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We Are ... Bridging Medicine and Science Vol. 1, Issue 2, Fall 2012

Marshall University Biomedical Sciences

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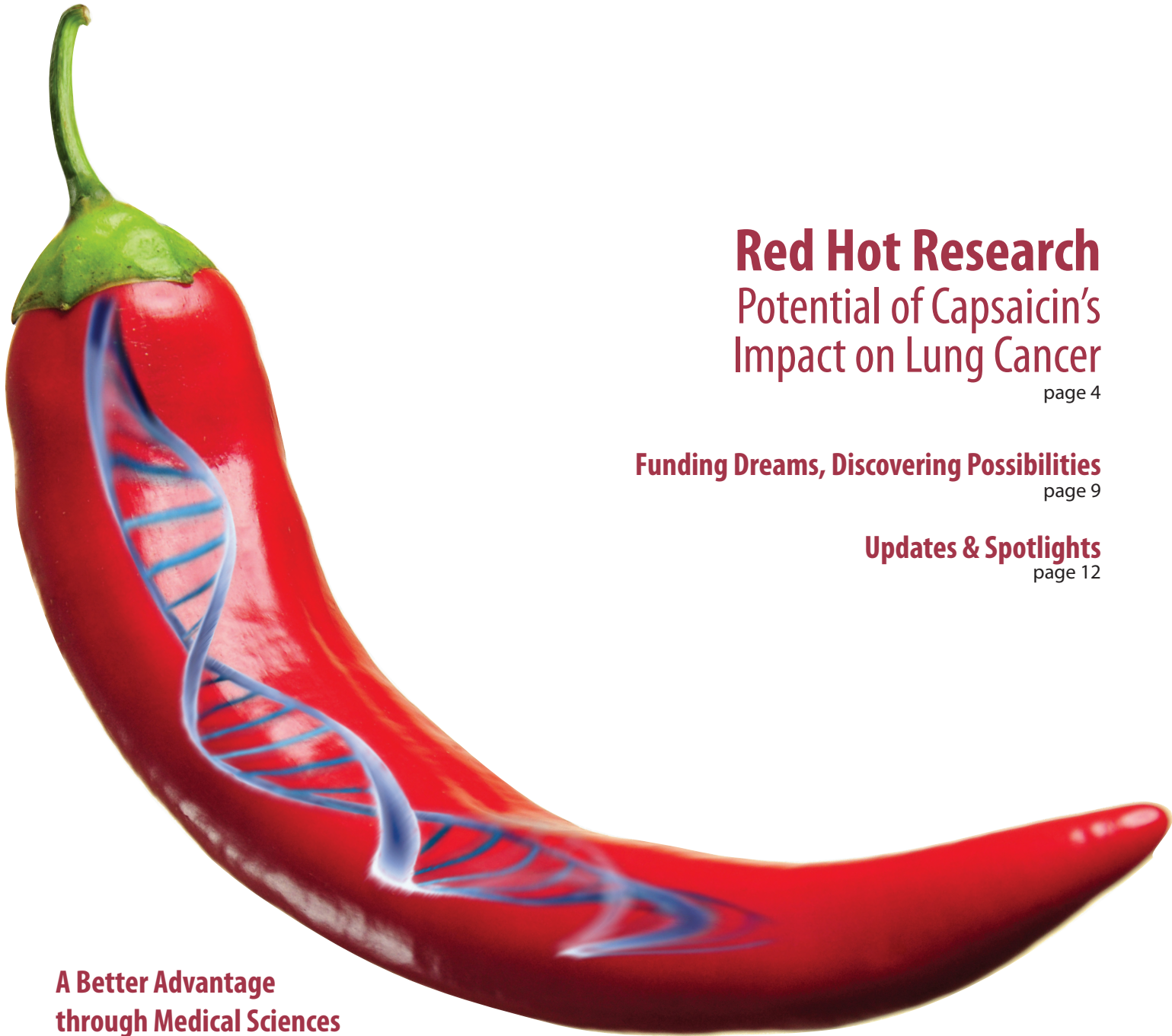
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VOL 1 | ISSUE 2

WE ARE...BRIDGING MEDICINE AND SCIENCE

A PUBLICATION FROM MARSHALL UNIVERSITY BIOMEDICAL SCIENCES AND GRADUATE PROGRAM



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A publication of Marshall University
Biomedical Sciences, providing news
and information for and about faculty
members, students, staff, alumni and
friends.

Letters and suggestions are welcome
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Greetings from the Biomedical Sciences Graduate Student Organization President

Dear Past, Present, and Future BMS Family,

A year after we published the inaugural issue of our Biomedical Science Magazine, "We Are... Bridging Medicine and Science," our program has continued to strive for research excellence within its five research clusters.

Big and exciting changes have happened in just one year's time here at Marshall, starting with the opening and dedication of the McKown Translational Genomic Research Institute, which is housed inside the Edwards Comprehensive Cancer Center at Cabell Huntington Hospital. The opening of this facility has sparked several new and exciting clinical trials, which indicates a new and dynamic working environment with clinicians. The collaborative effort between BMS faculty and clinicians at Cabell Huntington Hospital is now expanding at an even faster pace after the appointment of the new Joan C. Edwards School of Medicine dean, Dr. Joseph Shapiro.

As always, the graduate students are at the heart of our thriving research program. In the past year, the students have attended several local and national conferences educating others about the research endeavors at Marshall. We have also worked alongside our Principal Investigators to provide multi-disciplinary research training to undergraduate students, through both the WV-INBRE and SRIMS undergraduate internship programs. Furthermore, our BMS Medical Sciences students have continued to find great success in being accepted to and succeeding in medical school. Additionally, our Graduate Student Organization has been very active, and has completed several philanthropic endeavors, as well as partnering with several outreach programs to continue to advocate for the importance of funding biomedical research.

In conclusion, faculty and students across all research disciplines at Marshall continue to collaborate to make this program strong and vibrant. The future continues to look bright as we start the year with 23 new incoming students.

We hope you enjoy the second annual "We Are... Bridging Medicine and Science" publication! And of course... **Go Herd!**

Sincerely,

M. Allison Wolf

M. Allison Wolf
Ph.D. Candidate
Graduate Student Organization President



M. Allison Wolf

Peppers and Potential: Dr. Piyali Dasgupta's Inroads into Lung Cancer Research

by Lisa Shrewsberry

There is a saying around the campfire that “smoke follows beauty.” Science bears witness to the anecdote, only in reverse, as the beauty of Dr. Piyali Dasgupta’s research has consistently, effectively pursued smoke. Her contributions to the enlarging body of evidence about nicotine, the addictive component of cigarettes, continues making vital inroads into lung cancer research. As Associate Professor and part of the Nutrition and Cancer Center at Marshall University, she is in the mix of scientists exploring the intricacies of cancer and its causes, to the end of seeking potential cures and treatments.

From New Delhi, India, Dasgupta arrived in the U.S. in 2000 for a post-doctoral fellowship at Columbia University in New York. When her mentor relocated to the Moffitt Cancer Center in Tampa, Florida, she moved to join him. Upon completion of her fellowship, the Ph.D.-level researcher initially arrived at Marshall University to become a tenure-track Assistant Professor.

Her lab is an arena where battle happens at the cellular level, exposing mechanisms by which the dangerous components of cigarette smoke, such as nicotine and nicotine-derived nitrosamine ketone (NNK), facilitate the survival and accelerate the progression of lung cancers. She fights a formidable foe: Lung cancer is one of the deadliest malignancies facing both men and women, a fact prompting the insatiable scholar to explore, explore, explore.

“What I’ve done so far is to try and understand how nicotine promotes lung cancer and protects lung tumors against anti-cancer drugs,” Dasgupta said. “By coincidence, I’m in West Virginia, where the tobacco consumption rates are very high.”

While not a tobacco producer itself, sandwiched between Pennsylvania and prolific producer North Carolina, the state is certainly a substantial tobacco consumer. According to most current Centers for

Disease Control and Prevention data, WV ranks highest for tobacco usage among adults in America.

“Research work in our lab is very relevant to the health of local people,” Dasgupta emphasized.

Searching nature’s storehouse for potential cancer therapies, her most interesting work surrounds capsaicin, a component of common chili peppers. She is measuring the compound’s ability to slow the progression of lung cancer cells.

“The Nutrition and Cancer Center is relatively new at Marshall University. There has been evidence that capsaicin suppresses the growth of several human cancers, including prostate and breast cancer,” Dasgupta explained.

Within her career, her most exciting involvement has been discovering that exposure to nicotine can decrease a patient’s response to chemotherapy. It is part and parcel to the relentless syndrome of smoking.

“Nicotine itself is not a cancer-causing compound. Other carcinogens initiate the cancer,” Dasgupta remarked. “But after initiation, consistent exposure to nicotine can actually help cancer grow.”

The finding opened up a significant debate, which in the realm of research spawns discovery. Would cancer patients exposed to nicotine replacement therapies demonstrate a lesser response to chemotherapy? If a non-smoking cancer patient were in contact with someone else’s smoke, would it affect their treatment?

The answers aren’t yet clear. “This is just the beginning,” she said, “but I am hoping as we get more data we will be able to collaborate with some clinicians and take the findings to the next therapeutic level.”

Outside her lab, Dasgupta is an advocate for clean air and smoke-free environments within Cabell County’s Coalition for Clean Air. Part of the group’s purpose is to raise awareness about the effects of smoking inside homes and cars. As part of the Tobacco Prevention Committee at Marshall University, one of her ambitions is to see Marshall University through to becoming a smoke-free campus. Another of her goals is to raise awareness of the hazard of third-hand smoke, examining the harmful compounds from cigarette smoke and their absorption by materials that transfer health-adverse substances to others.

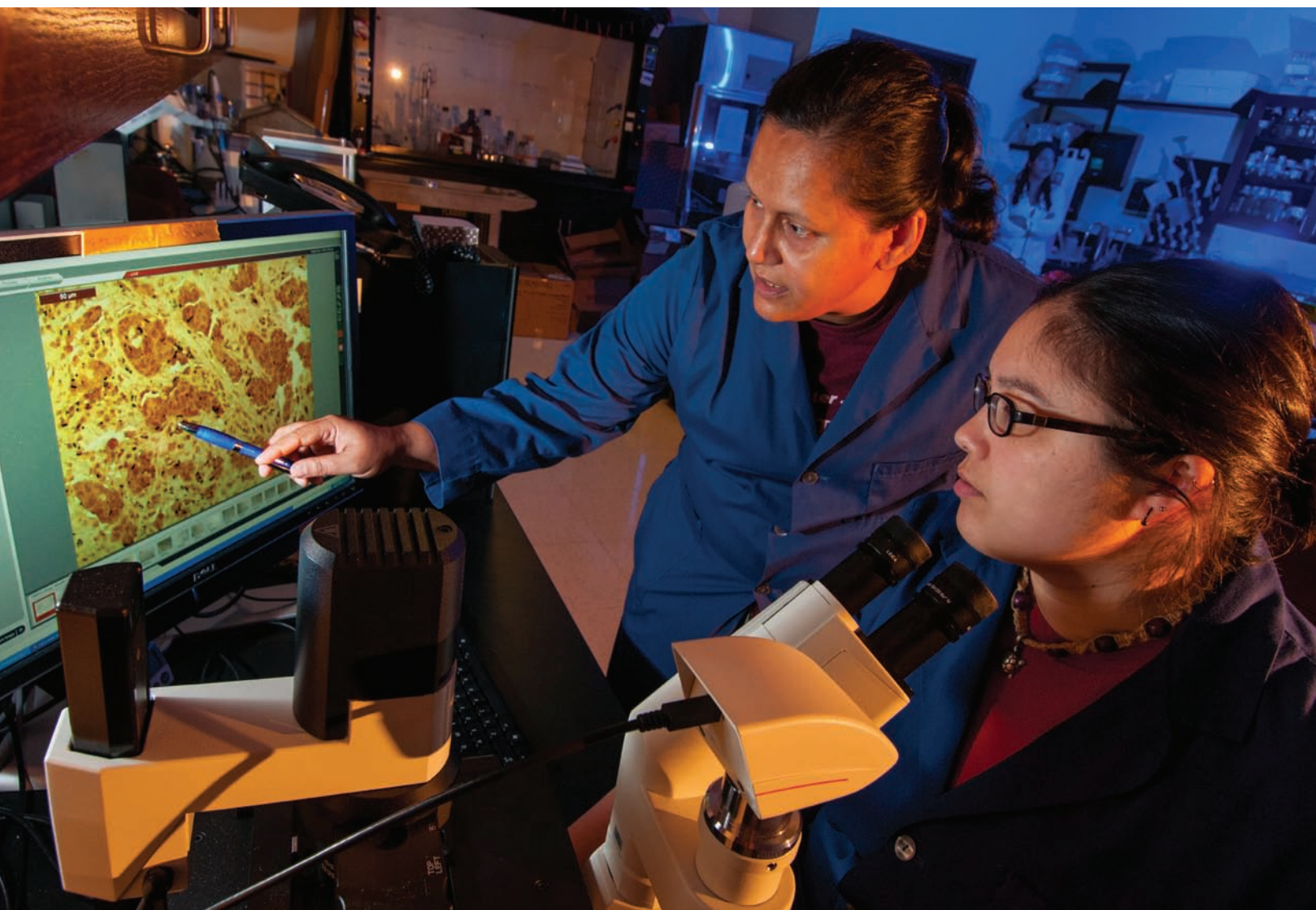
“If someone is smoking in a car, it gets absorbed by everything inside — the seats, the dashboard. (Third-hand smoke transfer) may not be bad for adults, but for children with a higher respiratory rate, it can harm them,” Dasgupta explained.

Yet a third emerging arm of Dasgupta’s research is investigating the gender basis of lung cancer. “Women are more prone to lung cancer than men, whether they smoke or not.”

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We Are...A Better Advantage through Medical Sciences

by Lisa Shrewsberry



The Marshall Medical Sciences program is for students determined to make it in medicine — whether uncertain about their proficiency, delayed in acceptance to medical school or making up for lost academic time. A preview with a purpose, the classes taken alongside MUSOM medical students also serve as a testing ground for preparedness for medicine as a fulfilling career.



Brittany Wall had a rude awakening. A graduating senior from Auburn University, she questioned her readiness for the most important step toward becoming a physician — medical school.

Her proficiency and confidence gained solid ground as she progressed within the two-year, non-thesis degree in Biomedical Sciences. She was thrilled to be taking the same classes as medical students already accepted into Marshall University School of Medicine — and excelling in them.

Wall tackled the medical school application process again. This time, her competence was at an all-time high.

Having completed the Medical Sciences program and been accepted into Joan C. Edwards School of Medicine for Fall 2012, Wall is finally assured in her choices and her abilities. “I can go to medical school. I can sit there and do it well. Medical school is all about surviving. They are looking for people who are going to graduate, and the Medical Sciences program shows them we can do it.”

Originally from Ashland, Kentucky, the 24-year-old quashed any cause to celebrate. “I began submitting applications and it was a horrible process. I called my mom crying and told her, ‘I don’t think I can do it,’” she admits.

The application process held Wall, who had achieved average MCAT scores, in the painful balance of suffering by comparison to higher-performing candidates. “It taught me how competitive I needed to be and I realized I wasn’t. I needed to do something about it.”

Fortunately, Wall’s mother had learned about the Marshall University Medical Sciences program from a conference she’d attended. “They sent me all the information about the program and it was perfect. It is for people like me who need to improve their GPA or MCAT scores and who basically want a taste of medical school before they take the giant leap into it.”



Alex Muñoz is breathing a sigh of relief — but it is the calm before a welcome tempest. He has just passed the first exam toward obtaining his medical license and is awaiting news of first-year rotations.

The self-assured young man considers

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Peppers and Potential, continued from page 4

The anomaly intrigues Dasgupta, as it does many of her research students, eager to get at a scientifically sound answer.

Dasgupta is seeking publication of her findings in both science and medical journals in order to transfer the findings from research to patient therapies. Her constant search for funding to perpetuate research has brought support from many groups, including FAMRI, the Flight Attendant Medical Research Institute, formed from a class action lawsuit brought by non-smoking flight attendants against the tobacco industry. The non-profit

medical and scientific research organization formed as part of the settlement for the diseases and deaths attributable to second-hand smoke within airline cabins. Recently, she was awarded a National Institutes of Health grant to support her studies involving capsaicin and lung cancer therapy. Others who have funded Dasgupta’s research include NASA, the American Retina Foundation and the American Society for Pharmacology and Experimental Therapeutics.

“With the economy being what it is, I try to approach funding at every level — for master’s level students, fellowships and summer students for stipends,” Dasgupta

explained. “Many of my students aim to be physician-scientists and to do scientific research throughout their career.”

To those outside her lab who go about their daily lives unaware of her quiet explorations, a chili pepper is a chili pepper. But to Dasgupta and her students, driven to seek scientific solutions to our health problems, these peppers are potential.

“If you ask most medical school candidates, they aren’t aware of the possibilities research offers,” Dasgupta said. “That is something that excites me immensely. It is part of my job to motivate students into research.”



A Better Advantage, continued from page 7

himself a non-traditional student, having worked for years as a waiter/bartender after discovering that a degree and subsequent position in electrical engineering wasn't a good fit. Medicine, he knew, was the right choice, but he'd have to begin at square one. His undergraduate degree lacked all the necessary prerequisites: Chemistry, Physics, Biology...

Additionally, Muñoz had only spoken English since the age of 15, the age he arrived in America with his family from Columbia, South America.

"I was as far as one can possibly get from the dream I had," he admits. Affording one class at a time at the University of California at Irvine, Muñoz finished his prerequisites in only two years. "I wanted to get it done," he explains. "I knew it was going to take me a long time to get into medical school."

Time ticked onward. Muñoz, always at the top of his class despite the challenges he faced with English, performed poorly on his MCAT, admitting, "I had no business taking it the first time I took it."

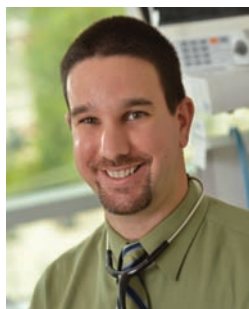
With medical school unavoidably postponed, he searched carefully through listings of master's degrees and narrowed his choices to 15, one of which was Marshall University's Medical Sciences program.

"I never knew Huntington, W.Va. existed," he states, adding, "I had seen the movie 'We Are Marshall.'"

Balancing affordability with academic reputation, Muñoz chose Marshall over Boston University, both of which granted acceptance.

He was immediately impressed with the level of intelligence of his peers and the stimulating competition he encountered within the program. "You get to learn from medical students and from being around them, listening to their successes and failures." He received his M.S. degree in July 2010, and matriculated into MUSOM the following semester.

"I'm going to do this no matter what," he emphasizes. "Medicine is a marathon, not a sprint. At one point, I could see as far ahead as third year medical school. Now, I can see



as far ahead as my residency."

Sean Loudin likes the sound of his newest prefixes: Dr. and Daddy. He and wife, Ashlee, are proud parents of 4-year-old Owen and 2-year-old

Austin. His life's aspirations, as far as being husband, father and physician, have come to fruition. The M.D. from Philippi, W.Va., now a member of the Division of Neonatal-Perinatal Medicine at Marshall University and also an Assistant Professor of Pediatrics at the Joan C. Edwards School of Medicine, remembers a time when he wasn't so self-assured, when it seemed his career aspirations would be indefinitely tabled.

"I was waitlisted by both medical schools: West Virginia University and Marshall University," he admits.

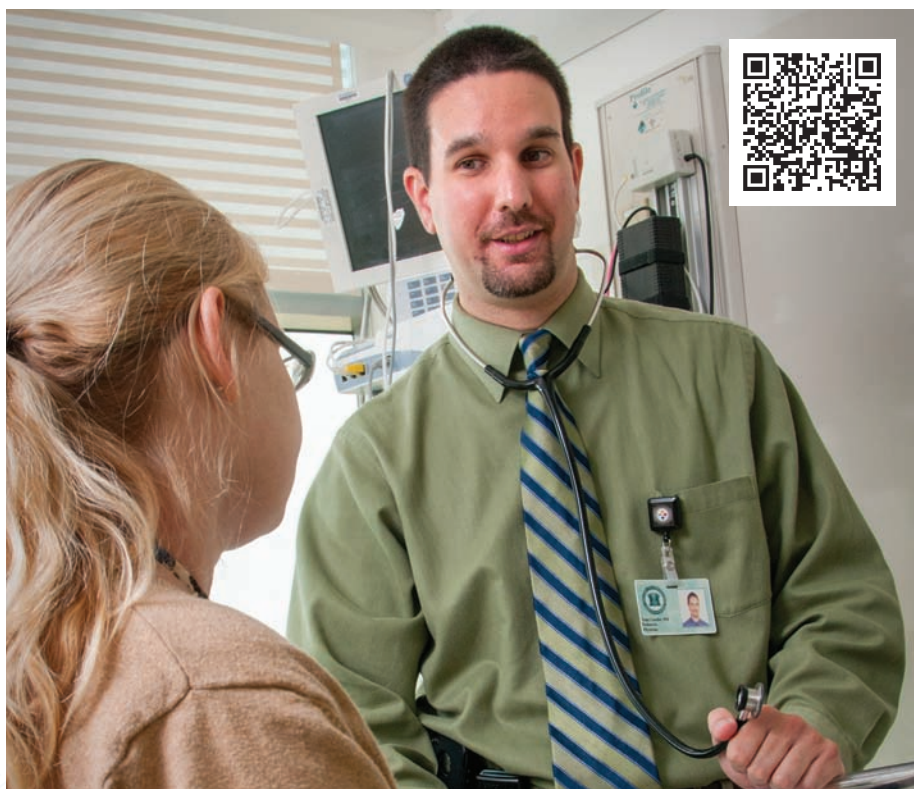
Resolute, he learned about the graduate Medical Sciences program at Marshall and decided to apply. "I thought it would be the best use of my time while awaiting

reapplication," explains Loudin. After completing only one year of the Medical Sciences program before reapplication and acceptance into MUSOM, his role-reversal of now teaching students attests it was time well spent.

"I'm not sure I would've had the motivation to go through with the MCAT again and to do what I needed to do to get accepted had it not been for the Medical Sciences program."

Most important to Loudin was familiarity — being able to sit in medical school classes with medical students and reviewing the information on their level. "It took that added layer of stress away. I got to see just how medical school would be before I went. I knew then I was capable of being successful."

The Marshall Medical Sciences program is for the students determined to make it in medicine — whether uncertain about their proficiency, delayed in acceptance to medical school or making up for lost academic time. A preview with a purpose, the classes taken alongside MUSOM medical students also serve as a testing ground for preparedness for medicine as a fulfilling career.



Sean Loudin, M.D. giving good news to the mother of a soon-to-be released infant



We Are...Funding Dreams, Discovering Possibilities

by Lisa Shrewsberry

Although Dr. Gary Rankin first plotted to reach the stars as an honest-to-goodness astronaut, he hadn't yet been exposed to where his true, lasting contributions would lie — until he encountered a research mentor.

"As an undergraduate student, I was approached by a faculty member at the University of Arkansas at Little Rock to do a research project. He also encouraged me to get my doctorate in medicinal chemistry. That eventually led me to Marshall, and I've been here ever since."

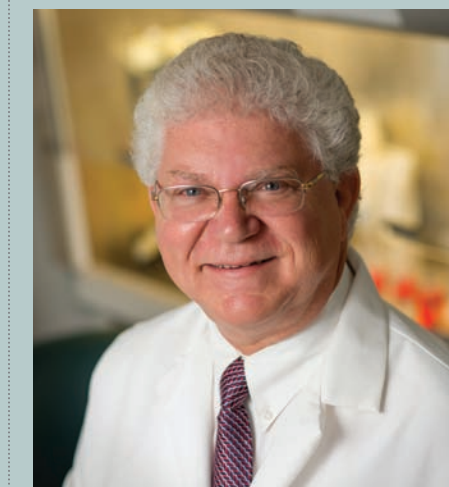
Graduate training in drug development followed, and Rankin's expertise in kidney toxicology advanced, as did his purpose — in discovering the impact research can have on human life.

In addition to being Professor and Chair of the Department of Pharmacology, Physiology and Toxicology for Joan C. Edwards School of Medicine, Rankin is the principal investigator for and director of WV-INBRE, part of the IDeA Network of Biomedical Research Excellence.

WV-INBRE involves 16 colleges and universities, providing resources, instrumentation and opportunity beyond their sponsoring institution's capacity. For some students, the projects supported by WV-INBRE are catalysts to their pursuing careers in biomedical research.

WV-INBRE: Seeking Solutions to West Virginia's Declining Health Status

"The whole idea was to begin this competitiveness among institutions in states like West Virginia," Rankin explains,



DR. GARY RANKIN has served as the principal investigator on one or more NIH for more than 25 years. In this capacity, he has been the PI on research grants totaling approximately \$40 million. He is also author of more than 150 research articles, reviews and book chapters, mainly in the area of kidney toxicology.

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A Better Advantage, continued from page 9

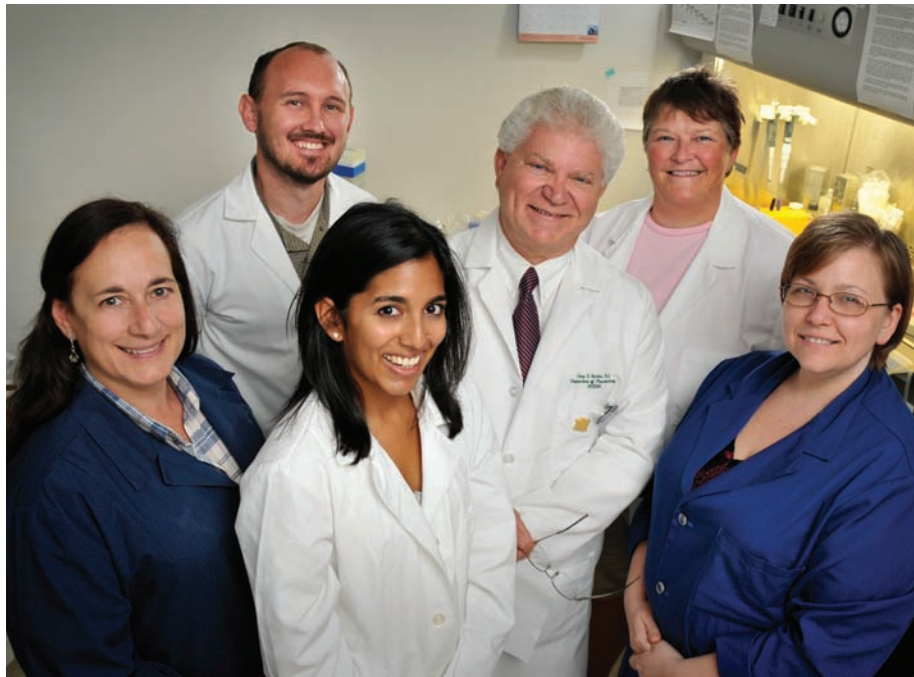
“So far, two INBRE grants and supplements exceed a total of \$32 million. We’re really funding research in the state of West Virginia.”

“to stimulate an increase in biomedical research.” When Marshall University and WVU submitted separate applications, the NIH decided to combine the two programs into one, with Marshall as lead institution.

Rankin still relishes the future possibilities for WV-INBRE. As conductor to a symphony of investigators and contributors, partners and students, Rankin explains how lab discoveries emerging from W.Va. institutions translate into added days, weeks, years and quality of life to its residents and beyond.

“In terms of disease, we are one of the top states in the country in all the bad statistics.” The students and researchers working under his administration are seeking solutions to the problems behind those statistics, like cardiovascular disease and Type II diabetes.

Since its inception in July 2004, WV-INBRE has funded a number of influential research projects, such as ACoRN, which stands for Appalachian Cardiovascular Research Network and is exploring the genetic basis of cardiovascular disease.



Dr. Rankin, Director of the WV-INBRE program, asks students to consider the difference they may one day make to countless lives through biomedical research. Pictured (from left): Diane Anestis, Christopher Racine, Sukanya Baksi, Dr. Rankin, Jeane Chaffin, and Deborah Preston.

Presently, WV-INBRE supports five major research projects and eight pilot projects, representing those making it through the application and external review process before selection and subsidy.

The economic scope of WV-INBRE is something Rankin believes few understand. “So far, two INBRE grants and supplements exceed a total of \$32,000,000. We’re really funding research in the state of West Virginia.”

Researchers empowered toward discovery through INBRE funds hail from all regions of the Mountain State. “We are funding researchers at West Liberty, at Shepherd,

Alderson-Broaddus, Wheeling Jesuit, Bluefield State... universities and colleges that are a part of our network either get direct funding or they get the ability to have students come (to Marshall or WVU) as part of the summer research program.”

Recently, Rankin and Dr. Yi Charlie Chen from Alderson-Broaddus College in Philippi, W.Va., visited China, testimony to the far-reaching impact of regional discovery. Rankin presented data at the World Cancer Congress in Beijing from a study he completed with his wife, Dr. Monica Valentovic. Their research explained how resveratrol, a component of wine, blocks the toxicity of certain cancer drugs to the kidneys.

Ph.D. levels,” she states, witnessing many erstwhile summer interns transitioning into one of the five research clusters of the MU Biomedical Sciences Graduate Program.

“At 20, you don’t always know what you want to be in life. Here, you have the opportunity to try research and discover whether or not it’s for you.”

Summer interns have explored the effects of female sex hormones on the development of brain tumors, the

contributions of omega-3 fatty acids as cancer preventatives and understanding health effects of coal dust exposure, topics represented at past symposia bearing relevance to today’s biggest regional and national health problems. At the annual Summer Research Symposium, held alternately at West Virginia University and Marshall University, results from mentored projects serve as building blocks toward future progress.

“In many cases, students help design and complete their own experiments, which they present. It is a complete piece of research. That is the beauty of the program,” explains Mangiarua.

The lifelong scientist is still amazed how quickly her students grasp the topics they are investigating. “They study, they go to the literature, they learn quickly. And by the end, you can see these really

DR. ELSA MANGIARUA has served as a grant reviewer for the National Institutes of Health, National Science Foundation and the Department of Defense and as an ad-hoc reviewer for the Journal of Cardiovascular Research, Atherosclerosis and Annals of Clinical & Laboratory Science, among other publications. Her cardiovascular research has been extensively funded and published.

young researchers presenting like experts, answering questions from the audience at the symposium.”

Taking to the podium at each summer’s conclusion, her colleague, Dr. Rankin, further challenges the students to expand their visionary borders. He asks them to look around the auditorium and consider the possibility that one from among them may some day discover the newest drug to

treat a medicoeconomic and medicosocial giant such as heart disease.

“Researchers are dreamers,” he reminds, “but we’re logical dreamers.”

For more information on WV-INBRE, visit <http://www.wv-inbre.net>.

WV-INBRE Summer Program: Tomorrow’s Logical Dreamers



Dr. Elsa Mangiarua, Director for both the Marshall University and West Virginia University WV-INBRE Summer Research Programs, encourages future researchers and fortifies tomorrow’s

medical professionals in their career-formative years.

“Some do have lab experience, but the idea of bringing them to Marshall University and WVU (for the summer) is to expose them to an intensive and structured research environment. This program is a dedicated two months of complete immersion in high level research,” explains Mangiarua.

Students accruing confidence in the nine-week summer lab demonstrate an affinity for research as a career. “Many of our graduates have gone on to develop themselves at the technical, master’s and

Making Much of Time: WV-INBRE 2011 - 2012 Summer Intern Ben Kordusky

Ben Kordusky has made the most of his WV-INBRE summer experience — twice. He applied and was accepted into the 2012 program, his second consecutive year. In 2011, he completed research quantifying the amount of fatty acids in the plasma of patients with chronic lymphocytic leukemia who were supplemented with “fish pills” — the omega 3 fatty acids most common to consumers. This summer, he was allowed to take his research a step further to examine the chemo-sensitizing effects of fatty acids and how they battle cancer cells, singularly or in combination with common cancer treatments.

A student from West Virginia Wesleyan College, considering both dentistry and biomedical research, Kordusky wanted more practical experience to help finalize a decision of continuing on with research as a career.

“I think it’s a wonderful experience, and anyone who has the opportunity to be a participant, should,” he says.



West Virginia Wesleyan student and WV-INBRE summer intern Ben Kordusky just completed his second summer at Marshall — clarifying the impact of omega 3 fatty acids on battling cancer cells.

Summer Research Internship for Minority Students

SRIMS



Frankie Woode // Princeton University

"Before the SRIMS program, I was worried that I did not have what it takes to perform valid research in a lab setting. However, the program did an excellent job of alleviating my worries by introducing me to a group of students who shared my aspirations and by providing me with a very knowledgeable mentor with whom I could work one-on-one."

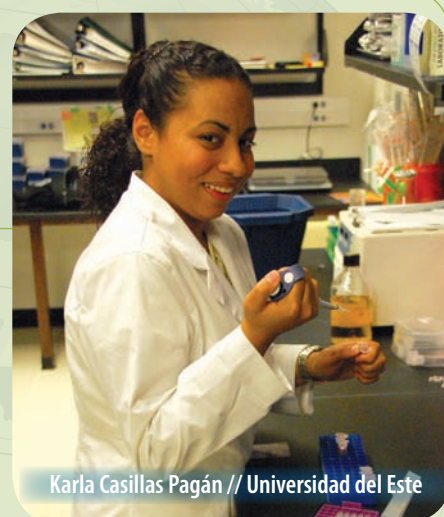
– Frankie Woode, Princeton University, Marshall University SRIMS 2012 Intern

The Summer Research Internship for Minority Students (SRIMS) program recruited very successfully this year. Interns for summer 2012 were a delight, and came from a wide geographical area: Karla Casillas Pagán from Universidad del Este (Puerto Rico); Diana Elizondo from University of Texas, Brownsville; Kelyn Pittman from University of Georgia; and Franklin "Frankie" Woode from Princeton University. Their research contributions were over a period of nine weeks, and in the following research clusters: Cardiovascular Disease, Obesity, and Diabetes; Infectious and Immunological Diseases; and Neuroscience and Developmental Biology.

The SRIMS Program was again able to secure funding from the Federation of American Societies for Experimental Biology Minority Access to Research Careers (FASEB MARC) program to defray some expenses. We hope to receive a sufficient amount of donations to expand the number of students from four to six in the near future. Your contributions would be appreciated! <http://www.marshall.edu/foundation/givenow.php> - SRIMS Program Fund (213073)

"Thanks to Marshall's Biomedical SRIMS program I further developed my professional and scientific skills, and have since been accepted to present my research at different symposia!"

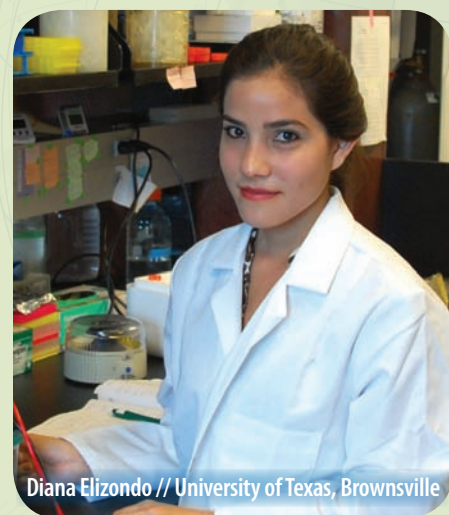
– Karla Casillas Pagán, Universidad del Este, PR



Karla Casillas Pagán // Universidad del Este



Kelyn Pittman // University of Georgia



Diana Elizondo // University of Texas, Brownsville

Faculty Update

Dr. Eric Blough recently left the College of Science's Department of Biological Sciences to join the Department of Pharmaceutical Science and Research in Marshall's new School of Pharmacy. He will continue to mentor current and new Ph.D. and Research M.S. students, as his research remains relevant to biomedical sciences, and he continues a joint appointment with the School of Medicine.



Dr. Carl Gruetter who researches within the Cardiovascular Disease, Obesity, and Diabetes research cluster and is a faculty member of the Department



of Pharmacology, Physiology, and Toxicology is the new chair of the School of Medicine Curriculum Committee. He is responsible for the overall design and delivery of medical education.

Dr. Richard Egleton is the new Coordinator for the Neuroscience and Developmental Biology Research Cluster. Dr. Egleton's research focuses on the role of the blood brain barrier (BBB) and the neurovascular unit (NVU) in disease progression.



Dr. Joseph I. Shapiro joined Marshall University as the new Dean of Joan C. Edwards School of Medicine. Dean Shapiro served at the University of Toledo College of Medicine in Toledo, Ohio, and brings with him more than 30 years of clinical and teaching experience.



Dr. Rudy (Ruu-Tong) Wang, an Associate Professor in the Department of Anatomy and Pathology, retired at the end of the 2011-2012 academic year. Dr. Wang spent 31

years as a faculty member at the Joan C. Edwards School of Medicine and taught hundreds of medical students micro anatomy and neuroanatomy. He was also the Director of the electron microscope imaging core when the basic sciences' departments were located at the Medical Education Building at the VA Medical Center. Subsequently, he managed the electron microscopes when they became part of the Imaging Center in the Byrd Biotechnology Center on the campus of Marshall University. Dr. Wang moved to Houston, Texas this summer to join his family, which had relocated to Texas earlier in the 2011-2012 academic year. We thank Rudy for his many years of devoted teaching and wish him and his family enjoyment and good health in retirement.

Ph.D. Alumni RECENT GRADUATES



Sunil Kakarla, Ph.D., DVM, M.S. – Dr. Kakarla earned his Ph.D. in Biomedical Sciences in August 2011 under the mentorship of Dr. Eric Blough. His dissertation title was "Age-Associated Alterations in the F344XBN Rat heart and the Efficacy of Chronic Acetaminophen Ingestion as a Therapeutic Approach." He is working as a veterinarian at Banfield Pet Hospital in Cary, North Carolina.

Juliana Akinsete, Ph.D. – Dr. Akinsete earned her Ph.D. in Biomedical Sciences in December 2011 under the mentorship of Dr. Elaine Hardman. Her dissertation

title was "Dietary Interventions Against Mammary Glands and Prostate Cancers."



Linda Eastham, Ph.D. – Dr. Eastham earned her Ph.D. in Biomedical Sciences in May 2012 under the mentorship of Dr. Richard Niles. Her dissertation was titled "Nuclear Receptor Expression and Characterization of the Major Retinoic Acid Target Gene in Melanoma." Dr. Eastham is working as a Postdoctoral Fellow at Progenesis Technologies, LLC in Huntington, West Virginia.

Siva K. Nalabotu, Ph.D., DVM, M.S. – Dr. Nalabotu earned his Ph.D. in Biomedical Sciences in May 2012 under the mentorship of Dr. Eric Blough. His dissertation was titled "Evaluation of the Role of Oxidative Stress, Inflammation and Apoptosis in the Pulmonary and



the Hepatic Toxicity Induced by Cerium Oxide Nanoparticles Following Intratracheal Instillation in Male Sprague-Dawley Rats." He is working as an associate veterinarian in the greater Cincinnati, Ohio area.



Anjaiah Katta, Ph.D., DVM, M.S. – Dr. Katta earned his Ph.D. in Biomedical Sciences in August 2011 under the mentorship of Dr. Eric Blough. His dissertation title was "Muscle Plasticity and Intramuscular Signaling in the Insulin Resistant Obese Zucker Rat." Dr. Katta is working as a veterinarian at Copper Basin Veterinary Clinic in Tennessee.

RESEARCH CLUSTER SPOTLIGHT

Research within Marshall University's Biomedical Sciences (BMS) Graduate Program is organized into five research clusters, derived from the key areas of faculty research expertise. These research clusters allow the program to take an interdisciplinary approach and form interdepartmental collaborations that enhance both faculty research and the experience of graduate students.

CANCER BIOLOGY CLUSTER

Coordinator – Dr. Beverly Delidow
Facts – 13 faculty members, 9 Ph.D. students, 5 M.S. students, 8 undergraduate students, 1 high school student, and 2 postdoctoral fellows
Successes – Faculty participated in 6 BMS courses including Cancer Colloquium, Foundations of Biomedical Science (BMS 600), Signal Transduction, and Communication Skills for Biomedical Sciences. They also participated in Molecular Basis of Medicine, and Medical Physiology and Pharmacology courses. This cluster holds 9 federal grants and several other extramural grants. Cluster graduate students received 5 fellowship awards. Faculty submitted 7 proposals, published 24 peer-reviewed journal articles and 1 book chapter and presented at numerous regional and national meetings. Faculty also edited a published book, reviewed a number of journal manuscripts and served as grant reviewers for NIH, NSF, DoD and private foundation grant programs.

Allison Wolf, a Ph. D. candidate, in Dr. Claudio's laboratory, received the Frederick J. Lotspeich award.

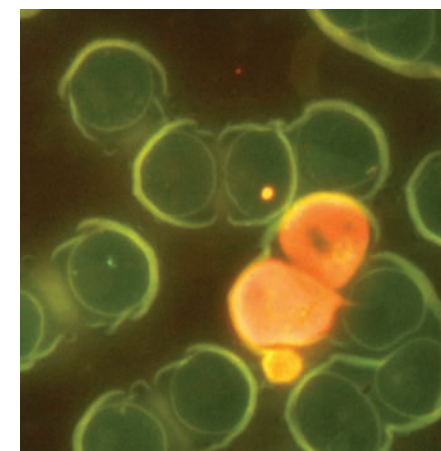


Image of micronucleus in white blood cells

CARDIOVASCULAR, OBESITY AND DIABETES

Coordinator – Dr. Nalini Santanam
Facts – 15 faculty members, 4 clinical faculty. In addition, 4 graduate students, 1 postdoctoral fellow, 3 clinical residents/fellows, 8 undergraduate and 3 medical students conducted research in members' laboratories.

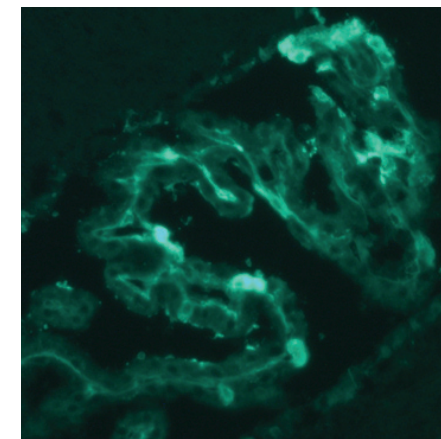


Image of Flk-1 expression in the rat choroid plexus. Flk-1 is a receptor for vascular endothelial growth factor (VEGF), an important regulator of vascular function and development in health and disease.

Successes – 12 extramural research grants held, 23 articles published in peer-reviewed journals, numerous presentations given at either state or national meetings.

Christopher Adams, M.D., second-year cardiology fellow, won the top poster presentation prize at regional and national American College of Cardiology Conferences.

Rebecca Furby, 2011 SRIMS undergraduate student, won a FASEB-MARC travel award to the Annual Biomedical Research Conference for Minority Students.

Nalini Santanam, Ph.D., served as an American Heart Association grant reviewer (since 2007).

Richard Egleton, Ph.D., served as a grant reviewer for the American Heart Association and the American Diabetes Association and for the Israel Science Foundation.

Elsa Mangiarua, Ph.D., reviewed graduate fellowship applications for both the NSF and the Department of Defense.

Eric Blough, Ph.D., served as a reviewer for the US-Israel Bi-National Science Foundation and as an ad hoc reviewer for an NIH study section on muscle biochemistry.

INFECTIOUS AND IMMUNOLOGICAL DISEASES

Coordinator – Dr. Hongwei Yu
Facts – 6 faculty members, 2 Ph.D. students, 1 post-doctoral fellow
Successes – 12 peer-reviewed studies published, numerous presentations at state and national meetings. Grant support gained from the NIH (INBRE program, Dr. Don Primarano) and Cystic Fibrosis Foundation (Dr. Hongwei Yu). Faculty members reviewed 16 journal transcripts.



Image of *Pseudomonas aeruginosa*, which turns into a mucoid, slimy form (right) during chronic lung infections in patients with Cystic Fibrosis (CF)

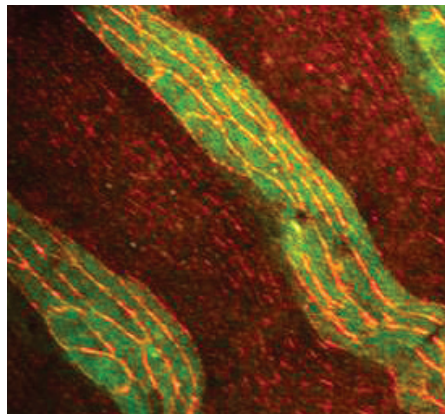
TOXICOLOGY AND ENVIRONMENTAL HEALTH SCIENCES

Coordinator – Dr. Monica Valentovic
Facts – 7 faculty members, 9 graduate students
Successes – 16 undergraduates received research experiences. Faculty members held 8 extramurally funded grants, published 8 journal articles and 4 book chapters, and led numerous presentations.

Dr. Gary Rankin participated in several NIH study sections, is a Toxicology editorial board member and was a finalist for the PhRMA award in Excellence in Pharmacology/Toxicology.

continued on page 16

Research Cluster Spotlight, continued from page 15



Confocal image of a *Drosophila* embryo

Dr. Valentovic participated in 2 NIH study sections, was elected Secretary/Treasurer of the Division of Toxicology of ASPET, reviewed 20 manuscripts for various journals and is an assistant editor for Toxicology and Environmental Health. She collaborated with Dr. Piyali Dasgupta on a recent NIH grant to examine capsaicin's effect on small cell lung cancer.

NEUROSCIENCE AND DEVELOPMENTAL BIOLOGY

Coordinator – Dr. Richard Egleton
Facts – 10 faculty members, 14 graduate students
Successes – Faculty laboratories provided training for 17 undergraduates and 3 medical students. Faculty held 14 extramurally funded grants, published 8 peer-reviewed articles and held presentations at numerous regional and national conferences.

Dr. Egleton spoke at a Penn State Symposium on "Prevention of Metabolic Syndrome by Dietary Phytochemical."

Dr. Georgel was an invited speaker at 6 venues, including Babarham Institute in Cambridge, UK and the Institut de Genetique et de Biologie Moleculaire et Cellulaire, in Illkrich, France.

Dr. Maria Serrat was featured in "Neuron" for her MU-ADVANCE Fellowship and for her research using real-time imaging to determine the impact of environmental fac-

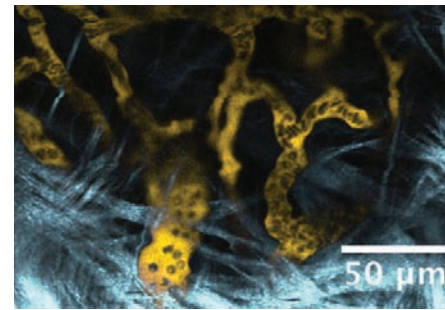


Image of blood vessels in the plexus surrounding the tibial growth plate of a live, anesthetized 5-week old mouse

tors like nutrition, temperature and physical activity on bone elongation.

Faculty provided extramural grant reviews for the American Diabetes Association, the American Heart Association, the BBSRC-UK, Pennsylvania Department of Health, Women in Science Fellowships and the Department of Army Research Office.

Biomedical Sciences Grant Funding for the 2011-2012 Academic Year

We continue to partner with the University of Kentucky Clinical and Translational Science Awards (CTSA) and participate in monthly leadership meetings, retreats and the annual Appalachian Health Summit. Marshall faculty received several pilot grant awards and are "grooming" several junior clinical faculty for submission of applications for the KL2 awards (mentored research training). At the very end of the academic year, we received word that the Research Challenge Grant application to fund the continued development of the West

Virginia Cancer Genomics Network would be awarded for five years with a cumulative budget of \$1.35 million. Marshall with the Edwards Comprehensive Cancer Center is the lead institution for the award with subcontracts to partners at the WVU Cancer Center and Charleston Area Medical Center. The long-term goal is to expand the network to an Appalachian Cancer Genomics Network with additional funding from the Appalachian Regional Commission.

NUMBER OF COMPETITIVE GRANT APPLICATIONS | 63

AMOUNT OF FUNDS REQUESTED | \$27,885,944

NUMBER OF COMPETITIVE GRANTS FUNDED | 17

AMOUNT OF FUNDING | \$1,114,309



Program & Students

Our program has completed another successful year that has seen significant changes in the School of Medicine. Changes range from the newly established scholarship for BMS students by BMS students, to the hiring of Dr. Joseph Shapiro as our new Dean, to the enhanced M.D./Ph.D. program.



Miranda Carper, Ph.D. Candidate

We are very proud of our graduate students for many reasons, but one stands out in particular. The BMS Graduate Student Organization (GSO) took the initiative to raise funds this past academic year to establish a scholarship

for two BMS research students in the amount of \$500 each. The intent of this scholarship is to recognize students from the BMS Graduate Program who have demonstrated outstanding performance in their related programs and to the local and national community.



Steven Rogers, Ph.D. Student

This year's winners are Miranda Carper (a Ph.D. candidate researching in Dr. Pier Paolo Claudio's laboratory) and Steven Rogers (a newly accepted Ph.D. student conducting research in Dr. Eric Blough's laboratory).

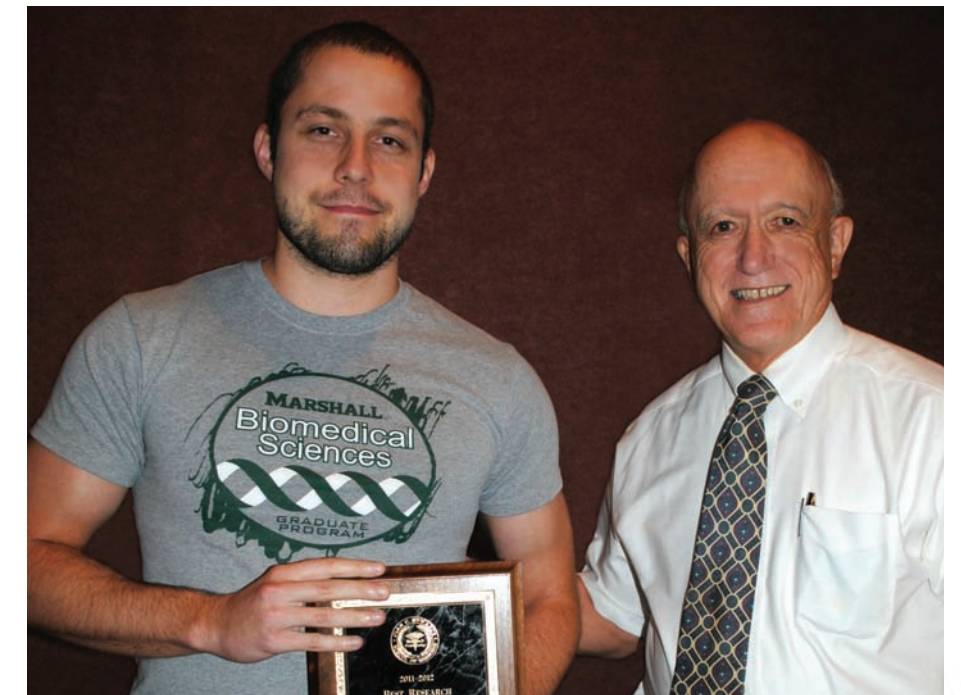
Additionally, the Biomedical Sciences Graduate Program recognizes graduate students each year at the Annual Research Retreat. For 2011-2012, we congratulate Allison Wolf (a Ph.D. candidate in Dr. Pier Paolo Claudio's lab) for winning the award for Best Overall Performance as a Graduate Student; she will receive a plaque and a paid trip to an international meeting, up to \$3,500. And, for the Best Research Performance, congratulations go to Johannes Fahrman (a Ph.D. candidate in Dr. Elaine Hardman's lab); he will receive

a plaque and an expenses paid trip to a national meeting, up to \$2,000.

Another positive development in the BMS Program is Dean Shapiro's commitment to enhancing the M.D./Ph.D. combined degree. We will recruit candidates for two M.D./Ph.D. slots in each entering medical school class, beginning with fall 2013. The selected students will receive remission of tuition and receive a Ph.D. level stipend for all years (approximately seven years) of the program. There will be safeguards put in place to insure repayment if the student drops either part of the dual degree option. Students also will be required to submit an M.D./Ph.D. fellowship grant

application before the end of the third year of the program. It is expected that this cadre of M.D./Ph.D. students will enhance the intellectual and translational research environment in both the medical student and graduate student training activities.

Our next academic year promises to be as stimulating with a new pilot grant program, a new faculty member to be recruited to replace Dr. Reichenbecher who retired a few years ago, and interviewing applicants for the enhanced M.D./Ph.D. track. We welcome six new Ph.D. candidates, 15 medical sciences students and two research M.S. students this fall 2012 to help kick off the new year!



Johannes Fahrman, Ph.D. Candidate, receives award from Dr. Richard M. Niles

BE A PART OF WHAT'S NEW!

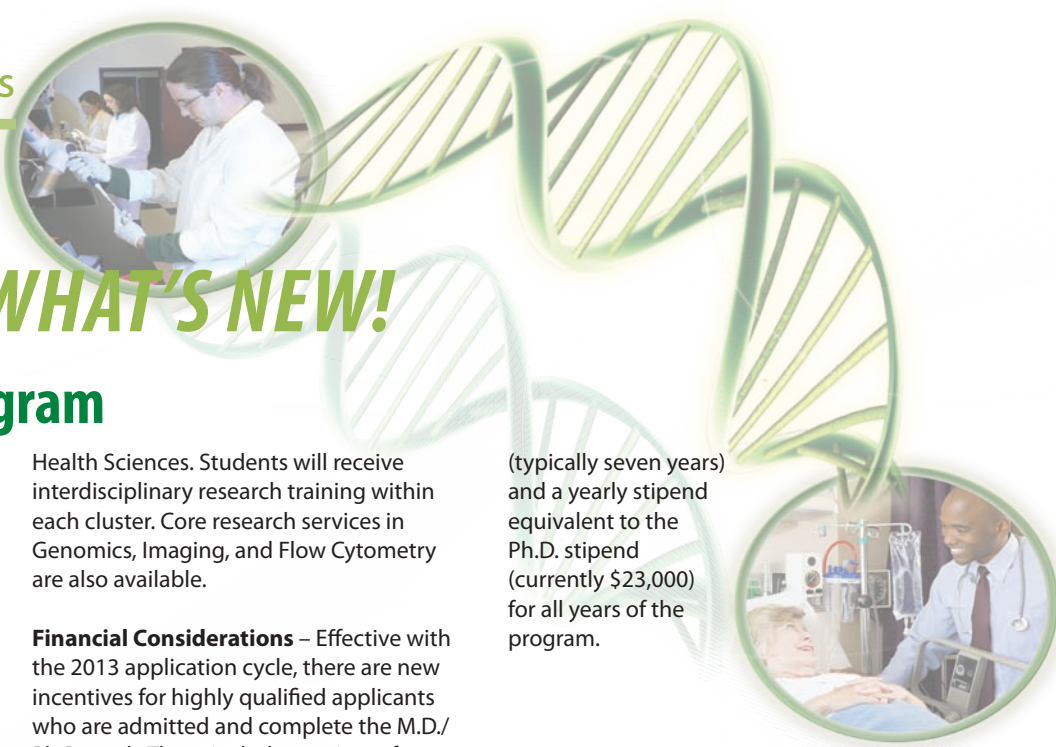
New M.D./Ph.D. Program

Program Description – Students in this track will be involved in course work, research activities and/or clinical training for the entire calendar year for the duration of the program. Also, students will be required to submit an M.D./Ph.D. fellowship grant application before the end of their third year of study. Research clusters include: Cardiovascular Disease, Obesity, and Diabetes; Infectious and Immunological Diseases; Neuroscience and Developmental Biology; and Toxicology and Environmental

Health Sciences. Students will receive interdisciplinary research training within each cluster. Core research services in Genomics, Imaging, and Flow Cytometry are also available.

Financial Considerations – Effective with the 2013 application cycle, there are new incentives for highly qualified applicants who are admitted and complete the M.D./Ph.D. track. These include a waiver of tuition for the entire length of the program

(typically seven years) and a yearly stipend equivalent to the Ph.D. stipend (currently \$23,000) for all years of the program.



New Ph.D. Application Deadlines and Procedure

Deadlines – The BMS Ph.D. Program has changed its application deadline to January 15th for domestic applicants and January 8th for international applicants! The application and supporting documents must be received on or before these dates in order for applicants to be reviewed and given priority consideration for a stipend and tuition benefits.

Change in Application Procedure...for the Ph.D. only

– The required application materials remain the same, but their destinations have changed. The application procedure requires submitting certain items to the Graduate Admissions Office and others directly to the BMS Graduate Program Recruitment Coordinator. This new procedure will help expedite the application process as well as improve efficiency. Applications, fees, official GRE scores, and official transcripts must all go to the Graduate Admission Office (100 Angus E. Peyton Drive, South Charleston,

WV 25303-1600). Written statements and official letters of recommendation must be sent to Diana Maue via e-mail at maue1@marshall.edu or via mail to: Biomedical Sciences Graduate Program, Marshall University, One John Marshall Drive, BBSC 301-F, Huntington, WV 25755-2195. Be sure to check the website for specifics!

Newly Designed Website
Marshall's Biomedical Sciences Graduate Program recently launched its newly designed website! You will experience a friendlier format, and one that puts a brighter spotlight on Marshall's BMS researchers, students, and alumni.
www.marshall.edu/bms

Employers of Marshall's BMS Alumni

- Applied Biosystems
- Brown University, Division of Biology and Medicine
- East Ohio Regional Hospital
- Federal Bureau of Investigation, Weapons of Mass Destruction
- Kent State University, Exercise Science Physiology
- L'Oréal
- Long Island Jewish Medical Center
- Marshall University, Forensic Science Graduate Program
- Morehead State University
- Mountwest Community & Technical College
- National Institutes of Health
- Progenesis Technologies, LLC
- Rite Aid Pharmacy
- Shawnee State University, Department of Natural Sciences
- Syntonix Pharmaceuticals, a subsidiary of Biogen Idec
- University of Alabama, Birmingham
- University of Charleston School of Pharmacy
- University of Hawaii at Manoa
- University of Kentucky Graduate Center for Toxicology
- University of Massachusetts, Worcester
- University of North Carolina, Wilmington
- University of Virginia
- University of Maryland Medical Career Center, Department of Oncology
- Wheeling Jesuit University
- Wil Research Laboratories
- Zymed Laboratories

"Marshall's BMS Ph.D. Program strengthened my analytical and problem solving skills, giving me the strategic mindset critical to responding effectively to threats of bioterrorism."

– Nathan Head, Ph.D., Supervisory Agent FBI Weapons of Mass Destruction Directorate and alumnus of the BMS Ph.D. Program



Incoming Biomedical Sciences Ph.D. Students for Fall 2012

- Caroline Hunter, B.S.**
Roanoke College (VA) – B.S.
- Lina Niu, B.E., M.S.**
Xiangtan University (China) – B.E.; Marshall University – M.S. in Biological Sciences

Sean Piwarski, B.S., B.A., M.S.
California Lutheran University – B.S., B.A.; Marshall University – M.S. in Forensic Science

Steven Rogers, B.S.
Marshall University – B.S.

Holly Tamski, B.S.
Seton Hill University (PA) – B.S.

Justin Tomblin, B.S.
Marshall University – B.S.

Incoming Biomedical Sciences Research M.S. Students for Fall 2012:

Adam Fischer
Glenville State University (WV) – B.S.

William O'Toole
Marshall University – B.S.

Incoming Biomedical Sciences M.S., Medical Sciences Students for Fall 2012:

- Mujiba Ansari – University of South Florida
- Oksana Bailiff – Marshall University
- Allison Dillard – West Virginia University
- Morgan Efaw – Marshall University
- Brad Gillon – College of The Holy Cross (MA)
- Larry Harbrecht – Marshall University
- Jarrod Harman – Marshall University
- John Hurley – Marshall University
- Chirag Patel – Marshall University
- Travis Potter – University of Tennessee, Knoxville
- Leslee Rice – Marshall University
- Bill Rollyson – West Virginia State University
- Adam Rudmann – The Ohio State University
- Cathryn Stevenson – Grambling State University (LA)
- Michelle Studeny – University of Kentucky



Biomedical Sciences Graduate Program
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R.C.B. Biotechnology Science Center
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Make a Gift to the Biomedical Sciences Graduate Program

The BMS Graduate Program continues to thrive, but is always seeking ways to make improvements for its students. Your financial contribution will support BMS Ph.D. students via scholarships/stipends or fund students' travel to biomedical meetings. Financial support can also be given to strengthen and expand the Biomedical Sciences Summer Research Internship for Minority Students (SRIMS).

Contribution of any amount is both helpful and appreciated!

Please contribute to the BMS Graduate Program Fund (213078) or the SRIMS Program Fund (213073) online at <http://www.marshall.edu/foundation/givenow.php>, or by mailing a check payable to:

The Marshall University Foundation, Inc.
519 John Marshall Drive
Huntington, West Virginia 25705

THANK YOU!

www.marshall.edu/bms