• You are leaving VCU; or
• You have been contacted by a company

If you are in doubt, we urge you to contact Tech Transfer to discuss your discovery

What is intellectual property and what should I do with it?

What to do if you think you may have an invention?
Once you determine that you may have created intellectual property, we encourage you to share it with us by completing an invention disclosure form, which is posted on our web site (www.research.vcu.edu/ott).

When is the best time to submit an invention disclosure?
Most intellectual property is not conceived in a stereotypical flash of a light bulb. Instead, IP is usually developed after many months or years of optimization of the invention or software code. An optimal time to submit an invention disclosure is when you can fully describe your discovery and how it works.

Many researchers submit invention disclosures at the same time they are getting ready to submit a manuscript for publication that describes the discovery. Much of the effort required to complete the invention disclosure is synergistic with preparing a manuscript; both use much of the same information on the methodologies and data related to the discovery. It is a good idea to submit an invention disclosure to our office or contact us before any publication, which includes manuscripts, abstract submissions for meetings, or presentations.

Another event that may trigger submission of an invention disclosure is a pending industry research agreement. An invention disclosure should be submitted ahead of signing a related industry research agreement. This will allow us to inform the company that VCU already has existing IP related to the proposed work.

Invention disclosures may need to be submitted ahead of your departure from VCU. If you further develop your discovery at another institution, we will continue to work together to ensure that commercialization occurs.

Sometimes, we receive invention disclosures after a publication has occurred. While publication without patent protection may hamper our ability to commercialize a patentable invention, it certainly does not prevent us from commercializing copyrights and tangible research materials. In fact, a number of VCU researchers have been contacted by potential industry partners who have seen their publications. We encourage you to submit an invention disclosure on your copyright or tangible research material.

We will be glad to talk with you and advise you on the preparation of invention disclosures, on the different types of intellectual property protection and commercialization.

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