

# A.B.S.T.R.A.C.T.

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## Spotlight Scientist by Erin Kristobak

A recent Ph.D. graduate in the Department of Biomedical engineering, Shannon Faley, has helped to develop a groundbreaking technology in which thousands of single cells in suspension can be studied simultaneously. The novel system was designed in the laboratory of Dr. John Wikswow and has great potential to provide exciting data in countless fields of biomedical research.



**Shannon Faley**

Faley joined the Vanderbilt graduate program in Biomedical Engineering in August of 2000. She began her graduate career in the lab of E. Duco Jansen, Associate Professor of Biomedical Engineering, where she completed her Master's thesis research on the expression of Vascular Endothelial Growth Factor (VEGF) during mammary tumorigenesis in a transgenic mouse model.

Following completion of her Master's degree in 2002, Faley joined the lab of Dr. John Wikswow, Professor of Biomedical Engineering, Molecular Physiology & Biophysics, and Physics. Wikswow is the head of the Vanderbilt Institute for Integrative Biosystems Research and Education (VIIBRE), an organization created in 2002 with the goal of strengthening education and research in the bioengineering and biophysical science fields at Vanderbilt.

Faley's project in the Wikswow lab is a realization of the research goals of VIIBRE. Having developed an interest in immunology while completing her Master's work, she embarked upon the development of a system to isolate single non-adherent cells for study. Previously, this task had been very difficult, if not impossible, to perform. However, using her knowledge in engineering and physics, Faley and other collaborators in the Wikswow lab created a novel microfluidic device that allows for investigation of single cells in suspension.

The microfluidic cell culture device uses a constant flow of media through a chamber to hold individual cells in tiny "traps" made of polydimethylsiloxane (PDMS), a silicon-based organic polymer

with a texture similar to gelatin. In its entirety, the device is small enough to fit on a glass slide, measuring only one centimeter wide. Due to its small size, it requires very little media: in one experiment, the cells remained viable with a 100 nl per minute flow into the device, using less than 50  $\mu$ l media for a 24 hour experiment. Due to the extremely low volume, there is no dilution of any components produced by the cells of study. This provides a major advantage to the milliliter-scale volumes used in traditional cell culture, making the system much more representative of physiological conditions. A paper outlining the design of this original device is currently in preparation to be submitted to *Lab on a Chip*.

Faley's Ph.D. thesis project investigated the immune synapse between Jurkat T and dendritic cells in the microfluidic device. She isolated dendritic cells in an upper chamber of a device whose media outflow fed into a second chamber containing T cells. In a manuscript in preparation, Faley will present her observation, discovered using the new device, that a factor produced by the dendritic cells results in the stimulation of T cells without cell-cell contact. Her study introduces this novel and sensitive detection system for intercellular signaling.

Surprisingly, this tiny device is easy to manufacture, inexpensive to make, and could easily be installed in many biomedical research laboratories. Dr. Wikswow and Dr. Faley are excited about the potential this system has for use in additional experimental systems. They look forward to collaborating with other scientists at Vanderbilt and abroad to further explore the novel data that can be obtained using their device.

Faley defended her Ph.D. dissertation, "Development of a Microfluidic Platform for the Study of T Cell Signaling," on March 16, 2007. She has accepted a post-doctoral fellowship with Jon Cooper in the Department of Electronics & Electrical Engineering at Glasgow University in Scotland. The Cooper lab specializes in "Lab-on-a-Chip" technology, in which assays are miniaturized to be performed in fluid volumes as small as picoliters, imitating more closely the conditions in living organisms. After her postdoctoral fellowship, Faley plans to continue to be intimately involved in laboratory research, most likely in an academic setting.

**Sponsored by: the Office of Biomedical Research, Education and Training (BRET)**

## Neuroscience Program by Jessica Moore

Karoly Mirnics, in collaboration with David Lewis at the University of Pittsburgh and Pat Levitt, recently published a paper in *Biological Psychiatry* titled "Molecular Evidence for Increased Expression of Genes Related to Immune and Chaperone Function in Prefrontal Cortex in Schizophrenia." This microarray study demonstrates that mRNAs for eleven genes involved in the response to infection are increased in schizophrenia patients.

The study of schizophrenia's complex etiology benefits from methods that do not require defined hypotheses, such as gene expression profiling. This method reveals novel connections between this mental disorder, which affects approximately one percent of the population, and gene networks and has previously identified changes in expression of genes in the GABA and glutamate systems, in oligodendrocytes, at synapses, and in mitochondria. These studies, and the newly published research, examine gene expression in the prefrontal cortex because of the centrality of functions requiring this area, such as working memory and goal-directed behavior, to schizophrenia (Lewis DA and Mirnics K, *Progress in Brain Research* 2006).

This study minimizes confounds common to microarray research, allowing replicable conclusions. The design of the custom-made microarray decreases cross-hybridization and its impact on the results. Further, the gene expression changes reported meet significance requirements when analyzed four different ways.

Expression of 67 genes differs between the schizophrenia samples and controls, including 45 downregulated and 21 upregulated transcripts, many confirming previous findings. Most importantly, clustering analysis reveals that upregulation of eleven of the genes, all of whose functions are immune or chaperone (to prevent protein aggregation in response to cellular stress), is strongly correlated and that a subset of schizophrenic subjects contribute to their significance.

This study provides cortical gene expression evidence for the neuroimmune hypothesis of schizophrenia, so far based on epidemiological, serological, and pathological data (Rothermundt et. al., *Brain, Behavior, and Immunity* 2001). The increased expression of these genes might represent either a response to a chronic infection or an autoimmune condition, or permanent damage from an earlier infection or immune challenge, possibly during brain development. The authors favor the latter interpretation because expression of markers of acute immune response are similar between groups and prenatal exposure of rodents to maternal immune response has previously been shown to cause behavioral and pathophysiological effects similar to schizophrenic symptoms (Ozawa et. al., *Biological Psychiatry* 2006, Zuckerman et. al., *Neuropsychopharmacology* 2003). Further, the researchers speculate that early-life elevation of inflammatory cytokines in the brain causes symptoms of schizophrenia both by altering development of brain circuits and by continuing to affect cognitive function through increased immune gene expression throughout life.

Karoly Mirnics, MD, (karoly.mirnics@vanderbilt.edu) joined the faculty of the Graduate Program in Neuroscience, the Kennedy Center for Research on Human Development, and the Department of Psychiatry at Vanderbilt in 2006.

Pat Levitt, Ph.D. (pat.levitt@vanderbilt.edu) is a Vanderbilt faculty member in the Department of Pharmacology and Neuroscience Program, and is the Director of the Kennedy Center for Research on Human Development.

"researchers...have unambiguously identified a genetic variant...that is associated with an increased risk for developing multiple sclerosis"

## Human Genetics Department by Stephen Turner

Several groups of human genetics researchers in the United States and abroad, including Jonathan Haines's group in the Center for Human Genetics Research here at Vanderbilt University, have unambiguously identified a genetic variant in the interleukin 7 receptor (IL7R) that is associated with an increased risk for developing multiple sclerosis, a neurodegenerative disorder that afflicts over a quarter million Americans.

These findings, published simultaneously in *Nature Genetics* and *The New England Journal of Medicine* on July 29 represent the first major discovery in MS genetics in 30 years. Researchers have known for quite some time that MS has a strong genetic component that has remained elusive until now. "The effect of a single genetic variant is not overwhelming," said Jonathan Haines, senior corresponding author on the *Nature Genetics* paper, in an interview. "The techniques that worked well for identifying genes causing Mendelian genetic disorders do not work well for more common, complex diseases," remarked Haines. Although there is certainly a strong genetic element that increases risk of developing MS, the genetic effect is subtle, and more sophisticated techniques are needed to identify the genes involved.

When asked to comment on the implications of this finding for future MS treatment and research, Haines remarked that this discovery would not lead to any immediate changes in the way MS patients are treated, but that researchers would now better know where to focus their studies. One of the most important questions raised by this finding is determining the significance of variation in the soluble to membrane-bound isoform ratio of the receptor, which is caused by this variant in IL7R. Once this is answered, researchers may be able to rationally design drugs that target constituents in the IL7R pathway.

Haines also noted that this study would not have been possible without an interdisciplinary approach. "This would have been impossible without our collaboration with clinicians who make accurate diagnoses, specialists in ascertainment and sample collection, molecular geneticists, and statisticians with analytical expertise."

As for ongoing research, the genetic basis of MS is far from being fully explained. The variant described in these studies does not by itself cause MS – it only increases one's risk of developing MS. The variant is quite common, and many individuals inherit the variant but never develop symptoms of MS. It is unclear whether the product of this gene interacts with other genes, environmental factors, or both. As part of her Ph.D. thesis research, Rebecca Zuvich, a third year graduate student in the Haines lab, will be examining other genes in the IL7R and related pathways to see if variation in any of these genes will allow us to more completely explain the genetic basis of MS.

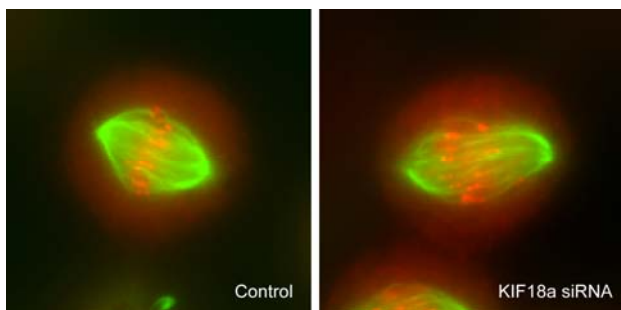
Jonathan Haines, Ph.D. (jonathan.haines@vanderbilt.edu) is a faculty member at Vanderbilt in the Departments of Molecular Physiology and Biophysics and Human Genetics, and is the Director of the Center for Human Ethics Research.

In the first issue of ABSTRACT, the department of Cell and Developmental biology (CDB) column will profile the two new faculty members that have joined the department this year. Melanie Ohi and Ryoma (Puck) Ohi began their scientific journey at Vanderbilt as graduate students in the lab of Kathy Gould and are now returning to start their own labs.

Dr. Melanie Ohi's lab, located on the third floor of MRBIII, will be studying two major complexes: the spliceosome, which she has studied in both her graduate and post-doctoral training, and the Anaphase Promoting Complex (APC/C). In order to further understand the spliceosome, splicing complexes will be isolated during different stages of the splicing process and characterized both structurally and biologically in *S. pombe*. Studies on the APC/C will be centered around the isolation of its components and characterization of its structure. Graduate students who would like to join Melanie's lab will study these structures with an integrated approach, utilizing biochemistry, genetics, and structural biology. First-year students who wish to rotate here will begin the initial characterization of one of the components from the spliceosome or APC/C and observe how the cryo-electron microscope is utilized for these projects.

Dr. Puck Ohi's laboratory, also located on the third floor of MRB III, will identify and study substrates of the protein kinase Aurora B to better understand its function(s) during mitosis. In collaboration with an investigator at Colorado State University, alanine and phosphomimetic mutants of the known Aurora B substrate Hec1 will be utilized to examine the function of Hec1 phosphorylation at the kinetochore. Studies will also examine whether the activities of Kif18a, a microtubule depolymerizing kinesin whose function is required for normal chromosome dynamics during metaphase (Figure below), are controlled by Aurora B-catalyzed phosphorylation. The third focus of Puck's research concentrates on identifying the phosphatase that antagonizes Aurora B activity. Students rotating in Puck's laboratory can pick a project based on their scientific and technical interests. One potential project will use live cell imaging to investigate the consequence of removing KIF18a on the accuracy of chromosome segregation during anaphase. Another potential rotation project is to assess the effect of removing the phosphatase PP6 from *Xenopus* egg extracts on spindle assembly.

Graduate students interested in learning more about either of these labs may contact Melanie at [melanie.ohi@vanderbilt.edu](mailto:melanie.ohi@vanderbilt.edu) and Puck at [ryoma.ohi@vanderbilt.edu](mailto:ryoma.ohi@vanderbilt.edu).



Functional consequences of KIF18a siRNA. HeLa cells were transfected with either control or KIF18a siRNAs. Forty-eight hours later, cells were fixed and processed for immunofluorescence using either CREST (red) or anti-tubulin (green) antibodies to detect kinetochores and microtubules, respectively. Chromosomes in control cells are aligned at the metaphase plate and have robust kinetochore fibers. In contrast, chromosomes in KIF18a- cells fail to congress and are attached to weakly developed kinetochore-fibers.

## Cancer Biology Department by Andrew Smith

Two of the greatest challenges of cancer therapy are determining which pathways to target for individual cancers, and understanding how these pathways work. A single treatment may be effective against one tumor, and useless on a seemingly identical tumor in another patient. Thus, understanding which tumor-associated proteins are active or inactive in an individual tumor would greatly facilitate cancer therapy. Meanwhile, a better understanding of how cancer-related pathways are regulated would provide new targets for therapy. Two recent publications from Cancer Biology labs highlight these two facets of cancer therapy.

As with many therapies, the use of Matrix Metalloproteinase (MMP) inhibitors has been limited by the inability to determine an effective dosage for patients that will inhibit the MMP activity of tumors without harming the patient. To address this, Dr. Lynn Matrisian, Dr. Oliver McIntyer, and their colleagues have collaborated with Metaprobe to develop a compound called PCA-7 (Proteinase-modulated Contrast Agent), consisting of the standard gadolinium (Gd) ion used for MRI contrast with a covalently attached peptide that is cleaved by MMP-7, an MMP found in many malignant adenocarcinomas. In addition to the peptide, PCA-7 also features a hydrophilic PEG group bound to the peptide and a hydrophobic group between the Gd and peptide. Upon cleavage of the peptide by MMP-7, the PCA-7 falls out of solution, resulting in a prolonged MRI signal relative to a standard contrast agent or a scrambled uncleavable variant. This compound has been successfully tested in nude mice injected with SW480 colon cancer cells engineered to express exogenous MMP7 (SW480Mat). Tumors derived from SW480Mat cells produced a prolonged MRI signal relative to those derived from parental cells lacking MMP-7 when the PCA-7 agent was used. This

prolonged signal could be effectively blocked in the same mouse using a small molecule MMP inhibitor. Drs. McIntyer and Matrisian and their colleagues hope this technology can be adapted to monitor the activity of other proteins in tumors, such as receptor tyrosine kinases. The findings of this study are published in the August edition of *Molecular Imaging*.

Equally important in improving targeted cancer therapy is understanding how cancer promoting pathways are normally regulated. Dr. Wendell Yarbrough and colleagues have identified the ARF binding partner LZAP (Leucine Zipper ARF-associated Protein) as a potential tumor suppressor acting through the NF- $\kappa$ B pathway. LZAP protein was lost in approximately 30% of primary head and neck squamous cell carcinomas. Loss of LZAP transformed cells in a number of classical assays, such as anchorage independent growth in soft-agar, and caused increased tumor growth in a mouse xenograft model. LZAP loss also caused an increase in expression of NF- $\kappa$ B target genes. The authors demonstrate that LZAP physically interacts with and phosphorylates RelA, the transcriptionally active subunit of NF- $\kappa$ B, and increases its association with Histone Deacetylases, inhibiting the transcription of target genes. This is an example of active repression, in which LZAP represses NF- $\kappa$ B transcription by actively binding and regulating NF- $\kappa$ B, rather than physically blocking the promoter. This work is expected to appear in the September edition of *Cancer Cell*.

Dr. Lynn Matrisian, Ph.D. ([lynn.matrisian@vanderbilt.edu](mailto:lynn.matrisian@vanderbilt.edu)) is the Chair of the Department of Cancer Biology at Vanderbilt.

Dr. Oliver McIntyer, Ph.D. ([oliver.mcintyre@vanderbilt.edu](mailto:oliver.mcintyre@vanderbilt.edu)) and Dr. Wendell Yarbrough, M.D. ([wendell.yarbrough@vanderbilt.edu](mailto:wendell.yarbrough@vanderbilt.edu)) are faculty members in the Department of Cancer Biology.

“New, groundbreaking research in the study of autism is evolving the understanding of the disorder’s genetic and genomic basis.”

## Pathology Department by Robin Marjoram

Over the last few years, the Department of Pathology has grown in all areas it encompasses, including its investigative programs in vascular biology and cancer biology. Recently, the cancer biology program was fortunate enough to recruit two new faculty members to the department and Vanderbilt University: Christine Eischen, Ph.D. and Andries Zijlstra, Ph.D., who have started exciting research programs in lymphoma pathobiology and tumor cell invasion and metastasis, respectively.

Dr. Eischen obtained her Ph.D. in Immunology from the Mayo Clinic in Dr. Paul Leibson’s lab, did a postdoctoral fellowship at St. Jude Children’s Research Hospital in the lab of Dr. John Cleveland, and then joined the Eppley Institute for Research in Cancer at the University of Nebraska as an Assistant Professor. In November 2006, she moved her lab to Vanderbilt University to continue her research on genes that regulate B cell lymphoma development by affecting known tumor suppressor and oncogenic pathways. Dr. Eischen’s lab has demonstrated that progression to B cell malignancy is accelerated when there are alterations in the tumor suppressors p53 and ARF. Alternatively, a deficiency in the oncogene Mdm2 results in the suppression of lymphoma development. A manuscript on this topic is currently in press (Wang P., et al., 2007, *Oncogene*) showing that elevated Mdm2 expression induces chromosomal instability and confers a survival and growth advantage to B cells. The lab has other studies underway to further characterize these findings and elucidate novel pathways that regulate transformation. Results from these studies will provide a better understanding of the genes and pathways that regulate tumorigenesis and cancer development, which will lead to improved therapeutics for human lymphomas and other malignancies.

Dr. Zijlstra obtained his Ph.D. in Genetics and Cell Biology from Washington State University. Prior to coming to Vanderbilt, he conducted research at the Italian National Institute for Cancer Research in Genova and the Scripps Research Institute. He chose Vanderbilt as the institution to start his lab because it offered a highly collaborative environment and the Department of Pathology lends itself to translational research. Dr. Zijlstra’s research is primarily focused on the metastatic dissemination of tumor cells and the contributing molecular processes, with particular interest in migration and invasion by utilizing the chicken embryo as a model organism. Their recent work has focused on the role of CD151, a tetraspanin whose function is poorly understood. They believe that this molecule can control migration by regulating detachment at the rear of the cells, since promoting immobility through CD151 reduces metastasis by more than 90%. Since starting at Vanderbilt, Dr. Zijlstra has received a transitional award (KOI) which will fund their investigation into the molecular mechanisms of CD151 and the screening for molecular mechanisms that promote immobility. He has also received a small internal research grant to image the cellular physiology of intravasation and dissemination *in vivo*.

Dr. Christine Eischen, Ph.D. (Christine.eischen@vanderbilt.edu) and Dr. Andries Zijlstra, Ph.D. (andries.zijlstra@vanderbilt.edu) are both faculty in the Department of Pathology at Vanderbilt.

## Molecular Physiology and Biophysics Department by Heather Gosnell

Autism spectrum disorders (ASDs) affect approximately 6 in 1,000 children worldwide, yet only 10% of autism cases have an identified genetic cause. New, groundbreaking research in the study of autism is evolving the understanding of the disorder’s genetic and genomic basis, says Jim Sutcliffe, Ph.D, associate professor in the department of Molecular Physiology and Biophysics.

Dr. Sutcliffe is a member of the Autism Genome Project Consortium (AGPC), a worldwide collaboration of autism researchers. Recently the AGPC published an article in *Nature Genetics* (vol. 39, no. 3, March 2007) examining genomic anomalies in families containing 2 or more subjects with autism spectrum disorders (ASDs). The study included over 1400 affected families from all over the world, and is to date the largest collection of families ever studied in autism research. Instead of looking at the risk conferred by specific genes, studies of this scope are examining which networks of genes are important and are common throughout autistic populations. Using cohorts of this size is essential in order to overcome the complex heterogeneity of these disorders and allowed the authors to use a combination of approaches to increase the power of their findings.

In the AGPC study, after each subject was genotyped, the authors used the intensity of the signal from the SNP array to infer the copy number of an individual, relative to the other samples. Copy number variations (CNVs) refer to changes in DNA sequence that occur in individuals, and are an increasingly-common tool in genetic research. CNVs can be inherited, occur sporadically, or be mixed. The sites of these CNVs can then be used as putative risk loci for ASDs, and also as a sorting mechanism to reduce genetic heterogeneity for linkage studies. Finally, linkage analysis was used to find genomic regions of interest that may increase the risk of autism in families.

The group’s findings have significantly changed the way researchers are approaching the study of the genetic bases for ASDs. Most importantly, using linkage studies based on the CNV analysis, this study identified a specific area of the genome, chromosome 11p13, as highly significant in conferring risk for autism. More generally, however, it showed that CNVs are important for the risk of autism at a global, population-wide level- a genomic, not just genetic, risk. Dr. Sutcliffe and other AGPC researchers hope this type of finding will shift the focus of the field from looking primarily at candidate genes and linkage studies to piecing together the broader scope of genetic variations that underlie autism disorders.

Dr. Jim Sutcliffe, Ph.D (james.s.sutcliffe@vanderbilt.edu) is a faculty member in the Departments of Psychiatry and Molecular Physiology and Biophysics at Vanderbilt.

## Current News by Kevin Seale

### Cyborg Cells - Creating Life in the Laboratory?

Researchers at the J. Craig Venter Institute (JCVI) in Rockville, MD have recently reported an experiment that some say borders on the creation of a synthetic life form. There has been growing interest in discovering and producing a “minimal cell,” possessing the fewest molecular species necessary for self-maintenance and replication within a closed membrane. This year Dr. Carole Lartigue and colleagues at JCVI achieved a landmark in this effort by replacing the entire genome of *Mycoplasma capricolum* (a bacterial goat pathogen that lacks a cell wall) with the naked genome of *Mycoplasma mycoides* (a similar, but genetically distinct cow pathogen). Although identical to *M. mycoides*, the resulting organism is at least partially synthetic since the naked surrogate genome was transplanted in the laboratory. This makes a completely synthetic organism controlled entirely by recombinant DNA products an imminent possibility. In fact, it is rumored that the group has already created a fully “syn” organism they call *Mycoplasma laboratorium* in unpublished research. This rumor sparked protest by the Ottawa-based environmental watchdog group on Erosion, Technology and Concentration (ETC), who refers to the would-be organism as “Synthia” on their website. In any case, it is the stated goal of JCVI to engineer a minimal cell by whatever means, and commandeer its machinery for the production of commercially useful materials such as hydrogen, ethanol or biodegradable plastics.

JCVI filed U.S. and world patents in October 2006 that they hope will carve out a substantial chunk of the future market in synthetic organisms while not impeding academic research in the field. The patent stems from the group’s previous work on *M. genitalium*, a slower-growing *Mycoplasma* species in which they identified 382 of the organism’s 482-gene repertoire as essential for life. In the present work, the genome of *M. mycoides*, including a  $\beta$ -galactosidase gene, was extracted intact by immobilizing the cells in agarose and digesting away all but the DNA. The naked, circular DNA was isolated and incubated with a growing *M. capricolum* colony in the presence of polyethylene glycol, and the resulting transformants were plated onto agar substrates. Approximately three days later, synthetic colonies began to appear as evidenced by the bright blue hydrolysis product of  $\beta$ -galactosidase. Blue and white colonies, presumably hybrids, also appeared after a longer time period. The researchers picked the blue colonies and conducted thorough genomic and proteomic tests and declared them to be pure strains of *M. mycoides*. This result will undoubtedly aid researchers at JCVI in their quest to create a fully synthetic life form.

ETC is urging patent organizations to reject JCVI’s claims on the basis that creating and patenting “*Mycoplasma laboratorium*” breaches societal boundaries before public debate, and even before public awareness of what has happened. ETC has been successful at blocking

corporate maneuvers in the past, perhaps most notably those of agro-giant Monsanto. However, Lartigue’s co-author John Glass received a warm response to his presentation of the transplant results at the Kavli Futures Symposium in Greenland this summer. Kavli attendees, including such futuristic luminaries as Freeman Dyson, inventor of the “Astro-Chicken,” issued the “Ilulissat Statement,” as a vision urging funding for the merging of nanotechnology and synthetic biology, including studies such as Lartigue’s. Editors of the journal *Nature* responded by applauding the concept of removal of divine intervention from the creation of life. They hope the work will, among other things, help to undermine the religious dogma of pro-life advocates, since new life may eventually be purchased as easily as a cell transfection kit. Perhaps, unless ETC prevails, these engineered life forms will be privately owned by corporations such as ETC-coined “Microbesoft.” Other researchers do not attribute such gravity to JCVI’s work. Venter himself stated that religion has continually adapted to new information as it is revealed by science and it will adapt to this development as well. MIT synthetic biologist Tom Knight points out that difficulties obtaining the patent can be circumvented easily by sprinkling in a few non-essential genes, and that the main problem with the patent application is that it doesn’t provide instructions for building the synthetic cell, an omission that he believes is “rather tasteless.”

What exactly constitutes a fully synthetic cell is a question open to debate. Replacement of the genome with a synthesized copy of naturally occurring DNA with a few genes deleted or substituted here and there is a bit like looking over mother nature’s shoulder to cheat on an exam. The complexity of interactions between gene products remains in the mysterious realm of the unknown. Vanderbilt professor Anthony Forster emphasizes that, while the work “heralds the ability to more easily change large amounts of the genome, we don’t understand genomes well enough to make these changes effectively.” The resulting organism, if it survives, would always be a dubious combination of original work and genetic plagiarism. The real work lies in the complete understanding of the genes, their products and their synergistic interactions. Dr. Forster points out that organisms with tweaked genomes were patented decades ago. For example, in 1980 General Electric was assigned a patent for a genetically modified bacterium capable of degrading hydrocarbon molecules (USPTO 4,259,444) after a supreme court ruling in GE’s favor.

Meanwhile, Venter and colleagues have outfitted a sea-going vessel, *Sorcerer II*, to scour the planet’s oceans to identify and genetically classify microbial life forms. It is perhaps not a coincidence that researchers discovered a 200 nanometer life form *Nanoarchaeum equitans* in a thermal vent near Iceland in 2002. JCVI researchers undoubtedly realize that harnessing a fully synthetic organism will be easier if they begin with one that already requires very few genes to function. They may even have to discover it first!

“They hope the work will, among other things, help to undermine the religious dogma of pro-life advocates”

## Business News by Kim Korwek

Each year, the biomedical training programs at Vanderbilt produce highly trained new Ph.D.'s and postdoctoral fellows. These talented minds are anxious to continue their training, and many desire to make the move from academia to industry. However, this move is often constrained by geography; Tennessee does not possess the huge variety of biotechnology and pharmaceutical opportunities that are abundant in areas like southern California, Boston, or Research Triangle Park. But for young professionals who are nurturing careers as well as the responsibilities of their personal lives, such a move may be difficult. Are there any opportunities for young scientists in the Volunteer State?

Nashville and middle Tennessee:

Well within the comfort zone for Vanderbilt trainees is the nearby Cool Springs Life Sciences Center (CSLSC) in Williamson County. This \$74 million, 10-acre campus was designed attract biotechnology and bioscience companies to the area. The first of the three buildings on campus is completed and is occupied by several organizations that may provide opportunities for scientists. In addition to Vanderbilt's continued involvement in the project, the campus is home to the Williamson Office of Economic Development and its Knowledge Quest Institute to foster the development of a knowledge-based economy and the workforce to staff such endeavors.

The bench-science space at CSLSC is occupied by BioMimetic Therapeutics, Inc. This growing company focuses on the development of drug-device combination products, most notably their product for the treatment of bone and tissue loss due to periodontal disease. At the time of publication, BioMimetic Therapeutics featured advertisements seeking scientists and research associates skilled in immunology, protein chemistry, and clinical research.

With two additional, larger facilities under development, CSLSC may prove to be a valuable asset for scientists seeking to remain in middle Tennessee while still progressing in their careers.

East Tennessee:

The most well-know research center in East Tennessee is the Oak Ridge National Laboratory. Partnered with UT, this is a promising area for scientists willing to make the short move across the state. Oak Ridge National Laboratory focuses on a variety of research areas, including neutron science, the development of advanced materials, supercomputing, new energy production techniques, and the understanding of complex biological systems. Today you could apply for a job as a polymer morphologist, a program manager for the materials science program, or senior commercialization manager in the office of technology transfer.

Also in east Tennessee is the established biopharmaceutical and chemical research-based industries of the Tri-Cities area (Johnson City, Bristol and Kingsport). Eastman Chemical Company manufactures and markets chemicals, fibers and plastics worldwide. King Pharmaceuticals focuses on technologies involving cardiovascular/metabolics, neuroscience, and hospital/acute care. This is a nationwide company, but their Bristol headquarters has both manufacturing and administrative positions, including a variation of medical science liaison and pharm tech engineer. Finally, GlaxoSmithKline's Bristol manufacturing location has need for chemists, while they also seek pharmaceutical sales representatives throughout the state.

West Tennessee:

St. Jude Children's Research Hospital is an obvious draw to Memphis for scientists. There are several other companies who have already headquartered here, including Smith & Nephew (orthopaedics, endoscopy, wound management), Medtronic Sofamor Danek, and Wright Medical (orthopaedic biologics). Memphis is also actively creating a favorable environment for further expansion of the biotechnology industry with a partnership between the Memphis Regional Chamber of Commerce and Memphis BioWorks Foundation.

Networking and finding more opportunities:

Scientists looking to stay in Tennessee may have to work harder or be more creative about finding opportunities and making career connections. Local organizations to foster education and biotechnology, such as Memphis BioWorks Foundation and Tennessee Biotechnology Association, can aid in this networking. These organizations bring together scientists and non-scientists interested in increasing the biotechnology presence in Tennessee. Many directors of the major biotechnology companies in the area are highly involved in these organizations, providing a valuable link to the newest opportunities and developments in the area.

*Full disclosure: The author is a member of the Tennessee Biotechnology Association Student Chapter.*

*“Scientists looking to stay in Tennessee may have to work harder or be more creative about finding opportunities and making career connections.”*

## Journal Club by Dominique Donato

### “Beyond Cell Migration: A Role for Rho and Rac in Cell-Cell Contact Formation”

Rho and Rac activity can be found in localized zones of migrating cells, especially at the edge of the lamellipodium, a large protrusion of membrane at the cell's leading edge (Hall 1998). However, the mechanisms that these two seemingly antagonistic GTPases may be exerting to form epithelial cell-cell contacts remained unclear until recently. In a recent article published in the *Journal of Cellular Biology*, “Localized zones of Rho and Rac activities drive initiation and expansion of epithelial cell-cell adhesion,” Yamada and Nelson create a real-time picture of cell-cell contact formation and the roles of the Rho and Rac GTPases in this process.

Using a variety of microscopy techniques including Total Internal Reflection Fluorescence Microscopy (TIRF-M) and Fluorescence Resonance Excitation Transfer, the researchers were not only able to describe the phenomena in a detailed time-course, but also piece together signaling mechanisms associated with these biological changes.

RhoA and Rac1 are both members of the Rho GTPase family. RhoA activation is known to be associated with actomyosin contraction in cell migration as well as the formation of cell-cell contacts. Rac1 is involved in the formation of actin meshworks and the subsequent protrusion of membrane in the form of lamellipodia at the leading edge of migrating cells (Hall 1998).

Though these activities seem to be antagonistic, the authors suggest a model where both are necessary to complete the three stages of cell-cell adhesion; 1) lamellipodial extension and interaction between two adjacent cells, 2) cadherin engagement and the dissolution of actin bundles between the cell-cell contacts, and 3) the completion of actin filament organization along the cell edges and the expansion of the contact area. Yamada and Nelson suggest that the first two steps of this process are dependent on Rac1 and Arp2/3 and the third and final stage is dependent on RhoA activation and myosin II phosphorylation.

The authors observed that as a cell's lamellipodium expands and touches that of another cell, E-cadherin accumulates at the cell-cell contact area in the same region where actin becomes more and more diffuse, forming a distinct gap in the cortical actin ring. The mechanism by which E-cadherin localizes to cell-cell contacts is still unresolved.

Cytochalasin D treatment, which caps barbed ends of actin filaments and prevents its elongation, revealed the formation of small actin asters at the edge of cell-cell contacts, but not adjacent to the cell-cell contact itself. The authors interpreted the movement of the asters away from the zone of the cell-cell contact as a result of one or more of the following: 1) an absence or reduction in actin tension at cell-cell contacts, 2) the presence of global tension in cortical actin at the cell perimeter, and/or 3) barbed-end actin anchoring at the edges of cell-cell contacts and at the opposite, non-contacting site of the cell.

Immunocytochemistry experiments revealed an accumulation of myosin II at the edges of cell-cell contacts and along the cortical actin bundle in adhering MDCK pairs. Serine-phosphorylated myosin II (p-myosin II) was found preferentially at the edges of cell-cell contacts, but excluded from the cell-cell contacts. Addition of Y27632, a ROCK (Rho Kinase) inhibitor, led to the diffusion of p-myosin II and disruption of the cortical actin ring, but did not destroy the cell-cell contact itself. However, ML7, a small molecule inhibitor of the myosin light chain kinase (MLCK), also led to the redistribution of p-myosin II and disruption of cell-cell contact.

Immunocytochemistry experiments revealed an accumulation of myosin II at the edges of cell-cell contacts and along the cortical actin bundle in adhering MDCK pairs. Serine-phosphorylated myosin II (p-myosin II) was found preferentially at the edges of cell-cell contacts, but excluded from the cell-cell contacts. Addition of Y27632, a ROCK (Rho Kinase) inhibitor, led to the diffusion of p-myosin II and disruption of the cortical actin ring, but did not destroy the cell-cell contact itself. However, ML7, a small molecule inhibitor of the myosin light chain kinase (MLCK), also led to the redistribution of p-myosin II and disruption of cell-cell contact.

Using Rac1 and RhoA FRET probes developed previously (Itoh et al. 2002, Yoshizaki et al. 2003), the authors were able to observe the activation of these two GTPases during cell-cell contact expansion in living cells. Rac1 and Arp3 accumulated at the edge of lamellipodia during cell-cell contact formation. Once cell pairs made contact with each other, Rac1 and Arp3 reorganized to the edge of the cell-cell contact. Arp3 was completely absent from the cell-cell contacts, but occasionally Rac1 appeared in lamellipodia forming in the center of the cell-cell contact. RhoA was present in the retracting cell edge and also at the edges of the cell-cell contact, but not in the cell-cell contact itself or the tip of lamellipodia.

Since RhoA can be activated through integrin-mediated adhesion, the authors used a focal adhesion marker to investigate the role of integrins in cell-cell contacts. The authors noticed b-catenin and E-cadherin proximal to paxillin-positive sites at the edge of cell-cell contact. However, they did not colocalize with paxillin. All three molecules were in close proximity to actin, suggesting an association between integrin-positive adhesions and cell-cell contacts through the actin cytoskeleton.

The authors' final model suggests that E-cadherin may somehow inhibit this RhoA activity. However, they provide no evidence in the current study to support this hypothesis, which could be easily tested using RNAi. The authors performed a largely descriptive study, which may be important as a basis for future studies. They did the necessary experiments to demonstrate the involvement of a Rac1 pathway in the cortical actin ring reorganization and the involvement of a RhoA pathway in eliciting actomyosin contraction and cell-cell contact expansion through ROCK and MLCK activation. Future studies must be performed to elucidate the pathways upstream of RhoA and Rac1 during cell-cell contact formation.

Soichiro Yamada and W. James Nelson belong to the Department of Molecular and Cellular Physiology at Stanford University

**Yamada, S. and W.J. Nelson. 2007. Localized zones of Rho and Rac activities drive initiation and expansion of epithelial cell-cell adhesion. *J. Cell Biol.* 178:517-527.**

Hall, A. 1998. Rho GTPases and the Actin Cytoskeleton. *Science.* 279:509-514.

Itoh, R.E., K. Kurokawa, Y. Ohba, H. Yoshizaki, N. Mochizuki, and M. Matsuda. 2002. Activation of rac and cdc42 video imaged by fluorescent resonance energy transfer-based single-molecule probes in the membrane of living cells. *Mol. Cell. Biol.* 22:6582-6591.

Yoshizaki, H., Y. Ohba, K. Kurokawa, R.E. Itoh, T. Nakamura, N. Mochizuki, K. Nagashima, and M. Matsuda. 2003. Activity of Rho-family GTPases during cell division as visualized with FRET-based probes. *J. Cell Biol.* 162:223-232.

## A LETTER FROM THE EDITORS

Dear Vanderbilt Community,

We hope that you found the inaugural issue of ABSTRACT to be both informative and thought-provoking. As students ourselves, we feel that it is important for developing scientists to stay informed of not only progress in our respective fields but also important issues in the societal, legislative, and economic environment in which we approach our scientific pursuits. Our goal in establishing this student and postdoctoral publication is three-fold:

- to inform readers about a variety of important developments in the realms of science, business and government
- to maintain trainees' intellectual connections with all biomedical departments, in keeping with the interdisciplinary goals of biomedical education at Vanderbilt.
- to provide Vanderbilt students and postdoctoral fellows with an opportunity to gain experience in science writing

We hope that you will look to ABSTRACT for coverage of current progress at Vanderbilt and in the broader scientific community and that the information provided here will spark discussion and debate among colleagues.

Finally, we would like to thank the Office of Biomedical Research, Education and Training (BRET) and, more specifically, Drs. Roger Chalkley and Kim Petrie for their support. We would also like to thank our writers, whose talent and investment have shaped our first issue and made ABSTRACT a reality. It is our sincere hope that ABSTRACT will become a staple of the student and postdoctoral experience at Vanderbilt, and thus we encourage you to contact us with your questions and comments.

Sincerely,

Erica Bowton and Julie Field  
Editors-in-Chief

# Graduate Student Update by Megan Johnson and Jamie Reed

## Biochemistry Department

### **Chris Barton, (Graduate Student) - Jennifer Pietenpol Lab**

#### **Award**

2<sup>nd</sup> place poster award, Vanderbilt-Ingram Cancer Center Retreat, 2007.

### **Amy C. Moore (Postdoctoral Fellow) - Scott Hiebert Lab**

#### **Awards**

American Cancer Society Postdoctoral Fellowship January 2007- December 2008.

AACR-Aflac, Inc. Scholar in Training travel award, for American Association for Cancer Research (AACR) meeting in Los Angeles, CA, 2007.

#### **Presentations**

RUNX1-MTG8 stimulates Wnt signaling by redirecting N-CoR and MTG co-repressor complexes. AACR Annual Meeting, Los Angeles, CA, 2007.

### **Pradeep S. Pallan (Postdoctoral Fellow) - Martin Egli Lab**

#### **Publications**

Pallan PS, Lubini P, Egli M. A left-handed supramolecular assembly around a right-handed screw axis in the crystal structure of homo-DNA. *Chemical Communications*, 2007.

Egli M, Pallan PS. Insights from crystallographic studies into the structural and pairing properties of nucleic acid analogs and chemically modified DNA and RNA oligonucleotides. *Annual Review of Biophysics & Biomolecular Structure*, 2007.

Pallan PS, Egli M. Selenium modification of nucleic acids. Preparation of oligo-nucleotides with incorporated 2'-SeMe-uridine for crystallographic phasing of nucleic acid structures. *Nature Protocols*, 2007.

Pallan PS, Egli M. Selenium modification of nucleic acids. Preparation of phosphoro-selenoate derivatives for crystallographic phasing of nucleic acid structures. *Nature Protocols*, 2007.

Egli M, Lubini P, Pallan PS. The long and winding road to the structure of homo-DNA. *Chemical Society Reviews*, 2007.

#### **Presentation**

Probing the structure and activity of DNA-/RNA-processing enzymes with the 2,4-difluorotoluy/ribo-2,4-difluorotoluy (dF/rF) nucleoside, an apolar thymidine/uridine analogue. Abstracts of American Chemical Society 234th National Meeting & Exposition, Boston, MA, 2007.

### **Ning Wang, Ph.D. (Postdoctoral Fellow) - Tadashi Inagami Lab**

#### **Publication**

Wang N, Li Z, Ding R, Frank GD, Senbonmatsu T, Landon EJ, Inagami T, and Zhao ZJ. **Antagonism or synergism: Role of tyrosine phosphatases SHP-1 and SHP-2 in growth factor signaling.** *Journal Biological Chemistry*, 2006.

#### **Presentation**

Coordinated regulation of epidermal growth factor signaling by the protein tyrosine phosphatases SHP-1 and SHP-2. FASEB (Federation of American Societies for Experimental Biology) Experimental Biology, San Francisco, CA, 2006.

## Biomedical Engineering Department

### **Lori Arlinghaus (Graduate Student) - Adam Anderson Lab**

#### **Award**

Joint Annual Meeting ISMRM-ESMRMB 2007 Educational Stipend, ISMRM (International Society for Magnetic Resonance in Medicine), 2007.

#### **Presentation**

Investigating Williams Syndrome with Diffusion Tensor Imaging. Joint Annual Meeting ISMRM-ESMRMB, Berlin, Germany, 2007.

## Biomedical Informatics Department

### **Yindalon Aphinyanaphongs (Graduate Student) - Constantin Aliferis Lab**

#### **Presentations**

Formative comparative evaluation of traditional and recent quality-content filters for answering clinical questions with MEDLINE. Medical Library Association Annual Meeting and Exhibition, Philadelphia, PA, 2007.

Text categorization models for identifying unproven cancer treatments on the web. 12<sup>th</sup> International Medical Informatics Congress. MedInfo; Brisbane, Australia, 2007.

A comparison of impact factor, clinical query filters, and pattern recognition query filters in terms of sensitivity to topic. 12<sup>th</sup> International Medical Informatics Congress. MedInfo, Brisbane, Australia, 2007.

### **Laura E. Brown (Graduate Student) - Ioannis Tsamardinos Lab**

#### **Presentation**

Comparing decision support methodologies for identifying asthma exacerbations. 12<sup>th</sup> International Medical Informatics Congress. MedInfo, Brisbane, Australia, 2007.

### **Thomas Campion (Graduate Student) - Russ Waitman Lab**

#### **Presentations**

Analysis of a computerized sign-out tool: identification of unanticipated uses. NLM Trainees Conference, San Francisco, CA, 2007.

Blogs, wikis, and discussion forums: attributes and implications for clinical information systems. 12<sup>th</sup> International Medical Informatics Congress. MedInfo, Brisbane, Australia, 2007.

### **Joshua Denny, Ph.D. (Postdoctoral Fellow) - Anderson Spickard, III Lab**

#### **Publications**

Rosenbaum BP, Denny JC, Spickard AS III. **Analysis of medical student content searches that resulted in unidentified UMLS concepts.** *American Medical Informatics Association Annual Symposium Proceedings*, 2006.

#### **Presentations**

Identifying QT prolongation using Natural Language Processing from ECG impressions. 12<sup>th</sup> International Medical Informatics Congress. MedInfo, Brisbane, Australia, 2007.

Identifying a rare mortal risk factor using full text search of an EMR. 12<sup>th</sup> International Medical Informatics Congress. MedInfo; Brisbane, Australia, 2007.

A randomized study of feedback on student write-ups using an electronic portfolio. COMSEP, San Antonio, TX, 2007.

### **Judith Dexheimer (Graduate Student) - Dominik Aronsky Lab**

#### **Publications**

Dexheimer JW, Jones I, Chen Q, Talbot TR, Mason D, Aronsky D. **Providers' beliefs, attitudes, and behaviors before implementing a computerized pneumococcal vaccination reminder.** *Academic Emergency Medicine*, 2006.

Dexheimer JW, Jones I, Waitman LR, Talbot TR, Gregg W, Aronsky D. **Prospective evaluation of a closed-loop, computerized reminder system for pneumococcal vaccination in the emergency department.** *American Medical Informatics Association Annual Symposium Proceedings*, 2006.

### **Stephany Duda (Graduate Student) - Dan Masys Lab**

#### **Publications**

Aronsky D, Madani S, Carnevale RJ, Duda S, Feyder MT. **The prevalence and inaccessibility of Internet references in the biomedical literature at the time of publication.** *Journal of the American Medical Informatics Association*, 2007.

Madani S, Carnevale RJ, Duda S, Feyder MT, Aronsky D. **Prevalence and inaccessibility of URLs in the biomedical literature.** *American Medical Informatics Association Annual Symposium Proceedings*, 2006.

#### **Presentation**

An XML model of an enhanced data dictionary to facilitate the exchange of clinical research data in international studies. 12<sup>th</sup>

International Medical Informatics Congress. MedInfo, Brisbane, Australia, 2007.

#### **Nathan Hoot (Graduate Student) - Dominik Aronsky Lab**

##### **Publications**

**Hoot NR, Zhou C, Jones I, Aronsky D. Measuring and forecasting emergency department crowding in real time. *Annals of Emergency Medicine*, 2007.**

**Hoot N, Aronsky D. An early warning system for overcrowding in the emergency department. *AMIA Annual Symposium Proceedings*, 2006.**

##### **Presentations**

Predicting emergency department overcrowding: a prospective validation study. Academic Emergency Medicine Annual Meeting, Chicago, IL, 2007. (Poster)

Model of donor/recipient variables improves liver transplant graft survival. American Hepato Pancreato Biliary Association (HPB) Meeting, 2006 (Poster)

How well do clinicians predict survival after liver transplantation? HPB Meeting, 2006. (Poster)

#### **Kim Unertl (Graduate Student) - Matthew Weinger Lab**

##### **Publication**

**Unertl KM, Weinger MB, Johnson KB. Applying direct observation to model workflow and assess adoption. *AMIA Annual Symposium Proceedings*, 2006.**

##### **Presentation**

Variation in use of informatics tools among providers in a diabetes clinic. 12<sup>th</sup> International Medical Informatics Congress. MedInfo, Brisbane, Australia, 2007.

#### **Jacob Weiss (Graduate Student) - Nancy Lorenzi Lab**

##### **Presentation**

Blogs, wikis, and discussion forums: attributes and implications for clinical information systems. 12<sup>th</sup> International Medical Informatics Congress. MedInfo, Brisbane, Australia, 2007.

## **Cancer Biology Department**

#### **Nelson Alexander, Ph.D. (Postdoctoral Fellow) - Alissa Weaver Lab**

##### **Publications**

**Alexander NR, Tran NL, Rekapally H, Summers CE, Glackin C, Heimark RL. N-cadherin gene expression in prostate carcinoma is modulated by integrin-dependent nuclear translocation of Twist1. *Cancer Research*, 2006.**

Heimark RL, **Alexander NR. Adhesion and Cytoskeletal Molecules in Metastasis: Cadherin Switching in Cancer Progression, Cell Adhesion and Cytoskeletal Molecules** in *Metastasis Series: Cancer Metastasis - Biology and Treatment*, Vol. 9 Springer Science, Eds. Cress AE, Nagle RB. 2006. (Book chapter)

##### **Presentation**

**Alexander NR, Weaver AM. Regulation of Breast Cancer Invadopodia Formation and Function: The Role of the Extracellular Matrix. The American Society for Cell Biology Meeting, San Diego, CA, 2006.**

#### **Roy Barco (Graduate Student) - Josiane Eid Lab**

##### **Award**

Minisymposium Presenter at the Annual Meeting of the American Association for Cancer Research, 2007.

##### **Publications**

**Barco R, Hunt LB, Frump AL, Garcia CB, Benesh A, Caldwell R, Eid JE. The synovial sarcoma SYT-SSX2 oncogene remodels the cytoskeleton through activation of the ephrin pathway. *Molecular Biology of the Cell*, 2007. (epub ahead of print)**

Pretto D, **Barco R, Rivera J, Neel N, Gustavson MD, Eid JE. The synovial sarcoma translocation protein SYTSSX2 recruits beta-catenin to the nucleus and associates with it in an active complex. *Oncogene*. 2006.**

#### **Brian Bierie (Graduate Student) - Harold L. Moses Lab**

##### **Publications**

**Bierie B, Moses HL. Tumour microenvironment: TGFbeta: the molecular Jekyll and Hyde of cancer. *Nature Reviews Cancer*, 2006.**

**Bierie B, Moses HL. TGF-beta and cancer. *Cytokine & Growth Factor Reviews*, 2006.**

**Kimberly Boelte (Graduate Student) - Charles Lin Lab**

**Publication**

Kobayashi H, **Boelte KC**, Lin PC. **Endothelial cell adhesion molecules and cancer progression. *Current Medicinal Chemistry*, 2007.**

**Nicole Bryce, Ph.D. (Postdoctoral Fellow) - Alissa Weaver Lab**

**Award**

American Heart Foundation Postdoctoral Fellowship, Southeast Affiliate, July 2005 – June 2007.

**Presentations**

Specific tropomyosin isoforms alter the susceptibility of actin filaments to actin altering drugs. American Society for Cell Biology Annual Meeting, San Diego, CA, 2006.

Cortactin in invadopodia formation. American Association for Cancer Research Annual Meeting, Washington DC, 2006.

**Xiaolan Chen, Ph.D. (Postdoctoral Fellow) - Li Yang Lab**

**Publication**

Yuhui H, **Chen X**, Dikov MM, Novitskiy SV, Mosse CA, Yang L, Carbone DP. **Distinct roles of VEGFR-1 and -2 in the aberrant hematopoiesis associated with elevated levels of VEGF. *Blood*, 2007.**

**Manesh Chittezhath, Ph.D. (Postdoctoral Fellow) - Josiane Eid Lab**

**Publications**

Singh R, Deep G, **Chittezhath M**, Kaur M, Nield L, Malkinson A, Agarwal R. **Inhibition of primary lung tumors growth and progression to vascular phase by silibinin. *Journal of the National Cancer Institute*, 2006.**

**Chittezhath M**, Kuttan G. **Radioprotective activity of naturally occurring organosulfur compounds. *Tumori*, 2006.**

**Linda Connelly, Ph.D. (Postdoctoral Fellow) - Fiona Yull Lab**

**Publication**

**Connelly L**, Robinson-Benion C, Chont M, Saint-Jean L, Li H, Polosukhin VV, Blackwell TS, Yull FE. **A transgenic model reveals important roles for the NFkappaB alternative pathway (p100/p52) in mammary development and links to tumorigenesis. *Journal of Biological Chemistry*, 2007.**

**Presentation**

Increased expression of NF- $\kappa$ B p100/p52 affects both proliferation and apoptosis in the murine mammary gland. American Association for Cancer Research Annual Meeting, Washington, DC, 2006.

**Rebecca Coyle (Graduate Student) - Jason Jessen Lab**

**Publication**

Bernal NP, Stehr W, **Coyle R**, Erwin CR, Warner BW. **Epidermal growth factor receptor signaling regulates Bax and Bcl-w expression and apoptotic responses during intestinal adaptation in mice. *Gastroenterology*, 2006.**

**Tracy Criswell, Ph.D (Postdoctoral Fellow) - Carlos Arteaga Lab**

**Publication**

Biswas S, **Criswell TL**, Wang SE, Arteaga CL **Inhibition of transforming growth factor-beta signaling in human cancer: targeting a tumor suppressor network as a therapeutic strategy. *Clinical Cancer Research*, 2006.**

**Presentations**

Knock down of the TGF $\beta$  type III receptor impairs motility and invasiveness of human breast cancer cells. Keystone Symposium: Molecular Targets for Cancer, Whistler, BC, 2007.

The Type III TGF $\beta$  Receptor Regulates Cell Motility through Modulation of NF $\kappa$ B Activity and Transcriptional Repressors of E-cadherin. American Association for Cancer Research Special Conference in Cancer Research: TGF $\beta$  in Cancer and Other Diseases, La Jolla, CA, 2006.

**Laura DeBusk (Graduate Student) - Charles Lin Lab**

**Award**

Travel Award, 2006 Keystone Symposium NF-kappaB: 20 Years on the Road from Biochemistry to Pathology, Banff, Alberta,

March 23 – March 28, 2006.

#### **Publications**

**DeBusk L**, Russell A, Imai K, and Matrisian L. **In the Forefront of Basic and Translational Cancer Research: Meeting Report.** *Cancer Research*, 2007.

Kobayashi H, **DeBusk LM**, Lin PC. **Angiopoietin/Tie2 signaling regulates tumor angiogenesis.** *Antiangiogenic cancer therapy*. Eds Ellis L and Teicher B (2007).

Yankeelov TE, **DeBusk LM**, Billheimer DD, Luci JJ, Lin PC, Price RR, Gore JC. **Repeatability of a reference region model for analysis of murine DCE-MRI data at 7T.** *Journal of Magnetic Resonance Imaging*, 2006.

Kamiyama, M, Pozzi, A, Yang, L, **DeBusk, LM**, Breyer, RM, Lin, PC. **EP2, a receptor for PGE(2), regulates tumor angiogenesis through direct effects on endothelial cell motility and survival.** *Oncogene*, 2006.

Kobayashi, H, **DeBusk, LM**, Babichev, YO, Dumont, DJ, Lin, PC. **Hepatocyte growth factor mediates angiopoietin-induced smooth muscle cell recruitment.** *Blood*, 2006.

#### **Presentation**

IKK $\alpha$  activation induces tumor angiogenesis. 2006 Keystone Symposium NF-kappaB: 20 Years on the Road from Biochemistry to Pathology, Banff, Alberta, 2006.

#### **Soumyadeep Dey (Graduate Student) - Stephen J. Brandt Lab**

##### **Presentation**

Novel role for the TAL1/SCL transcription factor in differentiation of murine bone marrow monocytes. American Society of Hematology Annual Meeting, Orlando, FL, 2006. (Poster)

#### **Michael R. Dohn, Ph.D. (Postdoctoral Fellow) - Albert Reynolds Lab**

##### **Awards**

Poster Presentation Award, Vanderbilt University Postdoctoral Poster Symposium, Nashville, TN, 2007.

Oral Presentation Award, Vanderbilt University Department of Cancer Biology Annual Retreat, Lake Barkley, KY, 2006.

##### **Publication**

Wildenberg GA, **Dohn MR**, Carnahan RA, Davis MA, Lobdell NA, Settleman J, Reynolds AB. **p120-Catenin and p190RhoGAP regulate cell-cell adhesion by coordinating antagonism between Rac and Rho.** *Cell*, 2006.

#### **Wei Bin Fang (Graduate Student) - Jin Chen Lab**

##### **Award**

Department of Defense Breast Cancer Research Program Predoctoral Traineeship Award.

##### **Publications**

Brantley-Sieders DM, **Fang WB**, Hwang Y, Hicks D, Chen J. **Ephrin-A1 facilitates mammary tumor metastasis through an angiogenesis-dependent mechanism mediated by EphA receptor and vascular endothelial growth factor in mice.** *Cancer Research*, 2006.

#### **Ritwik Ghosh (Graduate Student) - Susan Kasper Lab**

##### **Publications**

**Ghosh R**, Gu G, Tillman E, Yuan J, Wang Y, Fazli L, Rennie PS, Kasper S. **Increased expression and differential phosphorylation of stathmin may promote prostate cancer progression.** *Prostate*, 2007.

Tillman E, Yuan J, Gu G, Fazli L, **Ghosh R**, Flynt AS, Gleave M, Rennie PS, Kasper S. **DJ-1 binds to androgen receptor directly and mediates its activity in hormonally treated prostate cancer cells.** *Cancer Research*, 2007.

##### **Presentation**

Stathmin in prostate cancer development and progression. Society of Basic Urologic Research Annual Fall Meeting, Phoenix, AZ, 2006.

#### **Mark Harris (Graduate Student) - Vito Quaranta Lab**

##### **Awards**

Honorable Mention, Cancer Biology Retreat Poster, 2006

Awarded membership to the American Association for the Advancement of Science 2006-2007

## **Presentations**

Molecular Mechanism of Laminin-Integrin Binding. American Society of Matrix Biology International Conference, Nashville, TN, 2006. (Poster)

## **Miao He (Graduate Student) - Peng Liang Lab**

### **Presentation**

Inhibition of IL-24 signaling with soluble IL-20R2-Fc fusion protein. 100<sup>th</sup> American Association for Cancer Research Meeting, Los Angeles, CA, 2007. (Poster)

## **Yue He (Graduate Student) - Simon Hayward Lab**

### **Awards**

Department of Defense prostate cancer research pre-doctoral fellowship, \$100,000, 2006.

Travel award from American Association for Cancer Research (AACR), AACR Pathology of Cancer Workshop, 2006.

### **Presentations**

Tissue-specific consequence of overexpressing cyclin D1 in prostate cancer progression. Malignant consequences of manipulation of PTEN and Cyclin D1 in human prostatic stromal and epithelial cells. AACR special conference: Innovations in Prostate Cancer Research. San Francisco, CA, 2006.

Malignant consequences of manipulation of PTEN and Cyclin D1 in human prostatic stromal and epithelial cells. 2006 Society for Basic Urologic Research Fall Symposium. Phoenix, AZ, 2006.

Malignant consequences of manipulation of PTEN and Cyclin D1 in human prostatic stromal and epithelial cells. 2006 AACR Workshops in Cancer Research: Pathobiology of Cancer. Snowmass Village, CO, 2006.

## **Yuhui Huang (Graduate Student) - David Carbone Lab**

### **Award**

American Association for Cancer Research (AACR) Scholar-in-Training Award, 2007.

### **Publications**

**Huang Y, Chen X, Dikov MM, Novitskiy SV, Mosse CA, Yang L, Carbone DP. Distinct roles of VEGFR-1 and -2 in the aberrant hematopoiesis associated with elevated levels of VEGF. *Blood*, 2007**

Yang L, **Huang Y**, Porta R, Yanagisawa K, Gonzalez A, Segi E, Johnson DH, Narumiya S, Carbone DP. **Host and Direct Antitumor Effects and Profound Reduction in Tumor Metastasis with Selective EP4 Receptor Antagonism. *Cancer Research*, 2006.**

### **Presentations**

AACR Annual Meeting, Washington DC, 2006.

Notch signaling mediates the effect of VEGF on T lymphocyte development in cancer. Tumor Biology Minisymposium Session, AACR Annual Meeting, Los Angeles, CA, 2007. (Oral) –Cited by Dan G. Duda at the AACR meeting.

## **Jérôme Jourquin, Ph.D. (Postdoctoral Fellow) - Vito Quaranta Lab**

### **Publications**

Chaillan FA, Rivera S, Marchetti E, **Jourquin J**, Werb Z, Soloway PD, Khrestchatskiy M, Roman FS, **Involvement of tissue inhibition of metalloproteinases-1 in learning and memory in mice. *Behavioural Brain Research*, 2006.**

**Jourquin J, Yang N, Kam Y, Guess C, Quaranta V. Dispersal of epithelial cancer cell colonies by lysophosphatidic acid (LPA). *Journal of Cellular Physiology*, 2006.**

### **Presentations**

Rapid generation of protein gradients using computer controlled hydrodynamic focusing for studying the role of haptotaxis in cancer invasion, 3<sup>rd</sup> American Society of Matrix Biology Meeting, Nashville, TN, 2006. (Poster)

A novel methodology to study the role of haptotaxis in cancer invasion, 2<sup>nd</sup> Young Researcher in Mathematical Biology Workshop, Columbus, OH, 2006. (Poster)

Dispersal of Epithelial Cancer Cell Colonies by Lysophosphatidic Acid (LPA), Cooperative Human Tissue Network Seminar Series, Nashville, TN, 2006. (Oral)

## **Sarah Kurley (Graduate Student) - Albert Reynolds Lab**

### **Publication**

Burdette JE, Kurley SJ, Kilen SM, Mayo KE, Woodruff TK. **Gonadotropin-induced superovulation drives ovarian surface epithelia proliferation in CD1 mice.** *Endocrinology*, 2006.

#### **Nuruddeen D. Lewis (Graduate Student) - Keith Wilson Lab**

##### **Publication**

Chaturvedi R, Asim M, Lewis ND, Algood HMS, Cover TL, Kim PY, Wilson KT. **L-arginine availability regulates inducible nitric oxide synthase-dependent host defense against *Helicobacter pylori*.** *Infection & Immunity*, 2007.

##### **Presentations**

Macrophage Arginase Restricts Host Defense to *Helicobacter pylori* by Inhibiting Inducible NO Synthase. Digestive Disease Week: American Gastroenterological Association Annual Meeting, Washington DC, 2007. (Oral)

Infiltrating gastric macrophages are highly susceptible to apoptosis and exhibit attenuated nitric oxide production in *Helicobacter pylori* infection. Digestive Disease Week: American Gastroenterological Association Annual Meeting, Washington DC, 2007. (Poster)

Arginine availability is critical to the innate immune response to *Helicobacter pylori* by regulation of iNOS translation. Fourth International Conference Biology, Chemistry and Therapeutic Applications of Nitric Oxide. Monterey, CA, 2006. (Oral)

#### **Amanda Linkous (Graduate Student) - Dennis Hallahan Lab**

##### **Award**

Scholar-in-Training Travel Award, Radiation Research Society. 53<sup>rd</sup> Annual Meeting of the Radiation Research Society, Philadelphia, PA, 2005-2006.

##### **Presentations**

Inhibition of cytosolic phospholipase A2 (cPLA2) leads to decreased function in irradiated vascular endothelium. 13<sup>th</sup> International Congress of Radiation Research. San Francisco, CA, 2007. (Poster)

Cytosolic phospholipase A2 regulates viability and function of irradiated vascular endothelial cells. American Association for Cancer Research Annual Meeting, Los Angeles, CA, 2007. (Poster)

Cytosolic phospholipase A2-dependent lysophosphatidylcholine (LPC) production and signaling mediates immediate response to 3 Gy in endothelial cells. 53<sup>rd</sup> Annual Meeting of the Radiation Research Society, Philadelphia, PA, 2006. (Poster)

Low Dose of Radiation (3 Gy) Initiates an Immediate Signal Transduction through Lysophosphatidylcholine (LPC), a Novel Second Messenger Generated by Cytosolic Phospholipase A2, Which Regulates Response in Vascular Endothelium." 48<sup>th</sup> Annual Meeting of the American Society for Therapeutic Radiology and Oncology, Philadelphia, PA, 2006. (Poster)

#### **Shanshan Liu (Graduate Student) - Vito Quaranta Lab**

##### **Award**

U.S. Department of Defense Predoctoral Traineeship

#### **Ines Macias-Perez (Graduate Student) - Ambra Pozzi Lab**

##### **Award**

Travel Award for Winter Eicosanoid Conference, March 2006.

##### **Publication**

Rao R, Redha R, Macias-Perez I, Su Y, Hao C, Zent R, Breyer MD, Pozzi A. **Prostaglandin E2-EP4 receptor promotes endothelial cell migration via ERK activation and angiogenesis in vivo.** *Journal of Biological Chemistry*, 2007.

#### **Michelle Martin, Ph.D. (Postdoctoral Fellow) - Lynn Matrisian Lab**

##### **Award**

3<sup>rd</sup> Place, Post-Doctoral Poster Presentation, 6th Annual Host-Tumor Interactions, Program and Department of Cancer Biology Joint Retreat, 2006.

##### **Publications**

Martin MD, Matrisian LM. The other side of MMPs: **Protective roles in tumor progression.** *Cancer & Metastasis Reviews*, 2007. (epub ahead of print)

Lynch CC, Vargo-Gogola T, Martin MD, Fingleton B, Crawford HC, Matrisian LM.

**Matrix metalloproteinase 7 mediates mammary epithelial cell tumorigenesis through the ErbB4 receptor.** *Cancer Research*, 2007.

Halpern J, Lynch CC, Fleming J, Hamming D, Martin MD, Schwartz HS, Matrisian LM,

Holt GE. The **application of a murine bone bioreactor as a model of tumor: Bone interaction**. *Clinical & Experimental Metastasis*, 2006.

**Martin MD**, Hilsenbeck SG, Mohsin SK, Hopp TA, Clark GM, Osborne CK, Allred DC  
O'Connell P. **Breast tumors that overexpress nuclear metastasis-associated1 (MTA1) protein have high recurrence risks but enhanced responses to systemic therapies**. *Breast Cancer Research & Treatment*, 2006.

#### **Toni Nagy (Graduate Student) - Richard Peek Lab**

##### **Presentation**

Digestive Disease Week: American Gastroenterological Association Annual Meeting, Washington DC, 2007. (Oral)

#### **Edward Nam (Graduate Student) - Fen Xia Lab**

##### **Award**

Radiation Research Society Scholar in Training Travel Award, 2006.

##### **Presentation**

The engagement of BRCA1 and Bid, interplay between chromosomal break repair and apoptosis. Radiation Research Society Annual Meeting DNA Repair & Damage Response, Philadelphia, PA, 2006. (Oral)

#### **Srinivas Rao Nandana (Graduate Student) - Robert Matusik Lab**

##### **Awards**

Society for Basic Urologic Research Travel Award, 2006.

U.S. Department of Defense Predoctoral Traineeship Award, 2006.

#### **Nicole Neel (Graduate Student) - Ann Richmond Lab**

##### **Award**

Vanderbilt University Graduate Student Travel Award, Gordon Research Conference: Chemotactic Cytokines, Aussois, France, 2006.

##### **Publications**

**Neel NF**, Lapierre L, Goldenring J, Richmond A. **RhoB plays an essential role in CXCR2 sorting decisions**. *Journal of Cell Science*, 2007.

Ueda Y, **Neel NF**, Schutyser E, Raman D, Richmond A. **Deletion of the Carboxyl Terminal Domain of CXCR4 Leads to the Down-regulation of Cell-Cell Contact, Enhanced Motility and Proliferation in Breast Carcinoma Cells**. *Cancer Research*. 2006.

Pretto D, Barco R, Rivera J, **Neel N**, Gustavson MD, Eid JE. **The synovial sarcoma translocation protein SYT-SSX2 recruits beta-catenin to the nucleus and associates with it in an active complex**. *Oncogene*, 2006.

##### **Presentations**

RhoB plays an essential role in CXCR2 sorting decisions. Gordon Research Conference: Chemotactic Cytokines, Aussois, France, 2006. (Oral)

RhoB plays an essential role in CXCR2 sorting decisions. American Association for Cancer Research (AACR) Pathobiology of Cancer Workshop, Snowmass, CO, 2006. (Poster)

RhoB plays an essential role in CXCR2 sorting decisions. AACR Annual Meeting, Los Angeles, CA, 2007. (Poster)

#### **Daniel O'Brien (Graduate Student) - Richard Peek Lab**

##### **Award**

Vanderbilt University Graduate Student Travel Award, Digestive Disease Week, American Gastroenterology Association (AGA) Meeting, Los Angeles, CA, 2006.

##### **Publication**

**O'Brien DP**, Israel DA, Krishna U, Romero-Gallo J, Nedrud J, Medof ME, Lin F, Redline R, Lublin DM, Nowicki BJ, Franco AT, Ogden S, Williams AD, Polk DB, Peek RM Jr. **The role of decay-accelerating factor as a receptor for *Helicobacter pylori* and a mediator of gastric inflammation**. *Journal of Biological Chemistry*, 2006.

##### **Presentations**

Regulation of the *H. pylori* cellular receptor Decay-accelerating factor (DAF). Digestive Disease Week: AGA Annual Meeting, Washington, DC, 2007. (Oral)

Decay Accelerating Factor (DAF) is a cellular receptor for *Helicobacter pylori*.

Digestive Disease Week: AGA Annual Meeting, Los Angeles, CA, 2006. (Oral)

**Seth R. Ogden (Graduate Student) - Richard Peek Lab**

**Publication**

O'Brien DP, Israel DA, Krishna U, Romero-Gallo J, Nedrud J, Medof ME, Lin F, Redline R, Lublin DM, Nowicki BJ, Franco AT, **Ogden S**, Williams AD, Polk DB, Peek RM Jr. **The role of decay-accelerating factor as a receptor for *Helicobacter pylori* and a mediator of gastric inflammation.** *Journal of Biological Chemistry*, 2006.

**Presentations**

*Helicobacter pylori* alters the subcellular localization of p120-catenin in gastric epithelial cells. Digestive Disease Week: American Gastroenterology Association (AGA) Annual Meeting, Washington, DC, 2007 (Poster)

*Helicobacter pylori* induction of matrix metalloproteinase-7. Digestive Disease Week: AGA Annual Meeting, Los Angeles, CA, 2006. (Poster)

**Veronica Placencio (Graduate Student) - Neil Adri Bhowmick Lab**

**Awards**

Ruth L. Kirschstein National Research Service Award NIH Fellowship, 2007.

Society of Basic Urologic Research Travel Award to meeting in Phoenix, AZ, 2006.

**Presentation**

Wnt signaling contributes to the androgen independence of prostatic epithelia resulting from the loss of TGF- $\beta$  responsiveness of the stroma. Society of Basic Urologic Research, Phoenix, AZ, 2006. (Poster)

**Karen Riggins (Graduate Student) - Roy Zent Lab**

**Presentation**

The role of MT1-MMP in renal development. American Society for Matrix Biology Biennial Meeting, 2006. (Poster)

**Andres Rojas (Graduate Student) - William M. Grady Lab**

**Award**

Selected to attend the American Association for Cancer Research Pathobiology of Cancer Workshop, Snowmass Village, CO, 2006.

**Publication**

Muñoz NM, Upton M, **Rojas A**, Washington MK, Lin L, Chytil A, Sozmen EG, Madison BB, Pozzi A, Moon RT, Moses HL, Grady WM. **Transforming growth factor  $\beta$  receptor type II inactivation induces the malignant transformation of intestinal neoplasms initiated by *Apc* mutation.** *Cancer Research*, 2006.

**Presentation**

Aberrant methylation of TSP-1 impairs TGF- $\beta$ 1 activation in colon cancer. The Edward A. Smuckler Memorial Workshop, 2006. (Poster)

**Alisha Russell (Graduate Student) - Linda Sealy Lab**

**Publication**

DeBusk L, **Russell A**, Imai K, and Matrisian L. **In the Forefront of Basic and Translational Cancer Research: Meeting Report.** *Cancer Research*, 2007.

**Presentation**

In the Forefront of Basic and Translational Cancer Research, 7th American Association for Cancer Research-Japanese Cancer Association Joint International Conference, Waikoloa, HI, 2007. (Poster)

**Mark Sinnamon (Graduate Student) - Lynn Matrisian Lab**

**Award**

AACR-Aflac, Incorporated Scholar-in-Training Award, 2007.

**Publications**

Schwartz DR, Moin K, Yao B, Matrisian LM, Coussens LM, Bugge TH, Fingleton B, Acuff HB, **Sinnamon M**, Nassar H, Krawetz SA, Linebaugh BE, Sloane BF. **Hu/Mu ProtIn oligonucleotide microarray: dual-species array for profiling protease and protease inhibitor gene expression in tumors and their microenvironment.** *Molecular Cancer Research*, 2007.

Acuff HB, **Sinnamon M**, Fingleton B, Boone B, Levy SE, Chen X, Pozzi A, Carbone D, Moin K, Sloane BF, Matrisian LM. **Analysis of host- and tumor-derived proteases using a custom dual species microarray reveals a protective role for stromal MMP12 in non-small cell lung cancer.** *Cancer Research*, 2006.

**Presentation**

Mast cell ablation causes enhanced intestinal tumor formation in APCMin/+ mice. American Association for Cancer Research (AACR) Annual Meeting, Los Angeles, CA, 2006

**Whitney Smalley (Graduate Student) - Albert Reynolds Lab**

**Awards**

2<sup>nd</sup> Place Poster Prize, Vanderbilt Cancer Biology Annual Retreat, 2006

3<sup>rd</sup> Place Poster Prize at Vanderbilt Ingram Cancer Center Annual Retreat, 2006

**Presentation**

Consequences of p120 Ablation in the Mouse Small Intestine and Colon and Similarities to Human Inflammatory Bowel Disease. Mouse Models of Human Cancer Consortium Steering Committee Meeting, Washington, DC, 2006.

**Manisha Tripathi (Graduate Student) - Vito Quaranta Lab**

**Publication**

Dey P\*, Tripathi M\*, Batra JK. **Involvement of loops L2 and L4 of ribonucleolytic toxin restrictocin in its functional activity.** *Protein & Peptide Letters*, 2007. (\*equal contribution)

**Michael N. VanSaun, Ph.D. (Postdoctoral Fellow) - Lynn Matrisian Lab**

**Publications**

VanSaun M, Humburg BC, Arnett MG, Pence M, Werle MJ. **Activation of matrix metalloproteinase-3 is altered at the frog neuromuscular junction following changes in synaptic activity.** *Developmental Neurobiology*, 2007. (epub ahead of print)

VanSaun MN, Matrisian LM. **Matrix metalloproteinases and cellular motility in development and disease.** *Birth Defects Research Part C, Embryo Today*, 2006.

**Meredith Vaughan (Graduate Student) - Albert Reynolds Lab**

**Publication**

Xiaobo X, Carnahan RH, Vaughan MH, Wildenberg GA, Reynolds AB. **p120 serine and threonine phosphorylation is controlled by multiple ligand-receptor pathways but not cadherin ligation.** *Experimental Cell Research*, 2006.

**Presentation**

Characterization of a novel p120-catenin phospho-serine monoclonal antibody. American Society for Cell Biology 46<sup>th</sup> Annual Meeting, San Diego, CA, 2006. (Poster)

**Hailun Wang (Graduate Student) - Dennis E. Hallahan Lab**

**Award**

53<sup>rd</sup> Annual Radiation Research Society (RRS) Meeting Travel Award, Philadelphia, PA, 2006.

**Presentation**

Radiation-induced expression of Tax-interacting protein 1 (TIP-1) in tumor vasculature. 53<sup>rd</sup> Annual RRS Meeting, Philadelphia, PA, 2006.

**Brian Yaspan (Graduate Student) - Jeffrey Smith Lab**

**Award**

U.S. Department of Defense Predoctoral Traineeship: Identification and characterization of an X-linked familial prostate cancer gene, 2005 - present.

**Publication**

Yaspan BL, Breyer J, Cai Q, Dai Q, Elmore JB, Amundson I, Bradley KM, Shu X, Gao Y, Dupont WD, Zheng W, and Smith JR. **Haplotype analysis of CYP11A1 identifies promoter variants associated with breast cancer risk.** *Cancer Research*, 2007.

**Guanglei Zhuang (Graduate Student) - Jin Chen Lab**

**Publications**

Zhuang G, Hunter SG, Hwang Y, Chen J. **Regulation of EphA2 receptor endocytosis by SHIP2 lipid phosphatase via phosphatidylinositol 3-Kinase-dependent Rac1 activation.** *Journal of Biological Chemistry*, 2007.

Hunter SG, Zhuang G, Brantley-Sieders DM, Swat W, Cowan CW, Chen J. **Essential role of a Vav family guanine nucleotide exchange factors in EphA receptor-mediated angiogenesis.** *Molecular & Cellular Biology*, 2006.

## **Cell & Developmental Biology Department**

### **Omonigho Aisagbonhi (Graduate Student) - Antonis Hatzopoulos Lab**

#### **Award**

American Heart Association Predoctoral Fellowship, July 2007 – June 2009.

### **Michael Anderson (Graduate Student) - Laura Lee Lab**

#### **Presentations**

Mat89Bb is required for male meiosis in *Drosophila*. 48<sup>th</sup> Annual *Drosophila* Research Conference, Philadelphia, PA, 2007. (Poster)

A functional genomics screen identifies Mat89Bb as a novel cell cycle regulator. 47<sup>th</sup> Annual *Drosophila* Research Conference, Houston, TX, 2006. (Poster)

### **Sarah Anthony (Graduate Student) - David M. Miller, III Lab**

#### **Presentation**

Microarray profiling of *C. elegans* GABAergic motor neurons to reveal synaptic remodeling genes. 16<sup>th</sup> International *C. elegans* Meeting, Los Angeles, CA, 2007. (Poster)

### **Scott Boyle (Graduate student) - Mark de Caestecker Lab**

#### **Publications:**

Boyle S, Shioda T, Perantoni AO, de Caestecker M. Cited1 and Cited2 are differentially expressed in the developing kidney but are not required for nephrogenesis. *Developmental Dynamics*, 2007.

Lovvorn HN, Westrup J, Opperman S, Boyle S, Shi G, Anderson J, Perlman EJ, Perantoni AO, Wills M, de Caestecker MP. CITED1 expression in Wilms' tumor and embryonic kidney. *Neoplasia*, 2007.

Lovvorn HN, Boyle S, Shi G, Shyr Y, Wills ML, Perantoni AO, de Caestecker M. Wilms' tumorigenesis is altered by mis-expression of the transcriptional co-activator, CITED1. *Journal of Pediatric Surgery*, 2007.

Boyle S, de Caestecker MP. The role of transcriptional networks in coordinating early events in kidney development. *American Journal of Physiology. Renal Physiology*, 2006.

Chen J, Boyle S, Zhao M, Su W, Takahashi K, Davis L, de Caestecker M, Takahashi T, Breyer M, Hao C-M. Differential expression and localization of the intermediate filament protein Nestin during renal development and its localization in adult podocytes. *Journal of the American Society of Nephrology*, 2006.

Shi G, Boyle SC, Sparrow DB, Dunwoodie SL, Shioda T, de Caestecker MP. The transcriptional activity of CITED1 is regulated by phosphorylation in a cell cycle dependent manner. *Journal of Biological Chemistry*, 2006.

### **Lindsay Bramson (Graduate Student) - Christopher Wright Lab**

#### **Awards**

Honorable Mention, Poster Competition, First Pan-American Society for Developmental Biology Meeting and Society for Developmental Biology National Meeting, Cancun, Mexico, 2007.

Vanderbilt University Graduate Student Travel Award for travel to the above meeting, 2007.

Society for Developmental Biology Travel Award for travel to the above meeting, 2007.

### **Monika Clark (Graduate Student) - John Penn Lab**

#### **Award**

Vanderbilt University Graduate Student Travel Award, Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL, 2007.

#### **Presentation**

COX-2 promotes VEGF-induced angiogenesis in retinal endothelial cells. The Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL, 2007. (Poster)

### **Emily Cross (Graduate Student) - David Bader Lab**

#### **Awards**

Vanderbilt Summer Science Academy Symposium Speaker

Training Program in Breast Cancer Research Travel Grant

**Chris Cselenyi (Graduate Student) - Ethan Lee Lab**

**Awards**

Vanderbilt University Graduate Student Travel Award, American Society for Cell Biology (ASCB), San Diego, CA, 2006.

**Presentations**

Biochemical evidence for a role of Galpha(o) in beta-catenin/Wnt signaling. Phosphorylation and G-protein Mediated Signaling Networks Gordon Conference, Biddeford, ME, 2007. (Poster)

ASCB Annual Meeting, San Diego, CA, 2006. (Poster)

**Karen Edelblum (Graduate Student) - D. Brent Polk Lab**

**Awards**

Vanderbilt University Graduate Student Travel Award, Digestive Disease Week: American Gastroenterological Association (AGA) Annual Meeting, Los Angeles, CA, 2006.

Vanderbilt University Graduate Student Travel Award, AGA Symposium: Stem Cells in Gastrointestinal Diseases, Tyson's Corner, VA, 2006.

AGA Student Travel Award, AGA Symposium: Stem Cells in Gastrointestinal Diseases, Tyson's Corner, VA, 2006.

**Publications**

**Edelblum KL, Yan F, Yamaoka T, Polk DB. Regulation of apoptosis during homeostasis and disease in the intestinal epithelium. *Inflammatory Bowel Diseases*, 2006.**

Frey MR, Dise RS, Edelblum KL, Polk DB. **p38 kinase regulates epidermal growth factor receptor downregulation and cellular migration. *EMBO Journal*, 2006.**

**Presentations**

Raf is required for intestinal epithelial cell survival in response to DSS-induced injury. Digestive Disease Week: AGA Annual Meeting, Washington DC, 2007. (Poster)

Raf is required for intestinal epithelial cell survival in response to DSS- induced injury. AGA Symposium: Stem Cells in Gastrointestinal Diseases, Tyson's Corner, VA, 2006. (Poster)

KSR is required for Raf activation in TNFR-mediated intestinal epithelial cell survival. Digestive Disease Week: AGA Annual Meeting, Los Angeles, CA, 2006. (Poster)

**Jeremy Goettel (Graduate Student) - D. Brent Polk Lab**

**Awards**

StarBrite Award, 2007.

American Gastroenterological Association (AGA) Foundation Research Award, 2007.

Vanderbilt University Graduate Student Travel Award, Digestive Disease Week: AGA Annual Meeting, Washington, DC, 2007.

**Presentation**

Digestive Disease Week: AGA Annual Meeting, Washington DC, 2007. (Oral)

**Hillary Hager (Graduate Student) - David Bader Lab**

**Awards**

Vanderbilt University Graduate Student Travel Award.

**Xi Huang (Graduate Student) - Chin Chiang Lab**

**Publications**

Huang X, Litington Y, Chiang, C. Region-specific requirement of cholesterol modification of Sonic Hedgehog in patterning the telencephalon and spinal cord. *Development*, 2007.

Huang X, Litington Y, Chiang C. Ectopic Sonic hedgehog signaling impairs telencephalic dorsal midline development: implication for human holoprosencephaly. *Human Molecular Genetics*, 2007.

**Presentation**

National Developmental Biology Meeting, 2006. (Poster)

**Kristin Kalie (Graduate Student) - Laura Lee Lab**

**Award**

American Heart Association Predoctoral Fellowship, July 2006-July 2008

**Presentations**

Biochemical evidence for a role of Galpha(o) in beta-catenin/Wnt signaling. Phosphorylation & G-Protein Mediated Signaling Networks Gordon Conference. Biddeford, ME, 2007. (Poster)

Determining a Role for G protein in Wnt Signal Transduction. American Society for Cell Biology Annual Meeting. San Diego, CA, 2006. (Poster)

**Julie Merkle (Graduate Student) - Laura Lee Lab**

**Awards**

Vanderbilt University Graduate Student Travel Award, 48<sup>th</sup> Annual Drosophila Research Conference, Philadelphia, PA, March 2007.

Program in Developmental Biology Travel Fellowship, 48<sup>th</sup> Annual Drosophila Research Conference, Philadelphia, PA, March 2007.

Program in Developmental Biology Travel Fellowship, 47<sup>th</sup> Annual Drosophila Research Conference, Houston, TX, March 2006.

2<sup>nd</sup> Prize Poster Presentation Award at Vanderbilt Ingram Cancer Center Retreat, May 2006.

**Presentation**

48<sup>th</sup> Annual Drosophila Research Conference in Philadelphia, PA, 2007. (Poster)

**Paul Miller (Graduate Student) - Irina Kaverina Lab**

**Award**

Vanderbilt University Graduate Student Travel Award, Gordon Conference on Motile and Contractile Systems, New London, NH, July 2007.

**Publication**

Efimov A, Kharitonov A, Efimova N, Loncarek J, Miller PM, Andreyeva N, Gleeson P, Galjart N, Maia AR, McLeod IX, Yates JR 3rd, Maiato H, Khodjakov A, Akhmanova A, Kaverina I. Asymmetric CLASP-dependent nucleation of non-centrosomal microtubules at the trans-golgi network. *Developmental Cell*, 2007.

**Presentation**

Role of CLASPs in golgi organization and trafficking in relation to cell motility. Gordon Conference on Motile and Contractile Systems, New London, NH, 2007. (Oral)

**Katherine Moynihan (Graduate Student) - David Bader Lab**

**Award**

American Association of Anatomists Travel Award, Experimental Biology (EB) Annual Meeting, Washington, DC, April 28 – May 2, 2007.

**Publication**

Moynihan KL, Stockdale F, Bader D. Development of the Avian Heart. In: *Heart Development and Regeneration*. Eds. Harvey RP and Rosenthal N, Elsevier, Inc., 2007. (Book chapter)

**Presentation**

Analysis of cytLEK1 interactions with hook2. EB Annual Meeting, Washington, DC, 2007. (Oral)

**Kimberly Norman (Graduate Student) - James Sligh Lab**

**Award**

Travel Award, Keystone Symposia. Metabolomics: From Bioenergetics to Apoptosis, Snowbird, UT, April 2006.

**Presentations**

Cyclosporine A modulates cell death in keratinocytes through mitochondrial effects. Society for Investigative Dermatology Annual Meeting, Los Angeles, CA, 2007. (Poster)

Mitochondrial effects of Cyclosporine A enhance survival of cultured skin cells in response to UVA irradiation. Keystone Symposia. Metabolomics: From Bioenergetics to Apoptosis, Snowbird, UT, 2006. (Poster)

**Rachel Ostroff (Graduate Student) - David M. Miller, III Lab**

**Presentations:**

International C. elegans Meeting, Los Angeles, CA, 2007. (Poster)

**Claudia Petit (Graduate Student) - Kathleen Gould Lab****Award**

Vanderbilt University Graduate Student Travel Award, 2<sup>nd</sup> International Meeting on Septin Biology, Ascona, Switzerland, May 2007.

**Presentation**

Regulation of the *Schizosaccharomyces pombe* anillin-like protein Mid2 is essential for proper assembly and disassembly of the septin ring during cytokinesis. 2<sup>nd</sup> International Meeting on Septin Biology, Ascona, Switzerland, 2007. (Poster)

**Jamie Rickmyre (Graduate Student) - Laura Lee Lab****Award**

Vanderbilt University Graduate Student Travel Award, American Society for Cell Biology (ASCB) meeting, San Diego, CA, December 2006.

**Presentations**

Microcephalin (MCPH1) is required for cell-cycle progression in the early Drosophila embryo. 48th Annual Drosophila Research Conference, Philadelphia, PA, 2007. (Poster)

**Rachel Roberts (Graduate Student) - Kathleen Gould Lab****Awards**

Association for Women in Science Citation of Merit, 2007.

Vanderbilt University Graduate Student Travel Award, International Fission Yeast Meeting, Copenhagen, Denmark, June 2007.

Vanderbilt University Graduate Student Travel Award, American Society for Cell Biology (ASCB) Annual Meeting, San Diego, CA, 2006.

National Science Foundation Graduate Research Foundation, May 2004 – May 2007.

**Presentations**

Identification of a novel binding partner for Cdc15. International Fission Yeast Meeting, Copenhagen, Denmark, 2007. (Oral)

Essential contractile ring protein Cdc15: Phosphoregulation and identification of a novel binding partner. International Fission Yeast Meeting, Copenhagen, Denmark, 2007. (Poster)

Phosphoregulation of the essential *S. pombe* contractile ring protein Cdc15. ASCB Annual Meeting, San Diego, CA, 2006. (Poster)

**Josh Rosenberg (Graduate Student) - Kathleen Gould Lab****Award**

Vanderbilt University Graduate Student Travel Award, 2006.

**Publications**

Rosenberg JA, Tomlin GC, McDonald WH, Snysman BE, Muller EG, Yates JR, 3rd, Gould KL. Ppc89 links multiple proteins, including the septation initiation network, to the core of the fission yeast spindle-pole body. *Molecular Biology of the Cell*, 2006.

Vander Kooi CW, Ohi MD, Rosenberg JA, Oldham ML, Newcomer ME, Gould KL, Chazin WJ. The Prp19 U-box crystal structure suggests a common dimeric architecture for a class of oligomeric E3 ubiquitin ligases. *Biochemistry*, 2006.

**Judsen Schneider (Graduate Student) - David M. Miller, III Lab****Award**

2<sup>nd</sup> place poster award, International C. elegans Meeting, Los Angeles, CA, June 27 – July 1, 2007.

Vanderbilt University Graduate Student Travel Award, International C. elegans Meeting, Los Angeles, CA, June 27 – July 1, 2007.

**Presentation**

Genetic screens uncover new Unc-4 suppressor mutations. International C. elegans Meeting, Los Angeles, CA, 2007. (Poster)

**Joshua Smith (Graduate Student) - R. Daniel Beauchamp Lab****Presentations**

Smad4 mediated reversal of EMT is associated with activation of autocrine BMP signaling in colorectal cancer cells. Keystone Symposia for Host Cell Interaction and Response to the Cancer Cell, Keystone, CO, 2007. (Poster)

Smad4 mediated reversal of EMT is associated with activation of autocrine BMP signaling in colorectal cancer cells. Digestive Disease Week, American Gastroenterological Association (AGA) Institute, Washington, DC, 2007. (Poster)

Smad4 expression in colorectal cancer promotes tumor suppression and enhances survival. 15th Annual SPORE Meeting, Baltimore, MD, 2007. (Poster)

### **William Clay Spencer (Graduate Student) - David M. Miller, III Lab Publication**

#### **Presentations**

Southeast Regional Developmental Biology Meeting, Nashville, TN, 2006. (Poster)

International C. elegans Meeting, Los Angeles, CA, 2007. (Poster)

### **Rebecca Thomason (Graduate Student) - David Bader Lab Publications**

Sea Urchin Genome Sequencing Consortium. The genome of the sea urchin *Strongylocentrotus purpuratus*. *Science*, 2006.

Byrum CA, Walton KD, Robertson AJ, Carbonneau S, Thomason RT, Coffman JA, McClay DR. Protein tyrosine and serine-threonine phosphatases in the sea urchin, *Strongylocentrotus purpuratus*: identification and potential functions. *Developmental Biology*, 2006.

### **Curtis Thorne (Graduate Student) - Ethan Lee Lab Awards**

American Heart Association Fellowship, 2006-2008

Vanderbilt University Graduate Student Travel Award

Vanderbilt University Program in Developmental Biology Travel Award

Included on provisional patent application (filed): Biochemical Screen and Identification of Compounds that Regulate the Wnt Pathway

#### **Presentations**

Biochemical evidence for a role of Galph $\alpha$ (o) in beta-catenin/Wnt signaling. Phosphorylation and G-Protein Mediated Signaling Networks Gordon Conference, Biddeford, ME, 2007. (Poster)

American Society for Cell Biology (ASCB) Annual Meeting, San Diego, CA, 2006. (Poster)

### **Susanne Tranguch (Graduate Student) - Sudhansu Dey Lab Awards**

Ruth L. Kirschstein National Research Service Award Predoctoral NIH/NIDA Fellowship: Immunophilin-endocannabinoid signaling during early pregnancy, February 2007- January 2008.

Endocrine Scholars Award, Endocrine Society, Toronto, CA, March 2007.

#### **Publications**

Tranguch S, Chakrabarty A, Guo Y, Wang H, Dey SK. Maternal PTX3 deficiency compromises implantation in the mouse. *Biology of Reproduction*, 2007.

Tranguch S, Wang H, Daikoku T, Xie H, Smith D, Dey SK. FKBP52 deficiency-conferred uterine progesterone resistance is genetic background and pregnancy stage specific. *Journal of Clinical Investigation*. 2007.

Daikoku T, Tranguch S, Chakrabarty A, Wang D, Khabele D, Orsulic S, Morrow JD, DuBois RN, Dey SK. ERK is a target of COX-1-PPAR $\delta$  signaling in epithelial ovarian cancer. *Cancer Research*, 2007.

Hong J, Kim ST, Tranguch S, Smith DF, Dey SK. Deficiency of co-chaperone immunophilin FKBP52 compromises sperm fer-

tilizing capacity. *Reproduction*, 2007.

Rouzer CA, Tranguch S, Wang H, Zhang H, Dey SK, Marnett LJ. Zymosan-induced glyceryprostaglandin and prostaglandin synthesis in resident peritoneal macrophages: roles of cyclooxygenases-1 and -2. *Biochemical Journal*, 2006.

Daikoku T, Tranguch S, Trofimova IN, Dinulescu DM, Jacks T, Nikitin AY, Connolly DC, Dey SK. Cyclooxygenase-1 is over-expressed in multiple genetically engineered mouse models of epithelial ovarian cancer. *Cancer Research*, 2006.

Tranguch S, Smith DF, Dey SK. Progesterone receptor requires a co-chaperone for signaling in uterine biology and implantation. *Reproductive BioMedicine Online*, 2006.

Dey SK, Tranguch S. Molecular signaling in embryo-uterine interactions during implantation. In *Biology and Pathology of Pro-phoblast*, Eds. Moffet A, Loke C, McLaren A. Cambridge University Press, Cambridge, UK, 2006. (Book chapter)

#### **Presentations**

Requirement for progesterone signaling in the uterus is genetic and pregnancy stage specific. Keystone Conference, Reproduction: Advances and Challenges, Santa Fe, NM, 2007. (Poster)

Following temporal biological processes using imaging MALDI MS: Implantation and early embryo growth in mice. American Society for Mass Spectrometry (ASMS) Conference on Mass Spectrometry, Indianapolis, IN, 2007. (Poster)

Quantitative proteome analysis of embryo implantation in FKBP52 KO and progesterone treated mice by multivariable DIGE/MS. ASMS Conference on Mass Spectrometry, Indianapolis, IN, 2007. (Poster)

Combined proteomic strategies for studying embryo implantation in mice. ASMS Conference on Mass Spectrometry, Seattle, WA, 2006. (Poster)

#### **Katie Violette (Graduate Student) - Harold Scott Baldwin Lab**

##### **Award**

American Heart Association Predoctoral Fellowship July 2007 – June 2009.

##### **Presentation**

Weinstein Cardiovascular Development Conference, Indianapolis, IN, 2007. (Poster)

#### **Jessica Von Stetina (Graduate Student) - Daniela Drummond-Barbosa Lab**

##### **Awards**

Vanderbilt University Graduate Student Travel Award, 2006.

1<sup>st</sup> place best graduate student talk award, 10<sup>th</sup> Annual Program in Developmental Biology Scientific Retreat, Vanderbilt University, Nashville TN, 2006.

4<sup>th</sup> place best poster award, Southeast Regional Society for Developmental Biology, Vanderbilt University, Nashville TN, 2006.

##### **Publication**

Pretto D, Barco R, Rivera J, Neel N, Gustavson MD, Eid JE. The synovial sarcoma translocation protein SYT-SSX2 recruits beta-catenin to the nucleus and associates with it in an active complex. *Oncogene*, 2006.

##### **Presentations**

*dendos* is required for the metaphase I arrest of *Drosophila* oocytes potentially via regulation of MPF activity. Southeast Regional Society for Developmental Biology Meeting, Chapel Hill, NC, 2007. (Poster)

alpha-endosulfine and its roles in the proliferative response to nutrition of the *Drosophila* ovary. Southeast Regional Society for Developmental Biology Meeting, Nashville, TN, 2006. (Poster)

#### **Kel Vin Woo (Graduate Student) - Harold Scott Baldwin Lab**

##### **Award**

American Heart Association Predoctoral Fellowship, July 2006 – June 2008.

#### **Susan Yanni (Graduate Student) - John Penn Lab**

##### **Award**

Vanderbilt University Graduate Student Travel Award, XVII International Congress of Eye Research, Buenos Aires, Argentina, 2006.

##### **Presentations**

The role of COX-2 in VEGF induction by retinal Müller cells. The Association for Research in Vision and Ophthalmology, Ft. Lauderdale, FL, 2007. (Poster)

Regulation of VEGF induction in Muller cells by COX-2. XVII International Congress of Eye Research, Buenos Aires, Argen-

tina, 2006. (Poster)

alpha-endosulfine and its roles in the proliferative response to nutrition of the *Drosophila* ovary. 47th Annual *Drosophila* Research Conference, Houston, TX, 2006. (Poster)

## Human Genetics

### **Will Bush (Graduate Student) – Marylyn Ritchie Lab**

#### **Presentation**

Association Rule Discovery has the ability to Model Complex Genetic Effects – IEEE Symposium on Computational Intelligence and Data Mining. Honolulu, HI, 2007.

### **Ryan Delahanty (Graduate Student) – James Sutcliffe Lab**

#### **Publications**

Cross S, Kim SJ, Weiss LA, **Delahanty RJ**, Sutcliffe JS, Leventhal BL, Cook EH Jr, Veenstra-Vanderweele J. **Molecular Genetics of the Platelet Serotonin System in First-Degree Relatives of Patients with Autism.** *Neuropsychopharmacology*, 2007.

Weiss LA, Kosova G, **Delahanty RJ**, Jiang L, Cook EH, Ober C, Sutcliffe JS. **Variation in ITGB3 is associated with whole-blood serotonin level and autism susceptibility.** *European Journal of Human Genetics*, 2006.

#### **Presentations**

Association of the UBE3A Substrate ECT2 with Autism – American Society for Human Genetics Annual Conference, San Diego, CA, 2007.

Evidence for association of autism with loci encoding UBE3A-regulated proteins – 6<sup>th</sup> International Meeting for Autism Research, 2007.

Saturation SNP coverage across the GABRB3 locus refines association to autism. American Society for Human Genetics Annual Conference, New Orleans, LA, 2006.

The gene encoding ECT2, a candidate substrate of the Angelman syndrome protein E6-AP, is associated with autism. American Society for Human Genetics Annual Conference, New Orleans, LA, 2006.

### **Kelli Ryckman (Graduate Student) – Scott Williams Lab**

#### **Presentation**

Racial differences in genetic association of cytokine concentrations in the presence and absence of bacterial vaginosis - American Society for Human Genetics Annual Conference, San Diego, CA, 2007.

### **Kylee L. Spencer (Postdoctoral Fellow) – Jonathan Haines Lab (defense Aug 16<sup>th</sup>)**

#### **Awards**

Retina Research Foundation Joseph M. and Eula C. Lawrence Travel Scholarship from the Association for Research in Vision and Ophthalmology (ARVO), 2007.

#### **Publications**

**Spencer KL**, Hauser MA, Olson LM, Schnetz-Boutaud N, Scott WK, Schmidt S, Gallins P, Agarwal A, Postel EA, Pericak-Vance MA, Haines JL. **Haplotypes Spanning the Complement Factor H Gene Are Protective Against Age-Related Macular Degeneration.** *Investigative Ophthalmology and Visual Science*, 2007.

**Spencer KL**, Hauser MA, Olson LM, Schmidt S, Scott WK, Gallins P, Agarwal A, Postel EA, Pericak-Vance MA, Haines JL. **Protective Effect of Complement Factor B and Complement Component 2 Variants in Age-related Macular Degeneration.** *Human Molecular Genetics*, 2007

#### **Presentations**

Deletion of CFHL1 and CFHL3 Genes in Age-Related Macular Degeneration – Association for Research in Vision and Ophthalmology (ARVO), Ft. Lauderdale, FL, 2007

## Microbiology & Immunology

### **Lesia R. Black, Ph.D. (Postdoctoral Fellow) – Chris Aiken Lab**

## **Awards**

NSRA Individual Postdoctoral Fellowship from the National Institute of Allergy and Infectious Disease for research entitled "TRIM5 $\alpha$ , HIV-1 Uncoating and the Ubiquitin-Proteasome Pathway" (Oct 2007-Sept 2008)

## **Presentations**

Trim5 $\alpha$  Disrupts the Normal Cylindrical Structure of HIV-1 CA-NC Complexes Assembled *in vitro* (Oral) – Retroviruses Conference, Cold Spring Harbor Laboratory, 2007.

## **Iris Castro (Graduate Student) – Wasif Khan Lab**

### **Awards**

AAI/FASEB-MARC Program Travel Award to attend the annual AAI Meeting

National Abstract Competition and Distinction in the Oral Presentation and Poster session of the Minority Trainee Research Forum, Sunny Isles Beach, FL 2006

### **Publications**

Shinners NP, Carlesso G, **Castro I**, Pierre A, Hoek KL, Corn R, Woodland R, Scott ML, Wang D, Khan WN, **Bruton's Tyrosine Kinase Mediates NF- $\kappa$ B Activation and B Cell Survival by B Cell Activating Factor of the TNF Family.** *Journal of Immunology*, 2007.

### **Presentations**

Duration of NF- $\kappa$ B activation is linked to regulation of apoptosis within transitional B cell populations in the mouse spleen (Poster) - American Association of Immunologists Annual Meeting, Miami Beach, FL, 2007

Impaired peripheral B cell development and function in RasGRP3-Deficient mice (Poster) - American Association of Immunologists Annual Meeting, Miami Beach, FL, 2007.

Differential sensitivity of transitional 1 and 2 B cells to death is influenced by expression levels of transcription factor NF- $\kappa$ B (Poster) - Minority Trainee Research Forum, Sunny Isles Beach, FL, 2006.

## **Brian Corbin, Ph.D. (Postdoctoral Fellow) – Eric Skaar Lab**

### **Award**

2<sup>nd</sup> Place Poster – Mechanism and Function of Calprotectin in the Host Response Against *Staphylococcus aureus* Infection at the Microbial Pathogenesis: Mechanisms of Infectious Disease FASEB Summer Research Conference, Snowmass Village, CO, 2007.

Ruth L Kirschstein NSRA Individual Fellowship

## **Lance Eckerle, Ph.D. (Postdoctoral Fellow) – Mark Denison Lab**

### **Publications**

**Eckerle, L.D.**, Brockway, S.M., Sperry, S.M., Lu, X. and M.R. Denison. **Effects of mutagenesis of murine hepatitis virus nsp1 and nsp14 on replication in culture.** *Advances in Experimental Medicine and Biology*, 2006.

### **Presentations**

Evidence for RNA proofreading in an RNA virus: Increased mutation frequency in coronavirus exoribonuclease mutants (Oral) – 8<sup>th</sup> International Symposium on Positive-Strand RNA Viruses, Washington, D.C. 2007.

Effects of mutagenesis of murine hepatitis virus putative exoribonuclease on virus replication and RNA synthesis (Oral) – American Society for Virology 25<sup>th</sup> Annual Meeting, Madison, WI, 2006.

## **Kelly Gangwer (Graduate Student) – Borden Lacy Lab**

### **Award**

1<sup>st</sup> place Poster at the Vanderbilt Institute for Chemical Biology Retreat – Structural Analysis of the Helicobacter pylori Vacuolating Toxin p55 Domain, Vanderbilt University, Nashville, TN, 2007.

## **Kristen Guglielmi (Graduate Student) – Terence Dermody Lab**

### **Award**

Dissertation Enhancement Award from Vanderbilt University Graduate School 2007. This award was to finance travel to Germany to participate in data collection and solution of the X-ray crystal structure of a complex between a fragment of reovirus attachment protein  $\sigma$ 1 and cellular receptor junctional adhesion molecule-A with collaborators in the Thilo Stehle Laboratory.

### **Publication**

**Guglielmi KM**, Kirchner E, Holm GH, Stehle T, Dermody TS. **Reovirus binding determinants in junctional adhesion molecule-A.** *Journal of Biological Chemistry*, 2007.

## **Rachel Henry (Graduate Student) – Tom Thomas Lab**

## **Awards**

Travel Award from the Vanderbilt University Graduate School to attend American Association of Immunologists 94<sup>th</sup> Annual Meeting, Miami Beach, FL, 2007

## **Presentations**

Physiological Levels of Insulin Induce Receptor Editing in anti-insulin B cells to Maintain Tolerance (Poster) – American Association of Immunologists 94<sup>th</sup> Annual Meeting, Miami Beach, FL, 2007

Tolerance Induction for Immature anti-insulin B cells Involves Impaired Calcium Mobilization (Poster) - American Association of Immunologists 94<sup>th</sup> Annual Meeting, Miami Beach, FL, 2007

Blissful Ignorance, Depressed Silence, or a Total Makeover? How B cells Cope with Hormones Microbes & Defense Academic Society Presentation, Vanderbilt University, Nashville, TN, 2007

## **David Hout, Ph.D. (Post Doctoral Fellow) – Christopher Aiken Lab**

### **Award**

National Research & Service Award (NRSA) granted on first submission for research entitled “The Roles of Elongation Factor 1 alpha and Matrix in HIV-1 core disassembly” (Grant Number 1 F32 AI076171-01).

## **Jiyang Jiang, Ph.D. (Post Doctoral Fellow) – Christopher Aiken Lab**

### **Publication**

Jiang J, Aiken C. **Maturation-Dependent HIV-1 Particle Fusion Requires a Carboxyl-Terminal Region of the gp41 Cytoplasmic Tail.** *Journal of Virology*, 2007.

## **Mingli Qi (Graduate Student) – Christopher Aiken Lab**

### **Publication**

Qi M, Aiken C. **Selective restriction of Nef-defective Human Immunodeficiency Virus type 1 by a proteasome-dependent mechanism.** *Journal of Virology*, 2007.

## **Michelle L. Reniere (Graduate Student) – Eric Skaar Lab**

### **Publication**

**Reniere ML, Torres VJ, Skaar EP. Intracellular metalloporphyrin metabolism in *Staphylococcus aureus*.** *Biometals*, 2007.

### **Presentations**

*Staphylococcus aureus* heme oxygenases facilitate nutrient iron acquisition during pathogenesis, National Conference on Gram-Positive Pathogens, Lincoln, NE, 2006.

*Staphylococcus aureus* heme oxygenases facilitate nutrient iron acquisition during pathogenesis, International Conference on Bioinorganic Chemistry, London, Ontario, Canada, 2007.

## **Christopher J. Rold (Graduate Student) – Christopher Aiken Lab**

### **Presentation**

Proteasomal Degradation of Trim5alpha Upon Encounter of a Restriction-Susceptible Retrovirus, Retrovirus Conference, Cold Spring Harbor Laboratory, 2007.

## **Brenna Simons (Graduate Student) – Spyros Kalams Laboratory**

### **Award**

Travel Award from the Office of AIDs Reseach to attend the Keystone Symposia on HIV Pathogenesis

### **Presentations**

Biased T cell receptor gene usage of an immunodominant epitope-specific CD8+ T cell population – Keystone Symposia HIV Pathogenesis and Vaccine Conference, Whistler, BC Canada, 2007.

## **Chisu Song, Ph.D. (Postdoctoral Fellow) – Christopher Aiken Lab**

### **Publication**

**Song C, Aiken C. Analysis of Human Cell Heterokaryons Demonstrates that Target Cell Restriction of Cyclosporin A-Resistant HIV-1 Mutants is Genetically Dominant.** *Journal of Virology*, 2007.

## **Jennifer Sparks (Graduate Student) – Mark Denison Lab**

### **Awards**

American Society for Virology Student Travel Grant Award 2007 – Fellowship provided by the American Society for Virology to aid students in presenting their experimental results at the annual meeting of the society.

PEO Scholar Award – PEO is a philanthropic organization that celebrates the advancement of women, educate women through scholarships, grants, loans, and stewardship of Cottey College. (2007).

#### **Publications**

**Sparks JS**, Lu X, Denison MR. **Genetic Analysis of Murine Hepatitis Virus nsp4 in Virus Replication**, *Journal of Virology*, 2007.

#### **Presentations**

Genetic elements of murine hepatitis virus nsp4 required for virus replication – 26<sup>th</sup> Annual American Society for Virology Meeting, Corvallis, OR, 2007.

Murine hepatitis virus nsp4 has no known or predicted function Description: First genetic analysis of nsp4 and its requirement in virus replication.

#### **Devin Stauff (Graduate Student) – Eric Skaar Lab**

##### **Awards**

One of top 7 poster presentations at 2007 FASEB Conference on Microbial Pathogenesis 2007 for the poster entitled “Signaling and DNA Binding Activities of the *Staphylococcus aureus* HssR-HssS two-component system required for heme sensing.

##### **Publications**

**Stauff DL**, Torres VJ, Skaar EP. **Signaling and DNA Binding Activities of the *Staphylococcus aureus* HssR-HssS two-component system required for heme sensing**. *Journal of Biological Chemistry*, 2007.

#### **Michael L. Vetter (Graduate Student) – Richard D’Aquila Lab**

##### **Award**

Keystone Symposium Travel Award: Molecular and Cellular Determinants of HIV Pathogenesis, NIAID Scholar 2007, Whistler, BC Canada.

2<sup>nd</sup> Annual NIH National Graduate Student Research Festival (NGSRF) – Chosen to attend the research festival on the NIH main campus in Bethesda, MD. The expense paid NGSRF introduces 250 advanced graduate students in the sciences to the NIH Intramural Research Program (IRP) with the aim of recruiting them to do postdoctoral training at the NIH

##### **Presentation**

T Helper Type 2 CD4+ Lymphocytes Express Less APOBEC3G and Produce More Infectious Virions Than T Helper Type 1 (Poster) - Keystone Symposium: Molecular and Cellular Determinants of HIV Pathogenesis, Whistler, BC Canada, 2007.

#### **Ruifeng Yang (Graduate Student) – Christopher Aiken Lab**

##### **Publication**

Yang R, Aiken C **A mutation in alpha helix 3 of CA renders human immunodeficiency virus type 1 cyclosporin A resistant and dependent: rescue by a second-site substitution in a distal region of CA**. *Journal of Virology*, 2007.

## **Molecular Physiology & Biophysics**

#### **Sunday A Abiria (Graduate Student) – Roger Colbran Lab**

##### **Award**

American Heart Association Fellowship

#### **Amanda Ackermann (MSTP Student) – Maureen Gannon Lab**

##### **Award**

Medical Scholars Award: \$20,000 for stipend support and \$10,000 for equipment and supplies. This predoctoral fellowship from the American Diabetes Association will fund research entitled ‘The Role of FoxM1 in Beta Cell Mass Regeneration.’ This study will examine the role of FoxM1, a transcription factor involved in cell cycle progression, in regeneration of pancreatic insulin-producing cells in a mouse model of pancreatic injury. These studies have implications for the generation of new insulin-producing cells from progenitor cells *in vitro*, or the regeneration of endogenous insulin-producing cells in individuals with diabetes. (August 2007 – July 2008).

#### **Anthony J Baucum (Postdoctoral Fellow) – Roger Colbran Lab**

##### **Award**

UNCF-MERCK Fellowship

#### **Kelly J Chandler (Graduate Student) – Doug Mortlock Lab**

##### **Publication**

**Chandler KJ, Chandler RL, Broeckelmann E, Hou Y, Southard-Smith EM, Mortlock DP**. Measuring BAC transgene copy

number in mice: overall variation across multiple transgenic lines and correlations with transgene integrity and expression. *Mammalian Genome*, 2007.

#### **Presentation**

Mapping long-range enhancers of *Bmp4* and exploring the role of long-range evolutionarily conserved regions flanking *Bmp4* - 20<sup>th</sup> Annual International Mammalian Genome Conference, Charleston, SC, 2006.

#### **Ronald L Chandler (Graduate Student) – Doug Mortlock Lab**

##### **Publication**

**Chandler RL, Chandler KJ, McFarland KA, Mortlock DP.** *Bmp2* transcription in differentiating osteoblasts is regulated by a distant 3' enhancer located 156.3 kilobases from the promoter. *Molecular and Cellular Biology*, 2007.

#### **Kim Coenen (Graduate Student) – Alyssa Hasty Lab**

##### **Award**

Predocutorial Fellowship from the American Heart Association. This fellowship will fund work focused on whether macrophage Toll-like Receptor 4 plays a role in dietary saturated fatty acid induced macrophage infiltration into white adipose tissue and the resultant inflammation and insulin resistance. (July 2007 – June 2009).

##### **Publication**

**KR Coenen, ML Gruen, A Chait, and AH Hasty.** Diet-Induced Increases in Adiposity, but Not Plasma Lipids, Promote Macrophage Infiltration into White Adipose Tissue. *Diabetes*, 2007.

#### **Weston Dulaney (Graduate Student) – Phoebe Stewart Lab**

##### **Presentation**

CryoEM Structure of Adenovirus 12 in Complex with  $\alpha_5\beta_5$  Integrin - Microscopy & Microanalysis Meeting. Ft Lauderdale, FL, 2007.

#### **Stephen Lindert (Graduate Student) – Phoebe Stewart & Jens Meiler Labs**

##### **Presentation**

CryoEM guided de novo Protein Fold Elucidation - Gordon Conference on Three Dimensional Electron Microscopy. New London, NH, 2007.

#### **Jian Shi (Graduate Student) – Phoebe Stewart Lab**

##### **Presentation**

Structure of an Hsp16.5 Variant in Complex with T4 Lysozyme - Gordon Conference on Three Dimensional Electron Microscopy. New London, NH, 2007.

Structure of truncated Hsp16.5 in complex with T4 Lysozyme - Association for Research in Vision and Ophthalmology Meeting, 2007.

#### **Mariena Silvestry (Graduate Student) – Phoebe Stewart Lab**

##### **Presentation**

CryoEM Studies of the *ts1* Mutant Adenovirus - Microscopy & Microanalysis Meeting. Ft Lauderdale, FL, 2007.

#### **Dewight Williams, Ph.D. (Postdoctoral Fellow) – Phoebe Stewart Lab**

##### **Presentation**

Subnanometer resolution structure of the DNA-dependent protein kinase catalytic subunit, DNA-PKcs- Gordon Conference on Three Dimensional Electron Microscopy. New London, NH, 2007.

## **Neuroscience**

#### **Emmanuel Botzolakis (Graduate Student) – Robert Macdonald Lab**

##### **Awards**

Dissertation Enhancement Award, Vanderbilt University (2007)  
Travel Award, American Academy of Neurology (2007)  
Travel Award, Society for Neuroscience Chapters (2006)  
Travel Award, Vanderbilt University (2006)

##### **Publications**

Bianchi MT, **Botzolakis EJ (co-first)**, Haas KF, Fisher J, Macdonald RL. **Microscopic Kinetic Determinants of Macroscopic Currents: Insights from Coupling and Uncoupling of GABA<sub>A</sub> Receptor Desensitization and Deactivation.** *Journal of Physiology*, 2007.

Lagrange AH, **Botzolakis EJ**, Macdonald RL. **Enhanced Macroscopic Desensitization of  $\alpha 4$  Subunit-Containing GABA<sub>A</sub> Receptors Shapes the Response to Synaptic and Extrasynaptic GABA.** *Journal of Physiology*, 2007.

#### **Presentations**

An Ultra-Fast High-Throughput Solution Switching System - Biomedical Engineering Society Annual Meeting, Los Angeles, CA, 2007.

Revisiting the Benzodiazepine Mechanism of Action: From Bench to Beside and Back - 59<sup>th</sup> Annual Meeting of the American Academy of Neurology, Boston, MA, 2007.

Higher Nocturnal Levels of 6-Sulfatoxymelatonin are Associated with Increased Delta Sleep in Children with Autism – 59<sup>th</sup> Annual Meeting of the American Academy of Neurology, Boston, MA, 2007.

Insight into the Assembly of  $\alpha\beta$  and  $\alpha\beta\gamma$  GABA<sub>A</sub> Receptors Using Flow Cytometry and Fluorescence Resonance Energy Transfer – 36<sup>th</sup> Annual Meeting for the Society for Neuroscience, Atlanta, GA 2006.

#### **Joshua W. Buckholtz (Graduate Student) – David Zald Lab**

##### **Awards**

Research Society on Alcoholism Student Merit Award (2007)

Wisconsin Health Emotions Research Institute Scholar (2007)

Graduate Student Prize in Neuroeconomics: Center for Neuroeconomics, Claremont Graduate University (2007)

##### **Publications**

**Buckholtz JW**, Meyer-Lindenberg A, Honea RA, Straub RE, Pezawas L, Egan MF, Vakkalanka R, Kolachana B, Verchinski BA, Sust S, Mattay VS, Weinberger DR, Callicott JH. **Allelic variation in RGS4 impacts functional and structural connectivity in the human brain.** *Journal of Neuroscience*, 2007.

**Buckholtz JW**, Callicott JH, Kolachana B, Hariri AR, Goldberg TE, Genderson M, Egan MF, Mattay VS, Weinberger DR, Meyer-Lindenberg A. **Genetic variation in MAOA modulates ventromedial prefrontal circuitry mediating individual differences in human personality.** *Molecular Psychiatry*, 2007.

**Buckholtz JW**, Sust S, Tan HY, Mattay VS, Straub RE, Meyer-Lindenberg A, Weinberger DR, Callicott JH. **fMRI Evidence for Epistasis between COMT and RGS4.** *Molecular Psychiatry*, 2007.

#### **Sam Crish, Ph.D. (Postdoctoral Fellow) – David Calkins Lab**

##### **Award**

Postdoctoral Fellowship, Fight for Sight, Inc. July 2007 – This is funding to study the axonal transport and axon degeneration in a new model of glaucoma in the rat.

#### **Adeola Davis (Graduate Student) – Danny Winder Lab**

##### **Award**

**Periadolescent noradrenergic regulation in the BNST**, National Institute on Drug Abuse – Adults and adolescents differ in anxiety, thus understanding basic mechanisms that contribute to anxiety differences will potentially lend insight to age-appropriate therapeutics for treating drug abuse and anxiety disorders. Additionally, the bed nucleus of the stria terminalis (BNST) receives a dense innervation of norepinephrine and potentially plays a role in the differences in anxiety and stress between periadolescents and adults.

#### **Hideki Iwamoto, Ph.D. (Postdoctoral Fellow) – Lou DeFelice Lab**

##### **Award**

R03 NS058924 National Institute of Neurological Disorders and Stroke. This funding will support biophysical studies of human choline transporters linked to cholinergic synapses. (March 2007 – February 2009)

##### **Publications**

**Iwamoto H**, Blakely RD, and DeFelice LJ. **Na<sup>+</sup>, Cl<sup>-</sup>, and pH-dependence of the human choline transporter (hCHT) in *Xenopus* oocytes: The proton inactivation hypothesis of hCHT in synaptic vesicles.** *Journal of Neuroscience*, 2006.

#### **Zoe McElligott (Graduate Student) – Danny Winder Lab**

##### **Award**

NRSA individual fellowship for research entitled “Alpha-1-Adrenergic Receptor Mediated Long Term Depression in the BNST.” This will fund her research on the role of alpha1-adrenergic receptor long term depression in the bed nucleus of the stria terminalis (BNST) of mice that have been chronically exposed to ethanol. Adrenergic signaling within the BNST has been shown to mediate anxiety and drug seeking behaviors. (2007).

## **Jamie Reed (Graduate Student) – Jon Kaas Lab**

### **Awards**

Graduate School Travel Grant to attend the Society for Neuroscience 36<sup>th</sup> Annual Meeting in Atlanta, GA, 2006.

Ruth L. Kirschstein NRSA predoctoral individual fellowship awarded for \$25,571 (includes stipend support, tuition, fees, insurance, and lab supplies). This will support research entitled Spatial-temporal stimulus interactions in primate S1 hand cortex neurons. (February 2007 – January 2008)

### **Publications**

Remple MS, Reed JL, Stepniewska I, Kaas JH. **The organization of frontoparietal cortex in the tree shrew (*Tupaia belangeri*) I: Architecture, microelectrode maps, and corticospinal connections.** *Journal of Comparative Neurology*. 2006.

Remple MS, Reed JL, Stepniewska I, Lyon DC, Kaas JH. **The organization of frontoparietal cortex in the tree shrew (*Tupaia belangeri*) II: Connectional evidence for a frontal-posterior parietal network.** *Journal of Comparative Neurology*. 2007.

### **Presentations:**

Multielectrode recordings of neurons in primary somatosensory cortex of owl monkeys during skin indentations with dual probes inside and outside the classical receptive field - Society for Neuroscience Annual Meeting. Atlanta, GA. 2006.

The spontaneous activity of neurons in area 3b of monkeys is suppressed by skin indentation outside the receptive fields - Society for Neuroscience Annual Meeting, Atlanta, GA, 2006.

## **Jennifer A. Steiner (Graduate Student) – Randy Blakely Lab**

### **Awards**

Society for Neuroscience Travel Award to the IBRO World Congress awarded by the Society for Neuroscience. The Society for Neuroscience gave \$1500 travel awards to nine selected North American graduate students to attend the International Brain Research Organization World Congress of Neuroscience (IBRO) held in Melbourne, Australia, July 2007.

### **Presentation**

Adenosine Receptor and Protein Kinase G-linked Pathways in Support of Antidepressant Sensitive Serotonin Transporters (Poster) – IBRO World Congress of Neuroscience, Melbourne, Australia, 2007.

## **Pathology**

## **Chastity Bradley – Fritz Parl Lab**

### **Publication**

Bradley C, van der Meer R, Roodi N, Yan H, Chandrasekharan MB, Sun ZW, Mernaugh RL, Parl FF. **Carcinogen-Induced Histone Alteration in Normal Human Mammary Epithelial Cells.** *Carcinogenesis*, 2007.

## **Emily Clark (Graduate Student) – Alissa Weaver Lab**

### **Publication**

Clark ES, Whigham AS, Yarbrough WG, Weaver AM. **Cortactin is an essential regulator of matrix metalloproteinase secretion and extracellular matrix degradation in invadopodia.** *Cancer Research*, 2007.

## **Brian Cox (Graduate Student) – Jay Jerome Lab**

### **Publications**

Cox BE, Griffin EE, Ullery JC, Jerome WG. **Effects of cellular cholesterol loading on macrophage foam cell lysosome acidification.** *Journal of Lipid Research*, 2007

Yancey PG, Jerome WG, Yu H, Griffin EE, Cox BE, Babaev VR, Fazio S, Linton MF. **Severely altered cholesterol homeostasis in macrophages lacking apoE and SR-BI1.** *Journal of Lipid Research*, 2007.

## **Jonathan Creamer, Ph.D. (Postdoctoral Fellow) – Paul Brock Lab**

### **Award**

American Heart Association Postdoctoral Fellowship

## **Heather Kroh (Graduate Student) – Paul Bock Lab**

### **Award**

Young Investigator Award travel grant presented through the International Society on Thrombosis and Haemostasis to attend the XXIst Congress, 2007.

### **Publication**

Kroh HK, Tans G, Nicolaes GA, Rosing J, Bock PE. **Expression of allosteric linkage between the sodium ion binding site and**

**exosite I of thrombin during prothrombin activation.** *Journal of Biological Chemistry*, 2007.

#### **Presentation**

von Willebrand Factor Binding Protein is a Novel Conformational Activator of Prothrombin, XXIst Congress of the International Society on Thrombosis and Haemostasis, Geneva Switzerland, 2007.

#### **Ashish Mogal (Graduate Student) – Sarki Abdulkadir Lab**

##### **Publication**

**Mogal AP**, van der Meer R, Crooke PS, Abdulkadir SA. **Haploinsufficient prostate tumor suppression by NKX3.1: a role for chromatin accessibility in dosage-sensitive gene regulation.** *Journal of Biological Chemistry*, 2007.

#### **Cheryl Overton (Graduate Student) – Sergio Fazio Lab**

##### **Publications**

**Overton C**, Yancey P, Major A, Linton M, Fazio S. **Deletion of macrophage Low Density Lipoprotein (LDL) receptor related protein increases atherosclerosis in the mouse.** *Circulation Research*, 2007.

Fan D, Qiu S, **Overton CD**, Yancey PG, Swift LL, Jerome WG, Linton MF, Fazio S. **Impaired secretion of apolipoprotein E2 from macrophages.** *Journal of Biological Chemistry*, 2007.

#### **Karen Wiles (Graduate Student) – Paul Bock Lab**

##### **Award**

American Heart Association Predoctoral Fellowship to fund research entitled “Skizzle: a Novel Plasminogen Activator from *Streptococcus agalactiae*” (July 2007 – June 2009)

Young Investigator Award travel grant presented through the International Society on Thrombosis and Haemostasis to attend the XXIst Congress, Geneva Switzerland, 2007.

#### **Presentation**

Skizzle, A Novel Plasmin(ogen) Binding Protein and Plasminogen Activator from *Streptococcus agalactiae* - XXIst Congress of the International Society on Thrombosis and Haemostasis, Geneva, Switzerland, 2007.

#### **Jody Ullery (Graduate Student) – Jay Jerome Lab**

##### **Award**

American Heart Association Predoctoral Fellowship

#### **Pharmacology**

#### **Mohamed Rafiuddin Ahmed, Ph.D. (Postdoctoral Fellow) – Eugenia Gurevich Laboratory**

##### **Publications**

Bychkov E, **Ahmed MR**, Dalby KN, Gurevich EV **Dopamine depletion and subsequent treatment with L-DOPA, but not the long-lived dopamine agonist pergolide, enhances activity of the Akt pathway in the rat striatum.** *Journal Neurochemistry*, 2007.

Hanson SM, Gurevich EV, Vishnivetskiy SA, **Ahmed MR**, Song X, Gurevich VV. **Each rhodopsin molecule binds its own arrestin.** *Proceedings of National Academy of Science*, 2007.

##### **Presentations**

Lentivirus-mediated overexpression of GRK6 suppresses dopamine receptor signaling in the 6-OHDA rat - 36<sup>th</sup> Annual Neuroscience Society Meeting, Atlanta, GA, 2006.

Simple rules of arrestin binding: one rhodopsin, two phosphates - XVII International Congress of Eye Research, Buenos Aires, Argentina, 2006.

Successfully completed the construction of lentiviruses containing the genes for the expression of GRK2, 3, 5 and 6 enzymes for both *in vitro* and *in vivo* applications - 36<sup>th</sup> Annual Neuroscience Society Meeting, Atlanta, GA, 2006.

#### **Ashley Brady, Ph.D. (Postdoctoral Fellow) – Jeff Conn Lab**

##### **Award**

Individual NRSA Fellowship from the National Institute of Mental Health (NIMH). This will fund research to develop novel subtype-selective agonists for the M1 muscarinic acetylcholine receptor (mAChR) which can be used as tools to definitively determine whether the M1 receptor is the subtype responsible for mediating the physiological and behavioral effects of mAChR agonists thought to be important for antipsychotic activity. Ultimately, a better understanding of these receptors may lead to im-

proved therapies for patients suffering from a variety of neurodegenerative disorders including Alzheimer's disease and Schizophrenia (2007).

#### **Thomas Bridges (Graduate Student) – Craig Lindsley Lab**

##### **Publication**

Molecule of the Month, *Current Topics in Medicinal Chemistry*, 2007. Description: Small entry discussing the synthetic peptide Bremelanotide (PT-141), a potential treatment for male and female sexual dysfunction, currently in clinical trials.

#### **Engeny Bychkov, Ph.D. (Postdoctoral Fellow) - Eugenia Gurevich Lab**

##### **Publication**

**Bychkov E, Ahmed MR, Dalby KN, Gurevich EV. Dopamine depletion and subsequent treatment with l-DOPA, but not the long-lived dopamine agonist pergolide, enhances activity of the Akt pathway in the rat striatum.** *Journal Neurochemistry*, 2007.

**Bychkov ER, Gurevich VV, Joyce JN, Benovic JL, Gurevich EV. Arrestins and two receptor kinases are upregulated in Parkinson's disease with dementia.** *Neurobiology of Aging*, 2006.

#### **Sameer Chopra, Ph.D. (Postdoctoral Fellow) – Dan Roden & Tao Zhong Labs**

##### **Award**

Keystone Symposia Scholarship from the National Heart, Lung, and Blood Institute (NHLBI). Awarded for presentation for research at Keystone Symposia: Molecular Pathways in Cardiac Development and Disease, Breckenridge CO 2007.

Travel Grant from the Council on Basic Cardiovascular Sciences (BCVS) and American Heart Association. This grant enabled presentation of research at the AHA Scientific Sessions 2007.

MSTP Student Travel Award received from Vanderbilt University.

##### **Publications**

Jia H, King I, **Chopra SS**, Wan H, Ni TT, Jiang C, Guan X, Wells S, Srivastava D, Zhong TP. **Vertebrate heart growth is regulated by functional antagonism between *Gridlock* and *Gata5*.** *Proceedings of the National Academy of the Sciences*, 2007.

**Chopra SS, Watanabe H, Zhong TP, Roden DM. Molecular cloning and analysis of zebrafish voltage-gated sodium channel beta subunit genes: Implications for the evolution of electrical signaling in vertebrates.** *BMC Evolutionary Biology*. 2007.

**Chopra SS, Zhong TP. Vascular development in zebrafish.** Book chapter in: Aird W.C, Ed. *Endothelial Biomedicine*, 2007 (ISBN 9780521853767).

##### **Presentation**

Expression of the cardiac sodium channel Na<sub>v</sub>1.5 is required for the differentiation of cardiomyocyte progenitor cells *in vivo* - American Heart Association (AHA) Scientific Sessions, Chicago, IL, 2006.

Early and late roles for voltage-gated sodium channels in embryonic heart development and function - Keystone Symposia, Molecular Pathways in Cardiac Development and Disease/Integrative Basis of Cardiac Disease, Breckenridge, CO, 2007.

*In vivo* characteristics of voltage-gated sodium channel beta subunits - Keystone Symposia, Molecular Pathways in Cardiac Development and Disease/Integrative Basis of Cardiac Disease (Joint Meeting), Breckenridge, CO, 2007.

Sodium channel beta subunits modulate heart rate, drug sensitivity, and development in zebrafish embryos - American Heart Association (AHA) Scientific Sessions, Chicago, IL, 2006.

#### **Whitney Cleghorn (Graduate Student) – Vsevolod Gurevich Lab**

##### **Award**

ASBMB Graduate/Postdoctoral Travel Award to attend 2007 ASBMB Annual Meeting

##### **Publications**

Hanson SM, **Cleghorn WM**, Fancis DJ, Vishnivetskiy SA, Raman D, Song X, Nair KS, Slepak VZ, Klug CS, Gurevich VV. **Arrestin Mobilizes Signaling Proteins to the Cytoskeleton and Redirects their Activity.** *Journal of Molecular Biology*, 2007.

Gurevich VV, Gurevich EV, **Cleghorn WM. Arrestins as Multi-functional Signaling Adaptors.** *Handbook of Experimental Pharmacology*. 2007.

##### **Presentation**

Arrestin-dependent mobilization of signaling proteins to the cytoskeleton (Oral) – American Society for Biochemistry and Mo-

lecular Biology (ASBMB) Annual Meeting, Washington, DC, 2007.

Arrestin-dependent mobilization of signaling proteins to the cytoskeleton (Poster) - American Society for Biochemistry and Molecular Biology (ASBMB) Annual Meeting, Washington, DC, 2007.

#### **Brett A. English (Graduate Student) – Randy Blakely Lab**

##### **Award**

Predocutorial Fellowship Award from the American Heart Association Southeast Affiliate to research the cardiovascular phenotypic consequences of genetic deficits in the presynaptic choline transporter (CHT) (July 2007 – June 2009)

Repayment of Pharmacy School Loans from the NIH Loan Repayment Program. This funding will also help to support research on the cardiovascular phenotypic consequences of genetic deficits in the presynaptic choline transporter (CHT) (October 2007 – September 2009)

#### **Richard Gustin (Graduate Student) – Edwin Weeber Lab**

##### **Publication**

Van Woerden GM, Harris KD, Hojjati MR, **Gustin RM**, Qiu S, de Avila Freire R, Jiang YH, Elgersma Y, Weeber EJ. **Rescue of neurological deficits in a mouse model for Angelman syndrome by reduction of alphaCaMKII inhibitory phosphorylation.** *Nature Neuroscience*, 2007.

##### **Presentation**

Mechanisms of Angelman Syndrome Pathology - Angelman Syndrome Foundation Biennial Conference, St. Louis, MO, 2007.

#### **Michael Holinstat, Ph.D. (Postdoctoral Fellow) – Heidi Hamm Lab**

##### **Award**

Pathway to Independence Grant “Thrombin regulation of Rap1 signaling in human platelet activity” NIH-1K99HL089457-01. This research will investigate the mechanisms by which thrombin receptors, PAR1 and PAR4 regulate platelet activation, clot formation, and thrombosis through the small G protein, Rap1. (August 2007-July 2012).

Loan Repayment Program Recipient. This award from the NIH pays student debt from academic institutions in return for clinical investigations in the health profession. This award was approved for his continued involvement in a SCCOR on thrombosis and human disease.

Postdoctoral Travel Award to attend the National ASBMB Meeting at FASEB and present work on PAR1 signaling through phosphatidylinositol kinases in human platelet.

##### **Publications**

Voss B, McLaughlin J, **Holinstat M**, Zent R, Hamm HE. **PAR-1, but not PAR-4, activates human platelets through a Gi/o/PI3K signaling axis.** *Molecular Pharmacology*. 2007.

**Holinstat M**, Voss B, Bilodeau ML, Hamm HE. **Protease activated receptors regulate human platelet activation through a phosphatidic acid-dependent pathway.** *Molecular Pharmacology*, 2007.

##### **Presentation**

Phosphatidylinositol (PIP<sub>n</sub>) signaling required for PAR1-mediated human platelet activation via Rap1 - Summer Research Conference: Proteases in Hemostasis & Vascular Biology (FASEB), Indian Wells, CA, 2007.

PI-3K differentially regulates protease activated receptor-mediated platelet activation in humans through Rap1 - American Society for Biochemistry and Molecular Biology (ASBMB) Annual Meeting, Washington, DC, 2007.

#### **Pavlina Ivanova, Ph.D. (Postdoctoral Fellow) – Alex Brown Lab**

##### **Publications**

Milne SB, **Ivanova PT**, Forrester JS, and Brown HA. **Lipidomics: An Analysis of Cellular Lipids by ESI-MS.** *Methods*, 2006.

Rouzer CA, **Ivanova PT**, Byrne MO, Milne SB, Marnett LJ, Brown HA. **Lipid Profiling Reveals Arachidonate Deficiency in RAW264.7 Cells: Structural and Functional Implications.** *Biochemistry*, 2006.

Callender HL, Forrester JS, **Ivanova PT**, Preininger A, Milne SB, Brown HA. **Quantification of diacylglycerol species from biological extracts by electrospray ionization mass spectrometry.** *Analytical Chemistry*, 2007.

Rouzer CA, **Ivanova PT**, Byrne MO, Brown HA, Marnett LJ. **Lipid profiling reveals glycerophospholipid remodeling in zymosan-treated macrophages.** *Biochemistry*, 2007.

Ivanova PT, Milne SB, Byrne MO, Xiang Y, Brown HA. **Glycerophospholipid identification and quantitation by electrospray ionization mass spectrometry.** *Methods in Enzymology*, (chapter), 2007.

**Erin J. McArdle (MSTP Student) – Al George Lab**

**Award**

Predocutorial Fellowship from the American Heart Association for her project investigating the function of KCNE4 in cardiac physiology (July 2007 – June 2009).

**Jamie McConnell (Graduate Student) – Brian Wadzinski Laboratory**

**Publication**

McConnell JL, Gomez RJ, McCorvey LR, Law BK, Wadzinski BE. **Identification of a PP2A-interacting protein that functions as a negative regulator of phosphatase activity in the ATM/ATR signaling pathway.** *Oncogene* 2007.

Wegner AM, McConnell JL, Blakely RD, Wadzinski BE. **An automated fluorescence-based method for continuous assay of PP2A activity.** *Methods in Molecular Biology*, 2007.

**Mingwei Ni (Graduate Student) – Bone Center**

**Award**

Travel grant to attend the 29th ASBMR meeting in Hawaii and present research.

**Presentation**

Type III TGF $\beta$  Receptor Regulates BMP Signaling in Differentiating Osteoblasts *in vitro* and *in vivo* - 29th ASBMR Annual Meeting, Honolulu, HI, 2007.

**Nora Sanchez (Graduate Student) – Sanjoy Das Lab**

**Publication**

Ray S, Xu F, Li P, Sanchez NS, Wang H, Das SK. **Increased level of cellular Bip critically determines estrogenic potency for a xenoestrogen kepone in the mouse uterus.** *Endocrinology*, 2007.

**Douglas Sheffler Ph.D. (Postdoctoral Fellow) – Jeff Conn Lab**

**Award**

PhRMA Foundation Post-Doctoral Fellowship in Pharmacology/Toxicology. Funding for research project entitled Regulation of mGluR1 function by positive allosteric modulators. This research will explore the effects of mGluR1-selective allosteric potentiators on a variety of signaling pathways, their mechanism of action, and to characterize the mGluR1 positive allosteric potentiator binding site in order to further development of mGluR1 allosteric modulators as novel drugs. (August 2007 – July 2009)

**Jana K Shirey (Graduate Student) – Jeff Conn Lab**

**Award**

Pharmaceutical Research and Manufacturers of America Foundation Predocutorial Fellowship in Pharmacology/Toxicology. The PhRMA Foundation offers competitive research fellowships and grants to young scientists performing research in disciplines important to the pharmaceutical industry. (2007 – 2009)

Ruth L Kirschstein National Research Service Award (NRSA) (2007-2010).

**Nicole Speed (Graduate Student) – Aurelio Galli Lab**

**Presentation**

Reelin-dependent modulation of long term depression and long term potentiation in area CA1 of the hippocampus - Society for Neuroscience Meeting Annual Meeting, San Diego, CA, 2007.

**Xiaofei Sun (Graduate Student) – Sudhansu Dey Lab**

**Publication**

Wang H, Xie H, Sun X, Kingsley PJ, Marnett LJ, Cravatt BF, Dey SK. **Differential regulation of endocannabinoid synthesis and degradation in the uterus during embryo implantation.** *Prostaglandins & Other Lipid Mediators*, 2007.

**Mikio Tanabe (Graduate Student) – Tina Iverson Lab**

**Award**

Uehara memorial foundation Post Doctoral Fellowship (June 2006-June 2007).

**Mengnan Tian (Graduate Student) – Robert MacDonald Lab**

**Award**

Predocutorial Research Training Fellowship from the Epilepsy Foundation for 2007. This fellowship will fund research designed

to characterize the consequence of a unique intronic mutation in the human GABA<sub>A</sub> receptor  $\gamma 2$  subunit identified in a family with autosomal dominant childhood absence epilepsy and febrile seizures.

#### **Todd Townsend (Graduate Student) – Joey Barnett Lab**

##### **Award**

Travel Award to attend the Weinstein Cardiovascular Development Conference 2007.

2<sup>nd</sup> Annual NIH National Graduate Student Research Festival (NGSRF) – Chosen to attend the research festival on the NIH main campus in Bethesda, MD. The expense paid NGSRF introduces 250 advanced graduate students in the sciences to the NIH Intramural Research Program (IRP) with the aim of recruiting them to do postdoctoral training at the NIH

##### **Presentation**

Endocardial cell transformation is dependent on Par6 regulation of RhoA (Oral) - Weinstein Cardiovascular Development Conference, Indianapolis, IN, 2007.

The PDZ Binding Motif and Interaction of GIPC with the Type III TGF beta Receptor (TGFB3) are Required for Noncanonical TGF beta Signaling (Poster) - Weinstein Cardiovascular Development Conference, Indianapolis, IN, 2007.

#### **Eun-Ja Yoon (Graduate Student) – Heidi Hamm Lab**

##### **Awards**

Predocctoral Fellowship Grant from the American Heart Association. This will fund research on the mechanism of how G protein  $\beta\gamma$  subunit modulate exocytotic vesicular fusion. (July 2006 – June 2008).

Graduate Student Travel Award to attend the ASPET Annual Experimental Biology Meeting, San Francisco, CA, 2006.

##### **Publications**

**Yoon EJ, Gerachshenko T, Spiegelberg BD, Alford S, Hamm HE. G $\beta\gamma$  interferes with Ca<sup>2+</sup>-dependent binding of synaptotagmin to the SNARE complex. *Molecular Pharmacology*, 2007.**

Preininger AM, Henage LG, Oldham WM, **Yoon EJ**, Hamm HE, Brown HA. **Direct modulation of phospholipase D activity by G $\beta\gamma$ .** *Molecular Pharmacology*, 2006.

##### **Presentation**

Gbg reduces the number and quantal size of exocytotic events in neurosecretory chromaffin cells - ASPET Annual Experimental Biology Meeting, San Francisco, CA, 2006.

Ca<sup>2+</sup> channel-independent modulation of exocytotic transmitter release by G-protein  $\beta\gamma$  subunits – 36<sup>th</sup> Annual Meeting for the Society for Neuroscience, Atlanta, GA, 2006.