BREAKTHROUGHS

UNIVERSITY OF VIRGINIA PATENT FOUNDATION
2008 ANNUAL REPORT

PATENT FOUNDATION
UNIVERSITY OF VIRGINIA

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ON THE COVER
PluroGel™, an innovative antibacterial gel developed by 2008 Edlich-Henderson Inventor of the Year George T. Rodeheaver, Ph.D., and his collaborators.
Photo by Jackson Smith

A NEW YEAR, A NEW LOOK, A NEW LEAF

LETTER FROM THE EXECUTIVE DIRECTOR

Photo by Stephanie Gross

This year, the University of Virginia Patent Foundation is celebrating its 30th year of dedicated service to the University's faculty, staff and student inventors. In that time, the Patent Foundation has generated more than $36.6 million in revenues for the University and distributed an additional $18.4 million to University inventors and their collaborators. In fiscal year 2008, inventors throughout the School of Medicine, the School of Engineering and Applied Science, the College and Graduate School of Arts & Sciences, and the School of Architecture disclosed 178 of their research discoveries to the Patent Foundation. In addition, 12 U.S. patents were issued to U.Va. inventors, and 13 copyrights were registered to U.Va. authors.

As for our new look, you may already have noticed that this year's annual report is a departure from the reports of the past several years. The Patent Foundation is also in the midst of rolling out its new Web site, a significantly revamped and redesigned *www.uvapf.org*. The new site offers completely new, more-useful content for inventors and members of industry and, with its streamlined look, is much easier to navigate. These tools were designed with you in mind, so we encourage you to let us know what you think by filling out the feedback form on our new site or e-mailing *feedback@uvapf.org*.

I'm also proud to announce that the UVAPF is going "green." All Patent Foundation communications and marketing materials, including this very report, are being designed with an eye to eco-friendliness. For example, this report's new dimensions minimize printer waste, and it was printed on Forest Stewardship Council-certified mixed-resource paper, by a Council-certified printer, using environmentally friendly inks. We know that many of our inventors and licensees are working to make the environment cleaner through a focus on sustainable and renewable resources, and we are glad to support them in this effort.

Robert S. MacWright, Ph.D., Esq.
Executive Director and CEO
University of Virginia Patent Foundation

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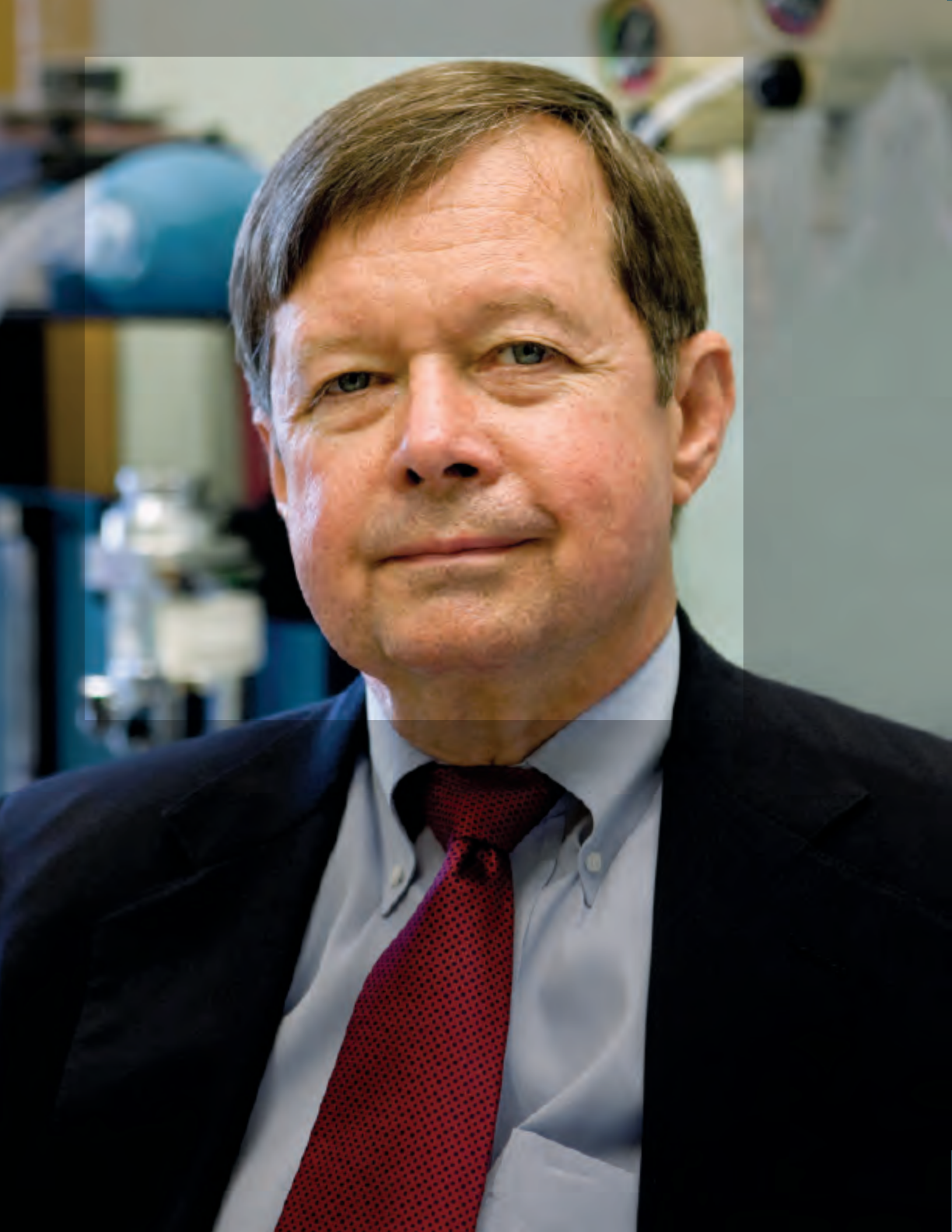


MY BREAKTHROUGH IS

CHANGING THE LIVES OF THOUSANDS OF BURN VICTIMS

GEORGE T. RODEHEAVER, PH.D.

2008 EDLICH-HENDERSON INVENTOR OF THE YEAR
PLASTIC SURGERY

It's frightening to think that only 15 years ago burn victims faced often insurmountable risks of infection, even in quality treatment facilities. And patients suffering from chronic wounds, such as diabetic ulcers, pressure ulcers and venous leg ulcers, were out of options.

That was then. Now, we have PluroGel™.

Invented by George T. Rodeheaver, Ph.D., Richard F. Edlich, M.D., Ph.D., and Sherry Sutton, PluroGel™ is a revolutionary antimicrobial gel designed to reduce the suffering of patients with severe burns and chronic wounds. The topical treatment is unique in that it thickens at high temperatures (such as body temperature) and liquefies at cooler temperatures. As a result, PluroGel™ effectively delivers healing medication when applied to the body but is easily removed by cool water, making it much less painful to remove than other existing therapies, which unfortunately have to be scraped off.

This groundbreaking technology, for which the U.Va. Patent Foundation received a U.S. patent in 1997, has been used to treat patients throughout the U.Va. Health System. More than 2,000 patients — some referred from up to 400 miles away to receive the treatment — have benefited from the invention.

"The technology has had a dramatic impact so far," says Rodeheaver, distinguished professor in U.Va.'s Department of Plastic Surgery and director of U.Va.'s Wound Healing Research Laboratory. "The fact is that in our burn center we have been able to eliminate infection, which was the leading cause of death 15 years ago. And we have had great success in healing chronic wounds, many of which [using traditional remedies] had not healed for numerous years."

In honor of Rodeheaver's contributions in advancing this innovative wound-healing technology, which he developed over more than three decades of research in the U.Va. Health System, the U.Va. Patent Foundation named him the 2008 Edlich-Henderson Inventor of the Year.

"Each year, the Patent Foundation selects a U.Va. researcher whose contributions have had an important impact on society as well as their field as the Edlich-Henderson Inventor of the Year," says Robert S. MacWright, J.D., Ph.D., executive director of the Patent Foundation.

Photo by Jane Haley

"THE FACT IS THAT IN OUR BURN CENTER WE HAVE BEEN ABLE TO ELIMINATE INFECTION, WHICH WAS THE LEADING CAUSE OF DEATH 15 YEARS AGO."

FROM LEFT TO RIGHT: Jars of PluroGel™; Rodeheaver tells the story of PluroGel™ at the Patent Foundation's 2008 awards banquet. *Photos by Jane Haley and Stephanie Gross*

"This year," MacWright adds, "Dr. Rodeheaver was chosen for this top honor because of his work to reduce the suffering and improve the recovery of burn victims and patients with chronic wounds. This work has made a big difference for patients at the U.Va. Health System, and Dr. Rodeheaver's continued efforts will bring its benefits to patients everywhere."

Rodeheaver, the Richard F. Edlich Professor of Biomedical Research, says he is especially thrilled to have been selected as the winner of an award named in part for his friend, co-inventor and long-time collaborator. "This award is not only an honor for me but also a tribute to Dr. Edlich, who has made so many contributions to emergency medicine over the years," he says.

Building on his success achieved within the U.Va. Health System, Rodeheaver has worked diligently to commercialize the technology through a start-up company, PluroGen™ Therapeutics Inc., which he founded with Associate Professor Adam J. Katz, M.D., also of the Department of Plastic Surgery. PluroGen™ is currently seeking Federal Drug Administration approval of the product so that it can be made available commercially to the public, beyond the University hospital.

After 36 years at the University and having written more than 200 journal articles, Rodeheaver says he continues to enjoy pushing forward on the frontiers of science. According to the faculty member-cum-inventor and now entrepreneur — who considers himself to be "old-school" — technology transfer is an exciting new path for his research.

"It is a new paradigm for me; it's unique and exciting," he says. "Entrepreneurship in particular is something I see as a brand-new adventure."

Rodeheaver was honored May 19 at the Patent Foundation's annual awards banquet, which also celebrated those U.Va. inventors who received U.S. patents and copyrights in 2007. *See page 16.*

George T. Rodeheaver, Ph.D., 2008 Edlich-Henderson Inventor of the Year, is pictured in the burn unit at the U.Va. Medical Center, where his wound-healing technology has helped more than 2,000 patients.
Photo by Jackson Smith

NOMINATOR'S MESSAGE

Dr. George T. Rodeheaver is the only full-time basic scientist in a department of plastic surgery in the United States. During his clinical research career at the University of Virginia Health Sciences Center, he has made revolutionary advances in burn care and trauma wound care. When I became the recipient of the highest academic honor from the American College of Emergency Physicians, the James D. Mills Award, I had the honor of co-authoring with Dr. Rodeheaver a two-part peer-reviewed publication in the *Journal of Emergency Medicine* that highlights our revolutionary advances in trauma wound care during the past 40 years.

Dr. Rodeheaver has obviously played a leadership role in improving trauma and burn wound care with his exciting new patented cream for burn wounds. In addition, he joined me as a co-author of a citizens' petition to the U.S. Food and Drug Administration to ban the use of cornstarch on surgical and examination gloves in our country. If approved by the FDA, the ban we petitioned for is likely to save the lives of thousands of patients and health care workers across the nation.

The Edlich-Henderson Inventor of the Year Award is a wonderful way to recognize Dr. Rodeheaver for decades of scientific achievements. He is a star!

—Richard F. Edlich, M.D., Ph.D.

THE EDLICH-HENDERSON INVENTOR OF THE YEAR AWARD

The highest honor bestowed by the U.Va. Patent Foundation, the Edlich-Henderson Inventor of the Year award recognizes an inventor or team of inventors each year whose technology has proven to be of notable value to society. Named for U.Va. Professor Emeritus Richard F. Edlich, M.D., Ph.D., and Christopher J. Henderson, the award is a tribute to their enduring support of and commitment to the University and its inventors. Award winners receive a $10,000 cash prize and formal recognition at the Patent Foundation's annual awards banquet.

AWARD WINNERS

2008 George T. Rodeheaver, Ph.D.
2007 Wladek Minor, Ph.D.
2006 George T. Gillies, Ph.D.
2005 Benjamin M. Gaston, M.D.
John F. Hunt, M.D.
2004 Haydn N.G. Wadley, Ph.D.
2003 William A. Petri Jr., M.D., Ph.D.
Barbara J. Mann, Ph.D.
2002 Joel M. Linden, Ph.D.
2001 Doris Kuhlmann-Wilsdorf, Ph.D.
2000 Ronald P. Taylor, Ph.D.
1999 John C. Herr, Ph.D.
1997 Richard L. Guerrant, M.D.
Timothy L. Macdonald, Ph.D.
1996 Jessica J. Brand
Patrice G. Guyenet, Ph.D.
Richard D. Pearson, M.D.
Janine C. Jagger, Ph.D.
1995 Donald F. Hunt, Ph.D.
Jeffrey Shabanowitz, Ph.D.
George C. Stafford Jr., Ph.D.
1994 Gerald L. Mandell, M.D.
Gail W. Sullivan
1993 Joseph Larner, M.D., Ph.D.
1992 Robert M. Berne, M.D.
Luiz Belardinelli, M.D.
Rafael Rubio, Ph.D.

BREAKTHROUGH RESEARCH

BY THE NUMBERS

UVAPF YEAR AT A GLANCE

FISCAL YEAR 2008

INVENTIONS

178 Invention disclosures by U.Va. inventors

PATENTS

179 Provisional patent applications filed

69 U.S. applications* filed

12 U.S. patents issued

266 U.S. applications* pending

COPYRIGHTS

13 Copyrights registered to U.Va. authors

DEALS

65 Total deals with companies and institutions

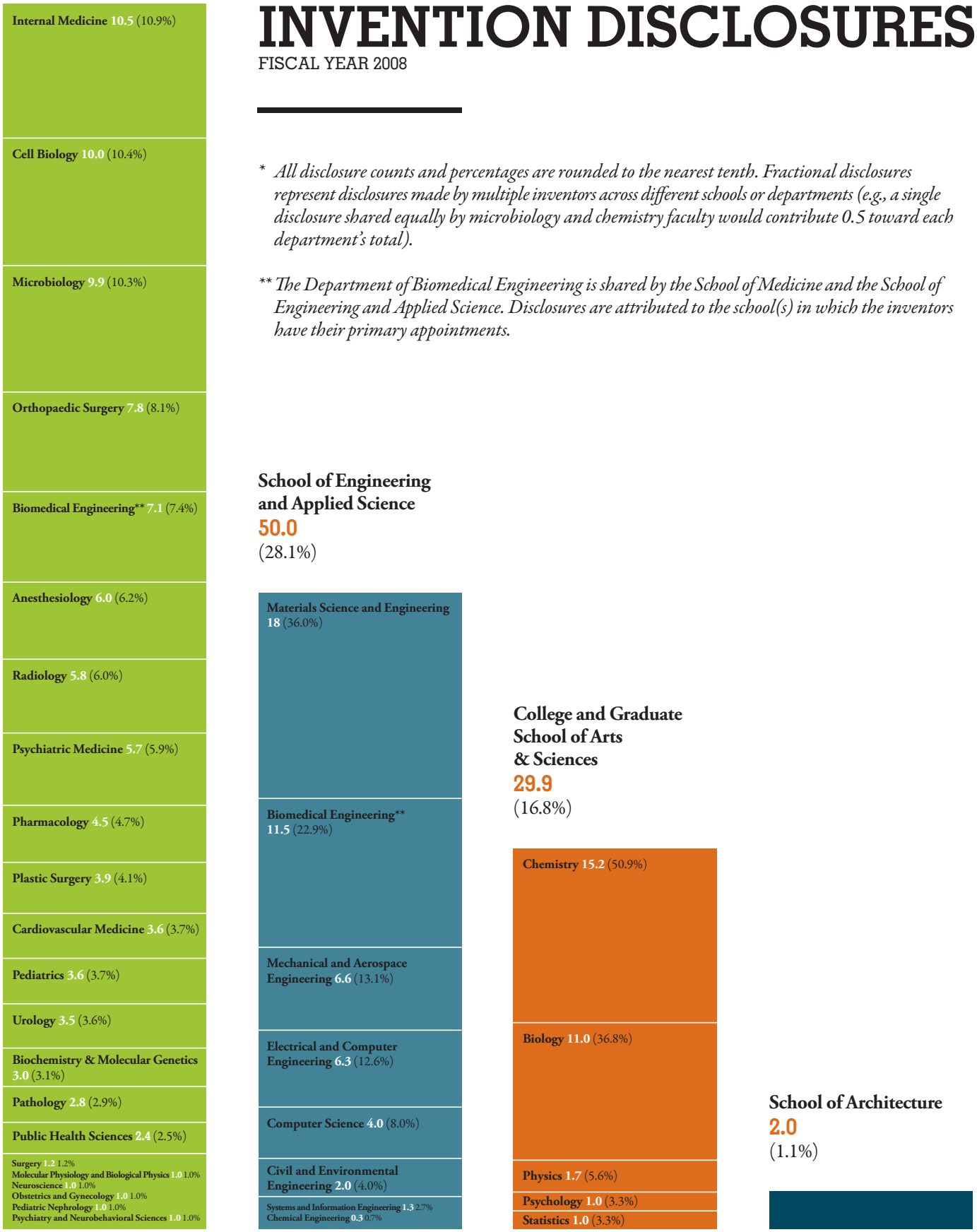
**Includes U.S. designations in Patent Cooperation Treaty (international) patent applications*

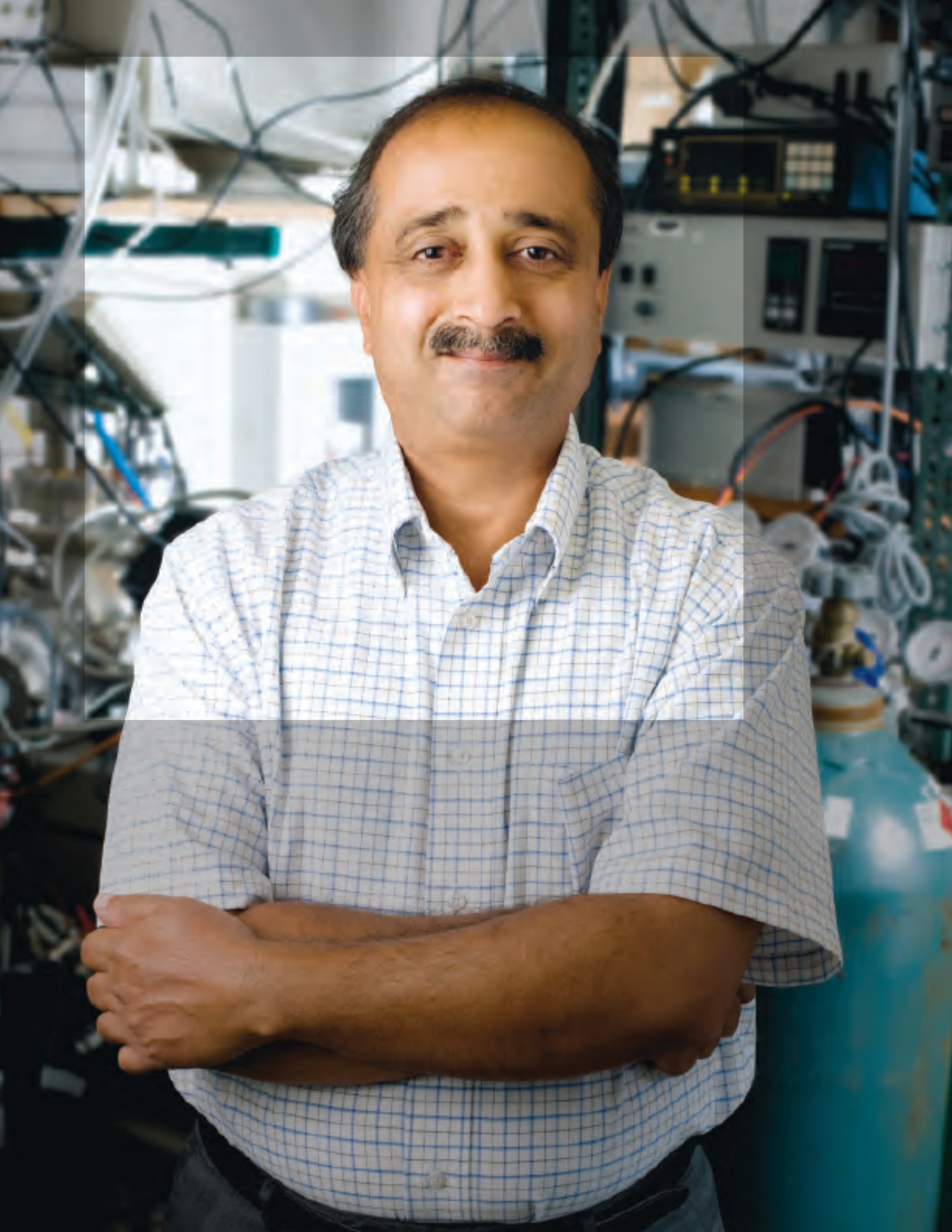
INVENTION DISCLOSURES

FISCAL YEAR 2008

* *All disclosure counts and percentages are rounded to the nearest tenth. Fractional disclosures represent disclosures made by multiple inventors across different schools or departments (e.g., a single disclosure shared equally by microbiology and chemistry faculty would contribute 0.5 toward each department's total).*

** *The Department of Biomedical Engineering is shared by the School of Medicine and the School of Engineering and Applied Science. Disclosures are attributed to the school(s) in which the inventors have their primary appointments.*





MY BREAKTHROUGH IS

BRIDGING THE GAP TO ALTERNATIVE FUELS

BELLAVE S. SHIVARAM, PH.D.

PHYSICS

If current technology commercialization had a Holy Grail, it would probably be an effective alternative to gasoline. Over the past few years, scientists have made considerable progress toward reducing consumers' dependence on fossil fuels, but no one alternative has emerged that is as efficient — and even as affordable — as gasoline.

Enter Bellave S. Shivaram, Ph.D., an associate professor of physics at U.Va. whose recent discovery of a new class of hydrogen storage materials could lead to higher-performing hydrogen fuel cells with a wide variety of applications. The novel materials, developed in collaboration with post-doctoral fellow Adam B. Phillips, Ph.D., are capable of absorbing approximately twice as much hydrogen as are other known materials. And because they can store and transport hydrogen at room temperature and low pressures, these new materials are also considerably simpler and less expensive to produce than other known alternatives.

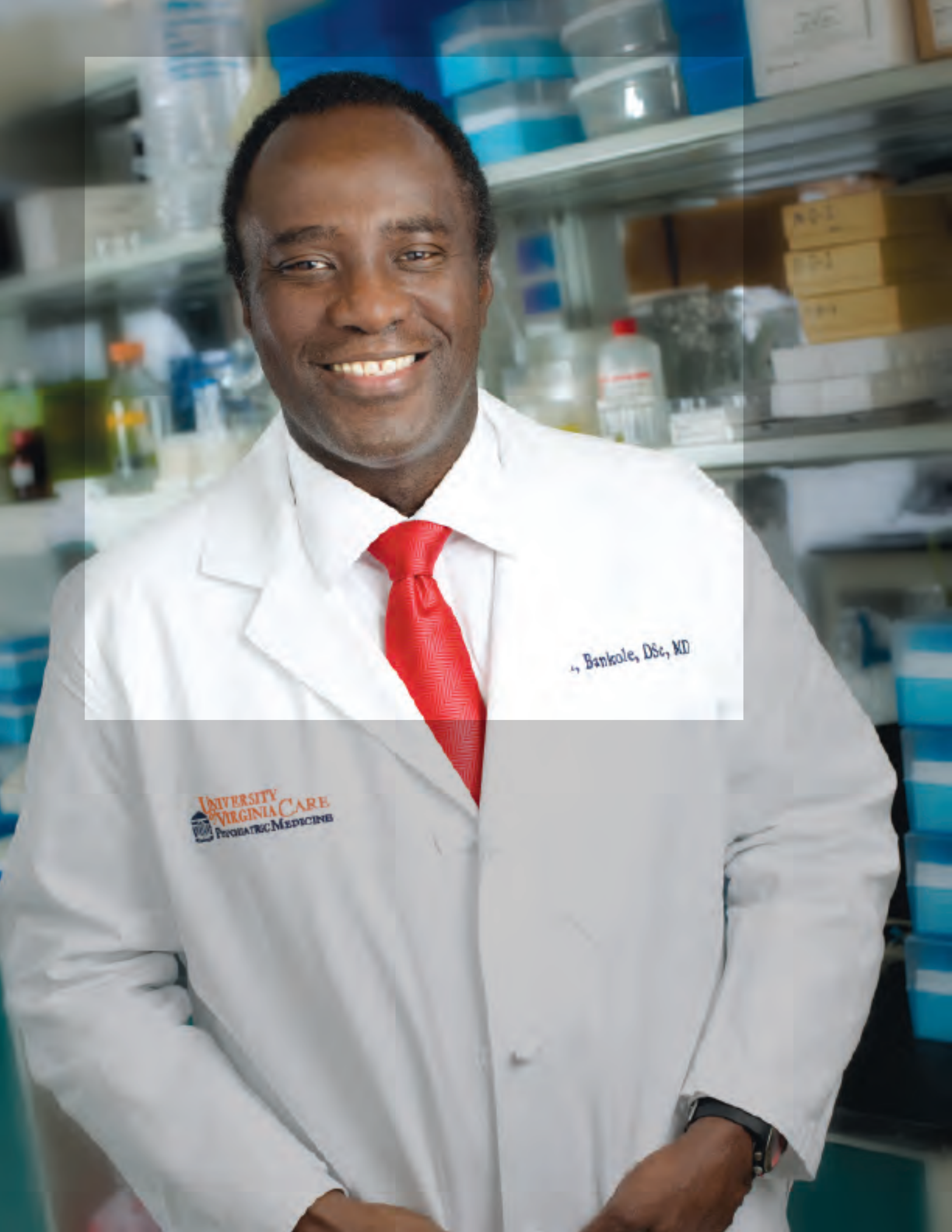
"In terms of hydrogen absorption, these materials could prove a world record," says Phillips, who was a doctoral student at the time of the discovery. "Most materials today absorb only 7–8 percent of hydrogen by weight, and only at cryogenic [extremely low] temperatures. Our materials absorb hydrogen up to 14 percent by weight at room temperature. By absorbing twice as much hydrogen, the new materials could help make the dream of a hydrogen economy come true."

The U.Va. Patent Foundation has filed a Patent Cooperation Treaty (international) patent application on this breakthrough technology and is currently working to find a company to take it to the marketplace.

"These materials are the next generation in hydrogen fuel storage materials, unlike any others we have seen before," Shivaram says. "They have passed every litmus test that we have performed, and we believe they have the potential to have a large impact."

The U.Va. physicists presented their findings at the November 2007 International Symposium on Materials Issues in a Hydrogen Economy in Richmond, Va., and published their work in the March 14, 2008, issue of *Physical Review Letters*, published by the American Physical Society. Their research is supported by the National Science Foundation and the U.S. Department of Energy and has been highlighted in *Science* (AAAS, U.S.), *Chemistry World* (Royal Society of Chemistry, U.K.) and *Materials World* (Institute of Materials, Minerals and Mining, U.K.), and by Japan's Nikkei Business Publications and more than 300 Web sites and online publications.

Photo by Jackson Smith


Bankole, DSc, MD
UNIVERSITY of VIRGINIA CARE
PSYCHIATRIC MEDICINE

MY BREAKTHROUGH IS

SIGNALING THE DECLINE OF ALCOHOLISM

BANKOLE A. JOHNSON, M.D., PH.D., D.SC.

PSYCHIATRIC MEDICINE

When Bankole Johnson, M.D., Ph.D., D.Sc., first presented his ideas for a drug to cure alcoholism two decades ago — ideas that involved a major shift in the way scientists thought about the brain and its neurotransmitters — he was laughed right out of the lecture hall.

"Most people assume addiction has to do with moral willpower," says Johnson, Alumni Professor and chairman of the U.Va. Department of Psychiatry and Neurobehavioral Sciences. "However, there is a biological component of alcoholism — just as there is with diabetes or high blood pressure. Alcoholism is a disease of the brain."

While Johnson says this idea has gained a lot of traction over the past 20 years as the body of research on addiction has become increasingly extensive, he describes his initial breakthrough research as a series of "leaps of faith."

A neuropharmacologist and basic scientist by training, Johnson had studied the pharmacological effects of alcohol, but a simple observation during his time at the University of Oxford is what led him to press the matter further: Why, when it takes 20–30 minutes for alcohol to have a viable effect on the body, do some people seem to get a "buzz" even before their first sip? This question ultimately led Johnson to determine that, counter to then-existing theory, the brain's serotonin-3 receptor had to be responsible for such rapid signaling of the effect.

Having determined the nature of the relationship between addiction and the brain's neurotransmitters, Johnson set out to test a drug that would serve, in effect, as an "antidote" to the alcoholism disease. Currently in phase 2 clinical testing, one of his inventive treatments combines existing drugs topiramate, typically used to treat seizures and migraine headaches, and ondansetron, used to treat chemotherapy-induced nausea and vomiting. By testing these drugs alone and in combination, Johnson is seeking to target the treatments to alcoholics with certain types of genetic polymorphisms, present in approximately 30–65 percent of all alcoholics. The targeted treatments could herald a new vista for individualized drug treatment for alcoholism.

"With these drugs, we hope to take alcoholism from an often hopeless disease to a disease people often recover from," he says.

The U.Va. Patent Foundation has filed patent applications within the United States and worldwide on Johnson's innovative drug treatments. And in an effort to move these technologies to the marketplace, Johnson and his collaborators have created a biotechnology start-up company, ADial™ Pharmaceuticals.

To Johnson, invention and discovery play a key role in his career as a physician and researcher. "What else is there, if there's no thrill in discovery?" he asks. "Knowing something for the first time is a thrill on its own, and as a physician scientist, finding something that relieves the suffering of humankind is the greatest reward I can think of."

As for his critics, Johnson notes, "They don't laugh anymore."

Photo by Jackson Smith

CELEBRATING UNIVERSITY OF VIRGINIA INVENTORS

FROM LEFT TO RIGHT: Donald F. Hunt, Ph.D., University Professor of Chemistry and Pathology, talks with 2008 Edlich-Henderson Inventor of the Year George T. Rodeheaver, Ph.D., at a reception before the ceremony; Patent Foundation Board Chairman Erik L. Hewlett, M.D., addresses attendees; and S. Pace Lochte, director of the U.Va. Office of Economic Development, enjoys the ceremony. *Photos by Stephanie Gross*

The U.Va. Patent Foundation honored the 2008 Edlich-Henderson Inventor of the Year and those University inventors who received U.S. patents and copyrights in 2007 at a special ceremony held the evening of Monday, May 19, at the Boar's Head Inn in Charlottesville, Va.

George T. Rodeheaver, Ph.D., distinguished professor in U.Va.'s Department of Plastic Surgery, accepted the 2008 Edlich-Henderson Inventor of the Year Award and spoke before a crowd of approximately 100 inventors and guests. Rodeheaver, the Richard F. Edlich Professor of Biomedical Research, was chosen for the revolutionary wound-healing technology — trade-named PluroGel™ — he developed over more than three decades of research in the U.Va. Health System. *For more about the 2008 Edlich-Henderson Inventor of the Year, see page 4.*

Patent Foundation Executive Director Robert S. MacWright, J.D., Ph.D., and Board Chairman Erik L. Hewlett, M.D., presented more than 70 researchers with award certificates noting their patented invention or copyrighted work. *For a list of the U.S. patents issued to U.Va. inventors in 2007, see the chart on the opposite page.*

U.S. PATENTS ISSUED TO U.VA. INVENTORS IN 2007

U.S. PATENT NO.	TITLE	U.VA. INVENTOR(S)
7,157,480	Use of Pramipexole to Treat Amyotrophic Lateral Sclerosis	James P. Bennett Jr., M.D., Ph.D.
7,163,799	Neuromedin U Receptor NMUR2 and Nucleotides Encoding It	Kevin R. Lynch, Ph.D.
7,164,268	Method and Apparatus for Spin-Echo-Train Magnetic Resonance Imaging Using Prescribed Signal Evolutions	John P. Mugler III, Ph.D., James R. Brookeman, Ph.D.
7,169,818	Lysophosphatidic Acid Receptor Agonists and Antagonists	Kevin R. Lynch, Ph.D., Timothy L. Macdonald, Ph.D., Christopher E. Heise, Ph.D., Mark D. Okusa, M.D.
7,172,760	Compositions and Methods for Prevention and Treatment of Uncontrolled Formation of Intravascular Fibrin Clots	Ronald P. Taylor, Ph.D.
7,174,200	Optimized High-Speed Magnetic Resonance Imaging Method and System Using Hyperpolarized Noble Gases	Michael Salerno, M.D., Ph.D., John P. Mugler III, Ph.D., James R. Brookeman, Ph.D.
7,200,243	Spectral Mixture Process Conditioned by Spatially-Smooth Partitioning	Daniel M. Keenan, Ph.D.
7,211,348	Multifunctional Battery and Method of Making the Same	Haydn N.G. Wadley, Ph.D., Douglas T. Queheillalt, Ph.D.
7,214,665	2-propynyl Adenosine Analogs Having A_{2A} Agonist Activity and Compositions Thereof	Joel M. Linden, Ph.D., Jayson M. Rieger, Ph.D., Timothy L. Macdonald, Ph.D., Gail W. Sullivan, Lauren J. Murphree, Ph.D., Robert A. Figler, Ph.D.
7,223,325	Method for Orthogonal Analyte Stacking/ Injection Systems in Electrophoresis	James P. Landers, Ph.D., James F. Palmer, Ph.D.
7,226,913	Pharmaceutical Compositions Having A_{2A} Adenosine Receptor Agonist Activity	Joel M. Linden, Ph.D., Gail W. Sullivan, Ian J. Sarembock, M.D., Timothy L. Macdonald, Ph.D., Mark D. Okusa, M.D., Irving L. Kron, M.D., W. Michael Scheld, M.D.
7,229,258	Streamlined Unobstructed One-Pass Axial-Flow Pump	Houston G. Wood III, Ph.D., Paul E. Allaire, Ph.D., Steven W. Day, Ph.D., Xinwei Song, Ph.D., Alexandrina Untaroiu, Ph.D., Amy L. Throckmorton, Ph.D.
7,230,073	Sperm Specific Proteins	Zhonglin Hao, M.D., Ph.D., John C. Herr, Ph.D., Friederike L. Jayes, Ph.D., Jagathpala Shetty, Ph.D., Michael J. Wolkowicz, Ph.D.
7,235,295	Polymeric Nanofibers for Tissue Engineering and Drug Delivery	Cato T. Laurencin, M.D., Ph.D., Lakshmi S. Nair, Ph.D., Subhabrata Bhattacharyya, Ph.D.
7,241,790	Compounds Active in Sphingosine 1-Phosphate Signaling	Kevin R. Lynch, Ph.D., Timothy L. Macdonald, Ph.D.
7,255,858	Enhancing the Efficacy of Immunotherapies by Supplementing with Complement	Ronald P. Taylor, Ph.D., Margaret A. Lindorfer, Ph.D., Michael D. Solga, Adam D. Kennedy, Ph.D.
7,261,511	Robotic Pick Up and Delivery System	Robin A. Felder, Ph.D., Randy A. Turner, J. William Holman, Christopher A. Estey, Ph.D.
7,288,326	Active Energy Absorbing Cellular Metals and Method of Manufacturing and Using the Same	Dana M. Elzey, Ph.D., Haydn N.G. Wadley, Ph.D.
7,294,409	Medical Devices Having Porous Layers and Methods for Making Same	Whye-Kei Lye, Ph.D., Kareen L. Looi, J.D., M.B.A., Michael L. Reed, Ph.D.

MY BREAKTHROUGH IS

ENHANCING BIOMEDICAL IMAGING THROUGH SUSTAINABLE DESIGN

CASSANDRA L. FRASER, PH.D.

CHEMISTRY

"When you think of metal, you probably think of a hunk of metal," says Cassandra L. Fraser, Ph.D. "But there are metal compounds everywhere in nature — giving color and luminescence and serving as catalysts for enzymes throughout the natural world."

A professor of chemistry at U.Va., Fraser is now harnessing these properties and many others through the controlled synthesis of what she calls "polymeric metal complexes." Bio-inspired and often composed of sustainable materials, many of these metallopolymers are designed to be "greener" and more biocompatible than existing materials with similar properties.

Together with graduate students Guoqing Zhang and Jianbin Chen, Fraser has developed one class of biomaterials with the potential to impact imaging techniques useful in many areas of biomedical research, including cancer, diabetes and cardiovascular research. The U.Va. Patent Foundation has filed a U.S. patent application on these new materials — which combine a boron dye with poly(lactic acid), a polymer derived from corn that is common in medical and sustainable packaging applications.

The novel materials exhibit several visually stunning and useful optical properties, including phosphorescence — visualized as an afterglow following exposure to ultraviolet (UV) light — that exists at room temperature and is extinguished in the presence of oxygen. Fraser's team is also able to fine-tune the polymers' colorful displays across the spectrum. Together, these properties enable the polymers to serve as powerful optical imaging agents that could aid scientists in visualizing cellular and physiological processes and identifying tissues with low levels of oxygen, as in tumors and vascular blockages. In addition, while traditional dyes can degrade after being exposed to a microscope's UV light, this class of polymers retains its brightness and therefore utility. It has served as a successful imaging agent in cells, in tissues and *in vivo*.

"There is a lot of potential for biomaterials that exist at the interface of biomedicine and sustainable design," Fraser says. "If we continue to explore areas that are fertile for new discoveries and technologies, sometimes things come together in exciting and surprising ways."

Photo by Jackson Smith

MY BREAKTHROUGH IS

REVOLUTIONIZING ACCESS TO THE HUMAN HEART

SRIJOY MAHAPATRA, M.D.

BIOMEDICAL ENGINEERING AND INTERNAL MEDICINE

Sometimes what makes a technology a "breakthrough" is the fact that it doesn't break through at all. Take, for example, the novel epicardial ablation techniques developed by Srijoy Mahapatra, M.D. While current treatments for heart problems such as congestive heart failure center on surgical techniques, he seeks to treat the heart from the outside, without breaking through the heart's tissue.

"The heart is surrounded by a 1-millimeter wide, fluid-filled sac — that, by the way, you can't even see on X-ray," says Mahapatra, an assistant professor of internal medicine and biomedical engineering at U.Va. "Our new tools allow us to go through that sac to the epicardium [the heart's outermost tissue] without actually entering the heart, reducing patients' risk and recovery time."

Among these new tools is an "epi-needle access system," which includes a retractable needle and a sensor capable of measuring the pressure and pressure frequency of surrounding tissues. Developed with George T. Gillies, Ph.D., this revolutionary access system acts as a scope and thus requires only one 3-millimeter incision, making it much less invasive than surgical methods.

"Any time you reduce the risks of a procedure, as we have done with the epi-needle, you make treatment available to more people," Mahapatra says. "Because this technology is less invasive, we can use it to treat people who are currently not being treated."

That is good news for patients suffering from heart failure, atrial fibrillation, ventricular tachycardia and esophageal failure, all of whom could be helped by the scientists' new epicardial technology. With its advanced precision, the epi-needle can also be used for safer pacemaker insertion, ablation techniques, stem cell delivery and drug delivery throughout the body, and it will reduce the risk of stroke associated with atrial fibrillation.

The epi-needle is the first of a suite of epicardial technologies developed by Mahapatra and Gillies and disclosed to the U.Va. Patent Foundation.

"We are fortunate here at U.Va. to have inventive medical doctors like Srijoy, who can foresee novel solutions to clinical needs," says Gillies, research professor of mechanical and biomedical engineering at U.Va. "It is indeed a pleasure to work with him on these exciting technologies."

Mahapatra sees invention as an important and natural part of his work, and he encourages fellow clinicians to embark on paths to discovery through open, weekly discussions held in his office.

"I love taking a problem," he says, "and solving it by creating a tool that you can use with your hands to help patients."

Photo by Jackson Smith

BRINGING U.VA. INVENTIONS TO INDUSTRY

UVAPF CO-HOSTS FIRST INNOVATION SHOWCASE

In an effort to reach out to the Washington, D.C., technology community and promote the breakthrough discoveries of U.Va. researchers throughout the commonwealth of Virginia, the U.Va. Patent Foundation co-founded and co-hosted the first Virginia Innovation Showcase, held November 2, 2007, in McLean, Va. The showcase drew faculty inventors from eight Virginia colleges and universities and approximately 250 attendees.

"The Innovation Showcase was a great networking opportunity and a chance to see all of the exciting research and design going on in Virginia," says Shayn M. Peirce-Cottler, Ph.D., assistant professor of biomedical engineering at U.Va. "The environment was very inspiring from the inventor's point of view, and the focus on commercialization was energizing."

Peirce-Cottler was among the six U.Va. research teams to exhibit at the showcase, where she presented three technologies she developed with Bradley W. Kesser, M.D., assistant professor of otolaryngology at U.Va. These technologies included a device designed to insert "ear tubes" in the eardrums of children prone to ear infections, an anatomical model designed to assist with training for this device and a second device for inserting similar tubes into infected sinuses.

Virginia Secretary of Technology Aneesh P. Chopra, who delivered the keynote address at the showcase, cites the role of transferring technologies like Peirce-Cottler's to industry as particularly important to the commonwealth's economic development.

"Academic technology transfer is playing an increasingly vital role in the continual development of Virginia's high-tech community, and the University of Virginia Patent Foundation is a leading provider of innovative technologies across several disciplines," Chopra says. "By supporting U.Va. inventors and start-ups and building strong relationships with local industry, the U.Va. Patent Foundation is advancing promising early-stage technologies to the marketplace, fostering new jobs and bringing in new investment capital throughout the commonwealth."

The Patent Foundation joined with seven other academic technology transfer offices — all members of the Academic Licensing Community of Virginia (ALCOVe) — and the Business Alliance of George Mason University to create the showcase as an opportunity to exhibit the early-stage technologies in development throughout Virginia's academic sector. The 2008 event, dubbed the Mid-Atlantic Innovation Showcase, will be held Friday, November 14, and will include academic institutions throughout Virginia, D.C. and Maryland, as well as federal laboratories.



FROM LEFT TO RIGHT: Shayn M. Peirce-Cottler, Ph.D., of the U.Va. Department of Biomedical Engineering demonstrates an innovative new device; Virginia Secretary of Technology Aneesh P. Chopra participates in a panel discussion; Louis A. Bloomfield, Ph.D., of the U.Va. Department of Physics discusses his novel material. *Photos by Vicky Pombo*

"ACADEMIC TECHNOLOGY TRANSFER IS PLAYING AN INCREASINGLY VITAL ROLE IN THE CONTINUAL DEVELOPMENT OF VIRGINIA'S HIGH-TECH COMMUNITY, AND THE UNIVERSITY OF VIRGINIA PATENT FOUNDATION IS A LEADING PROVIDER OF INNOVATIVE TECHNOLOGIES ACROSS SEVERAL DISCIPLINES."

—ANEESH P. CHOPRA, VIRGINIA SECRETARY OF TECHNOLOGY

U.VA. INVENTIONS EXHIBITED

Louis A. Bloomfield, Ph.D.	Physics	A novel, supportive material designed to stabilize tables, secure cargo and more
Cassandra L. Fraser, Ph.D.	Chemistry	A new class of photoluminescent materials that serve as imaging agents
George T. Gillies, Ph.D.	Mechanical and Aerospace Engineering, Biomedical Engineering, Physics	A method of increasing efficiency of turbomachinery through improved control of passive electrostatic gas flows
Tatiana M. Globus, Ph.D.	Electrical and Computer Engineering	A method of utilizing terahertz energy for the screening and detection of biological threats
Mool C. Gupta, Ph.D.	Electrical and Computer Engineering	A nanocomposite foam designed to shield sensitive electronic devices from electromagnetic interference
Shayn M. Peirce-Cottler, Ph.D., and Bradley W. Kesser, M.D.	Biomedical Engineering and Otolaryngology (respectively)	A device designed to make insertion of "ear tubes" into eardrums safer and faster, an anatomical model of the ear used to assist in training with the device and a device designed to make the insertion of stents into the sinus passages safer and faster

BREAKTHROUGH

START-UP COMPANIES

U.VA. START-UP ADENOSINE THERAPEUTICS ACQUIRED BY GLOBAL BIOTECHNOLOGY COMPANY

Established in 1999, Adenosine Therapeutics LLC (ATL) was among the earliest start-up companies to come out of the University of Virginia. In August 2008, ATL achieved another significant milestone: It was acquired in one of the largest purchases ever of a U.Va. start-up.

Acquired by global biotechnology company Clinical Data Inc. in a deal that could be worth up to $66.2 million to company shareholders, ATL was founded on the technologies of Joel M. Linden, Ph.D., Timothy L. Macdonald, Ph.D., and nine additional U.Va. researchers. Linden, vice chair for research and a professor in the U.Va. Department of Medicine, worked with collaborators in the U.Va. School of Medicine to identify adenosine receptors as targets that could be utilized in the treatment of a variety of serious illnesses, including cardiac disease, asthma, diabetes, sepsis, chronic obstructive pulmonary disease (COPD) and sickle cell disease. In collaboration with Linden, Macdonald, a U.Va. professor of chemistry and pharmacology, synthesized an array of unique drug compounds that target those receptors.

With the help of the U.Va. Patent Foundation and local "angel" investment funding, Linden helped found ATL in an effort to further develop this innovative research. "I think creating spin-outs is a very effective way to create new products," Linden says. "Spin-out companies can use grants to increase the value of their products without dilution, and to create local jobs for our graduates. In addition, company advances feed back to University faculty to create new opportunities for conventional grant funding. My hope is that more U.Va. faculty will create start-ups as a means to translate their research into meaningful therapies or products."

Together with co-founder Robert S. Capon, chief executive officer of ATL, Linden and his collaborators have worked to develop and commercialize several novel therapeutic candidates designed to interact with adenosine receptors. ATL has licensed more than 30 patents and patent applications on adenosine-related technologies from the Patent Foundation and has continued to do collaborative research with University faculty through Small Business Innovation Research (SBIR) and U01 grants.

"The U.Va. Patent Foundation is happy to see the technologies of U.Va. start-up Adenosine Therapeutics take one big step closer to the marketplace," says Robert S. MacWright, J.D., Ph.D., executive director of the Patent Foundation.

Instruments and machinery at the Adenosine Therapeutics laboratories. *Photos by Jackson Smith*

"The Patent Foundation congratulates Rob Capon and Joel Linden for their success, and we thank them for their hard work to transfer the benefits of these important technologies to patients everywhere," MacWright adds.

Clinical Data plans to maintain the ATL laboratories in the U.Va. Research Park as a subsidiary called the Adenosine Therapeutics Group (ATG). As such, ATG will help to conduct clinical trials, including a phase 3 clinical trial on ATL146e (Stedivaze™), which is designed to help diagnose coronary artery disease.

JEFFERSON CORNER GROUP REWARDS BREAKTHROUGH RESEARCH

The Jefferson Corner Group I LLC is helping additional technology start-ups get one step closer to the marketplace. Administered by Spinner Technologies Inc., a for-profit subsidiary of the U.Va. Patent Foundation, the Jefferson Corner Group is a Charlottesville-based, member-managed "angel" fund that provides early-stage investment capital to U.Va. spin-off companies and other technology businesses.

In 2008, the Jefferson Corner Group provided investment capital to Arbovax Inc., a Raleigh, N.C., based company focused on protecting humans and animals from insect-borne viruses (arboviruses) such as the West Nile virus, Japanese encephalitis, dengue fever, yellow fever and chikungunya. Arbovax's patented technology, which involves the modification of arboviruses to prevent them from replicating in mammalian cells, could be used to vaccinate mammals from these and other insect-borne diseases.

In 2007, the Jefferson Corner Group provided funding to U.Va. start-ups ContraVac Inc. and PluroGen™ Therapeutics Inc., as well as to N.C.-based medical device company OptiVia Medical LLC.

MY EXPERIENCE AS A

UVAPF GRADUATE STUDENT INTERN

Q&A WITH STEPHANIE A. MILLER

In August 2007, Stephanie A. Miller began experiencing scientific research on a whole new level, as an intern at the U.Va. Patent Foundation. One of 50 U.Va. students to have participated in the Patent Foundation's graduate student internship program, Miller works closely with Assistant Director Miette H. Michie and other members of the licensing staff for four to six hours each week to help evaluate, protect and license new technologies developed throughout the University. Miller is currently a biochemistry doctoral candidate, studying the Ndc80 protein as it relates to cancer drug treatments in the laboratory of P. Todd Stukenberg, Ph.D. In the following Q&A, she tells us about her experience as a Patent Foundation intern and how that experience has helped shape her perspective as a scientist.

PATENT FOUNDATION: Let's start at the beginning: How did you first become interested in working as a graduate student intern at the U.Va. Patent Foundation?

STEPHANIE MILLER: When I was in my fourth year and had started to think about my career goals, I began searching for alternative — non-academic — career opportunities. I remembered that an older graduate student in my department had been an intern at the U.Va. Patent Foundation, and after reading more about the program, I decided to apply.

PF: What are some examples of the work you've done at the Patent Foundation?

SM: I have been involved in almost every aspect of the process over the past year. When I began, my assignments were mostly centered on marketing efforts — taking a filed patent application and generating a summary document, for example, or identifying companies that might be interested in the invention and contacting them. Then I moved on to doing prior art searches — doing a search of the literature and closely related patents to make sure that the invention would be considered novel by patent law standards.

PF: What's your favorite type of assignment?

SM: Most recently, I've been working with companies that are already interested in licensing our technologies. I act as a liaison between the company and the inventor and have even helped draw up licensing agreements. I've enjoyed my recent assignments the best because I get to interact with both sides of technology transfer: the inventors and the companies that license the inventions.

PF: What do you enjoy most about interning with the Patent Foundation?

Graduate student intern Stephanie A. Miller takes pause from a prior art search in the Patent Foundation library. *Photos by Tom Cogill and Jackson Smith*

"I'VE BEEN ABLE TO USE MY SCIENCE BACKGROUND IN WAYS THAT ARE NOT POSSIBLE IN THE LAB."

SM: Over the past year I've worked on inventions from many different disciplines that range from surgery to drug chemistry. I've been able to use my science background in ways that are not possible in the lab. As an intern, I've learned so much more about the life sciences than I normally would be exposed to.

PF: How has your experience as a Patent Foundation intern prepared you for the future?

SM: I'm still not sure what my career will be, but had I not been an intern, I would never have realized how many paths there are to choose from once I graduate. We work with technology transfer offices at biotech and pharmaceutical companies on a regular basis, and that has exposed me to career options in research and development, product production and marketing, in addition to tech transfer. Whatever career I eventually choose, I'm sure I will call upon the valuable skills I've developed at the Patent Foundation.

For more information about the U.Va. Patent Foundation's graduate student internship program, please contact Miette Michie at miette@uvapf.org *or 434.982.1610.*

FISCAL YEAR 2008

REVENUES AND DISTRIBUTIONS

REVENUES

License fees and royalties	$4,479,545
Patent costs reimbursed	$1,013,102
Interest and other income	$122,131
Total revenue	**$5,614,778**

DISTRIBUTIONS

Distributions to inventors (see graph)	$1,386,035
Distributions to the University of Virginia (see graph)	$1,213,468
Other distributions	$69,218
Total distributions	**$2,668,721**
Net revenues	**$2,946,057**

PATENT ROYALTY DISTRIBUTION SCHEDULE

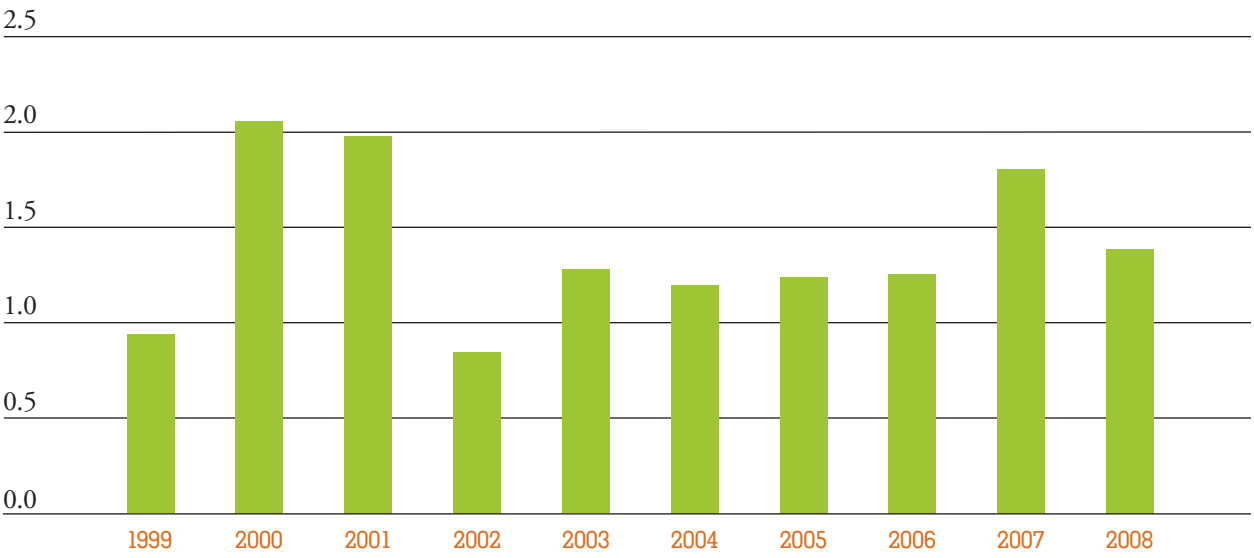
TOTAL ROYALTY INCOME	INVENTORS' INCOME	INVENTORS' RESEARCH	U.VA. PATENT FOUNDATION	INVENTORS' SCHOOL	SCHOLARLY ACTIVITIES FUND
<$100,000	50%	7.5%	42.5%	—	—
$100,000–$299,999	30%	20%	42.5%	7.5%	—
$300,000–$999,999	25%	15%	40%	10%	10%
≥$1,000,000	15%	15%	40%	20%	10%

SOFTWARE ROYALTY DISTRIBUTION SCHEDULE

TOTAL ROYALTY INCOME	AUTHORS' INCOME	AUTHORS' RESEARCH	U.VA. PATENT FOUNDATION	AUTHORS' SCHOOL	SCHOLARLY ACTIVITIES FUND
<$100,000	50%	25%	25%	—	—
$100,000–$299,999	30%	30%	25%	10%	5%
≥$300,000	25%	25%	25%	15%	10%

DISTRIBUTIONS TO INVENTORS (IN MILLIONS OF DOLLARS)

(Total accumulated distributions to inventors: $18,417,299)



DISTRIBUTIONS TO U.VA. (IN MILLIONS OF DOLLARS)

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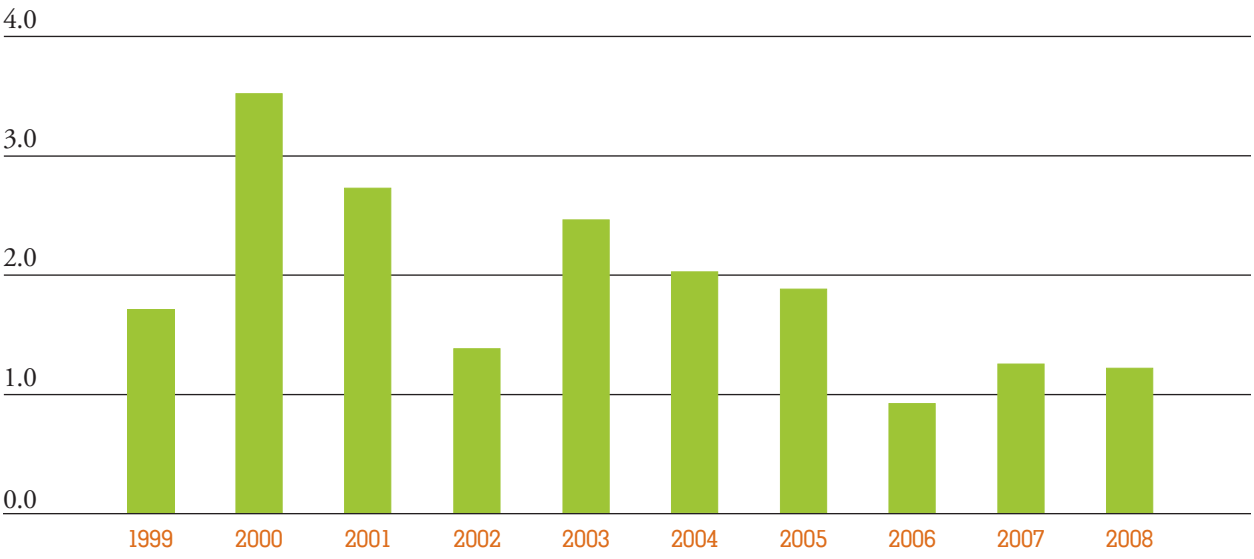

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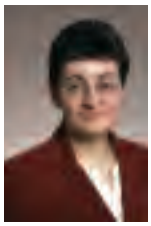

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Photos by Tom Cogill

MISSION

- To provide accessible, responsive, competent, timely and professional patenting and licensing services to U.Va. and its faculty and staff
- To serve as an efficient and effective conduit for the licensing of promising U.Va. technologies to industry, thus promoting their entry into the commercial marketplace and also generating royalties that can further U.Va. research
- To support and encourage local economic development by licensing locally, by licensing to start-up companies, and by encouraging and supporting faculty start-up activities
- To serve as a resource for information about patents and licensing, and to encourage recognition that such matters have become meaningful and valuable aspects of university life
- To encourage greater integration between academia and industry, thereby improving the flow of innovative university technologies to the public marketplace

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FIND OUT HOW FEATURED UVAPF INVENTOR BREAKTHROUGHS OF 2008 ARE

CHANGING THE LIVES OF THOUSANDS OF BURN VICTIMS

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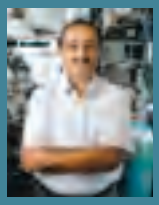

BRIDGING THE GAP TO ALTERNATIVE FUELS

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SIGNALING THE DECLINE OF ALCOHOLISM

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ENHANCING BIOMEDICAL IMAGING THROUGH SUSTAINABLE DESIGN

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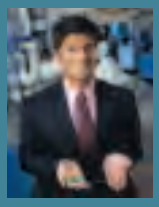

REVOLUTIONIZING ACCESS TO THE HUMAN HEART

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The UVAPF is going "green."
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