School of Medicine

Department of Pharmacology and Chemical Biology

Annual Report
2013-2014
General Description
During the 2013-2014 academic year, the Department of Pharmacology & Chemical Biology continued to grow its strengths in discovery and education related to the practice of pharmacology. The discovery component of our departmental missions employs basic chemical principles in developing an understanding of cell signaling events, and then applies these insights in the creation of new therapeutic strategies.

This past year, the department made significant new advances in understanding fundamental mechanisms of cell and tissue communication, how these events impact on cell growth and function, the creation of new drugs to control these processes and, from this, the generation of new intellectual property (patents) that allows the commercialization of these discoveries. In spite of challenging times, the concerted effort of both faculty and staff in making and communicating seminal research advancements has been rewarded by a continued growth in extramural research support that now totals $18,039,712 annually.

The teaching missions of the department are a high priority, thus they both thrive and continue to evolve. Donald DeFranco, Ph.D., has been highly effective in his position as Vice Chair for Education, as has Patrick Pagano, Ph.D., Director of our Molecular Pharmacology Graduate Program. We have continued to restructure and revise the Ph.D. Program in Molecular Pharmacology to be more responsive to student needs and the rapidly evolving training requirements for minting a competitive pharmacologist in the contemporary job market. They are using multiple strategies to inculcate in our students new expertise spanning from synthetic organic chemistry to physiology. In this regard, the Molecular Pharmacology Graduate Program has refocused its areas of specialization to provide additional focus on molecular aspects of signal transduction, cell and organ systems pharmacology, cancer pharmacology and drug discovery. We are especially pleased with student reactions regarding our recent integration of combined clinical simulator- and murine-based “hands-on” training in organ physiology and pharmacology into our graduate curricula. Due to the interest of students outside of the Molecular Pharmacology Graduate Program, we are further expanding these organ physiology and pharmacology teaching missions. Important contributions and leadership have also been lent in graduate education by Guillermo Romero, Ph.D., Associate Director of Graduate Education and Daniel Altschuler, Ph.D., Co-Director of the Molecular Pharmacology course, in addition to our overall departmental faculty.

By new mechanisms that regularly evaluate both mentors and students, Drs. DeFranco, Pagano and Freeman have succeeded in reducing our average time for graduation of Ph.D. students to four, and sometimes less than four, years for exceptionally productive students. Departmental faculty are particularly proud of our current outstanding Molecular Pharmacology Ph.D. and M.D./Ph.D. students, who are contributing important new insight into fundamental cell signaling processes, drug actions and drug discovery.

Medical education has also thrived under Dr. DeFranco’s leadership. He is one of the most highly esteemed educators and researchers in the Department of Pharmacology & Chemical Biology and the School of Medicine. Dr. DeFranco, along with Stephan Tofovic, M.D., Ph.D., have dramatically improved the integration of pharmacology instruction into the organ-based, modular instructional approach currently given to Pitt medical students. Additionally, all of the Pharmacology & Chemical Biology faculty participate in the execution of multiple small-group and team-based workshops, focusing on clinically relevant case studies in pharmacology. With constant attention to designing course content, optimal teaching strategies and their execution, we strive to continuously evolve and fulfill our mission to educate medical students and physicians in the conceptual basis for drug selection and administration.

Pharmacology & Chemical Biology faculty are also dedicated to inspiring and growing the next generation of young scientists and physicians. Michael Palladino, Ph.D. continues to direct our highly acclaimed summer undergraduate research program, which attracts some of the brightest young, aspiring basic and physician-scientists from around the country. This program is in part funded by the American Society of Pharmacology and Experimental Therapeutics, as well as participating School of Medicine centers and departments. Our undergraduate research program supports the summer living and laboratory expenses of students who are interested in a broad range of research themes. These students are matched with a laboratory that fits their
general interests and by pursuing a research project become exposed to challenging new laboratory skills, classroom experiences and an opportunity to interact with our internationally renowned departmental investigators. This represents a significant investment of time and resources that pays untold future dividends.

The stellar research environment that exists in the Department of Pharmacology & Chemical Biology is reflected by the high-impact publications and abundant extramural support levels cited in this report. In order to grow and evolve this vibrant environment, new investments are continually being made in the research tools utilized by departmental investigators.

Career development and strong mentorship for junior faculty are critical elements for nurturing a healthy future for the department. A new faculty mentoring process was instigated in recent years, whereby the Chair and senior faculty regularly meet with non-tenured and associate professor-level faculty to discuss and strategize how best to pursue career progression and key research objectives.

In summary, the practice of Pharmacology & Chemical Biology is unique among basic sciences, as it embraces a broad range of expertise in our efforts to understand fundamental cell communication events, drug-target molecule reactions and, finally, the design, synthesis and therapeutic application of new drugs in patients. This latter effort requires strengths or critical collaborations in computational drug design, synthetic organic chemistry, biophysics, structural biology and organ physiology. Thus, Pharmacology & Chemical Biology maintains strong ties with a variety of basic science and clinical disciplines, while maintaining firm roots in fundamental elements of chemistry, cell and molecular biology, drug actions and drug metabolism. These precepts are exemplified by our premier educational and research missions that include the institution of new educational strategies, the creation of new centers of excellence, the recruitment of stellar new faculty, and the scientific and teaching contributions of our dedicated faculty. We thus invite you to explore in more detail our annual report and, if interested, to join us in fulfilling the departmental mission to excel in education, drug discovery and improved patient care.
Research and Other Scholarly Activities
Research Interests

Bruce A. Freeman, Ph.D
Professor and Chair
Ph.D., University of California, Riverside, 1978

The basic and clinical research activities of the Freeman Laboratory focus on the eukaryotic cell production, reactions and signal transduction properties of oxidizing and free radical inflammatory mediators (e.g., superoxide, hydrogen peroxide, nitric oxide (NO), peroxynitrite, nitrogen dioxide, oxidized/nitrated lipids). In particular, we are interested in the action of these species as both redox signaling mediators under basal conditions and as pathogenic agents in inflammatory diseases. Our observations regarding O$_2$ and NO-derived reactive species have lent new insight into redox-dependent cell signaling and have revealed new therapeutic strategies for treating acute inflammation, metabolic syndrome, respiratory disorders and cardiovascular diseases.

In the late 1980s, his group studied the cellular and subcellular organelle production of superoxide and hydrogen peroxide. Following the landmark description of endothelial-derived relaxing factor (EDRF) as the free radical NO, the Freeman laboratory pioneered the concept that the inflammatory and signal transduction mediator NO displays unique redox signaling actions following reaction with superoxide, oxidizing fatty acids and heme peroxidases. The “oxidative inactivation” of NO is a kinetically fast reaction, yielding “reactive nitrogen species” as products. This array of reactions of O$_2$-derived species with NO can serve to both impair and transduce NO signaling via non-cGMP dependent mechanisms.

There is now a rapidly expanding appreciation that NO-derived reactive species display distinct chemical reactivities and exert cell signaling actions beyond the activation of guanylate cyclase – e.g., via thiol oxidation, electrophilic addition and receptor-dependent reactions. This aspect of redox-related chemical biology is an area that the Freeman laboratory continues to investigate, with the intent of defining the linkages between reactive oxygen species and NO-dependent cell signaling mechanisms. From a translational research perspective, his group is addressing how these interactions impact cell and organ function, with particular directed towards metabolic, cardiovascular and pulmonary diseases.

Dr. Freeman’s laboratory observed that NO reacts with superoxide (O$_2^-$) to yield the potent biological oxidizing and nitrating species peroxynitrite (ONOO$^-$) and its conjugate acid, peroxynitrous acid (ONOOH). Groundbreaking observations were made in this area by Joe Beckman, PhD and Rafael Radi, MD, PhD. Their work showed that peroxynitrite is both a direct oxidant and, after homolytic scission of peroxynitrous acid, yields the potent oxidant hydroxyl radical (OH) and the oxidizing and nitrating species nitrogen dioxide (NO$_2$) (Fig. 1). Also, they identified thiols and carbon dioxide as the principal biological targets of peroxynitrite. It is now known that peroxynitrite accounts for many of the pathogenic actions previously ascribed to its precursors - superoxide (and its products) and NO. Work from many laboratories continues to affirm that peroxynitrite mediates redox cell signaling actions upon the oxidation or nitration of target molecules such as thiols, aromatic amino acids, nucleotides and unsaturated fatty acids – with downstream cell signaling events and reactions of peroxynitrite now appreciated to be a consequence of its potent and unique reactivities.

Daniel Altschuler, Ph.D
Associate Professor
Ph.D. (Biology), University of Buenos Aires, Argentina, 1989

Dr. Altschuler’s laboratory studies mechanisms of signal transduction by the second messenger cAMP in cell proliferation. cAMP-dependent protein kinase (PKA) and Exchange protein activated by cAMP (Epac) represent the main effectors of cAMP action. Both pathways converge at the level of the small GTPase Rap1b, via its Epac-mediated activation and PKA-mediated phosphorylation. The role of Rap1 activation (Epac) and
phosphorylation (PKA) coordinating the early rate-limiting events in cAMP-dependent cell proliferation are studied using a multidisciplinary approach including molecular and cellular biology techniques in vitro, as well as in vivo validation using transgenic/knock in technologies in endocrine tumor models.

**Palaniappa Arjunan, Ph.D.**

Research Instructor  
*Ph.D., Indian Institute of Science, Bangalore, India, 1985*

Dr. Arjunan determines the structure of macromolecules of biological interest, and then analyses structure-function relationships. He primarily uses X-ray crystallography to accomplish this.

Dr. Arjunan's current research includes the high resolution three-dimensional structure determination of thiamin diphosphate (ThDP)-dependent enzymes, the yeast pyruvate decarboxylase (PDC) and pyruvate dehydrogenase multienzyme complex (PDHc) from Escherichia coli. The refined structure is then used to address long-standing issues regarding the structure and function of thiamin diphosphate-dependent enzymes. The structure determination also includes the structure of PDHc E1 in complex with a covalently bound reaction intermediate analogue. Other interests are: a) the crystal structural analysis of native and mutant ThDP-dependent enzymes, either alone or in complexes with substrates, inhibitors, activators or with other related enzymes and b) development of techniques for the determination and analysis of macromolecular crystal structure.

**Dr. Alessandro Bisello**  
Associate Professor  
*Laurea (Chemistry), University of Padova, Italy, 1992*

The general scientific theme in the laboratory is to define the role of accessory/scaffolding proteins (such as caveolin and EBP50/NHERF1) in the regulation of cellular and tissue functions. Our efforts focus on two specific areas:

Role of EBP50/NHERF-1 on vascular remodeling. The Ezrin-Radixin-Moesin Binding Phosphoprotein of 50 kDa (EBP50), also known as NHERF-1 is a PDZ domain-containing scaffolding protein. Our studies show that EBP50 is expressed at low levels in healthy vessels but is up-regulated following arterial injury. EBP50 contributes to the proliferation of vascular smooth muscle cells (VSMC). The temporal expression of EBP50 following arterial injury and its ability to regulate specific cell cycle proteins and signaling receptors suggest that this adaptor protein plays a key role in the integrated response of VSMC to injury. Current studies aim at determining the role of EBP50 on vascular remodeling.

Cellular regulation of the glucagon-like peptide 1 (GLP-1R) receptor and its role in regulating beta cell function, proliferation and survival. One of the most promising therapeutic targets for the treatment of type 2 diabetes is the glucagon-like peptide 1 receptor (GLP-1R). The well documented ability of GLP-1R agonists, either GLP-1 itself or exendin-4, to stimulate glucose-dependent insulin secretion and increase beta cell proliferation and survival led to the approval of exendin-4 for the treatment of type 2 diabetes. Our studies show that the GLP-1R interacts with caveolin-1 and this is necessary for the trafficking of the GLP-1R to the cell membrane and directs its localization to lipid rafts. The central hypothesis of this project is that the interaction between GLP-1R and caveolin-1 and its localization in lipid rafts is a fundamental mechanism controlling both the insulinotropic and the proliferative actions of GLP-1 and exendin-4.

**Dinara Bulgari, Ph.D.**  
Research Assistant Professor  
*Ph.D., Kazan State Medical University, Russia, 1993*
Dr. Bulgari’s research is focused on the mechanisms that regulate the neuropeptide release and activity-induced signaling in nerve terminals. She uses combination of genetic, electrophysiology and imaging techniques to study the native intact synapses in Drosophila model system.

Her current research projects include:

1. Mechanisms of dense-core vesicle (DCV) accumulation in peptidergic type III synaptic boutons. This project is stimulated by the discoveries obtained from type Ib boutons. Unlike type Ib boutons, type III peptidergic boutons possess a multitude of DCVs and very few SSVs. These DCVs contain crustacean cardioactive peptide, which triggers crucial developmental behaviors. Type III boutons contain ~7-fold more DCVs than type Ib boutons but DCV axonal transport to both bouton types is similar. The differential accumulation of DCVs in type Ib and III boutons could be due to differences in bouton DCV capacity, not synthesis or delivery.

2. Mechanisms which control exocytosis of DCVs and SSVs. Exploration of the hypothesis that inositol trisphosphate receptors (IP3Rs) are needed for activity-dependent presynaptic recruitment of CamKII and scaffold protein Bruchpilot. Our CamKII findings raise the question of whether IP3Rs recruit many presynaptic proteins to produce long-term changes in a subset of active zones. Such a mechanism could be involved in generating the heterogeneity in transmission between individual active zones.

These studies will continue to transform the understanding of neuropeptide release and signaling in the nerve terminal, which are fundamental to understanding the operation of the nervous system under physiological and pathological conditions.

Eugenia Cifuentes-Pagano, Ph.D.
Research Instructor
Ph.D., State University of New York at Stony Brook, 1994

Dr. Cifuentes-Pagano’s research interests focus on the understanding of the molecular mechanisms of action of novel NADPH oxidase isoforms and their regulation in the vasculature. The phagocyte NADPH oxidase (or respiratory burst oxidase) is a well-characterized reactive oxygen species (ROS)-generating system that catalyzes the one-electron reduction of oxygen to O2-, the precursor to a variety of other reactive oxygen species. The NADPH oxidase paradigm is a multi-subunit enzyme complex that includes two membrane-spanning subunits, p22-phox and nox2, and three cytoplasmic subunits, p40-phox, p47-phox and p67-phox. Our laboratory was the first to discover a nox2-based oxidase in the vasculature and to develop specific inhibitors targeting this robust source of ROS. Since that initial discovery, various isoforms of NADPH oxidase have been described which differ from the nox2 system in unique modifications of their nox-subunit amino acid sequence as well as the cytoplasmic components that they require. Besides their structural differences, the various isoforms present differential tissue and cellular distribution. The multi-level complexity of this family of proteins provides an opportunity to develop new tools to dissect the role of each of the isoforms in vascular function and pathology.

Donald DeFranco, Ph.D.
Professor & Vice Chair, Education
Ph.D., Yale University, 1981

Glucocorticoid hormones are widely used as prenatal agents for mothers at risk for preterm delivery and as postnatal agents in premature infants in order to decrease medical complications of prematurity. However, animal and clinical studies suggest that exposure of fetuses to glucocorticoids during development could affect future cognitive function and brain development. Delayed neurological effects of early glucocorticoid exposure may be mediated by reduced neural progenitor cell survival, proliferation or differentiation. We are using a number of in vivo and in vitro models to examine the role of the glucocorticoid receptor protein in survival and
function of developing neurons in the cerebral cortex. Both genomic and nongenomic mechanisms of glucocorticoid receptor action are being studied to uncover both short and long-term effects of these hormones.

Communication between the epithelial and stromal compartments of the prostate that is mediated by growth factors and cytokines is crucial for the maintenance of prostate growth and function. However, alterations in the expression and response to these factors can occur during prostate cancer progression and alter signaling between these compartments. We are examining various signaling pathways within the tumor microenvironment that mediate cross talk between cells within the stromal compartment and prostate cancer cells. For example, we have identified a prostate stromal cell specific transcriptional coactivator, the Hic-5 protein, that functions in both androgen and vitamin D signaling pathways. Hic-5 influences androgen regulation of paracrine factors in stromal cells. In addition, it is an important mediator of vitamin D response acting to regulate vitamin D metabolism in stromal cells and the antiproliferative response of this vitamin in prostate cancer cells.

He is also studying the TGF-beta signaling pathway with a particular interest in understanding the mechanism for its divergent action as both a tumor suppressor and tumor promoter. Recent studies revealed that human prostate cancer associated fibroblasts maintain a secreted activity that limits the migration of prostate cancer cells. However, TGF-beta derived from aggressive prostate cancer cells can block this migration inhibitory activity through activation of an ROS signaling pathway in the cancer-associated fibroblasts.

W. Chet de Groat, Ph.D.
Distinguished Professor
Ph.D., University of Pennsylvania Medical School, 1965

Dr. de Groat is interested in the autonomic nervous system and the neural regulation of pelvic visceral functions. Current studies focus on the reflex control of the urogenital tract and the mechanisms underlying transmission at central and peripheral autonomic synapses. These experiments are designed to examine (1) the neurotransmitters in the reflex pathways, (2) neuroplasticity during postnatal development or following neural injury, (3) the neural pathways responsible for the detection of visceral pain, and (4) the actions of drugs used to treat urogenital dysfunction. Experiments are conducted on a variety of preparations ranging from intact animals to isolated tissues, like spinal cord slices and dissociated neurons.

Julie Eiseman, Ph.D.
Research Professor
Ph.D., Cornell University Medical College, 1980

Research in the Eiseman laboratory is directed at the preclinical evaluation of potential anti-cancer agents. Studies include the determination of the maximum tolerated dose, pharmacokinetics, pharmacodynamics and efficacy. The laboratory is also interested in non-invasively measuring compounds with absorbance spectra in the long visible range.

Specific studies include the pharmacokinetics and efficacy of the pyrimidine compounds, fluorodeoxycytidine (FdCyd) and gemcitabine (dFdCyd) in combination with a cytidine deaminase inhibitor, tetrahydrouridine in CD2F1 mice and SCID mice with human pancreatic cancer xenografts.

The pharmacokinetics and efficacy of tubulin interactive agents including docetaxel, paclitaxel and 6-epidictostatin are also under investigation. Studies with docetaxel have examined the interaction with 9-nitrocamptothecin in an ovarian cancer xenograft (SK-OV3) and a physiological based pharmacokinetic model was developed to describe the disposition of docetaxel. This model will be evaluated for its usefulness in predicting patient docetaxel pharmacokinetics.
Dr. Eiseman is interested in understanding the mechanisms involved during photodynamic therapy with Pc 4 and other phototherapeutic agents and use elastic scattering spectrometry to measure changes in drug concentrations and hemoglobin saturation during and following photodynamic therapy. For these studies, we measure the concentrations of the drug and hemoglobin non-invasively as well as through destructive methods such as HPLC and LC/MS-MS.

Other agents investigated include a wide range of potential cancer chemotherapeutics including DB-67, CKD-602, 2,2-dimethylbutyrate, DA-3003-1, Zebularine, 17-allyl aminogeldanamycin and 17-dimethylamino-geldanamycin.

Keri Fogle, Ph.D.
Research Instructor
Ph.D., Columbia University, 2007

The ATP61 Drosophila model of mitochondrial encephalomyopathies shares common features with human diseases, including Maternally Inherited Leigh Syndrome (MILS) and Neuropathy, Ataxia, and Retinitis Pigmentosa (NARP). Some of the hallmarks of these diseases include neurodegeneration and seizure-like activity that is often unresponsive to commonly-used anti-epileptic drugs.

Dr. Fogle is using whole-cell patch clamp electrophysiology of the intact fly brain to explore the molecular mechanisms which underlie the neurobiological symptoms in the ATP61 model, specifically the membrane channel complexes which may couple metabolic disruption to neuronal dysfunction and hyperexcitability, and thus represent targets for novel therapeutic interventions.

Peter Friedman, Ph.D.
Professor
Ph.D., SUNY Upstate Medical Center, 1975

Studies in Dr. Friedman’s laboratory focus on spatiotemporal regulation of protein-protein interactions governing GPCR signaling and function. We are especially interested in the parathyroid hormone receptor (PTHr), which controls extracellular mineral ion homeostasis and bone turnover. Key advances have been made in understanding cell-specific PTHR signaling, trafficking, and post-translational modifications. Recent observations indicate that PTHR activation, desensitization and endocytosis are mediated through distinct structural states that derive from specific interactions between ligand and receptor. Agonist- or antagonist-occupied receptor states induce discrete conformations with accessibility to intracellular receptor domains. The differential or inducible involvement of these domains in coupling to G proteins may represent a molecular basis for ligand-selective responses not only for the PTHR, but also for other G protein-coupled receptors, and are novel drug targets. Current work is directed at elucidating the molecular and structural mechanisms of how cytoplasmic PDZ proteins such as NHERF1 legislate cell-, ligand-, and stage-specific receptor trafficking. The resulting information will be valuable in understanding mineral ion homeostasis under normal conditions, as well as disordered calcium balance in renal failure, hyperparathyroidism, or osteoporosis.

William Furey, Ph.D.
Professor
Ph.D., The State University of New Jersey, 1977

Dr. Furey’s research involves the structure determination and analysis of large biological molecules and complexes by x-ray crystallography, and correlating the results with known functions. The work currently focuses on thiamin (vitamin B1) dependent enzymes and cell cycle regulating enzymes, as well as crystallographic methods development. Results of these studies could lead to development of therapeutic agents directed against pathogenic organisms, and anti-cancer drugs.
The pyruvate dehydrogenase multienzyme complex (PDHc, MW 4.7 million Daltons, 60 protein subunits & 60 active sites for the E. coli version) is present in most organisms and is critical for carbohydrate metabolism where it converts pyruvate, the product of glycolysis, to acetyl-CoA via a complicated process of substrate channeling within the confines of the complex. Structural analyses of the complex and its three major enzymatic components E1 (24 copies), E2 (24 copies), & E3 (12 copies) are underway, and Dr. Furey has already determined high resolution crystal structures for some of the components and reaction intermediates from the E. coli version.

The E1 components are rate determining and require thiamin diphosphate as a cofactor, but must interact with a flexible segment [lipoyl domain (LD) and associated lipoamide side chain] on an E2 to transfer the first reaction product, an acetyl group, to the E2 active site. The acetyl group is then transferred to co-enzyme A within the E2 active site, and the product acetyl-CoA is released. The E2 bound lipoamide group (now reduced) then moves to an E3 (FAD dependent) active site, where it is oxidized to restore the initial conditions. Binding of the flexible segment to E1 and E3 subunits is mediated by additional binding to a peripheral subunit-binding domain (PSBD), shown bound to E1.

Mechanistic details regarding the catalytic reactions in each active site are sought, as well as identifying structural aspects critical for assembly of the individual components to form the complete multienzyme complex. Specific mutations in some of the components are associated with hereditary diseases in humans, and detailed analyses of the structure-function relationships may suggest development of plausible therapeutic agents to counter the effects of the mutations. Additionally, given the critical nature of this system in overall energy production for cellular function, development of inhibitors binding at any of the catalytic sites, or at sites disrupting protein-protein assembly, may considerably weaken or kill the organism. Lack of appreciable sequence homology between PDHc’s from humans and pathogenic bacteria therefore suggests that effective, pathogen specific antibacterial agents may be developed.

Early expression or over expression of Cdc25 proteins can cause the cell to prematurely progress leading to oncogenic effects, making these enzymes exciting targets for anti-cancer drug development. As part of a collaborative effort with Dr. John Lazo’s group, several potent inhibitors of Cdc25 proteins have been discovered, and structural analysis of their complexes with the enzymes are underway to reveal both where and how these inhibitors function. Dr. Furey has crystallized the catalytic domain of Cdc25b and determined its high-resolution structure. His group is currently co-crystallizing the catalytic domain with several inhibitors, as a step towards development of effective anti-cancer agents via structure-based drug design procedures.

In collaboration with the Hauptman-Woodward Institute for Medical Research, Dr. Furey's group is developing new computational methods for solving macromolecular crystal structures by automated techniques. This work involves creating and developing a software package BnP, which is a merging of the PHASES package developed in the Furey lab, and the SnB package developed in Buffalo. A simple, graphical user interface is developed to enable automatic creation of an interpretable electron density map starting from observed x-ray diffraction data, with only a few mouse clicks and text field entries required. This will invoke automatic scaling of data, determination of heavy atom/anomalous scatterer sites, refinement and validation of sites, calculation of protein phases, phase refinement, and phase improvement via solvent flattening/negative density truncation. A few more mouse clicks enable automated building of a complete or nearly complete model by interfacing with other externally developed software. The idea is to make it simple for novices to determine good quality crystal structures, while enhancing the productivity of more sophisticated users as well.

Ferruccio Galbiati, Ph.D.
Professor
Ph.D., University of Milan, 1996
Most cells can not divide indefinitely due to a process termed cellular senescence. Because cancer cells need to escape cellular senescence in order to proliferate and eventually form tumors, it is well accepted that cellular senescence is a powerful tumor suppressive mechanism. In addition, since several molecular changes that are observed in senescent cells occur in somatic cells during the aging process, investigating the molecular mechanisms underlying cellular senescence will also allow us to better understand the more complicated aging process. Thus, molecules that regulate cellular senescence represent potential therapeutic targets for the prevention/treatment of cancer as well as the fight against aging.

Our work is directed at unraveling the role of caveolin-1 as a novel mediator of cellular senescence. Caveolin-1 is the structural protein component of caveolae, invaginations of the plasma membrane involved in signal transduction. Caveolin-1 acts as a scaffolding protein to concentrate, organize, and functionally modulate signaling molecules within caveolar membranes.

Dr. Galbiati’s laboratory was the first to demonstrate that caveolin-1 plays a pivotal role in oxidative stress-induced premature senescence. We found that oxidative stress upregulates caveolin-1 protein expression through the p38 MAPK/Sp1-mediated activation of the caveolin-1 gene promoter. We also demonstrated that upregulation of caveolin-1 protein expression promotes premature senescence through activation of the p53/p21Waf1/Cip1 pathway by acting as a regulator of Mdm2, PP2A-C, TrxR1 and Nrf2. Moreover, we found that caveolin-1-mediated premature senescence regulates cell transformation and contributes to cigarette smoke-induced pulmonary emphysema, directly linking caveolin-1’s function to age-related diseases.

Taken together, these data indicate that caveolin-1 plays a central role in the signaling events that lead to cellular senescence. We are currently investigating, at the molecular level, the signaling pathways that link caveolin-1 function to oxidative stress-induced premature senescence. These investigations will contribute to elucidate the molecular mechanisms underlying aging and cancerous cell transformation.

Eun-Ryeong Hahm, Ph.D.
Research Instructor
Ph.D., Seoul National University, Seoul, Korea, 2003

Ryan Hartmaier, Ph.D.
Research Instructor
Ph.D., Baylor College of Medicine, 2010

Dr. Hartmaier’s research focuses on the discovery and understanding of genetic changes acquired during breast cancer metastasis. Under the mentoring of Dr. Adrian Lee, Dr. Hartmaier has applied many Next-Generation Sequencing (NGS) technologies to paired primary and metastatic tumors (from the same patient). This includes: whole genome paired-end sequencing, exome sequencing, RNA sequencing, and large-insert whole genome mate-pair sequencing. Analysis of this data allows the identification of somatic mutations that occur during breast cancer tumorigenesis, metastasis, and drug resistance.

Through many studies, including The Cancer Genome Atlas (TCGA), we know that primary tumors, in general, have acquired an extreme number of mutations during tumorigenesis. The overwhelming majority of these mutations are not ‘driver mutations’ that the tumor relies on for its carcinogenic phenotype. During metastasis, we and others have shown, the primary tumor enters an ‘evolutionary bottleneck’ and the majority of this genetic diversity is lost. Thus, by studying paired primary and metastatic tumors we can effectively find the genetic events driving metastasis and drug resistance.

Paired-end sequencing (PES) is the most common NGS strategy and is extremely powerful at detecting single nucleotide variants (SNVs) or small insertions and deletions (INDELs). PES can be used to detect structural variations (SVs) as well but this is mostly limited to ‘unbalanced events’ such as amplifications or deletions.
For ‘balanced events’ such as inversions and translocations, detection by PES can be difficult or impossible, particularly when the SV is flanked by a repetitive element. Mate-pair sequencing (MPS), however, is specifically designed to identify SVs even when present in repetitive regions. Below is a theoretical example comparing the ability of PES and MPS to detect an inversion flanked by low-copy repeat (LCR) regions.

Combining these different sequencing strategies on paired primary-metastasis tissues allows a comprehensive understanding of the genetic events that occur during metastasis and drug resistance.

**Jing Hu, Ph.D.**  
Assistant Professor  
*Ph.D., Karolinska Institute, Sweden, 1997*

The main focus of Dr. Hu’s research is to understand how posttranslational modifications—particularly by ubiquitin-related modifiers such as SUMO—of cancer-related factors, regulate cellular process in cancer biology and treatment. Through our research we hope to provide a novel angle of understand why chemotherapy often fails. Our goal is to identify novel molecular targets or events that have potential to guide the clinical development of new means to inhibit tumor progression and chemoresistance.

One of her research aims is to investigate how HDAC2 (Histone deacetylase 2) promotes tumorigenesis through enhancing substrate sumoylation. HDAC2 is a key regulator of oncogenic processes and is elevated in several human cancers, but how HDAC2 functions to promote carcinogenesis remains elusive. A commonly known feature of HDAC is to remove the acetyl group from an acetylated lysine and, consequently, our view of HDAC has for many years been solely from the deacetylase perspective. Intriguingly, we have found that HDAC2 possesses a deacetylase-independent sumoylation-promoting activity. To date her lab has identified two sumoylation substrates of HDAC2, including eukaryotic initiation factor 4E (eIF4E).

**Yi Huang, Ph.D.**  
Research Assistant Professor  
*Ph.D., Medical University of South Carolina, Charleston, SC, 2001*
Dr. Huang’s research interests focus on the investigation of epigenetic regulation of gene expression in breast cancer. There is a growing body of evidence to suggest that changes in the activity of chromatin-modifying enzymes contribute to the uncontrolled cell proliferation and tumorigensis. Importantly, epigenetic changes, unlike mutations or loss of chromosomes, are reversible that provides a rational mechanism for applying small molecule drugs as personalized therapeutics to target these changes in cancer. Our main research objective is to define in depth the mechanisms and biological consequences of functional interplay between chromatin-modifying enzymes in breast cancer development. We are also interested in identifying novel, small molecule reagents that act as selective inhibitors of important chromatin-modifying enzymes to target more specifically the small regions of chromatin and the subset of genes that are associated with most prominent alterations in the breast cancer genome. Our recent work demonstrated that activities of histone lysine-specific demethylase 1 (LSD1) and histone deacetylases (HDACs) are functionally linked in breast cancer, especially in triple negative breast cancer (TNBC). LSD1 inhibitor in combination with HDAC inhibitor displays superior synergy in blocking growth and metastasis of TNBC cells. We are investigating the precise mechanisms underlying orchestrated LSD1 and HDAC crosstalk in breast cancer and determining how the dysregulated interaction of histone-modifying enzymes leads to aberrant gene silencing and aggressive phenotype of TNBC. We are also studying if targeting LSD1/HDAC crosstalk by novel inhibitors are more efficacious in hindering TNBC growth than current strategies and thus represent a novel targeted therapy for this devastating disease.

Another focus of the lab is to determine the role of polyamine biosynthesis pathway in mediating the activity of estrogen receptor signaling in breast cancer. Since the growth of ER positive breast cancer largely relies on the action of estrogen, antagonizing ER or its ligands is one of the most important strategies for breast cancer treatment and prevention. Our recent study demonstrated that inhibition of a key polyamine biosynthesis enzyme, ornithine decarboxylase (ODC), diminishes ERα expression that leads to the loss of expression or function of several important ERα target or partner genes including PR, NF-kB and cyclin D1. Loss of ODC disrupts the binding of Sp1 and its newly identified co-factors (Pokemon, PARP-1, myc, etc) to ERα minimal promoter element. Clinically, patients that initially respond to anti-estrogen endocrine therapy will gradually develop resistance. This constitutes a major clinical challenge in breast cancer therapy and prevention. Therefore, development of more effective estrogen receptor modulators is necessary for improving the therapeutic efficacy of breast cancer. We are investigating how ODC mediates the expression and activity of ERα and elucidating the potential role of ODC in endocrine resistance development in breast cancer.

Edwin Jackson, Ph.D.
Professor
Ph.D., University of Texas at Dallas, 1979

Purine Pharmacology: Adenosine is an endogenous purine that regulates most physiological systems. We are investigating (using a variety of molecular, analytical, cellular and physiological tools and using several strains of genetically modified animals, as well as conducting studies in patients): 1) the production of adenosine from 3’,5’-cAMP and 2’,3’-cAMP (the cAMP-adenosine pathways); 2) the modulation of adenosine levels by guanosine;3) the roles of adenosine in regulating the sympathetic nervous system, heart, vascular system, kidneys, bladder, brain and immune system;4) the effects of adenosine on cardiac fibroblasts, vascular smooth muscle cells, vascular endothelial cells, glomerular mesangial cells, renal epithelial cells, T cells and B cells; 5) the role of exosomes in adenosine biochemistry; 6) how to modulate the adenosine system with drugs to treat cardiovascular and renal diseases, traumatic brain injury, cancer and HIV infected patients.

Cardiovascular and Renal Pharmacology: Our recent studies indicate that NPY1-36 (a peptide released from sympathetic nerves) and PYY1-36 (a peptide released from the intestines) trigger proliferation of and extracellular matrix production by pregglomerular vascular smooth muscle cells (PGVSMCs) and glomerular mesangial cells (GMCs) in kidneys from genetically-hypertensive animals, a phenomenon mediated via Y1 receptors and that involves signaling by RACK1 (receptor for activated C kinase 1). Dipeptidyl peptidase IV (DPPIV) metabolizes NPY1-36 and PYY1-36 (Y1 receptor agonists) to NPY3-36 and PYY3-36 (inactive at Y1 receptors). We are investigating whether a new class of antidiabetic drugs (DPPIV inhibitors) may adversely
affect the kidneys of hypertensive subjects by preventing the conversion of PYY1-36 and NPY1-36 to less active metabolites and thereby promoting inappropriate cell proliferation and extracellular matrix production.

Tija Jacob, Ph.D.
Assistant Professor
Ph.D., University of California, Berkeley, 2002

How does the neurotransmitter GABA produce myriad forms of inhibition in the central nervous system (CNS), restraining and shaping electrical activity to prevent anxiety, agitation, seizures, chronic pain and sleep disturbance? The majority of fast synaptic inhibition in the CNS is mediated by GABA type A neurotransmitter receptors (GABA$_A$Rs) which are Cl$^-$ selective ligand-gated ion channels composed of 5 subunits (from up to 17 different subunits), with differential expression across brain regions, cell types and subcellular localization.

The Jacob lab’s broad goal is to understand the impact of dynamically regulated GABA$_A$R surface levels and distribution in normal development and pathological conditions. The lab uses a combination of molecular, biochemical, cell biological and live-imaging approaches. GABA$_A$R are the sites of action of many clinically important drugs, including the benzodiazepines (BZ), which are front line treatments for anxiety, insomnia, schizophrenia and epilepsy. The Jacob lab is investigating modulation of GABA$_A$R trafficking and synaptic inhibition by BZ and other GABAergic agents.

Another area of research in the lab focuses on the role of GABAergic signaling in CNS development and plasticity. The majority of excitatory synapses in the brain are located at the end of dendritic spines, small protrusions from neuronal processes, with neighboring GABAergic synapses predominantly located on dendritic shafts. We have shown that higher GABA$_A$R surface levels leads to more inhibitory synapses, enhanced inhibitory synaptic transmission and a deficit in mature dendritic spines. Alterations in the excitatory/inhibitory ratio of neuronal signaling, abnormal spine morphology and mutations in GABA$_A$R subunits are associated with many neurological disorders including autism and other neurodevelopmental disorders. The Jacob lab is investigating the contribution of GABAergic inhibition to dendritic spine morphology, movement and plasticity. These studies aim to improve understanding of how GABAergic dysfunction contributes to human neurodevelopmental disorders including autism.

Yu Jiang, Ph.D.
Associate Professor
Ph.D., Yale University, 1995

Dr. Jiang’s laboratory is interested in intracellular signaling pathways governing cell growth and metabolism. The laboratory’s current research projects concern the signaling mechanism of the mammalian target of rapamycin (mTOR). mTOR is a protein ser/thr kinase that plays a key role in translation, autophagy and mitochondrial biogenesis. Its activity is regulated by signals of various origins, including nutrient, growth factor, energy and stress. The laboratory has previously identified FKBP38 that acts as an inhibitor of mTOR. Three projects centering on the role of FKBP38 in mTOR regulation are on-going. The first project concerns the activity of mTOR in mitochondrial function. We have recently found that FKBP38 is involved in recruitment of mTOR to mitochondria. The project investigates the role of the mitochondrial localized mTOR in mitochondrial function and cell senescence. The second project aims at the mechanism of FKBP38 in apoptosis regulation. FKBP38 has been shown to interact with the anti-apoptotic proteins, Bcl-2 and Bcl-xL. The project is to determine whether nutrient, growth factor and oxygen levels control the anti-apoptotic activity of Bcl-2 and Bcl-xL through FKBP38. The third project focuses on the role of primary cilium in mTOR regulation. Primary cilium is a vital cellular organelle that functions as a signaling hub in many eukaryotic cells. mTOR has been recently found to be a key effector of primary cilium-mediated signaling. This project explores the mechanisms through which primary cilium controls mTOR activity.
Thomas Kensler, Ph.D.
Professor
Ph.D., Massachusetts Institute of Technology 1976

Research interests in Dr. Kensler’s laboratory focus on the biochemical and molecular mechanisms involved in the induction of cancer by chemicals to serve as a basis for the prevention, interruption or reversal of these processes in man. One of the major mechanisms of chemical protection against carcinogenesis, mutagenesis and other forms of toxicity mediated by carcinogens is the induction of enzymes involved in their metabolism, particularly enzymes such as glutathione S-transferases, UDP-glucuronosyl transferases and NAD(P)H:quinone reductase that facilitate the detoxication and elimination of carcinogens. Furthermore, animal studies indicate that induction of these cytoprotective enzymes is a sufficient condition for obtaining chemoprevention and can be achieved in many target tissues by administering any of a diverse array of naturally-occurring and synthetic chemical agents. Our work utilizes animal and cell culture models to elucidate mechanisms of inhibition of aflatoxin hepatocarcinogenesis by dithiolethiones such as oltipraz, isothiocyanates such as sulforaphane and triterpenoids such as CDDO-Im. While induction of glutathione S-transferases clearly play an important role in chemoprevention of aflatoxin hepatocarcinogenesis, ongoing studies are seeking to identify additional genes induced by these agents. The Keap1-Nrf2 signaling pathway is activated by these classes of chemopreventive agents and leads to increased expression of genes that attenuate oxidative stress and inflammation among other actions. Their contributions to protection against carcinogenesis are under investigation.

A practical goal of his research has been to develop the tools to test the hypothesis that enzyme induction is a useful strategy for chemoprevention in humans. Hepatocellular carcinoma is the leading cause of cancer death in parts of Asia and Africa and may relate to hepatitis B virus infection and aflatoxin ingestion. Longitudinal surveys and prospective case-control studies in Qidong, P.R. China demonstrate consistent exposure of individuals in this region to aflatoxins and indicate a prime role for aflatoxin in the etiology of liver cancer, respectively. As a consequence, we have conducted clinical chemoprevention trials of oltipraz and other agents in Qidong. The initial randomized, placebo-controlled intervention of oltipraz demonstrated an increased excretion of aflatoxin-mercapturic acid, a derivative of the aflatoxin-glutathione conjugate, in the urine of participants receiving oltipraz. This study highlights the general feasibility of inducing Nrf2-regulated enzymes in humans. Follow-up trials are evaluating more effective agents and are assessing whether protective alterations in aflatoxin metabolism can be sustained for extended periods of time and whether diminished incidence of liver cancer can be achieved in this high-risk population.

Nicholas Khoo, Ph.D.
Research Assistant Professor
Ph.D., University of Iowa, 2003

Dr. Khoo investigates the basic molecular mechanisms underlying the development of metabolic syndrome and the role of electrophilic lipids, particularly nitro-fatty acids (NO2-FA) in preventing this pathogenesis. His specific research projects include:

1) Determination of the molecular mechanism(s) responsible for the anti-inflammatory cell signaling actions of electrophilic NO2-FAAs resulting in insulin sensitivity.

Obesity induces chronic inflammatory responses that are characterized by abnormal cytokine production, increased reactive oxygen species (ROS) generation and activation of inflammatory signaling pathways. Preliminary studies demonstrate these inflammatory conditions induce the oxidation and nitration of fatty acids to electrophilic products, specifically NO2-FA derivatives, that serve as potent anti-inflammatory cell signaling mediators. These electrophilic NO2-FA species potently bind peroxisome proliferator-activated receptors (PPARs), inhibit NF-kB activity and induce heme oxygenase (HO)-1. The treatment of NO2-FA results in
improved glucose homeostasis in mouse models of obesity and diabetes. The electrophilic nature of these NO2-FA signaling molecules and their anti-inflammatory properties are being examined using cultured mammalian cells as well as mouse models of obesity and diabetes. Additionally, a mass spectrometer approach is being used to characterize the formation of NO2-FA derivatives in insulin responsive tissues from murine models of obesity and diabetes (ob/ob, db/db or high fat diet). This is being complemented by similar approaches in cell culture.

**Identify molecular signaling pathways modulated by NO2-FA treatment in mice subjected to a high-fat diet.** Currently, three putative pathways for the anti-inflammatory actions of electrophilic NO2-FAs are being examined. The signaling pathways of all three PPAR isotypes, NF-kB and HO-1 are being explored in insulin-responsive tissues (adipose, liver and muscle). Additionally, mouse embryonic fibroblasts isolated from Nrf2 knockout mice will explore the potential mechanism(s) of electrophilic NO2-FA-induced HO-1 expression.

**Define mechanistic roles of all three PPAR isotypes, NF-kB and HO-1 in cultured cells.** The knockdown of these putative signaling pathways using si-RNA will be tested in cultured adipocytes, hepatocytes and skeletal muscle cells. Similarly, mouse embryonic fibroblasts isolated from Nrf2 knockout mice will explore the potential mechanism(s) of electrophilic NO2-FA-induced HO-1 expression.

2) Determination of the impact of NO2-FA derivatives on ROS and oxidative stress in insulin-responsive cultured cells and tissues of mouse models of obesity and diabetes. While oxidative stress and ROS are emerging as key culprits in the pathogenesis of obesity-induced insulin resistance, the sources of ROS remain unclear. Emerging studies suggest a link between mitochondrial dysfunction, insulin resistance and diabetic complications, suggesting that mitochondrially derived ROS could play a role in pathogenesis. How does this increase in ROS result in oxidative stress? Is there a decrease in antioxidant enzyme expression and activity in insulin-responsive tissues? These questions are currently being addressed by utilizing cutting edge techniques to detect ROS levels and antioxidant enzyme activity/expression in the cell culture and mouse models of obesity and diabetes described above.

3) The PPAR conundrum- Identification of novel PPAR agonists. The activation of PPARs has been shown to regulate glucose and lipid metabolism. These receptors are molecular targets for a number of marketed drugs. The hypolipidemic fibrates activate the isotype PPARα whereas PPARγ is the molecular target of thiazolidinedione (TZD) class of antidiabetic drugs. The activation of PPARγ-dependent downstream signaling has shown to improve insulin sensitivity. Rosiglitazone works as an insulin sensitizer by activating PPARγ and its downstream signaling pathways. Unfortunately, concerns about the severe adverse side effects have drastically limited the use of rosiglitazone despite excellent glycemic control in patients with diabetes. Thus, the development of new therapeutic strategies, such as dual PPARα/γ activators or selective PPARγ partial agonists, that retain their antidiabetic efficacy without adverse side effects are appealing, such as NO2-FAs.

In summary, these research interests will generate insights into mechanisms leading to obesity and its associated myriad of health problems and/or diseases such as diabetes, atherosclerosis and other cardiovascular complications, which will hopefully elucidate novel preventative and therapeutic strategies. The potential for electrophilic NO2-FA mediated therapy to prevent obesity-induced type 2 diabetes complications, without the known secondary effects exerted by TZDs, is currently being studied.

**Joan M. Lakoski, Ph.D.**

*Professor*

*Ph.D., University of Iowa, 1981*

Elucidating the cellular and molecular neuropharmacology of the aging brain is the focus of the Lakoski laboratory. Using multidisciplinary approaches to investigate biogenic amine receptor expression and function, both normal and pathological aging processes are being investigated in young, middle-aged and senescent small animal models. We are investigating the roles of the steroid hormones estrogen and
corticosterone on serotonin receptors, their receptor-effector coupling to G-proteins and related signaling transduction cascades, including the 5-HT1A and 5-HT2A receptor subtypes, and the serotonin neurotransporter (SERT) in discrete brain regions including cortical, hippocampal and midbrain regions; radioligand binding techniques, receptor autoradiography and functional neurochemical assays are among the technical approaches used to study the impact of the circulating hormone environment on the aging serotonergic neuronal system.

Related ongoing studies are utilizing in vivo microPET image analysis techniques to elucidate SERT expression and function with respect to aging and hormone treatment. In addition, the impact of selective neurotoxic insults to the dopamine-containing neuronal system is being investigated using behavioral, neurochemical and molecular approaches to better understand how this neurotransmitter system responds and recovers from neuronal injury across the lifespan.

Our goal is to contribute new information to understand the biology of central nervous system aging, including normal and neurodegenerative processes, in neurotransmitter systems established as key components in cognitive declines, mood disorders, and stress-related disorders common in the elderly. Ultimately, our aim is to improve the quality of life with advancing age by pharmacological interventions to delay the onset of neuronal decline and/or enhance endogenous repair mechanisms of the biogenic amine neurotransmitter systems.

Jack Lancaster, Ph.D.
Professor
Ph.D., University of Tennessee Center for the Health Sciences, 1974

Dr. Lancaster’s present research interests are in the chemical and physical foundations of the biological actions of reactive oxygen and nitrogen species. His most recent project is delineating the cellular functions of dinitrosyliron complexes (DNIC), which show a characteristic signal using electron paramagnetic resonance (EPR) spectroscopy and have been observed in tissues since the 1960’s in a huge variety of pathophysiological conditions. These species contain one iron with two molecules of bound nitric oxide (NO) but the complete molecular structures of these species are essentially unknown, as are possible biological functions. We recently reported data suggesting the cellular origin of the iron and also evidence for two cellular functions, formation of protein nitrosothiols and also protection against cellular injury as a result of hypoxia-induced iron mobilization and consequent oxidative stress (Li et al. J. Biol. Chem. 2014, in press).

Adrian Lee, Ph.D.
Professor
Ph.D., University of Surrey, Guildford, Surrey, England, 1993

Dr. Lee is investigating the endocrine regulation of mammary gland development and progression to mammary cancer. Specifically we are interested in interaction between steroid hormones (estrogen and progesterone) with the growth hormone (GH)/insulin-like growth factor-I (IGF-I) axis. These endocrine hormones are all critical for normal mammary development, but have also all been implicated in risk for breast cancer and in breast cancer progression.

They have shown that IGF-IR and IRSs are hormonally regulated in breast cancer, and we have now found that they are also developmentally and hormonally regulated during normal mammary gland development. We have found in breast cancer cell lines that estrogen can sensitize cells to insulin-like growth factor (IGF) stimulation by increasing expression of many of the IGF signaling components such as the IGF-IR and its downstream signaling intermediates IRS-1 and IRS-2.
They have also found that overexpression of IGF-IR, IRS-1, or IRS-2 causes transformation of mammary epithelial cells in culture, combined with epithelial to mesenchymal transition. We have also created transgenic mice that overexpress IGF-IR, IRS-1 or IRS-2 in the mammary gland and all mice develop mammary tumors. Mammary tumors in these mice show multiple cell lineages and expansion of putative mammary stem/progenitor cells. We are currently investigating how these pathways impact upon stem/progenitor cell renewal and cell fate determination.

**Edwin Levitan, Ph.D.**  
Professor  
*Ph.D., Brandeis University, 1986*

The Levitan lab studies biochemical and electrical signaling that controls neuronal and cardiac function with live cell imaging, electrophysiology and molecular biology. Current projects include in vivo imaging of green fluorescent protein (GFP) constructs in transgenic Drosophila nerve cells and serotonin in mammalian brain slices to determine how patterned electrical activity and synapses control transmitter release. We are also studying remodeling of rhythmic electrical activity in the heart and midbrain dopamine neurons by therapeutically important hormones and drugs. Most recently, multiphoton microscopy is being used to image vesicular accumulation and release of a psychiatric drug in the brain.

**Tatyana Mamonova, Ph.D.**  
Research Instructor  
*Ph.D., Kazakh National Academy of Sciences, Kazakh Scientific Research Institute of Catalysis and Electrochemistry, Almaty, Kazakhstan, 1995*

Dr. Mamonova research focuses on molecular modeling of the interactions of the adapter protein EBP50/NHERF1 with its target ligands, including parathyroid hormone receptor and type II sodium-dependent phosphate co-transporters. The goal of these studies will contribute to our understanding and prediction of conformational reorganization and the structure-function relationships in NHERF1 proteins associated with the ligand binding. The results will provide insights into developing drugs for selective therapeutic applications.

**Carola Neumann, M.D.**  
Visiting Associate Professor  
*M.D., Ludwig-Maximilian’s University Medical School, Munich, Germany, 1997*

**Roderick O’Sullivan, Ph.D.**  
Assistant Professor  
*Ph.D., Institute for Molecular Pathology, Vienna, Austria, 2006*

The O’Sullivan lab at the Hillman Cancer Center conducts research into proteins that alter the structural and epigenetic functions of human telomeres. Telomeres are structures at the ends of chromosomes – the integrity of telomeres is an important factor in maintaining genome stability to prevent cancer and accelerated aging. Current efforts in the lab relate to deciphering the relationship between the regulation between chromatin structure and telomere function in the Alternative Lengthening of Telomeres pathway.

**Steffi Oesterreich, Ph.D.**  
Professor  
*Ph.D., Humboldt University, Max-Delbrück Center for Molecular Medicine, Berlin, Germany, 1992*

The Oesterreich lab includes technicians, graduate students and postdoctoral fellows who are trained in a multi-disciplinary research environment to work in basic, translational, and clinical aspects of breast cancer research. Specifically, our research projects focus on the role of co-regulator proteins in estrogen response in breast
cancer. Estrogen mediates its potent mitogenic effects through the estrogen receptor (ER), which has been a successful target for endocrine therapy in breast cancer. Despite the success of such treatment, de novo or acquired resistance remains a major problem. A better understanding of how ER works is critical for the development of more efficient therapies, and better prediction for who should receive which form of endocrine therapy.

Over the last years, many dogmas in hormone response have changed, which has opened many exciting novel research areas. Examples are estrogen-mediated repression of gene transcription, and the role of co-repressors in this process, the close connection between estrogen signaling and epigenetic regulation of gene transcription, and the role of regulatory elements which are located far outside the promoter of the estrogen regulated genes, and which might even be on other chromosomes. We are studying these processes using state-of-the-art molecular and cellular techniques, mouse models, and clinical specimens. The ultimate goal of Dr. Oesterreich's research is to use this knowledge for improved diagnosis and endocrine treatment of breast cancer patients.

Patrick J. Pagano, Ph.D.
Professor & Vice Chair, Graduate Education
Ph.D., New York Medical College, 1991

Dr. Pagano’s research focuses on the modulatory role of the adventitia in vascular function and structure under both physiological and pathophysiological conditions. Dr. Pagano’s laboratory was among the first to identify a non-phagocytic NADPH oxidase in the vascular wall, demonstrating a critical role for essential subunit p67phox in its activity. He subsequently cloned vascular p67phox and illustrated its potent activation at the mRNA and protein level in response to the potent pro-hypertensive hormone angiotensin II. Stemming from these early discoveries, Dr. Pagano was the first to develop specific cell- and tissue-permeant peptidic and adenosinergic inhibitor of NADPH oxidase, which is widely considered the most specific NADPH oxidase inhibitor available. These and his other more recently developed inhibitors of novel isoforms of NADPH oxidase are expected to provide a platform for the development of new therapies aimed at treating hypertension and other cardiovascular diseases. Moreover, Dr. Pagano is broadly recognized for his pioneering work examining the role of adventitia-derived reactive oxygen species (ROS) and, in particular, superoxide anion and hydrogen peroxide in the modulation of vascular tone, inflammation, and remodeling.

Michael Palladino, Ph.D.
Associate Professor
Ph.D., University of Connecticut, 2000

The Palladino lab uses Drosophila (the fruit fly) as a genetic model system, as well as mice and human cell culture to study progressive neurological and neuromuscular disorders. We are currently focusing on elucidating the mechanism by which mutations affecting Na/K ATPase, triose phosphate isomerase (TPI), and ATP6 function result in RDP (rapid-onset dystonia parkinsonism), glycolytic encephalopathy, and mitochondrial encephalomyopathy, respectively. Our research program is directed toward four main goals 1) discovering and characterizing novel pathways that cause progressive disease, 2) understanding the physiological, cellular and molecular dysfunction that causes dysfunction in vivo, 3) understanding the molecular basis of progressive diseases, and 4) using our animal model system to identify novel therapeutic approaches.

Guillermo Romero, Ph.D.
Associate Professor
Ph.D., University of Virginia, 1980

G-protein coupled receptors (GPCR) are the largest family of cell surface receptors found in mammalian organisms. These receptors are a major target for drug development. Dr. Romero is interested in the
dynamics and traffic of GPCR, with special emphasis on the parathyroid hormone receptor type 1 (PTH1R). His approach is based on the use and development of novel optical techniques to study membrane proteins and their interactions with other cellular components in live cells.

Dr. Romero’s research focuses on two main areas: a) the role of the PDZ proteins sodium-hydrogen exchange regulatory factor (NHERF1) and Disheveled-2 in the regulation of the dynamics and traffic of GPCR; and b) the role of phospholipase D in the regulation of receptor traffic and function.

Dr. Romero’s approach is based primarily on the analysis of the physical properties of molecules of interest in live cells, using advanced optical techniques such as confocal microscopy, fluorescence recovery after photobleaching (FRAP), total internal reflection microscopy (TIRFM), image correlation spectroscopy (ICS), quantum dots, and others. Using these techniques, Dr. Romero has developed novel methods to examine protein-protein interactions in the temporal domain. For example, he has recently demonstrated that the PTH1R is tethered to the cytoskeleton and accumulates in the vicinity of subjacent actin stress fibers, forming bundles that are highly dynamic structures, moving along these bundles much more rapidly than between them.

Because of his interest in traffic, Dr. Romero is actively pursuing new approaches to the study of endocytic processes. To this effect, he recently developed novel methodologies for the purification and preparation of endosomes based on the use of magnetic nanoparticles attached to peptide ligands. In this technique, peptide ligands, such as insulin or epidermal growth factor, are adsorbed to colloidal iron nanoparticles (5-10 nm in diameter) and applied to the external surfaces of cells. These particles are sufficiently small to be internalized via the standard endocytic pathway and, because of the ferromagnetic properties of the colloidal iron, allow for a simple and rapid isolation of the endocytic vesicles containing the particle. He is using this novel technology to study the role of specific proteins in the endocytic pathway in a time-resolved manner.

**James Roppolo, Ph.D.**
Research Assistant Professor  
Ph.D., University of Michigan, 1970

Dr. Roppolo’s research is concerned with the autonomic nervous system’s control of bladder activity in normal animals and those with central nervous system injuries. A variety of techniques are used to examine, at the level of the lumbosacral spinal cord and brainstem, the various neuronal processes that occur in maintaining normal excretory function.

These methods include: (1) anatomical techniques (HRP tracing and immunohisto-chemical techniques) to determine the location of neurons and possible neuropeptides involved in these processes, (2) neurophysiological techniques (evoked potentials, intracellular and extracellular single neuron recordings) to determine the types of neuronal interactions that occur in this system, (3) neuropharmacological techniques (systemic and iontophoretic application of drugs), (4) behavioral techniques and microstimulation of the of the lumbosacral spinal cord.

**Francisco Schopfer, Ph.D.**  
Research Associate Professor  
Ph.D., University of Buenos Aires, Argentina, 2001

Dr. Schopfer’s research is focused on the understanding of the biological effects of electrophilic fatty acids. In particular, he studies the mechanism by which nitrated fatty acid activate and signal through peroxisome proliferator-activated receptor gamma (PPARγ). This receptor is the target of currently used antidiabetic drugs (thiazolidinediones). The activation of the receptor regulates fat and glucose metabolism, resulting in an overall decrease of glucose levels to normal values in patients with type II diabetes. The targeting of this receptor by
nitrated fatty acids results in a decrease of the glucose levels to normal values like thiazolidinediones, but without the known secondary effects exerted by thiazolidinediones. In addition to the intrinsic therapeutic value of nitrated fatty acid, they will aid in the understanding of the biological mechanism involved in PPARγ activation, leading to improved designs of anti-diabetic drugs targeting the PPARγ receptor.

The role of the PPARγ receptor in diabetes has been well established. Nonetheless, the role of endogenous signaling molecules on the activation of PPARγ is still unclear and under debate. Nitrated fatty acids are endogenously formed and bind to PPARγ with high affinity rivaling Rosiglitazone (thiazolidinediones), resulting in receptor activation. In addition, nitrated fatty acids covalently modify a critical cysteine (cys285) in the ligand binding pocket of PPARγ, promoting a particular conformational change that results in partial receptor activation. This partial activation results in the expression of a particular subset of genes under PPARγ regulation and a biological outcome that differs from the one obtained when activating the receptor with Rosiglitazone. Dr. Schopfer’s work focuses on understanding the mechanism of this selective activation and how it avoids the side effect presented upon full activation by agonist like Rosiglitazone.

Electrophilic fatty acids are constantly formed as fatty acid breakdown products during oxidative stress and as signaling messengers by enzymatic or non enzymatic pathways. Dr. Schopfer studies the formation of biologically relevant electrophiles, in particular nitrated fatty acids, and their signaling mechanisms. The study involves the detection and characterization of novel electrophiles formed during inflammation. Once the molecules are characterized, a chemical synthesis approach is used to generate enough quantities for biological experiments.

Electrophiles induce an important cellular response that includes the induction of phase II genes. This will in turn set up a more protective environment against damaging electrophilic molecules. A key player in the initiation of this biological response is the Keap 1/Nrf 2 couple. Keap 1 is usually bound to Nrf 2 in the cytoplasm. Upon formation of electrophiles, Keap 1, which contains several highly reactive cysteine, is targeted, dissociates from Nrf2 and is routed to degradation by the proteosome. These lead to Nrf2 nuclear translocation and activation of phase II genes. In particular, we study the mechanism by which different biologically relevant electrophiles target KEAP 1 and activate Nrf 2 responses. In addition, a more general proteomic approach is use to evaluate and characterize different electrophilic cellular protein targets. Once critical targets are identified using a mass spectrometry approach, a functional study of the modification is performed to determine the relevance and its cellular effects.

Sruti Shiva, Ph.D.
Associate Professor
Ph.D., University of Alabama at Birmingham, 2004

Dr. Shiva’s lab focuses on the mechanisms by which reactive nitrogen species (particularly nitrite and nitric oxide) regulate mitochondrial function during hypoxia and ischemia, the factors that influence this regulation and the implications of this regulation on pathology such as ischemia/ reperfusion injury.

Active projects in her lab include: The role of heme proteins in regulating nitrite-dependent modulation of mitochondrial respiration. The anion nitrite (NO2-) is an endocrine storage form of nitric oxide (NO) in blood and tissues that can be reduced to bioavailable NO by heme proteins in conditions of low oxygen. In blood, the reduction of nitrite by hemoglobin mediates hypoxic vasodilation. We are interested in understanding how tissue nitrite reductases regulate mitochondrial function. Specifically, myoglobin, when deoxygenated, can efficiently reduce nitrite to NO and this NO subsequently inhibits mitochondrial respiration by binding to complex IV of the mitochondrial respiratory chain. We are interested in other ways that this interaction between nitrite and myoglobin regulates mitochondrial function as well as characterizing the physiological interplay between mitochondria and myoglobin with nitrite/NO acting as a signaling molecule linking the two.
The regulation of mitochondrial function by nitrite during ischemia/reperfusion. Low concentrations of nitrite have been shown to mediate cytoprotection in a number of models of ischemia/reperfusion of the brain, liver, heart and kidney. However, the mechanism of this cytoprotection is not known. The mitochondria play a central role in the progression of ischemia/reperfusion injury. Hence, we are interested in how nitrite regulates mitochondrial function during ischemia/reperfusion.

Her lab has recently demonstrated that nitrite administered to animals before or during ischemia/reperfusion modulates mitochondrial function by S-nitrosating thiols on mitochondrial complex I, which leads to decreased reactive oxygen species generation, less oxidative damage of mitochondrial proteins, and prevention of cytochrome c release. We think that these modifications of function prevent mitochondrial dysfunction after reperfusion and lead to cytoprotection.

She is currently using isolated mitochondria, the Langendorff isolated and perfused heart, and in vivo ischemia/reperfusion models to further characterize nitrite-dependent cytoprotection, particularly in relation to other cytoprotective programs, such as ischemic preconditioning.

Mechanisms of nitrite generation and metabolism. Another focus of the lab is determining the mechanisms by which nitrite is formed and metabolized physiologically. Conventionally, nitrite is thought to be formed by the oxidation of nitric oxide. However, in vivo, the reaction of nitric oxide with oxygenated hemoglobin (which produces nitrate) is more kinetically favorable than the reaction with oxygen to produce nitrite. We have recently identified a role for the multicopper oxidase, ceruloplasmin, as an “NO oxidase” that can compete with the nitric oxide-hemoglobin reaction to oxidize NO to nitrite. We are currently further characterizing the role of ceruloplasmin in regulating nitrite levels in physiology and pathology, and in plasma and tissue.

Shivendra Singh, Ph.D.
Professor
Ph.D., Banaras Hindu University, India, 1984

Cancer chemoprevention is a relatively new but rapidly emerging sub-discipline in oncology and signifies the use of natural or synthetic agents to reverse or delay the process of carcinogenesis. Long latency of most epithelial cancers presents a large window of opportunity for intervention to prevent or slow disease progression. The research interests of the Singh laboratory include molecular characterization of novel cancer chemopreventive agents and rational design of mechanism-driven combination chemoprevention regimens. Cellular and transgenic animal models are used to screen potential cancer chemopreventive constituents from dietary and medicinal plants. Cutting edge cellular, molecular biological, Omics (metabolomics and proteomics), structural biology, and imaging techniques (MRI and bioluminescence) are used to (a) determine the mechanism of action of promising cancer chemopreventive agents, (b) monitor effects on cancer progression, and (c) identify biomarkers predictive of tissue exposure and possibly response. Some of the agents under active investigation in the Singh laboratory include: cruciferous vegetable-derived isothiocyanates, garlic-derived organosulides, and medicinal plant constituent withaferin A. As an example, recent published work from the Singh laboratory indicates suppression of glycolysis in mammary cancer prevention by withaferin A in a transgenic mouse model (JNCI, In Press, 2013). Likewise, complementary cellular and molecular biological, targeted proteomics, and molecular modeling techniques were used to identify beta-tubulin as a novel target of cancer cell growth arrest by withaferin A (WA).

Robert Sobol, Ph.D.
Associate Professor
Ph.D., Temple University, 1991

DNA damage is implicated as playing a causal role in numerous disease processes. Hence, it is suggested that DNA repair proteins, which maintain the integrity of the nuclear and mitochondrial genomes, play a critical role
in reducing the onset of multiple disease phenotypes. Conversely, the requirement for DNA repair and genome maintenance in response to radiation and genotoxic chemotherapeutics implicates DNA repair proteins as prime targets for improving response to currently available anti-cancer regimens. Further, cancer-specific DNA repair defects offer novel approaches for tumor-selective therapy. It is now expected that all cancer cells will be found to be defective in some aspect of DNA repair encoded by one of the 150 different proteins that catalyze DNA repair. To help in our understanding and treatment of cancer, geneticists and molecular biologists must explore the detailed consequences of an alteration in each of these repair pathways. It is our expectation that a detailed genetic and mechanistic understanding of the cellular phenotypes associated with specific DNA repair deficiencies will offer the opportunity to identify novel drug targets, optimize and validate new small molecule inhibitors of DNA repair and provide a mechanistic underpinning for the development of tumor selective therapeutic strategies.

In Dr. Sobol’s lab, they have identified two compensatory pathways that respond to defects in DNA repair mediated by the base excision repair pathway, including proteins involved in the synthesis and degradation of poly-ADP-ribose (PAR) and those involved in the biosynthesis of NAD⁺. In particular, we study the convergent roles of DNA Repair, PAR metabolism and NAD⁺ biosynthesis in response to chemotherapy.

Novel approaches to enhance tumor cell cytotoxicity of alkylating agents: Glioblastoma is the most commonly diagnosed brain malignancy and a major cause of cancer related death in the United States. Limited success in the treatment of glioblastoma has been demonstrated with the alkylating agent Temozolomide (TMZ). The overall goals of this project are to discover strategies to circumvent resistance to TMZ and enhance the cytotoxicity and efficacy of this alkylating agent. The base excision repair (BER) pathway provides significant resistance to TMZ by repairing damaged bases but some of the activity of TMZ is due to the accumulation of cytotoxic BER intermediates that result from incomplete or failed repair (termed BER Failure). As the rate-limiting enzyme in BER, DNA polymerase β (Polβ) is important to facilitate repair and to maintain cell survival following DNA damage. Therefore, inhibition of Polβ will enhance TMZ response. We posit that BER mediated by Polβ is a regulated process that signals BER failure through poly(ADP)ribose (PAR) synthesis and NAD⁺/ATP depletion by a process that requires activation of PARP1 & PARP2 and is regulated by the enzyme PARG. Specifically, we hypothesize that TMZ efficacy can be increased in glioma cells by increasing post-translational modification and inhibition of Polβ. BER failure-induced cell death results from energy (NAD⁺ & ATP) depletion due to elevated PAR synthesis mediated by the PARP1/PARP2 BER sensor complex, suggesting that the response to TMZ can be enhanced via increased PAR synthesis or further depletion of cellular NAD⁺ synthesis and/or deregulation of the BER enzyme PARG. Overall, we are testing the hypothesis that the BER pathway is a determinant of resistance to TMZ and therefore selective targeting of the BER pathway will significantly enhance TMZ efficacy.

Development and characterization of isogenic DNA Repair deficient human cell lines: To extend our analysis beyond base excision repair, we have embarked on a large-scale project for the development, characterization and transcriptome analysis of isogenic human cell lines deficient in all known DNA repair genes (>150) in three unique cell backgrounds (glioma, breast cancer and neuronal). These include genes involved in Base Excision Repair, Direct Reversal of Damage, Mismatch Excision Repair, Nucleotide Excision Repair, Homologous Recombination, Non-homologous End-Joining, the modulation of nucleotide pools, DNA polymerases, editing and processing nucleases, the Rad6 pathway, Chromatin Structure, DNA Repair genes defective in diseases and conserved DNA Damage Response genes and Fanconi Anemia/DNA crosslink repair. Further, each will be analyzed for alterations in PAR metabolism and NAD⁺ biosynthesis. With the expectation that DNA repair capacity impacts basic cellular functions both spontaneously and in response to genotoxic stress, alters the transcriptional and epigenetic landscape and dictates the cellular response to stress, the development of a complete panel of isogenic DNA repair deficient cell lines across multiple backgrounds will be a valuable platform for gene and drug discovery, validation of inhibitor specificity and the identification of response biomarkers and novel targets for gene/drug synthetic-lethality combinations.
Ongoing and future projects also include the identification of novel DNA Repair targets for improved chemotherapy response, testing and evaluation of novel DNA repair inhibitors, tumor tissue analysis for defects in expression of enzymes critical for chemotherapy response and evaluating the potential of NAD\(^+\) biosynthesis inhibitors in the development and testing of tumor specific, synthetically lethal, chemotherapy combinations.

Laura Stabile, Ph.D.
Research Associate Professor
Ph.D., West Virginia University, 1999

Dr. Stabile is interested in the role of growth factors and hormones in the development of human lung cancer. The hepatocyte growth factor (HGF)/c-Met pathway and the estrogen pathway both play key roles in the development and progression of lung cancer and represent attractive targeted pathways for drug development. Lung cancer kills more Americans every year than any other type of cancer, and the 5-year survival rate is only 16%. Lung cancer patients are typically diagnosed at a late stage and have very few effective therapeutic options. Thus, new targeted strategies are essential to make an impact on this disease.

c-Met is a receptor tyrosine kinase whose activation by HGF can lead to transformation (conversion of a normal cell into a malignant cell) and tumorigenicity (growth of tumors) in a variety of human tissues. Since c-Met and HGF are frequently overexpressed in lung cancer and there is a strong correlation between overexpression and decreased patient survival, the HGF/c-Met signaling pathway is a potential target for tumor control. Primary projects in this area of interest include: 1) studying the development and inhibition of lung carcinogenesis in a novel transgenic mouse model that overexpresses HGF in the airways 2) preclinical development of therapeutic drugs that target this pathway using a variety of techniques such as neutralizing antibodies to HGF, c-Met small molecule inhibitors, c-Met guanidinium-peptide nucleic acid antisense technology and 3) understanding the mechanism of signaling interactions between c-Met and the epidermal growth factor receptor (EGFR) pathway.

Dr. Stabile has successfully developed a murine model that mimics the overproduction of HGF found in human lung tumors and has shown that a single human HGF neutralizing antibody, L2G7, has profound inhibitory effects on development of lung tumors in this transgenic mouse model. Furthermore, lung tumors with K-ras mutation are resistant to blockage of the HGF pathway using L2G7. In addition, we have recently demonstrated the importance of induction of the cyclooxygenase 2 (COX-2)/prostaglandin E2 (PGE2) pathway and subsequent activation of EGFR by HGF in lung cancer cells. Figure 2 describes the signaling pathway of HGF that we are studying and areas of therapeutic intervention. Another aspect of research involves the estrogen pathway in lung cancer. Lung cancer is becoming increasingly common in women and in the U.S. accounts for more female deaths annually than breast cancer and all other gynecological cancers combined. Epidemiological studies show that male-female differences exist in the presentation of lung cancer. These observations suggest the role of estrogens in lung carcinogenesis. Primary projects in this area of interest include: 1) understanding both genomic and non-genomic effects of estrogen in the lung 2) elucidating cross-talk pathways between estrogen and the EGFR and VEGF pathways in the lung 3) understanding the differences in estrogen signaling in lung cancer patients who actively smoked versus those who never smoked and 4) preclinical development of therapeutic drugs that target this pathway such as estrogen antagonists and aromatase inhibitors.

Dr. Stabile has demonstrated that estrogen receptors are expressed in both normal lung as well as lung tumor cells and that estrogen promotes the growth of lung tumor cells. The growth stimulation is significantly inhibited in vitro and in vivo with the pure estrogen receptor antagonist, ICI 182,780 (Faslodex, fulvestrant).

In addition, Dr. Stabile has demonstrated that the estrogen receptor pathway can cross-talk with the EGFR pathway and targeting both pathways simultaneously using clinically relevant agents show enhanced anti-tumor effects compared to targeting either pathway alone. This drug combination is currently being tested in
clinical trials. Dr. Stabile is currently interested in elucidating the role of the newly discovered estrogen receptor, GPR30, which is thought to be responsible for some of the non-genomic actions of estrogen.

The overall goal for both areas of interest are to test different mechanisms by which these pathways control other growth-promoting proteins in the lung and test both available and novel drugs as single agent or combination therapies using novel animal models of lung cancer to determine how to inhibit these pathways most effectively. Optimal preclinical drugs will ultimately be translated to patient clinical trials.

Adam Straub, Ph.D.
Assistant Professor
Ph.D., University of Pittsburgh Graduate School of Public Health, 2008

The overarching goal of the Straub laboratory is to investigate novel redox-controlled cell signaling mechanisms that regulate endothelial and smooth muscle cell biology and cell-cell communication in the microcirculation. Our investigations focus on two important pathways: 1) the mechanisms by which endothelial cell expressed hemoglobin a regulates nitric oxide signaling in the blood vessel wall and 2) the mechanisms by which the intracellular nicotinamide phosphoribosyltransferase (NAMPT) pathway controls basic redox signaling functions in vascular cells.

Mechanisms of hemoglobin a-regulated nitric oxide signaling in endothelial cells.
Nitric oxide (NO) signaling regulates arterial vascular reactivity in the microcirculation to control peripheral vascular resistance and thus blood pressure. Recently, it was reported for the first time that hemoglobin a is expressed in arterial endothelial cells (ECs), where it is in complex with endothelial nitric oxide synthase (eNOS) (Straub et al., Nature 2012). It was demonstrated that endothelial hemoglobin a is enriched at the myoendothelial junction, the point where endothelial cells and smooth muscle cells make contact in resistance arteries and arterioles, where it regulates the effect of NO signaling on vascular reactivity. Mechanistically, hemoglobin a heme iron in the Fe$^{3+}$ state permits active NO signaling, and this signaling is shut off when hemoglobin a is reduced to the Fe$^{2+}$ state by endothelial cytochrome B5 reductase 3 (CytB5R3). These data reveal a novel paradigm by which the regulation of intracellular hemoglobin oxidation controls NOS signaling in non-erythroid cells. This paradigm may be relevant to a broad range of other somatic cells discovered to express hemoglobin (i.e. neurons, renal mesangial cells, macrophages, sympathetic nerves, hepatocytes, alveolar epithelial cells, and endometrial cells) and also known to express NOS isoforms. Our studies will be a direct outgrowth of this work, where we will focus on the molecular, cellular, and in vivo contribution of somatic hemoglobins and CytB5Rs as it pertains to vascular physiology and disease.

NAD regulation and the NAMPT pathway in vascular physiology and disease
Nicotinamide adenine dinucleotide (NAD) is a fundamentally important molecule critical for many redox reactions in biology. Interestingly, the regulation of NAD$^{+}$ and NAD(H) is dependent on cell type, which is governed by multiple mechanisms. One mechanism that regulates NAD$^{+}$ levels is NAMPT, also known as pre-B cell colony factor (PBEF) or visfatin. Existing both as an extracellular and intracellular protein, NAMPT is a rate-limiting enzyme in the NAD$^{+}$ biosynthesis pathway and is vital for embryonic development since homozygous knockout mice are embryonic lethal (Revollo et al, 2007). The extracellular form of NAMPT stimulates both NAD$^{+}$ and non-NAD$^{+}$ signaling pathways in vascular cells, while intracellular NAD$^{+}$ generated by NAMPT has been shown to regulate vascular cell longevity and protection against ischemia/reperfusion in the heart through a surtuit-1 dependent pathway (van der Veer et al 2007, Hsu et al, 2009). Although it has been established that intracellular NAMPT can regulate NAD$^{+}$ levels, the downstream signaling pathways relying on this enzyme with regards to resistance arterial tone regulation remains elusive. Our goal is to better understand the role(s) of this enzyme in the microcirculation and in vascular biology in general.
Dr. Van Houten’s laboratory studies the formation and repair of DNA damage in nuclear and mitochondrial genomes. We are particularly interested in the structure and function of proteins that mediate nucleotide excision repair and the role of oxidative stress in human disease.

Faulty DNA repair can promote mutations, aging, cancer and cell death. The process by which protein components of repair detect damaged or modified bases within DNA is an important but poorly understood type of protein-DNA interaction. The cell contains a series of pathways designed to protect its DNA from environmental and endogenous damage. One of the most remarkable aspects of nucleotide excision repair (NER) is that it can remove a wide range of DNA lesions that differ in chemistry and structure. During bacterial NER UvrA, UvrB and UvrC proteins work together to identify and remove DNA damage.

The UvrA and UvrB proteins are believed to recognize damage-induced distortion in the DNA helix rather than the lesion per se. However, detailed studies of the kinetics, thermodynamics and structures of the Uvr proteins have been limited due to their instability. To overcome this problem, UvrA, UvrB and UvrC from the thermophilic bacteria Bacillus caldovenax and Thermotoga maritima were recently cloned and overexpressed. The proteins maintain optimal activity at 65°C and are amenable to both structural and biophysical studies. The group is collaborating with Bob London’s NMR group at NIEHS for an analysis of the dynamics of UvrB upon ligand binding using NMR techniques. The group is also collaborating with Caroline Kisker, Ph.D. and her group, in Wurtzburg, Germany, on solving protein and protein-DNA structures by X-ray crystallography. We have recently solved a co-crystal structure of UvrB bound to DNA.

These complexes are being visualized on DNA using atomic force microscopy, performed Hong Wang, Ph.D., and single-molecule techniques using quantum dot labeling, performed by Neil Kad, Ph.D. at the University of Essex. These tools, combined with site-directed mutagenesis and biochemical analyses, allow for structure-function studies of the UvrA, UvrB and UvrC proteins, and form a basis for understanding the fundamental molecular processes of NER. The long-term goal is to have a complete understanding of how structural perturbations induced by specific DNA lesions are detected and removed by the NER machinery at the atomic level. Most recently we have begun to extend our studies to similar proteins found in humans.

Mitochondria represent an important target of reactive oxygen and mitochondrial DNA (mtDNA) appears to be an early and sensitive marker of this stress. Many human diseases are associated with reactive oxygen including cancer, heart disease and neurodegenerative diseases. Mitochondria are essential organelles for generating ATP during oxidative phosphorylation. The mtDNA encodes 13 polypeptides, 11 involved in electron transport and two serving as subunits of ATP synthase. Damage to mtDNA is repaired, but prolonged oxidant treatment results in persistent mtDNA damage, loss of mitochondrial function and apoptosis. These observations suggest that mtDNA damage is important in the toxicity induced by reactive oxygen species (ROS) such as superoxide, hydrogen peroxide and the hydroxyl radical. Our group is testing the hypothesis that ROS generated in the mitochondria results in mtDNA damage causing a vicious cycle of damage: mtDNA damage causes a decrease in transcription and loss of essential mitochondrial proteins, causing an inhibition of electron transport and subsequent release in more ROS. This process causes further mitochondrial decline and many degenerative diseases associated with aging. We have developed a very sensitive DNA damage assay based on quantitative PCR that allows us to examine damage to nuclear and mitochondrial DNA from as little as 100 microliters of human blood. We are currently examining the role of mtDNA damage and repair in several human diseases including cancer and Friedreich’s ataxia.

Jean-Pierre Vilardaga, Ph.D.
Associate Professor
Ph.D., Free University of Brussels, Belgium, 1996
The Vilardaga Laboratory is directed at understanding molecular mechanisms of G protein-coupled receptor (GPCR) signaling and trafficking – two key processes in biological signaling in general and, more specifically, in pharmacology and drug research. Adrenergic and peptide receptors, which transmit signals, respectively for small neurotransmitters (such as noradrenaline and dopamine) and larger peptide hormones (vasopressin, parathyroid hormone, parathyroid hormone related peptide), are two well characterized distinct subtypes of GPCRs that serve as useful models for analyzing GPCR mechanisms. The objective of this line of research is to elucidate the general principles of signal transduction from the extracellular ligand binding event to intracellular signaling cascades, which are involved in systems as diverse as neurotransmitter and hormonal signaling.

Optical approaches (e.g. FRET, TIRF microscopy) are used to monitor the activation/deactivation steps along the signaling cascades of GPCRs in live cells. This approach revealed fundamental mechanisms of GPCRs signaling and trafficking in live cells for neurotransmitter and peptide hormones such as the PTH, which were published in 2003-2007 in Nature Biotech, Nature Methods, Nature Chemical Biology, the Journal of Biological Chemistry and PNAS.

Recently Vilardaga laboratory also discovered the new concept that persistent cAMP production mediated by parathyroid hormone receptor endocytosis may mediate potent catabolic signaling actions via PTH (PNAS 2008, Nature Chem Biol 2009). This prolonged cAMP production from intracellular compartments further indicates that the traditional concept that cAMP production triggered by GPCRs originates exclusively at the cell membrane must be revised. The main focus of my current research aims at determining the origin of the prolonged signaling by GPCRs and its termination. These events and consequent signaling patterns are quite novel and important for cellular signaling.

Daniela Volonte, Ph.D.
Research Assistant Professor
Ph.D., University of Milan, Italy, 1996

Tumor development is initiated by a multiplicity of genetic abnormalities. Tumor cells need to escape barriers that limit uncontrolled cell proliferation. One of these barriers is represented by cellular senescence. Cancer cells need to overcome this obstacle to produce a clinically relevant tumor mass. For these reasons, cellular senescence represents a natural tumor suppressor mechanism. Thus, molecules that regulate cellular senescence are potential therapeutic targets for the treatment of cancer and the fight against aging.

Caveolae are invaginations of the plasma membrane enriched in cholesterol. Caveolin-1, the structural protein component of caveolar membranes, acts as a scaffolding protein to concentrate and functionally regulate signaling molecules.

In recent years, several independent lines of evidence have emerged suggesting that caveolin-1 may function as a "tumor suppressor protein" in mammalian cells. For example, caveolin-1 protein expression has been shown to be absent in several transformed cell lines derived from human mammary carcinomas, including MCF-7. In addition, caveolin-1 mRNA and protein expression are lost or reduced during cell transformation by activated oncogenes, such as v-Abl and H-ras (G12V); caveolae are absent from these cell lines. In addition, the human caveolin-1 gene is localized to a suspected tumor suppressor locus (D7S522; 7q31.1), a known fragile site (FRA7G) that is deleted in many types of cancer.

Oxidative stress is a known inducer of cellular senescence. We have shown that up-regulation of caveolin-1 is required for oxidative stress–induced cellular senescence in fibroblasts. To unravel the molecular mechanisms underlying oxidative stress-induced up-regulation of caveolin-1 in senescent cells, Dr. Volonte has shown that oxidants stimulate the activity of the caveolin-1 promoter reporter gene construct in fibroblasts. She has identified Sp1 binding to two GC-boxes as the core mechanism of oxidative stress–triggered caveolin-1 transactivation. In addition, through signaling studies she has shown p38 mitogen-activated protein kinase
(MAPK) as the upstream regulator of Sp1-mediated activation of the caveolin-1 promoter following oxidative stress. For the first time Dr. Volonte has delineated the molecular mechanisms that modulate caveolin-1 gene transcription upon oxidative stress bringing new insights into the redox control of cellular senescence in both normal and cancer cells.

Thus, cellular senescence may represent one of the molecular mechanisms through which caveolin-1 acts as a tumor suppressor protein. Current efforts are aimed at identifying the signaling molecules which link caveolin-1’s function to cellular senescence.

Nobunao Wakabayashi, Ph.D.
Research Assistant Professor
Ph.D., Tohoku University Graduate School, 1959

Loss of cellular homeostasis through exposures to endogenous (e.g., inflammation) and exogenous (e.g., carcinogens) stresses contributes to many diseases including carcinogenesis. The Keap1-Nrf2-ARE signaling pathway evokes an adaptive response to these stresses that serves to enhance cell survival. Through gene expression analyses of the signaling cascade linked to Nrf2, using both Keap1- and Nrf2-disrupted mice, it appears that multiple signaling pathways intersect with Nrf2 signaling. Our research goals are to elucidate novel signaling crosstalk based on genes bearing functional ARE (Nrf2-sMaf recognition enhancer element) in the promoter of target genes and the underlying mechanistic roles of the Keap1-Nrf2 system in protecting against chronic degenerative diseases in vivo. Currently, we are focusing on the role of Nrf2 signaling in tissue repair and regeneration.

Bin Wang, Ph.D.
Research Assistant Professor
Ph.D., Anhui Medical University, Hefei, China, 1999

Dr. Wang researching parathyroid hormone receptor trafficking, interaction with the adapter protein EBP50/NHERF1 and other proteins, and their effects on the signaling in kidney and bone cells. The goal of these studies will contribute to our understanding of mineral ion homeostasis under normal conditions, as well as the pathogenesis of diseases that are related to disordered calcium and phosphorus balance in renal failure, hyperparathyroidism, or osteoporosis. The results will provide insights into developing drugs for selective therapeutic applications.

Q. Jane Wang, Ph.D.
Associate Professor & Vice Chair, Regulatory Affairs
Ph.D., Creighton University, 1995

Dr. Wang’s lab conducts basic and translational research on oncogenic protein kinases in the area of cancer biology. The main focus is on diacylglycerol (DAG)-targeted protein kinases, particularly protein kinase D (PKD) and protein kinase C (PKC) family kinases. DAG is a key second messenger generated in cells in response to the activation of receptor tyrosine kinases and G protein-coupled receptors. It acts to disseminate vital signals from the cell surface to the cell interior. PKD and PKC are primary targets of DAG that regulate many fundamental cellular processes such as cell growth, survival, apoptosis, motility, and protein trafficking. In particular, PKD is at the center of the DAG signaling network, integrating signals from both DAG and PKC. In recent years, PKD has emerged as a promising therapeutic target for several diseases including cancer and heart disease. Deregulated PKD expression and activity have been demonstrated in a variety of pathological conditions, suggesting an active contribution to disease initiation and progression.

Dr. Wang’s laboratory seeks to understand both the basic structure of PKD and how different structural domains in PKD interact to regulate its activity and function. We are particularly interested in the C1 domain,
the high affinity DAG binding domain shared among all DAG receptors. Our previous studies identified PKD as a high affinity receptor for DAG and defined the structure-activity requirements for the binding of the PKD C1 domain to DAG and phorbol esters. This work has provided the basis for ligand-specific regulation of PKD isoforms. Our long-term goal is to investigate the intra- and intermolecular regulatory mechanisms controlling PKD activity and assess their impact on the function of PKD in intact cells. Ultimately, we seek to solve the 3D structure of this protein.

Growing evidence has implicated PKD in the pathogenesis of cancer. Using prostate cancer as a model, we will determine the functional relevance and signaling mechanisms of PKD in cancer. We will elucidate the signaling pathways both upstream and downstream of PKD and identify novel PKD substrates relevant to cancer promotion. In previous studies, we have identified PKD3 as a downstream target of the oncogenic kinase PKCe. We found that PKD3 acts through a hyperactive PKCe/PKD3 pathway to modulate the activity of ERK1/2 and Akt signaling, contributing to the growth and survival of prostate cancer cells. Another active area of research in our lab is to determine the in vivo relevance of PKD signaling to cancer. We use a variety of animal models including mouse xenograft models and transgenic/knock-out mice to determine the role of PKD in prostate cancer initiation, progression, and metastasis. In addition, we also study the cross-regulation between PKD and androgen receptor signaling and its implication in prostate cancer. Our studies have now expanded to other types of solid tumors such as head and neck cancer and pancreatic cancer. In the long run, we seek to validate PKD as a therapeutic target for cancer therapy.

In this major research endeavor, we seek to develop potent and selective small molecule inhibitors of PKD as pharmacological tools for dissecting PKD-mediated biological processes and as potential drugs for clinical application. This is an important study in the translation of PKD-targeted therapeutics into the clinic. In collaboration with our colleagues at the University of Pittsburgh Drug Discovery Institute and the Department of Chemistry, we have identified the first potent and selective small molecule PKD inhibitor, CID755673, and subsequently developed a class of unique ATP-noncompetitive inhibitors based on this parental compound. These inhibitors are cell-active and exhibit nanomolar potencies, with high specificity for PKD. Future studies are focused on further developing this series of inhibitors for in vivo and clinical application, and continuing our efforts in new drug discovery.

Stacy Gelhaus Wendell, Ph.D.
Research Assistant Professor
Ph.D., University of Maryland Baltimore County, Baltimore, MD, 2005

Nitrated and oxidized metabolites of O-3 and O-6 fatty acids, such as docosahexaenoic acid (DHA), eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA) arachidonic acid (AA) and linoleic acid (LA), are potent signaling mediators involved in inflammation and resolution, amongst a variety of other regulatory pathways. These oxidized metabolites are produced by reactive oxygen and nitrogen species as well as through enzymatic pathways including cyclooxygenase (COX), lipoxygenase (LO), and cytochrome P450s (CYP450). Dr. Gelhaus’ research is specifically focused on understanding the anti-inflammatory mechanisms of a specific subgroup of these metabolites; the electrophilic fatty acids. Examples of electrophilic fatty acids include nitrated fatty acids such as nitro-oleic and nitro-linoleic acid or oxidized lipids that contain an α,β-unsaturated ketone or epoxide. Electrophilic fatty acid metabolites can exert their effects through the modulation of transcriptional regulatory proteins. Many transcriptional regulatory proteins contain a nucleophilic amino acid residue, such as a cysteine or histidine, to which the electrophilic moiety of the fatty acid can form a reversible Michael addition. Many of these interactions have been described with the nitrated fatty acids, particularly nitro-oleic acid. In terms of cellular signaling, the Freeman lab has described several protein targets of posttranslational nitroalkylation modification, resulting in activation of pro-MMP9, PPARγ and the antioxidant pathway Keap1/Nrf2 and the inhibition of the pro-inflammatory transcription factor NF-kB.
The current focus of Dr. Gelhaus’ research is on the mechanism of these electrophilic fatty acids in asthma. Asthma is a complicated disease that much like cancer is comprised of numerous disease states and phenotypes. In many ways it is an umbrella of respiratory diseases that share some similar phenotypes such as airway hyper-responsiveness, increased mucus secretion, increased smooth muscle contraction and decreased airflow. In the most severe of cases, airway remodeling and corticosteroid resistance are not uncommon. It affects over 30 million worldwide and is an economic burden with therapeutic costs upwards of $19 billion dollars per year. While the number of asthmatics in Westernized countries seems to be plateauing, the worldwide number of asthmatics is projected to hit over 100 million by 2025, mostly in low/middle economically developing countries.

Dr. Gelhaus is looking at the formation of electrophilic fatty acids in transformed stable cell lines while collaborating with clinicians to study the formation and signaling of electrophilic fatty acids in mild to moderate asthmatic subjects. In this study, subjects undergo a baseline bronchoscopy after which they are placed randomly in one of three groups, control, aspirin, or indomethacin. The thought here is that indomethacin will completely inhibit cyclooxygenase activity; therefore, shunting metabolism to other pathways including lipoxygenase or CYP450. Aspirin will inactivate COX-1, but acetylate COX-2 at S516, thus altering enzymatic activity and the stereochemistry of product formation. Following 5 days of treatment, subjects return for a second bronchoscopy. At each bronchoscopy, blood, urine, bronchoalveolar lavage, and bronchial brushings are taken. The epithelial cells from the brushings can be cultured at the air liquid interface for mechanistic studies and identification of key electrophilic fatty acids. To reach these end goals, the lab utilizes molecular biology and analytical techniques, primarily mass spectrometry, (triple quadrupole and ion trap) to elucidate the structures of novel electrophilic species, accurately detect and quantify key electrophilic fatty acid oxidation products in biological matrices, and establish mechanisms of action in asthma and other lung and airway diseases. Furthermore, the implications of electrophilic fatty acid formation and signaling under inflammatory conditions using animal models are also being determined.

Steven Wendell, Ph.D.
Research Assistant Professor
Ph.D., University of Minnesota

Steven Woodcock, Ph.D.
Research Instructor
Ph.D., University of Oregon

The biological convergence of reactive oxygen species, nitrate/nitrite and unsaturated lipids produce a variety of nitrated and oxidized lipids, which as redox signaling mediators have been observed to have pluripotent activity in vivo.

Dr. Woodcock’s research interests include the synthesis of novel nitrated and oxidized lipids, mechanisms of nitration, and the reactivity of nitroalkenes. We use a combination of synthetic and physical organic chemistry along with biochemistry to help identify and study these species, and to study their production and interactions with a variety of electron-rich biological molecules. These studies support the emerging potential of nitrated lipids as therapeutic agents.

In addition we participate in collaborations with other labs to pair our synthetic interests with aspects of nitrated lipid activity in novel arenas, as well as to provided molecular probes for various redox signaling studies. Recent projects have included isotopically labelled standards, phospholipids, nucleic acid-steroid conjugates, and fluorescent and affinity-conjugates as chemical probes.
Cheng Zhang, Ph.D.
Assistant Professor
Ph.D., University of Science and Technology of China, Hefei, P.R. China, 2008

My group focuses on the study of model G protein-coupled receptors (GPCRs) to elucidate the molecular mechanisms of receptor signaling and to advance our understanding of their pharmacology. GPCRs are a family of cell surface receptors with over 700 members. They transduce signals from extracellular signaling molecules, including hormones and neurotransmitters, to intracellular effectors in order to mediate and regulate a broad spectrum of physiological and pathological processes. GPCRs have been heavily investigated in the pharmaceutical industry, and they constitute 30-40% of current drug targets. Yet the mechanistic details of GPCR signal transduction across the cell membrane are largely poorly understood, in part due to the extraordinary complexity of receptor conformational states associated with different ligands and different signaling outputs. My lab is trying to explore the molecular mechanisms underlying the signal transduction of certain GPCRs through combinatorial approaches, including structural biology approaches, spectroscopic tools, and molecular pharmacology approaches.

Current efforts are directed at elucidating the atomic structures of several GPCRs that function in inflammation and calcium metabolism, in complex with their ligands as currently used drugs or potential drug candidates. These structures will reveal the molecular basis of the action of the ligands, as well as the structural elements of receptors that are involved in signal transduction. This information will guide further biophysical and computational studies performed in my lab, or through collaborations, to explore the dynamics and conformational versatility of these receptors and guide structure-based drug design for the development of drugs with improved pharmacological properties. Long-term goals also include the structural characterization of these receptors in complex with their signaling effectors and the characterization of the different pharmacological behaviors of these receptors when coupled with different signaling effectors. The resulting information will greatly advance our understanding of GPCR signaling and GPCR molecular pharmacology, and will be quite valuable for designing new pharmaceuticals used in the treatment and management of inflammatory diseases, bone diseases and cancer.

Lin Zhang, Ph.D.
Professor
Ph.D., University of Southern California, 1995

The immediate goal of Dr. Zhang’s research is to understand how anticancer drugs kill cancer cells, and more importantly, why they fail so often. In the long term, we will attempt to use this knowledge to identify novel molecular targets and treatment strategies to improve cancer chemotherapy and chemoprevention.

Cell death in anticancer therapies
Our research program has centered on several molecules that control discrete steps of programmed cell death. The first one, PUMA, is a downstream target of the tumor suppressor p53 and a BH3-only Bcl-2 family protein. PUMA is required for DNA damage-induced and p53-dependent apoptosis, and also plays a key role in apoptosis induced by several targeted anticancer drugs. The second one, SMAC, is a mitochondrial apoptogenic protein and a caspase activator. SMAC helps to execute apoptosis induced by anticancer drugs via a mitochondrial feedback loop. Regulators of non-apoptotic cell death, such as the autophagy inducer Beclin 1 and the necrosis regulator RIPK3, have also been studied. Through analyses of these molecules and their associated protein networks, we try to gain deep understanding on how cell death is initiated and executed in human cancer cells, why some cancer cells are not sensitive to anticancer drugs, and what can be done to restore their sensitivity.
Oncogenic stem cells as the target of cancer chemoprevention
Prevention of human cancer through the use of chemical agents such as non-steroidal anti-inflammatory drugs (NSAIDs) has emerged as a promising strategy to reduce morbidity and mortality of cancer. Our recent studies showed that intestinal stem cells that have acquired oncogenic alterations are targeted by NSAIDs in chemoprevention of colon cancer. We are investigating how NSAIDs trigger apoptosis in such oncogenic stem cells, and if induction of apoptosis is critical for the chemopreventive effects of NSAIDs. We will also determine if apoptosis regulators can be used as markers to predict outcomes of chemoprevention of cancer patients, and if manipulation of apoptosis regulators can be used to improve the chemopreventive effects of NSAIDs.

Manipulation of cell death regulators
To target PUMA, we have developed a high-throughput screening system for identifying small molecules that can activate PUMA in p53-deficient cancer cells. In collaboration with the Pittsburgh Drug Discovery Institute, we will screen compound libraries to identify novel PUMA inducers. We have also identified and characterized small molecules that mimic the functional domains of PUMA and SMAC. Efforts are undertaken to apply these small molecules to chemotherapy and chemoprevention.

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External Advisory Board, UCLA Center for Neurovisceral Sciences and Women’s Health
Member, Dana Alliance for Brain Initiatives
Faculty, 1000 Biology, Head of Section for the Genito-Urinary and Reproductive Pharmacology

Julie Eiseman, Ph.D.
Research Professor
Grant Reviewer:
   Veteran’s Administration Merit Review (central and local)
   NCI, Cancer Drug Development and Therapeutics (CDDT) Study Section, STIR/SBIR
Reviewer:
   Journal of Biological Optics
   Cancer Chemotherapy and Pharmacology
   Oncology
   Research Communications in Molecular Pathology and Pharmacology
   Clinical Cancer Research
   Journal of Pharmacology and Experimental Therapeutics
   Molecular Pharmacology
   Journal of AOAC International
   Cancer Research
   Journal of Photochemistry and Photobiology
   Molecular Cancer Therapeutics
   Antimicrobial Agents and Chemotherapy

Peter Friedman, Ph.D.
Professor
Reviewer:
   National Science Foundation, Panel on Cellular and Molecular Biology
   National Science Foundation, Panel on Regulatory Biology
Awards Committee:
   American Physiological Society, Chair, 2005-2007
Study Section:
   National Institutes of Health, Molecular and Cellular Endocrinology Study Section
Consultant:
   FDA, novel parathyroid hormone compounds
Invited Reviewer:
   Journal of Biological Chemistry
   Journal of Cell Biology
Nature Chemical Biology
Nature Reviews Rheumatology
PLoS One
Bone
Biochemistry
Journal of Bone and Mineral Research
American Journal of Physiology

Editorial Board:
  European Journal of Molecular Biology
  Journal of Biological Chemistry

William Furey, Ph.D.
Professor
Ad Hoc Reviewer:
  Journal of Molecular Biology
  Biochemistry
  Nature Structure Biology
  Acta Crystallographica
  Proceedings of the National Academy of Sciences USA
  Proteins
  Journal of Biological Chemistry
  Protein Science

Ferruccio Galbiati, Ph.D.
Associate Professor
Editorial Board:
  h Bioscience
  The Journal of Biological Chemistry
Ad Hoc Reviewer:
  FASEB Journal
  Aging Cell
  Cancer Research
  Molecular Cancer Research
  Molecular Pharmacology
  Molecular Endocrinology
  PLoS ONE
  Free Radical Biology & Medicine
  American Journal of Physiology
  Journal of Cell Science
  Journal of Neurochemistry
  Human Genetics
  Molecular Carcinogenesis
  European Journal of Cancer
  Journal of Applied Physiology
  Experimental Cell Research
  Journal of Molecular Medicine
  Proteomics
  Journal of Cellular and Molecular Medicine
  Carcinogenesis
  Cell Research
Ad Hoc Grant Reviewer:
Jing Hu, Ph.D.
Assistant Professor
Ad Hoc Reviewer:
  Molecular Carcinogenesis
  Biochemical Pharmacology
  Neoplasia
Editorial Board:
  American Journal of Cancer Biology
Ad Hoc Grant Reviewer:
  Florida Department of Health: James & Esther King Biomedical Research Program and the
  Bankhead-Coley Cancer Research Program

Yi Huang, M.D.
Research Assistant Professor
Ad Hoc Reviewer:
  Molecular Carcinogenesis
  Journal of National Cancer Institute
  Breast Cancer Research and Treatment
  Breast Cancer Research
  BMC Cancer
  Cancer Biology & Therapy
  Medicinal Chemistry Communications
  PLoS One
  Cancer Investigation
  Hormones and Cancer
  BBA – Molecular Cell Research
  The Journal of Investigative Dermatology
Editorial Board:
  Frontiers in Epigenomics
  Cancer and Clinical Research

Edwin Jackson, Ph.D.
Professor
NIH Study Section, Permanent Member:
  Hypertension and Microcirculation
Editorial Board:
  Hypertension
  Journal of Pharmacology & Experimental Therapeutics
  Clinical and Experimental Hypertension
  American Journal of Physiology - Renal Physiology
  American Journal of Physiology - Regulatory, Integrative and Comparative Physiology
  American Journal of Physiology – Heart and Circulatory Physiology
  Cardiovascular Therapeutics
Journal Refereeing:
  American Journal of Physiology Cell Physiology
  American Journal of Physiology Heart and Circulatory Physiology
  American Journal of Physiology Regulatory, Integrative and Comparative Physiology
  American Journal of Physiology Renal Physiology
Biochemical Pharmacology
British Journal of Pharmacology
Cardiovascular Research
Circulation
Circulation Research
Clinical Cancer Research
Clinical and Experimental Hypertension
Clinical Pharmacology and Therapeutics
Hypertension
Journal of Cardiovascular Pharmacology
Journal of Clinical Investigation
Journal of Pharmacology and Experimental Therapeutics
Kidney International
Molecular Pharmacology
Nephrology Dialysis Transplantation
PLOS ONE
PNAS

Tija Jacob, Ph.D.
Assistant Professor
Journal Refereeing:
Neuroscience
Molecular Neurobiology

Yu Jiang, Ph.D.
Associate Professor
Study Section:
NIH NCI-Transition to Independence (K Grant), ad hoc reviewer
Editorial Board:
World Journal of Biological Chemistry
Ad Hoc Reviewer:
BBA
Current Molecular Pharmacology
Drug Discovery Today
Nutrition Research
Oncogene
Science
Journal of Biological Chemistry
Breast Cancer Research and Treatment
Structure
Grant Review:
Medical Research Council, England
National Science Centre, Poland
Department of Defense, Tuberous Sclerosis Complex Research Program Review Panel

Thomas Kensler, Ph.D.
Professor
Study Section:
NCCAM/NIH Special Emphasis Panel ZAT1 SM (25) – Mechanistic Research on Natural Products
Chair, ZRG1 OTC-C (02) Special Emphasis Panel (NIH)
Chair, ZRG1 OTC-Y 04 M Special Emphasis Panel (NIH)
Editorial Board:
Reviews in Mutation Research  
Carcinogenesis  
Journal of Biological Chemistry

Senior Editor:  
Cancer Prevention Research

Committee Memberships:  
Society of Toxicology, Disease Prevention Task Force; Chair [2010-2012]

Ad Hoc Reviewer:
Analytical Biochemistry  
Applied Occupational & Environmental Hygiene  
Archives of Biochemistry and Biophysics  
Biochemical Journal  
Biochemical Pharmacology  
Biochemistry  
Cancer Biochemistry Biophysics  
Cancer Detection and Prevention  
Cancer Epidemiology, Biomarkers & Prevention  
Cancer Prevention Research  
Cancer Research  
Carcinogenesis  
ChemBioChem  
Chemico-Biological Interactions  
Chemical Biology & Drug Design  
Chemical Research in Toxicology  
Drug Metabolism and Disposition  
Environmental Health Perspectives  
Environmental & Molecular Mutagenesis  
Environmental Research  
Experimental Cell Research  
FASEB Journal  
Free Radical Biology & Medicine  
Free Radical Research  
Gene  
Gut  
Hepatology  
International Journal of Cancer  
In Vitro Toxicology  
Journal of Agricultural & Food Chemistry  
Journal of Biological Chemistry  
Journal of Cellular Biochemistry  
Journal of Clinical Investigation  
Journal of Inorganic Biochemistry  
Journal of Investigative Dermatology  
Journal of Mass Spectrometry  
Journal of Medicinal Chemistry  
Journal of the National Cancer Institute  
Journal of Pharmacy and Pharmacology  
Journal of Toxicol. and Environ. Health  
Laboratory Animal Sciences  
Molecular Carcinogenesis  
Molecular Cellular Biology  
Molecular Pharmacology  
Mutation Research  
Nutrition and Cancer  
Oncogene  
Proc. National Academy of Science USA  
Proc. Soc. Experimental Biology and Medicine  
Risk Analysis  
Science  
Toxicology  
Toxicology Letters  
Trends in Molecular Medicine

Nicholas Khoo, Ph.D.  
Research Assistant Professor

Joan M. Lakoski, Ph.D.
Professor

Study Section:
Neuroendocrinology, Neuroimmunology and Behavior

Editorial Board:
American Journal of Translational Research

Committee Memberships:
Travel Awards Selection Committee, National Postdoctoral Association
Nomination Awards Committee, National Postdoctoral Association
Program Committee, Annual Meeting, National Postdoctoral Association
President’s Council, Society for Executive Leadership in Academic Medicine (SELAM) International Board Development Committee, Annual Meeting, National Postdoctoral Association

Ad Hoc Reviewer:
Neuroscience Letters
Journal of Pharmacology and Experimental Therapeutics
Endocrinology
Journal of Neuroscience Research
International Journal of Developmental Neuroscience
Molecular Endocrinology
Synapse
Psychopharmacology
Brain Research Bulletin
Neuroscience
Life Sciences Journal
Neuropharmacology
Gastroenterology
Environmental Research
Pharmacology, Biochemistry and Behavior
Journal of Neuroscience
Journal of Gerontology: Biological Sciences
Academic Medicine
Society for Clinical and Translational Science
Cell Biology Education – Life Sciences Education

Adrian Lee, Ph.D.
Professor

Peer Review:
Alternate Chair and Member, Career Catalyst Award Review, Susan G. Komen for the Cure
Ad Hoc Member, CDMRP Integration Panel
Member, CDMRP Breakthrough Proposal Review
Member, MUSC Pilot Project Review
Ad Hoc Member, SEP:ZCA SRB-C (J1) & (J2), NCI
Ad Hoc Member, Komen Tissue Bank
Permanent Member, NIH/NCI, Molecular Oncogenesis (MONC)

Advisory Board:
Scientific Advisory Committee, Susan G. Komen for the Cure
Boehringer Ingelheim, anti-IGF inhibitors

Editorships:
Member, Editorial Board, NPJ Breast Cancer
Corresponding Editor, Hormone Molecular Biology and Clinical Investigation
Member, Editorial Board, Hormones and Cancer
Member, Frontiers in Endocrinology Editorial Board
Editor, Endocrinology

Ad Hoc Reviewer:
Breast Cancer Research and Treatment
Cancer Research
Cancer Chemotherapy and Pharmacology
European Journal of Cancer
Cancer Investigation
Molecular Endocrinology
Cell Growth and Differentiation
International Journal of Cancer
Cancer Immunology and Immunotherapy
Oncogene
Journal of Neurobiology
Cancer
Breast Cancer Research
Journal of Cellular Biochemistry
Cancer Epidemiology Biomarkers & Prevention
Biotechniques
Molecular Cancer Therapeutics
Endocrinology
Trends in Biochemical Sciences
Molecular and Cellular Biology
Biochemistry
Growth Hormone & IGF Research
Journal of the National Cancer Institute
Endocrine-Related Cancer
Biomedical Microdevices
Nature Clinical Practice Oncology
Nature Reviews Cancer

**Edwin Levitan, Ph.D.**  
*Professor*  
Editorial Board:  
- Molecular Endocrinology
Study Section:  
- NIH NTRC Study Section

**Carola Neumann, M.D.**  
*Visiting Associate Professor*  
Ad Hoc Reviewer:  
- Biochemistry
- Cancer Letter
- Endocrine-Related Research
- Immunology
- Journal of Pharmacology and Experimental Therapeutics
- Leukemia and Lymphoma
- Mitochondrial DNA
- Molecular Carcinogenesis
- Frontiers in Genetics
- Plos One
- Cancer Research
- Current Opinion in Pharmacology
- Journal of Cellular Biology
Steffi Oesterreich, Ph.D.
Professor
Editorial Boards:
  Endocrinology
  Endocrine-Related Cancer
  Frontiers in Epigenomics
  Hormones and Cancer
Study Section:
  Permanent Member, NIH TCB Study Section
Ad Hoc Reviewer:
  Breast Cancer Research and Treatment
  Cancer Research
  Molecular Endocrinology
  Oncogene
  Cancer
  Breast Cancer Research
  Molecular Cancer Therapeutics
  Molecular and Cellular Biology
  Cancer Letters
  Carcinogenesis
  Clinical Chemistry
  Experimental Cell Research
  FEBS Letters
  Genomics
  Journal of Biological Chemistry
  Journal of Clinical Investigation
  Journal of Molecular Endocrinology
  Journal of Molecular Medicine
  Journal of the National Cancer Institute
  Molecular Carcinogenesis
  Molecular Medicine
  New England Journal of Medicine
  Nucleic Acid Research
  NURSA
  The Journal of Clinical Endocrinology & Metabolism
  Nature Medicine

Roderick O’Sullivan, Ph.D.
Assistant Professor
Ad Hoc Journal Reviewing:
  Genome Research

Patrick Pagano, Ph.D.
Professor
Associate Editor:
  Clinical Science
Editorial Board:
  American Journal of Physiology
  Cardiovascular Research
  Free Radical Biology & Medicine

Study Section:
  Permanent Member, NIH/NHLBI Study Section HM
  RFA Special Emphasis Panel, Cellular and Molecular Mechanisms of Arterial Stiffening and its Relationship to Development of Hypertension

Ad Hoc Reviewer:
  American Heart Association

Ad Hoc Reviewer:
  American Journal of Physiology
  Circulation Research
  Free Radical Biology & Medicine
  Antioxidants & Redox Signaling
  Arteriosclerosis, Thrombosis & Vascular Biology

Michael Palladino, Ph.D.
Associate Professor

Editorial Board:
  Neurobiology of Diseases
  ISRN Biotechnology

Guest Associate Editor:
  Genetics

Ad Hoc Reviewer:
  Genetics
  FASEB
  RNA
  IUBMB Life
  Journal of Neuroscience
  Human Molecular Genetics
  Cell Metabolism
  Molecular Cell
  Proceedings of the National Academy of Sciences USA
  Annals of the New York Academy of Sciences
  Cell Death and Differentiation
  BBA-Molecular Basis of Disease
  PLoS ONE
  PLoS Biology
  Neurobiology of Disease
  Pharmacologic Reviews
  GENE
  Genes, Brain and Behavior
  Brain Research Bulletin
  Toxicological & Environmental Chemistry
  Frontiers in Genetics
  Journal of Cell Science

Grant Reviews:
  United Mitochondrial Disease Foundation
  Chronic Fatigue Initiative
  Friedreich’s Ataxia Research Alliance
Study Section:
  NIH Neurogenetics (NMG) Study Section
  NIH NOMD Ad Hoc Panel Member
Ad Hoc Grant Reviewer:
  Wellcome Trust
  PEIR Grants

Wei Qian, Ph.D.
Research Instructor
Journal Reviews:
  PLOS One
  ACS Medicinal Chemistry Letters

Guillermo Romero, Ph.D.
Associate Professor
Editorial Board:
  Frontiers in Endocrinology
Ad Hoc Reviewer:
  BMC Cell Biology
  Molecular Endocrinology
  Journal of Cell Biology
  Endocrinology
  Journal of Cell Science
  Cancer Research
  European Journal of Immunology
Ad Hoc Grant Reviewer:
  National Science Foundation

James Roppolo, Ph.D.
Research Assistant Professor
Ad Hoc Reviewer:
  Journal of Urology, Neurourology and Urodynamics
  Brain Research

Francisco Schopfer, Ph.D.
Research Associate Professor
Grant Reviewer:
  American Heart Association, Lipid Peer Review Study Group
  ANII, Uruguay Research Council
Study Section:
  NIH Inflammation and Aging Special Emphasis Panel
  NIH Review Panel on Botanical Dietary Supplement Research Centers (BDSRC) (P50)
Ad Hoc Reviewer:
  Free Radical Biology and Medicine Journal
  International Immunopharmacology
  Life Sciences
  Free Radical Research

Sruti Shiva, Ph.D.
Associate Professor
Ad Hoc Reviewer:
Grant Reviewer:
- American Heart Association Review Committee Membranes and Subcellular Organelles

Study Section:
- Ad Hoc Reviewer, Myocardial Ischemia Metabolism NIH/MHLBI Study Section

Editorial Positions:
- Guest Forum Editor, Antioxidant Redox Signaling
- Editorial Board Member, Redox Biology

**Shivendra Singh, Ph.D.**

*Professor*

Study Section Member:
- Landon Foundation-AACR Innovator Award for Cancer Prevention Research
- Chemo/Dietary Prevention Study Section
- Ad Hoc Member, Special Emphasis Panel, ZCA1 SRB-2 (01)
- DoD, Breast Cancer Research Program
- Ad Hoc Member, CDP Study Section, NIH

Editorial Board:
- Molecular Pharmacology
- Molecular Cancer Therapeutics
- Open Access Pharmacology Journal
- Journal of Cell Death-Open Access
- Cancer Prevention Research
- Clinical Cancer Research
- Pharmaceutical Research
- Journal of Cancer Prevention

Associate Editor:
- Molecular Carcinogenesis

Ad Hoc Reviewer:
- Cancer Research
- Carcinogenesis
- Prostate
- Molecular Cancer Therapeutics
External Advisory:
Head and Neck SPORE, Emory University, Atlanta, GA
Cancer Therapy and Research Center, University of Texas Health Science Center, San Antonio, TX

Committee:
Data Safety Monitoring Board, PEITC Trial, University of Minnesota, Minneapolis, MN
External Advisory Board, University of South Dakota Translation Research Center

Robert Sobol, Ph.D.
Associate Professor

Editorial Board:
DNA Repair
Journal of Carcinogenesis and Mutagenesis
Mutation Research – Fundamental and Molecular Mechanisms of Mutagenesis
PLoS ONE

Editorial Advisory Board:
The Open Toxicology Journal

Associate Editorial Board:
American Journal of Cancer Research

Invited Editor:
Proceedings of the National Academy of Sciences of the USA

Ad Hoc Reviewer:
American Journal of Biotechnology
Analytical Biochemistry
BBA
Biochemistry
Biology of Reproduction
Brain Pathology
Cancer
Cancer Cell
Cancer Chemotherapy & Pharmacology
Cancer Research
Carcinogenesis
Cell Biology & Toxicology
Cell Cycle
Chemical Research in Toxicology
Chemistry & Biology
Clinical Cancer Research
Digestive Diseases and Sciences
DNA & Cell Biology
DNA Repair
EMBO J
EMBO Reports
Environmental and Molecular Mutagenesis
Environmental and Toxicology & Pharmacology
Expert Opinion on Investigational Drugs
FASEB J
FEBS Letters
Gene Therapy TIBS
Journal of Bacteriology
Journal of Biotechnology
Glia
Head and Neck
Journal of Biological Chemistry
Journal of Cerebral Blood Flow and Metabolism
Journal of Medicinal Chemistry
Journal of Neuro-Oncology
Journal of Neurochemistry
Journal of Neuro-Oncology
Leukemia Research
Mechanisms of Aging and Development
Molecular & Cellular Biochemistry
Molecular & Cellular Biology
Molecular Cancer
Molecular Cell
Molecular Pharmacology
Mutation Research
Nature Structural & Molecular Biology
Nucleic Acids Research
Oncogene
PLoS Genetics
PLoS ONE
PNAS
Science Translational Medicine
The Open Toxicology Journal
The Protein Journal
Toxicological Sciences
Tumor Biology

Ad Hoc Grant Reviewer:
NIH Study Section, ZRG1
NIH Study Section, Somatosensory and Chemosensory Systems

Gyun Jee Song, Ph.D.
Research Assistant Professor
Ad Hoc Reviewer:
Human Reproduction
Journal of Andrology
Asian Journal of Andrology
Fertility and Sterility

Laura Stabile, Ph.D.
Research Associate Professor
Editorial Board:
Cancer and Clinical Research
Ad Hoc Reviewer:
American Journal of Physiology- Lung Cellular and Molecular Physiology
Steroids
Molecular Carcinogenesis
Cancer Chemotherapy and Pharmacology
Cancer Biomarkers
Lung Cancer
Cancer Research
Clinical Cancer Research
Head and Neck
Evidence-Based Complimentary and Alternative Medicine
Molecular Endocrinology
Journal of Clinical Oncology
Oral Oncology
Journal of Translational Medicine
Grant Reviewer:
FAMRI Grant Review Panel

Adam Straub, Ph.D.
Assistant Professor
Ad Hoc Reviewer:
American Journal of Physiology Lung and Cellular and Molecular Physiology
Cell Calcium
Microcirculation
PLOS One
Free Radical Biology and Medicine
American Journal of Pathology
Grant Reviewer:
Member, Vascular Wall Biology 2 Committee, American Heart Association
Member, Blood Pressure Regulation 2, American Heart Association

Ben Van Houten, Ph.D.
Professor
Ad Hoc Reviewer:
Cell Metabolism
Chem. Res. Tox. Chemical Biology
Jean-Pierre Vilardaga, Ph.D.
Associate Professor
Ad Hoc Reviewer:
Nature Chemical Biology
Journal of Biological Chemistry
Nature
Proceedings of the National Academy of Sciences
American Journal of Physiology
Molecular Endocrinology
EMBO Report
Biochim Biophys Acta
Science Signaling
Reviewer:
NIH: Cell Biology Integrated Review Group
European Research Council: Molecular and Structural Biology and Biochemistry Review Group
Consulting:
Medicine, Massachusetts General Hospital
Board Membership
Chair, IUPHAR for PTH Receptors

Dario Vitturi, Ph.D.
Research Instructor
Ad Hoc Reviewer:
Nitric Oxide: Biology and Chemistry
Daniela Volonte, Ph.D.
Research Assistant Professor
Editorial Board:
Landes Bioscience Journal

Q. Jane Wang, Ph.D.
Associate Professor
Editorial Board:
PLoS ONE
International Journal of Clinical and Experimental Medicine
Academic Editor:
PLoS ONE
Reviewer:
Chemistry and Biology
Journal of Biological Chemistry
J Dermatol Sci
Grant Reviewer:
Ad Hoc Member, NIH/CSR, Drug Discovery and Molecular Pharmacology (DMP) Study Section
Ad Hoc Member, NIH/CSR, ZRG1 BMCT-C Study Section
Reviewer, NIH/CSR, NCI Omnibus Initiative Review Meeting (Drug Discovery) ZCA1RTRB-L (M1)
Study Section
Prostate Cancer UK
Study Section:
NIH/CSR, ZRG1 BMCT-C Study Section

Stacy Gelhaus Wendell, Ph.D.
Research Assistant Professor
Ad Hoc Reviewer:
Chemical Research in Toxicology
Analytical Chemistry
Prostaglandins, Leukotrienes and Essential Fatty Acids
Chemico-Biological Interactions
Journal of Clinical Investigation

Steven Woodcock, Ph.D.
Research Instructor
Ad Hoc Reviewer:
Synthetic Communications
Studies in Natural Products Chemistry

Cheng Zhang, Ph.D.
Assistant Professor
Ad Hoc Reviewer:
Cell and Biology International
Molecular Biosystem
Molecular and Cellular Biochemistry
Lin Zhang, Ph.D.

Professor

Editorial Board:
- Scientific Reports
- Current Cancer Drug Targets

Associate Editor:
- Molecular Carcinogenesis
- Genes & Diseases

Ad Hoc Reviewer:
- BBA Review Cancer
- BMC Cancer
- BMC Pulmonary Medicine
- Cancer Research
- Clinical Colorectal Cancer
- Current Cancer Drug Targets
- DNA Repair
- International Journal of Cancer
- Molecular Cancer
- Molecular Cancer Research
- Oncogene
- Oncotarget
- PloS One

Study Section Review Panel Membership:
- Standing Member, NIH ONC Drug Discovery and Molecular Pharmacology (DMP) Study Section
- National Cancer Institute, Division of Cancer Prevention PREVENT Cancer Program’s Special Emphasis Panel
- American Lung Association Research Grant Review Committee

Ad Hoc Review Panel:
- ZCA1-SLRB-1(J1) SEP: Cancer Biology 1, NCI Omnibus R21/R03 Review Panel
## Department of Pharmacology & Chemical Biology

### Research Grant & Contract Activity

#### FY14 Extramural Sponsored Project Funding

<table>
<thead>
<tr>
<th>Category</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Army Grants</td>
<td>$502,204</td>
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<tr>
<td>Foundations, Societies and Associations Funding</td>
<td>$1,219,459</td>
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<tr>
<td>Industry Grants/Contract</td>
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<tr>
<td>NIH Center Grants</td>
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<tr>
<td>NIH Contracts</td>
<td>$675,424</td>
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<td>NIH Developmental Grants</td>
<td>$662,601</td>
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<td>NIH Program Project Awards</td>
<td>$718,729</td>
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<td>NIH Research Awards</td>
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<td>NIH Training Grants</td>
<td>$184,671</td>
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<td>Fellowships</td>
<td>$106,558</td>
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<tr>
<td>Veterans Administration and Other Government Awards</td>
<td>$696,353</td>
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</tbody>
</table>

**Total Extramural Funding** $18,039,712

#### FY14 National Institutes of Health Funding

<table>
<thead>
<tr>
<th>Institute</th>
<th>Amount</th>
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<tbody>
<tr>
<td>National Institute on Aging (NIA)</td>
<td>$276,086</td>
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<tr>
<td>Other NIH</td>
<td>$39,973</td>
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<tr>
<td>National Center for Complementary and Alternative Medicine (NCCAM)</td>
<td>$364,669</td>
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<tr>
<td>National Cancer Institute (NCI)</td>
<td>$6,232,442</td>
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<tr>
<td>National Institute on Diabetes and Digestive and Kidney Diseases (NIDDK)</td>
<td>$2,843,866</td>
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<tr>
<td>National Institute of Environmental Health Science (NIEHS)</td>
<td>$506,072</td>
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<tr>
<td>National Institute of General Medical Sciences (NIGMS)</td>
<td>$1,620,996</td>
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<tr>
<td>National Heart, Lung and Blood Institute (NHLBI)</td>
<td>$2,925,309</td>
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</tbody>
</table>

**Total National Institute of Health Funding** $14,809,414
Department of Pharmacology & Chemical Biology
FY14 Extramural Sponsored Project Funding

- NIH Research Awards 67.87%
- NIH Center Grants 4.74%
- NIH Contracts 3.74%
- NIH Developmental Grants 3.67%
- NIH Program Project Awards 3.98%
- NIH Training Grants 1.02%
- Fellowships 0.59%
- Army Grants 2.78%
- Veterans Administration and Other Government Awards 3.86%
- Foundations, Societies and Associations Funding 6.76%
- Industry Grants/Contract 0.97%
- Veterans Administration and Other Government Awards 3.86%
Department of Pharmacology & Chemical Biology
FY14 Funding by NIH Institute

- National Institute on Aging (NIA) 1.9%
- National Heart, Lung and Blood Institute (NHLBI) 19.8%
- National Institute of General Medical Sciences (NIGMS) 10.9%
- National Institute of Environmental Health Science (NIEHS) 3.4%
- National Institute on Diabetes and Digestive and Kidney Diseases (NIDDK) 19.2%
- National Center for Complementary and Alternative Medicine (NCCAM) 2.5%
- National Cancer Institute (NCI) 42.1%
- Other NIH 0.3%
<table>
<thead>
<tr>
<th>Last Name</th>
<th>Grant Num</th>
<th>Agency Name</th>
<th>Title</th>
<th>Begin Date</th>
<th>End Date</th>
<th>Annual Direct Costs</th>
<th>Annual F&amp;A Costs</th>
<th>Annual Total Costs</th>
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<tbody>
<tr>
<td>ALTSCHULER</td>
<td>R01DK063069</td>
<td>National Institutes of Health</td>
<td>Rap 1b as a Mitogenic Signal in Thyroid</td>
<td>7/1/2009</td>
<td>6/30/2014</td>
<td>$106,586</td>
<td>$54,892</td>
<td>$161,478</td>
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<tr>
<td>ALTSCHULER</td>
<td>R03TW009001</td>
<td>National Institutes of Health</td>
<td>Exploiting the cAMP pathway in Chagas Disease Therapy</td>
<td>8/19/2011</td>
<td>7/31/2015</td>
<td>$1,900</td>
<td>$979</td>
<td>$2,879</td>
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<tr>
<td>ALTSCHULER</td>
<td>R01GM099775</td>
<td>National Institutes of Health</td>
<td>cAMP effector pathways in TSH signaling</td>
<td>7/1/2013</td>
<td>4/30/2017</td>
<td>$315,964</td>
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<tr>
<td>CSANYI</td>
<td>K99HL114648</td>
<td>National Institutes of Health</td>
<td>A Novel Role of Macrophage TSP1-CD47 Signaling in Atherosclerosis</td>
<td>8/23/2013</td>
<td>7/31/2015</td>
<td>$75,801</td>
<td>$6,064</td>
<td>$81,866</td>
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<tr>
<td>DEGROAT</td>
<td>R01DK090006</td>
<td>National Institutes of Health</td>
<td>New Strategies to Treat Overactive Bladder</td>
<td>9/30/2010</td>
<td>8/31/2014</td>
<td>$11,070</td>
<td>$5,701</td>
<td>$16,771</td>
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<td>DEGROAT</td>
<td>W81XWH-11-1-0819</td>
<td>Department of Defense</td>
<td>An Implantable Neuroprosthetic Device to Normalize Bladder Function after SCI</td>
<td>9/22/2011</td>
<td>10/21/2014</td>
<td>$13,876</td>
<td>$7,146</td>
<td>$21,022</td>
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<td>DEGROAT</td>
<td>P01DK093424</td>
<td>National Institutes of Health</td>
<td>Mechanisms/Treatments of Lower Urinary Tract Dysfunction After Spinal Cord Injury (Project 4)</td>
<td>8/20/2013</td>
<td>7/31/2018</td>
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## Percent of Faculty Support on Research Grants - FY14

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## Participants in research

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<thead>
<tr>
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<tr>
<td>Courtney Andersen</td>
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<td>Christopher Barnes</td>
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<td>Lynda Sorch</td>
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<td>Aaron Talsma</td>
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<td>Brian Taylor</td>
<td>Systems / Programmer III</td>
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<td>Liping Wang</td>
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<td>Shuping Xu</td>
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<td>Imad Al Ghouleh</td>
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<td>Myrian Attar</td>
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<td>Susan Farabaugh</td>
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<td>Marco Fazzari</td>
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<td>Frederic Jean-Alphonse</td>
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<td>Sergei Karnup</td>
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<td>Tiffany Katz</td>
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<td>Su Hyeong Kim</td>
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<tr>
<td>Fangdong Zou</td>
<td>Research Associate</td>
<td>Zhang</td>
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</table>
**Major Collaborations**

**Bruce Freeman, Ph.D.**  
*Professor and Chair*

Fadi Lakkis and Timothy Billiar (University of Pittsburgh): Organ preservation for transplantation  
Mitchell Fink and Derek Angus (University of Pittsburgh): Anti-inflammatory strategies for treating sepsis/ARDS  
Robert Squires and David Hackam (University of Pittsburgh): Anti-inflammatory strategies for treating GI surgical patients  
Mark Gladwin (University of Pittsburgh): Treatment of pulmonary hypertension

**Daniel Altschuler, Ph.D.**  
*Associate Professor*

Matthias Buck (Cleveland, OH): NMR  
James Inglese (NIH)  
Yuri Nikiforov: thyroid cancer  
Carlos Camacho: MD simulations  
Mikael Nilsson: thyroid embryology and stem cells

**Dr. Alessandro Bisello**  
*Associate Professor*

Sam Gellman (University of Wisconsin): novel GLP-1 analogs  
Dale Mierke (Dartmouth): interaction between EBP50 and Skp2  
Dean Madden (Dartmouth) and Zachary Bell (Rice): design, synthesis and characterization of metallo-peptide inhibitors of EBP50

**Donald DeFranco, Ph.D.**  
*Professor*

Dr. Gordon Rintoul (Simon Fraser University Vancouver, Canada)  
Dr. Selma Witchel (Division of Pediatric Endocrinology, Children’s Hospital of Pittsburgh)  
Dr. Elias Aizenman (Department of Neurobiology, University of Pittsburgh)  
Dr. Robert Bowser (Department of Pathology, University of Pittsburgh)  
Dr. Charlene Chu (Department of Pathology, University of Pittsburgh)  
Dr. Wen Xie (Department of Pharmaceutical Sciences, University of Pittsburgh)  
Dr. Zhou Wang (Department of Urology, University of Pittsburgh)  
Dr. Dean Bacich (Department of Urology, University of Pittsburgh)

**W. Chet de Groat, Ph.D.**  
*Distinguished Professor*

Dr. Naoki Yoshimura (Department of Urology, University of Pittsburgh): Collaborative urologic research in spinal cord injury  
Dr. Lori Birder (Department of Medicine, University of Pittsburgh): Collaborative urologic research in spinal cord injury  
Dr. Tony Kanai (Department of Medicine, University of Pittsburgh): New treatment for spinal cord injury
Dr. Changfeng Tai (Department of Urology, University of Pittsburgh): Mechanisms underlying neurogenic bladder disorders
Dr. Seong-Gi Kim and P. Wang (Radiology-Imaging Center, University of Pittsburgh): Neuroplasticity in the spinal cord
Drs. C. Bates and K. Walker (Pediatric Nephrology, University of Pittsburgh)
Dr. C. L. Cheng (Department of Urology, Taichung Veterans Hospital): Pharmacology of the lower urinary tract
Dr. M. Miyazato (Department of Urology, Japan)
Dr. Michael Chancellor (Department of Urology, Beaumont Hospital, Michigan): Use of liposomes in drug delivery
Drs. Pradeep Tyagi and M. Kashyap (Department of Urology, University of Pittsburgh): Use of liposomes in drug delivery
Dr. G. Salama (Department of Cardiology/Medicine, University of Pittsburgh)
Dr. Yan Xu (Department of Anesthesiology, University of Pittsburgh)
Dr. Sun Ok Yoon (Department of Neurosciences, Ohio State University)
Dr. Yoshio Arai (Department of Radiation Oncology)
Dr. Michael Ruggieri (Department of Physiology, Temple University)

**Julie Eiseman, Ph.D.**
*Research Professor*

Robert S. Parker, Ph.D. (Department of Chemical and Petroleum Engineering, University of Pittsburgh): Optical pharmacokinetics, modeling and calculations of elastic scattering spectrometer data of Pc4 and motexafin gadolinium; docetaxel pk
Peter Wipf, Ph.D. (Department of Chemistry, University of Pittsburgh): Collaborations on preclinical studies of phosphatase inhibitors and tubulin or motor protein interactive small molecules, Protein kinase D small molecule inhibitors
Dennis Curran, Ph.D. (Department of Chemistry, University of Pittsburgh): Collaborations on preclinical studies tubulin or motor protein interactive small molecules: 6-epi dictyostatin
Billy Day, Ph.D. (School of Pharmacy University of Pittsburgh): Collaborations on preclinical studies of phosphatase inhibitors and tubulin or motor protein interactive small molecules.6-epi dictyostatin
Ed Prochownik, M.D. (Pediatrics, Children’s Hospital): Preclinical studies of myc inhibitors
Alex Doemling, Ph.D. (School of Pharmacy, University of Pittsburgh): Tubulycin analogues as anti-cancer agents, MDM2 and MDM4 antagonists
Gabrialla Mustata, Ph.D. (Department of Computation Biology, University of Pittsburgh): Computational biology of c-myc inhibitors
Jerry Collins, Ph.D. (Developmental Therapeutics, NCI): Studies of pyrimidine nucleosides in xenografts animal pharmacology studies
Doug Ross, M.D. (University of Maryland Greenebaum Cancer Center, Baltimore, MD): Mechanisms of drug resistance due to BCRP
Nancy Olienik, Ph.D. (Case Western Reserve University/Ireland Cancer Center, Cleveland, OH): Studies on Pc 4 and other silicon phthalocyanines as photodynamic therapeutics and molecular alterations in xenografts following photodynamic therapy
Ivana Vucenik, Ph.D. (University of Maryland, Baltimore): IP6 pharmacokinetics and inositol
Irving Bigio, Ph.D. (Boston University, Boston, MA): Use of optical pharmacokinetics system (ESS) to measure drugs with absorbance spectra in the long wavelength visible spectra including motexafin gadolinium, motexafin lutetium, PC4, mitoxanthrone
Steve Musser, Ph.D. (FDA, Washington, DC): Characterization of metabolites by LC/MS/MS
David D’Argenio, Ph.D., (School of Engineering, UCLA, Los Angeles CA): Pharmacokinetic and pharmacodynamic modeling of 17-AAG and DMAG, zebularine, FdC
Steven Metallo, Ph.D. (Georgetown University): c-myc inhibitors.
Martin R Austwick, Ph.D. (University College London): Pharmacokinetics of photodynamic therapeutics

Peter Friedman, Ph.D.
Professor

Dr. John Wysolmerski (Yale University)
Dr. John Scott (HHMI, University of Washington)
Dr. Jean-Luc Parent (Sherbrooke, Quebec)
Dr. Kevin Xiao (Duke)
Dr. Marcel Bruchez (Carnegie-Mellon University)
Dr. Manoj Puthenveedu (Carnegie-Mellon University)
Dr. Simon Watkins (Department of Cell Biology, University of Pittsburgh)
Dr. Harry Blair (Department of Pathology, University of Pittsburgh)
Dr. Nathan Yates (Department of Cell Biology, University of Pittsburgh)
Dr. Tony Ferreira (Department of Computational and Systems Biology, University of Pittsburgh)

William Furey, Ph.D.
Professor

Dr. F. Jordan (Department of Chemistry, Rutgers University): E. coli pyruvate dehydrogenase multi-enzyme complex component structures
Dr. Guillermo Calero (Department of Structural Biology, University of Pittsburgh): Production of pyruvate dehydrogenase
Dr. Michael Palladino (Department of Pharmacology & Chemical Biology, University of Pittsburgh): Structural studies of triosephosphate isomerase
Dr. J. Conway (Department of Structural Biology, University of Pittsburgh): Cryo-EM studies on pyruvate dehydrogenase

Ferrucio Galbiati, Ph.D.
Professor

Dr. Thomas Kensler (Department of Pharmacology & Chemical Biology, University of Pittsburgh): Caveolin-1 and Nr2
Dr. Donald DeFranco (Department of Pharmacology & Chemical Biology, University of Pittsburgh): Nuclear receptor and caveolin-1
Dr. Patrick Pagano (Department of Pharmacology & Chemical Biology, University of Pittsburgh): Caveolin-1 and Nox
Sruti Shiva (Department of Pharmacology & Chemical Biology, University of Pittsburgh): caveolin-1 and mitochondrial function
Michael Lisanti (Paterson Institute for Cancer Research, The University of Manchester, Manchester, England): cigarette smoke and the tumor microenvironment

Jing Hu, Ph.D.
Associate Professor

Dr. Shihfan Kuan (Department of Pathology, University of Pittsburgh): Expression profiles of several Wnt pathway components and regulators in human colon cancer tissues and PDAD (pancreatic ductal adenocarcinoma) tissues
Dr. Lin Zhang (Department of Pharmacology & Chemical Biology, University of Pittsburgh): HDAC2, KRAS signaling in colon cancer
Dr. Guillermo Romero (Department of Pharmacology & Chemical Biology, University of Pittsburgh): regulation of Wnt signaling by PTMs of Gsk3
Dr. Gutian Xiao (Department of Microbiology and Molecular Genetics, UPCI): regulation of cancer-related signaling network by PTMs
Dr. Daolin Tang (Department of Surgery, UPCI): targeting cancer-related signaling network in PDAC
Dr. David Schlaepfer (Department of Reproductive Medicine, Moores Cancer Center, UCSD): FAK field

**Edwin Jackson, Ph.D.**
Professor

Pat Kochanek, M.D. (Department of Critical Care Medicine, University of Pittsburgh): Adenosine in traumatic brain injury
Ed Dixon, Ph.D. (Department of Critical Care Medicine, University of Pittsburgh): Adenosine in brain dysfunction
Elieser Gorelik, Ph.D. (Department of Pathology, University of Pittsburgh): Role of adenosine in cancer
Gerard Apodaca, Ph.D. (Department of Medicine, University of Pittsburgh): Role of adenosine in bladder function
Derek W. Gilroy, Ph.D. (Division of Medicine, University College London): Role of adenosine in inflammation
Stevan P. Tofovic, M.D., Ph.D.; Center for Clinical Pharmacology, University of Pittsburgh): Estradiol metabolites in renal disease
Raghvendra K. Dubey, Ph.D. (Department of Obstetrics and Gynecology, University Hospital Zurich): Vascular biology of estradiol metabolites
Lisa Satlin, M.D. (Division of Pediatric Nephrology, Mount Sinai School of Medicine): Purine metabolomics

**Yu Jiang, Ph.D.**
Associate Professor

Dr. Zhao (Nanjing Medical School, China): Clinical-related studies
Dr. Ferro-Novick (University of California, San Diego): Autophagy-related study
Dr. Freeman (Department of Pharmacology & Chemical Biology, University of Pittsburgh)
Dr. Weisz (Department of Medicine, University of Pittsburgh)
Dr. Liu (Department of Pathology, University of Pittsburgh)

**Edwin Levitan, Ph.D.**
Professor

John Horn (Department of Neurobiology, University of Pittsburgh): Dopamine neuron project
Elias Aizenman (Department of Neurobiology, University of Pittsburgh): Potassium channels and apoptosis
David Deitcher (Cornell) and Randy Hewes (Oklahoma): Neuropeptide release in Drosophila
Glenn Fishman (NYU): Cardiac potassium channel expression

**Tatyana Mamonova, Ph.D.**
Research Instructor

Zimei Bu

**Carola Neumann, M.D.**
Visiting Associate Professor
Drs. Michael Becich, Uma Chandra, Soumya Luthra, Adrian Lee, Steffi Oesterreich: development of a ROS-gene signature in basal like breast cancer
Dr. Tom Smithgall: Rad51 project
Dr. David Dabbs (Magee-Women’s Hospital): Activated phenotype (R21)
Dr. Li Lan: helping us visualize and quantify the dynamics between Prdx1 and Rad51 on sites of double strand DNA
Drs. Carolyn Anderson and Steven Thorne (University of Pittsburgh): will support us in developing a mouse model allowing imaging of mammary stroma associated fibroblasts in the context of metastasis
Drs. David Root and Glenn Cowley (Broad Institute, Boston): will support us in performing a shRNA kinase screen to identify kinases promoting CAFs
Drs. Christine Winterbourn and Mark Hampton (University of Otago), Elizabeth Veal (Newcastle University): all PIs are leading in the Prdx field
Drs. Li Lan and Liu Yang (UPCI): RAD51 project and telomers and ROS
Drs. Adam Feinberg and Philip DeLuc (CMU): PX-OC project and role of Prdx1 in cancer-associated fibroblasts
Dr. Shannon Kelleher (Penn State): zinc deficiency in breast cancer, ROS and Prdx1

Roderick O’Sullivan, Ph.D.
Assistant Professor

Kara Bernstein (University of Pittsburgh Cancer Institute): The role of RNF4 in the alternative lengthening of telomeres pathway
Chris Bakkenist (University of Pittsburgh Cancer Institute): Localization of ASF1 to replication forks
Genevieve Almouzni (Institut Curie, Paris, France): Deregulation of the histone supply chain leads to activation of the ALT pathway
Robert Sobol (University of Southern Alabama): The role of PARP and PARG in telomere maintenance and replication fork stability
Matthias Fischer (University of Cologne, Germany): Investigation of ALT in pediatric neuroblastoma

Patrick Pagano, Ph.D.
Professor

P. Michael Bauer (Department of Surgery, University of Pittsburgh)
Aaron Barchowsky (Department of Environmental and Occupational Health, University of Pittsburgh)
Robin Gandley (Magee Women’s Hospital)
Jeffrey Isenberg (Department of Medicine, University of Pittsburgh)
Xiang Gao (Department of Pharmaceutical Sciences, University of Pittsburgh)
Song Li (Department of Pharmaceutical Sciences, University of Pittsburgh)
Carlos Camacho (Department of Computational Biology, University of Pittsburgh)
Guangjie Cheng (Emory University)
Phil Palade (University of Arkansas)
Xiao-Ping Yang (Henry Ford Hospital)
William Beierwaltes (Henry Ford Hospital)

Michael Palladino, Ph.D.
Associate Professor

Ron Wetzel (University of Pittsburgh): The study of TPI aggregation and involvement in amyloidopathies
Andrew Van DeMark (University of Pittsburgh): The study of TPI protein pathogenic structure
Peter Andolfatto (Princeton University): collaborate to study pharmacology of Na/K ATPase alpha
Brett Kaufman (University of Pennsylvania): small mitochondrial imported RNAs modulate mito DNA copy number
Larry Rieter (University of Tennessee Health Science Center, Memphis, TN): Ubiquitin-mediated turnover of the Na/K ATPase

Wei Qian, Ph.D.
Research Instructor

Peter Wipf
Patricia Opresko

Guillermo Romero, Ph.D.
Associate Professor

Susan Amara (University of Pittsburgh): elucidation of the mechanisms by which amphetamines regulate the uptake of the dopamine transporter
Jing Hu (Department of Pharmacology & Chemical Biology, University of Pittsburgh): project that focuses on the role of HDAC2 in the regulation of the Wnt signaling pathway
Shivendra Singh (Department of Pharmacology & Chemical Biology, University of Pittsburgh)
Robert Sobol (Department of Pharmacology & Chemical Biology, University of Pittsburgh)

James Roppolo, Ph.D.
Research Assistant Professor

Seong-Gi Kim (Department of Radiology, University of Pittsburgh): fMRI brain imaging studies
Changfeng Tai (Department of Urology, University of Pittsburgh): Neurourology and pharmacology studies
Lori Birder (Department of Medicine, University of Pittsburgh): Neurourology and IC studies

Francisco Schopfer, Ph.D.
Research Associate Professor

Eugene Chen (University of Michigan): Study of the mechanisms of PPARgamma activation by nitrated fatty acids
Anna Lisa Levonen (University of Kuopio, Finland): Study of the activation of phase 2 genes by nitroalkenes, mainly focusing on KEAP/Nrf2 pathway

Sruti Shiva, Ph.D.
Assistant Professor

Jeffrey Isenberg (Department of Medicine, University of Pittsburgh)
Mark Gladwin (Department of Medicine, University of Pittsburgh)
Anje Cauwels (University of Ghent, Belgium)
Tienush Rassaf (University Hospital Aachen, Germany)
William Frazier (Washington University, St. Louis, MO)

Shivendra Singh, Ph.D.
Professor

Sruti Shiva (Department of Pharmacology & Chemical Biology, University of Pittsburgh)
Rohit Bhargava (Department of Pathology, University of Pittsburgh)
Rachel Jankowitz (Department of Medicine, University of Pittsburgh)
Saumen Sarkar (Department of Microbiology and Molecular Genetics, University of Pittsburgh)
Robert Sobol, Ph.D.
Associate Professor

Ben Van Houten (Department of Pharmacology & Chemical Biology, University of Pittsburgh): PARP activation and the impact on mitochondrial function (SeaHorse)
Patty Opresko and Ben Van Houten (University of Pittsburgh) and Marcel Bruchez (Carnegie Mellon University): Development of targeted in vivo protein-encoded DNA damaging agents (specific to telomeres, mitochondria and site-specific nuclear sites)
Carlos Camacho (University of Pittsburgh) and Geoff Wahl (Salk): Small molecule inhibitors of PolB/XRCC1 heterodimer formation
Ichiro Nakano (OSU): glioma stem cells
Charlie Brenner (Iowa): NAD metabolomics
Guy Poirier (CHUL Research Center): PARP proteomics
Nathan Yates (University of Pittsburgh): PolB and UBE3B interacting proteins
Conchita Vens (NKI): PolB in cancer
Wim Vermeulen (Erasmus): nucleosome dynamics in BER
Alfonso Bellacosa (Fox Chase): development of TDG inhibitors

Laura Stabile, Ph.D.
Research Associate Professor

Phouthone Keovahong and Y. P. Peter Di (Department of Environmental and Occupational Health, University of Pittsburgh): Lung Inflammation Project and KRAS Project
Richard Pietras, Edward Garon and Diane Marquez-Garbin (UCLA): clinical trials
Jennifer Grandis, Julie Bauman and Ann Marie Egloff (Department of Otolaryngology, University of Pittsburgh): Head and Neck SPORE Project 4 and R21 submitted
Sanja Dacic (Department of Pathology, University of Pittsburgh): Lung SPORE Project 1
Pamela Hershberger (Roswell Park Cancer Institute and UPCI): Vitamin D and EGFR mutation project
Brenda Diergaard (Department of Epidemiology, University of Pittsburgh): Obesity and Lung Cancer Risk – R21 Project and SPORE Project 3
Yan Lin and Brenda Kurland (UPCI Biostatistics): Lung SPORE Project 1
Jill Siegfried (University of Minnesota): Lung SPORE Project 1 and HGF/Estrogen Project
Timothy Burns (Division of Hematology-Oncology, University of Pittsburgh): EGFR, MET and estrogen related projects
Ahmad Tarhini (Department of Medicine, University of Pittsburgh): clinical trials
Lisa Villaruz (Department of Medicine, University of Pittsburgh): clinical trials
Guitain Xiao (Department of Microbiology and Molecular Genetics): NF-ƙB and lung cancer project
Sam Rothstein (Qroni, Inc.): SBIR Award - reformulation of failed tublin inhibitor

Adam Straub, Ph.D.
Assistant Professor

Donald DeFranco (Department of Pharmacology & Chemical Biology, University of Pittsburgh)
Liza Villanueva (Department of Cardiology, University of Pittsburgh)
Edwin Jackson (Department of Pharmacology & Chemical Biology, University of Pittsburgh)

Ben Van Houten, Ph.D.
Professor
Marcel Bruchez (Carnegie Mellon University): development of fluorogenic activating peptides for targeted ROS generation
Neil Kad (University of Essex, Colchester, UK): Single-molecule studies of bacterial repair proteins (R01 submitted)
Peter McHugh (Oxford University): analysis of yeast repair proteins using single molecule techniques (part of competitive renewal)
Jung-Hyun Min (Department of Chemistry, University of Illinois): analysis of human DNA damage recognition proteins (XPC-hR23B) by single molecule techniques (basis for competitive renewal)
Alan Tomkinson (University of New Mexico): development of anti-DNA ligase drugs, publication model close to submission; collaborative R01 not successful; will reapply
Roger Woodgate (NIH, NICHD): Role of nucleotide excision repair on the removal of RNA incorporated in DNA
Caroline Kisker (University of Wurtzburg, Wurtzburg, Germany): Structure and function of nucleotide excision repair proteins
Charleen Chu (Department of Pathology, University of Pittsburgh): mitochondrial bioenergetics and Parkinson’s disease
Simon Watkins (Department of Cell Biology, University of Pittsburgh): signal molecule analysis of DNA repair enzymes (currently supported by an R01)
Dana Bovbjerg and Frank Jenkins: role of stress in ROS generation and mitochondrial and nuclear DNA damage
Robert Edwards: Analysis of fatty acid metabolism in ovarian cancer cells (applied for Johnson & Johnson Corporate Office of Science and Technology); also applied to Ovarian Cancer SPORE for pilot funding
Patty Opresko: mitochondria and telomere cross-talk (received pilot funding from the Aging Institute)
Edward Prochownik: myc and mitochondrial function and dynamics (applied for an R01, successful)
Peter Wipf: development of small molecules that induce synergistic killing with cisplatin (invention disclosure)
Thomas Carrell (Ludwig Maximilians-Universitat Munchen, Germany): XPA structure-function

Jean-Pierre Vilardaga, Ph.D.
Associate Professor

Harvard University, Endocrine Unit
Harvard University, Center for Systems Biology
University of Wuerzburg (Germany), Institute of Pharmacology
University of Barcelona (Spain), Department of Pathology and Experimental Therapeutics
University of Santiago de Compostela (Spain), Department of Pharmacology

Daniela Volonte-Galbiati, Ph.D.
Research Assistant Professor

Donald DeFranco (Department of Pharmacology & Chemical Biology, University of Pittsburgh): role of Caveolin-1 in nuclear receptor signaling

Bennett Van Houten, Ph.D.
Professor

Carolyn Anderson, Barry Edwards: fatty acid metabolism in cancer cells
Kara Bernstein: binding of the shu complex to DNA
Dana Bovbjerg and Frank Jenkins: role of stress in ROS generation, and mitochondrial and nuclear DNA damage
Louis Fallo: action mechanisms of radiation toxicity amelioration by a mitochondrially targeted antioxidants
Charlee Chu: mitochondrial bioenergetics and Parkinson’s disease
Nancy Davidson: analysis of metabolic flux in human breast cancer cell lines
Robert Edwards: analysis of fatty acid metabolism in ovarian cancer cells
Timothy Greenamyre: mitochondrial DNA damage and Parkinson’s disease
Li Lan: use of killer red to examine DNA repair in real time
Michael Lotze: mitochondrial bioenergetics and T cell maturation
Patty Opresko: mitochondria and telomere cross-talk
Edward Prochownik: myc and mitochondrial function and dynamics
Simon Watkins: signal molecule analysis of DNA repair enzymes
Peter Wipf: XJB protection of oxidant injury to mitochondria
Marcel Bruchez (Carnegie Mellon University): development of fluorogenic activating peptides for targeted ROS generation
Sheila David (University of California, Davis): analysis of nucleotide excision repair in the removal of oxidative lesions
Neil Kad (University of Essex): single molecule studies of bacterial repair proteins
Peter McHugh((Oxford University): analysis of yeast repair proteins using single molecular techniques
Jung-Hyun Min (Department of Chemistry, University of Illinois): analysis of human DNA damage recognition proteins by single molecular techniques
Alan Tomkinson (University of New Mexico): development of anti-DNA ligase drugs
Roger Woodgate (NIH, NICHD): role of nucleotide excision repair on the removal of RNA incorporated in DNA

Q. Jane Wang, Ph.D.
Associate Professor

Billy Day (Department of Pharmaceutical Sciences, University of Pittsburgh)
Adam Glick (Penn State University)
J. Frederic Mushinski (National Cancer Institute)
Peter M. Blumberg (National Cancer Institute)

Stacy Gelhaus Wendell, Ph.D.
Research Assistant Professor
Fernando Holguin, Sally Wenzel and Merrit Fajt (Asthma Institute, University of Pittsburgh)
Donald DeFranco (Department of Pharmacology & Chemical Biology, University of Pittsburgh)
Natalia Kedishvili (University of Alabama at Birmingham)
Nathaniel Snyder (Drexel University)

Cheng Zhang, Ph.D.
Assistant Professor

Brian Kobilka (Stanford University)
Daniel Muller (ETH Zurich, Switzerland)
Brian Shoichet (UCSF)
Kayoung Chung (Sungkyunkwan University, Korea)
Qianming Chen (Sichuan University, China)
Xiang-qun Xie (University of Pittsburgh)
Lin Zhang, Ph.D.
Professor

Xiao-Ming Yin (Department of Pathology, University of Pittsburgh): Studying apoptosis induced by proteasome inhibitor
Cary Wu (Department of Pathology, University of Pittsburgh): Studying apoptosis caused by chance in extracellular matrix
Tao Cheng (Department of Radiation Oncology, University of Pittsburgh): Studies of PUMA-knockout mice
Robert Schoen (Department of Medicine, University of Pittsburgh): Studying chemoprevention of colon cancer by NSAIDs
Wei Zhou (Emory University): Developing molecular markers of lung cancer
Chuanshu Huang (New York University): Studying apoptosis induced by anti-cancer drugs
Jim Herman (Johns Hopkins University): Studying DNA methylation in lung cancer
Gerry Zambetti (St. Jude’s Children’s Hospital): Studies of PUMA-knockout mice
Chinese Academy of Medical Sciences: Studying esophageal cancer drug response

Entrepreneurial Activities

None.

Awards and Honors

Thomas Kensler, Ph.D.
Professor
Delta Omega Alpha Chapter, The Honorary Public Health Society, 2014
Thomspm Reuters Highly Cited Researcher (top 1% in Pharmacology & Toxicology), 2014

Jack Lancsater, Ph.D.
Professor
2014 Lifetime Achievement Award, Society for Free Radical Biology and Medicine

Invited Talks

Bruce Freeman, Ph.D.
Professor and Chair


“Electrophilic Fatty Acid Transduction of Redox Signaling Reactions.” Medical University of South Carolina, Charlestown, SC, March 19, 2012.


“Formation and Signaling Actions of Electrophilic Fatty Acid Derivatives.” 7th International Conference on the Biology, Chemistry and Therapeutic Application of Nitric Oxide, Edinburg, Scotland, July 25, 2012.
“The Fires of Inflammation Forge New Drugs.” Keynote Speaker, Burnett School of Biomedical Sciences, College of Medicine, University of Central Florida, Orlando, FL, August 16, 2012.

“Pulling New Drug Candidates from the Fires of Inflammation.” Wright State University, Dayton, OH, November 29, 2012.


“Formation and Signaling Actions of Electrophilic Fatty Acids.” The Environmental Response IV International Symposium, Tohoku University, Sendai, Japan, March 1, 2014.

“Pleiotropic Anti-Inflammatory Signaling Actions of Redox-Derived Fatty Acid Electrophiles.” Oxidative Stress Conference, Toledo, Spain, October 4, 2014.

**Daniel Altschuler, Ph.D.**  
*Associate Professor*

Cell Signaling Technology, Massachusetts, April 26, 2012.


School of Sciences, University of Buenos Aires, December 3, 2013.

**Palaniappa Arjunan, Ph.D.**  
*Research Instructor*


**Dr. Alessandro Bisello**  
*Associate Professor*

“A Coordination of Tissue Remodeling by the PDZ Protein EPB50/NHERF1.” Dartmouth College, July 2014.

**Donald DeFranco, Ph.D.**  
*Professor*

Department of Microbiology, University of Virginia School of Medicine, April 2012.

Department of Pharmacology, University of Pennsylvania School of Medicine, November 2012.
4th International Recent Advances in Health & Medical Sciences/International Conference on Oncology and Anticancer. Cyprus, June 2013.


Rapid Responses to Steroid Hormones International Conference, Erie, PA, September 2013.

Symposium Speaker, Society for Basic Urology Research Annual Meeting, Dallas, TX.

**W. Chet de Groat, Ph.D.**

*Distinguished Professor*


**Peter Friedman, Ph.D.**

*Professor*
CCNY Chemistry Department, February 2012.

Hans Prydz Lecture, Norway Centre for Molecular Medicine, University of Oslo, May, 2013.

Department of Pharmacology, University of Washington, September, 2013.

Sullivan Lecture, Kansas University Medical Center, November, 2013
University of California San Francisco, Endocrine, February 2014


**Ferruccio Galbiati, Ph.D.**  
*Associate Professor*

Paterson Institute for Cancer Research, The University of Manchester, Manchester, England

**William Furey, Ph.D.**  
*Professor*

“Structural Features of the Dihydrolipoamide Dehydrogenase E3 Component from the E. coli Pyruvate Dehydrogenase Complex.” American Crystallographic Association Meeting, Boston, MA, July 2012.


**Eun-Ryeong Hahm, Ph.D.**  
*Research Instructor*

SNUCRI Symposium, May 2012.

**Ryan Hartmaier, Ph.D.**  
*Research Instructor*


**Jing Hu, Ph.D.**  
*Assistant Professor*


The SUMO Pathway: Attractive Upcoming Cancer Targets? Texas Tech University Health Sciences Center School of Medicine Cancer Center. December 5, 2012.

Targeting Deregulated PTM Pathways for the Treatment of CRC and PDAC. Southwest Hospital, Third Military Medical University, Chongqing, China, October 29, 2014.
Targeting Deregulated PTM Pathways for the Treatment of CRC and PDAC. Cancer Center, Daping Hospital and Research Institute of Surgery Third Military Medical University, Chongqing, China, October 30, 2014.

**Edwin Jackson, Ph.D.**  
*Professor*


Jackson, E.K.: Role of the 2′,3′-Cyclic AMP-Adenosine Pathway in Kidney and Brain Injury. Presented to the Department of Anesthesiology, University of Colorado Denver, August 26, 2013.


**Tija Jacob, Ph.D.**  
*Assistant Professor*

Senior Vice Chancellor’s Research Seminar 12/7/2012 “GABAA Receptor Trafficking: Dynamic Inhibition in CNS Health and Disease”

**Yu Jiang, Ph.D.**  
*Assistant Professor*

“The role of Rheb in mTOR regulation” (2012). 2nd International Bone Biology Symposium, Shihezhi, China.


“The role of FKBP38 in tumor suppression” (2012). University of Pittsburgh Cancer Institution, Pittsburgh, PA.

“The role of Npr1 kinase in nitrogen discriminating pathway” (2012). Yeast Genetics Meeting at Princeton, NJ.

“Connecting mTOR to mitochondria” (2013) Brain Institution, Fudan University School of Medicine. Shanghai.

“Regulation of mTOR” (2013) National Center for Animal Models, Shanghai.

“A crosstalk between life and death, the role of FKBP38 in cell growth and apoptosis” (2013), Dean’s Inaugural Lecture, Suzhou University College of Medicine, Suzhou, China.

“The role of FKBP38 in tumor suppression” (2013). Department of Biochemistry and Molecular Biology, Louisiana State University Health Sciences Center, Shreveport, LA.


Gcn2 is an amino acid sensor for TORC1 in yeast. Metabolism, Diet and Disease: Cancer and Metabolism, Washington DC., May 2014.

Signaling Mechanism of tumor suppressor folliculin. International Frontier Biological Science Symposium, Chengdu, China, June 2014.


Regulation of mTOR. Department of Pathology, Indiana University School of Medicine, Indianapolis, IN, September 2014.

Signaling mechanisms of Primary Cilium. Brain Institution, Fudan University School of Medicine, Shanghai, China, November 2014.


**Thomas Kensler, Ph.D.**

*Professor*

Oxidants and Antioxidants in Biology, Alba, Italy, 2012

Oxygen Biology: Hypoxia, Oxidative Stress and Diseases, Sapporo, Japan, 2012


School of Pharmacy Distinguished Lectureship, Ohio State University, Columbus, OH, 2012

School of Pharmacy, University of Illinois Chicago, Chicago, IL, 2012

Food and Drug Administration, Center for Food Safety and Applied Nutrition, Laurel, MD, 2012
Southern California Chapter, Society of Toxicology Annual Meeting, Carlsbad, CA, 2012

Medical College of Wisconsin Cancer Center, Milwaukee, WI, 2012

Department of Structural and Cellular Biology, Tulane University, New Orleans, LA, 2012

Cancer Epidemiology, Prevention and Control Program, University of Pittsburgh Cancer Institute, 2013


International Workshop on Ageing and Cancer Cell Biology: Convergent and Divergent Molecular Mechanisms, Athens, Greece, 2013

XIII International Congress of Toxicology, Seoul, Korea, 2013

College of Pharmacy, Catholic University of Korea, Seoul, Korea, 2013

Gordon Research Conference: Cellular and Molecular Mechanisms of Toxicity, Andover, NH, 2013

Department of Food Science, Penn State University, University Park, PA, 2013

C Malcolm Trout Annual Lecture, Michigan State University, East Lansing, MI, 2013

Department of Pharmacology & Toxicology, Michigan State University, East Lansing, MI, 2013

Xiangshan Science Conference on Frontiers in Cancer Chemoprevention, Beijing, China, 2013

Aflatoxin Symposium, Vanderbilt University, Nashville, TN, 2013


Rutgers Cancer Institute of New Jersey, New Brunswick, NJ, 2013

Miller Lectureship, Weil Cornell Medical School, New York, NY, 2013

Environmental Response IV Conference, Sendai, Japan, 2014

Society for Free Radical Research International Biennial Meeting, Kyoto, Japan, 2014


Department of Pediatric Oncology, MD Anderson Cancer Center, Houston, TX, 2014


School of Public Health, University of Washington, Seattle, WA, 2014
Nicholas Khoo, Ph.D.
Research Assistant Professor

Inhibition of obesity-induced pulmonary arterial hypertension by nitro-fatty acids. Presented at PACCM Basic & Translational Research in Lung Disease Conference; Pittsburgh, PA, December 2012.

Nitrite and Nitro-Fatty Acids Potential Therapeutics Against Metabolic Syndrome. Presented at Fifth International Meeting on the Role of Nitrite and Nitrate in Physiology, Pathophysiology, and Therapeutics; Pittsburgh, PA, May 2013.

Jack Lancaster, Ph.D.
Professor

Dinitrosyliron Complexes: What May We Know about the Cellular Function of a Tumor Biomarker First Described 50 Years Ago? Gordon Research Conference on Oxygen Radicals: From Detection to Disease, Ventura, California, 2014.

A Radical Notion: Specialization is for Insects. 2014 Lifetime Achievement Award, Society for Free Radical Biology and Medicine, Seattle, WA, 2014.

Hypoxia-Induced Cellular Nonheme Iron Mobilization and Nitric Oxide: Biological Functions of an Unusual EPR Signal Observed in Tumors 50 Years ago. University of Illinois, Chicago, Department of Medicinal Chemistry and Pharmacognosy, 2014.

Joan M. Lakoski, Ph.D.
Professor


Invited Speaker with Dr. Robert J. Milner, “Know Your Kangaroo: The Pathway to Independence Award (K99/R00)”, Postdoc Retreat, University of Wisconsin, Milwaukee, WI, April 4, 2012.


Workshop: “Crafting Effective Specific Aims”
Workshop: “The Inside Story on a NIH Review Panel”

   Workshop: “Finding the Right Funding”
Workshop: “An Inside Look at Grant Reviews”
   Workshop: “Structure of a Proposal”
Workshop: “Writing Your Specific Aims”


Invited Speaker, “Navigating Through the University and Academic Health Center”, Career Mapping Workshops, Early Career Women Faculty Professional Development Seminar, American Association of Medical Colleges (AAMC), Potomac, MD, July 7, 2012.

Invited Speaker with Dr. Robert J. Milner, “Writing Effective Specific Aims”, Grant Writing Workshop, 2012 Gilliam Fellows Meeting, Howard Hughes Medical Institute, Chevy Chase, MD, August 9, 2012.

Invited Speaker with Dr. Robert J. Milner, “NIH Career Development Award General Workshop: Steps to a Competitive Application (including a mock study section)”, Memorial Sloan-Kettering Cancer Center, New York, NY, September 5, 2012.
   Workshop: “Steps to a Competitive Application”
Workshop: “Know Your NRSA”
   Workshop: “Know Your K”
   Workshop: “Know Your Kangaroo”

Invited Speaker, “Creating a Dynamic Research Mentoring Relationship: Advising Students and Postdocs”, Faculty Development Program to Enhance Teaching Skills, Penn State College of Medicine, Hershey, PA, September 14, 2012.


Invited Speaker with Dr. Robert J. Milner, “NIH Career Development Award General Workshop: Steps to a Competitive Application (including a mock study section)”, Office of Academic Affairs, Columbia University School of Medicine, New York, NY, November 30, 2012.
  
  Workshop: “Keys to a Successful K99/R00 Career Development Application”
  Workshop: “Crafting Effective Specific Aims”


Invited Speaker, “Preparing for Success: Career Opportunities in the Health Sciences”, La Roche College, Pittsburgh, PA, April 15, 2013. *(Target Audience: Undergraduate Students)*

Invited Speaker, “Grant Award Types”, University of Pittsburgh Faculty Development Fellowship Program, Pittsburgh, PA, April 18, 2013.

Invited Speaker, “Essential Networking as a Professional”, America’s Next Top Infectious Disease Model: HIV & Influenza Conference hosted by the Department of Epidemiology, Harvard School of Public Health Annual Conference for Undergraduate Students, Chicago, IL, April 21, 2013.

Invited Speaker with Dr. Robert J. Milner, “Know Your Kangaroo: Pathway to Independence Award (K99/R00), NIH Career Development Award Workshop, New York University Langone Medical Center, New York, NY, May 1, 2013.

Invited Speaker with Dr. Robert J. Milner, “Know Your NRSA” New York University Langone Medical Center, New York, NY, May 1, 2013.

Invited Speaker, “Applying for the NIH Pathway to Independence (K99/R00) Award, Center for Neuroscience, West Virginia University, Morgantown, WV, May 15, 2013.

Invited Presenter, “Maximizing Success in a Dynamic Mentoring Relationship”, Faculty Mentoring Workshop, Center for Neuroscience, West Virginia University, Morgantwon, WV, May 15, 2013.

Invited Faculty; “Maximizing Success as a Research Mentee”, 2013 MIDAS Summer Undergraduate Research Program, University of Pittsburgh MIDAS Center of Excellence, Pittsburgh, PA, May 24, 2013.


Invited Speaker, “Achieving Your Career Goals through Dynamic Mentoring”, Department of Ophthalmology Retreat, University of Pittsburgh School of Medicine, August 14, 2013.


Invited Presenter and Workshop Host, “Discovering the Leader within You: Exploring the Full Spectrum of Science Careers”, held on campus at Morehouse Medical College, Atlanta, GA, September 18, 2013. (Target audience of graduate students and postdoctoral fellows)


General Workshop: “Steps to a Competitive Application”
“Navigating NIH”
“Mock Study Section”
“15 Steps to the Payline”
“Know Your NRSA”
“Know Your K”
“Know Your Kangaroo”

Invited speaker with Dr. Robert J. Milner, “NIH Career Development & Training Award Workshops”, Rosalind Franklin University of Medicine and Science, North Chicago, IL, September 30, 2013.

General Workshop: “Steps to a Competitive Application”
“Know Your NRSA”
“Know Your K: A Guide to applying for a Career Development Award”


Invited Speaker with Dr. Robert J. Milner, “NIH Career Development & Training Award Workshops”, University of Massachusetts Medical School, Worcester, MA, October 31, 2013.

General Workshop: “Steps to a Competitive Application”
“Know Your Awards:
    Know your NRSA
    Know your K
    Know Your Kangaroo (Pathways to Independence (K99/R00 Award))”

Adrian Lee, Ph.D.
Professor

“Structural rearrangements in DNA repair genes”. 22nd Breast Cancer Think Tank, Cancun, Mexico, 2012.


“Recent failures of anti-IGFIR cancer therapies: A teaching moment for personalized biomarker directed clinical trials”. Epoley Cancer Center, Omaha, NE, 2012.

"IGFs and breast cancer" Insulin, obesity and Cancer, Taormina, Italy, 2013.

"Tumor heterogeneity" 22nd Breast Cancer Think Tank, Dominican Republic, 2013.

"Applying Personalized Genomic Medicine to Breast Cancer" Center for Integrated Oncology, Cologne, Germany, 2013.


“Genomic and Transcriptomic Changes in Metastatic Breast Cancer.” Grand Rounds, Case Western Research University, Cleveland, OH, 2014.

Carola Neumann, M.D.
Visiting Associate Professor

Stony Brook University, Dept. of Pathology, Dr. Ken Shroyer: “The peroxidase Prdx1 regulates specifically redox-signaling,” March 2012.


**Steffi Oesterreich, Ph.D.**

*Professor*


“Mechanism of Endocrine Resistance” McArdle Cancer Center, Madison, WI, Oct 2012.

“SRC1 - Bridging hormone response in breast and bone” Think Tank, Cancun, Mexico, 2012.


“Invasive Lobular Cancer (ILC): A Different B(r)east.” University of Denver Cancer Center, March 2014.


“Endocrine Resistance in Lobular Breast Cancer.” Harbin Medical School, Harbin, China, April 2014.

“Endocrine Response in Women’s Malignancies.” Charite, Humboldt University, Berlin, August 2014.

“Estrogen Response in Lobular Cancer.” Wright State University, Department of Biochemistry and Molecular Biology, Dayton, OH, October 2014.

“Role of Epigenetics in Endocrine Resistant Breast Cancer.” Fels Institute, Temple University, Philadelphia, PA, November 2014.

**Roderick O’Sullivan, Ph.D.**

*Assistant Professor*

NIH DNA Repair Video Seminar Series. NIH, Frederick, MD, 2014.

**Patrick Pagano, Ph.D.**

*Professor*
University of Mississippi Medical Center, Department of Physiology, “The Vascular Media: Nexus of Oxidative Stress and Inflammation,” Jackson, MS, May 9, 2012.

University of Mississippi Medical Center, Center, Center for Excellence in Cardiovascular-Renal Research, “Targeting Oxidative Stress, Bullseye Nox.” Jackson, MS, May 10, 2012.


Georgia Regents University, Section of Experimental Medicine, "Sly as a NOX, a Retrospective on the Challenges & Triumphs of Targeted Therapy", Augusta, GA, September 5, 2013.

2013 Redox Biology Center Symposium, University of Nebraska – Lincoln, Redox Signaling: A Potential Therapeutic Target for Human Disease, Nox Inhibitor Discovery & Vascular Disease, a Retrospective, Lincoln, NE, October 10, 2013.

British Heart Foundation Glasgow Cardiovascular Research Centre, University of Glasgow, The Quest for Nox Therapeutics, Perspectives on the Challenges, Pitfalls & Triumphs, Glasgow, Scotland, October 16, 2013.

Jagiellonian Centre for Experimental Therapeutics (JCET), Jagiellonian University, NOX, a Retrospective on the Challenges & Triumphs of Targeted Therapy, Krakow, Poland, October 18, 2013.

University of Oklahoma Health Sciences Center, Department of Physiology, New Frontiers in Nox Regulation, From Mechanism to Therapy, Oklahoma City, OK, February 13, 2014.

“Frontiers in Nox Regulation, from Novel Modulators to Nox Inhibitors.” Virginia Commonwealth University, Department of Pharmacology & Toxicology, Richmond, VA, March 27, 2014.

“New Insights into Nox Regulation, from Mechanism to Therapy.” University of Missouri-Columbia, Health Sciences Center, Department of Pharmacology & Physiology, Columbia, MO, May 6, 2014.

“New Players on the Nox Stage, From Chaperones to Effectors.” Klinikum der Goethe-Universität, Institut für Kardiovaskuläre Physiologie, Vascular Research Centre, Frankfurt am Main, Germany, May 14, 2014.


“Modulators and Signaling Pathways Controlling Vascular Nox, From Chaperones to New Inhibitors.” Northeast Ohio Medical University, Department of Integrative Medical Sciences, Dr. Hans G. Folkesson Memorial Seminar Series, Rootstown, OH, November 4, 2014.

"New Players on the Nox Stage, From Chaperones to Effectors.” American Heart Association Scientific Sessions, Cardiovascular Seminar Series: Redox Signaling in Cardiovascular Disease: NADPH Oxidase and Beyond, Chicago, IL, November 17, 2014.

Michael Palladino, Ph.D.
Associate Professor

“Genetic Mitochondrial Manipulation Strategies.” UMDF Mitochondrial Medicine, 2014.

**Francisco Schopfer, Ph.D.**

*Research Associate Professor*

Invited Speaker, Institute for Environmental Medicine, University of Pennsylvania, 2012.

Invited Speaker Oxygen Club of California World Congress 2012, Alba, Italy.

Bioactive Lipids Conference, Puerto Rico, 2013

Mass Spectrometry Course, Department of Medicine, Universidad de la Republica, Uruguay, 2014

Laboratory of Oxygen Metabolism, School of Medicine, University of Buenos Aires, 2014.

**Sruti Shiva, Ph.D.**

*Assistant Professor*


“Platelet mitochondria: From mechanism to biomarker of Disease.” Department of Hematology, Emory University, Atlanta, Georgia, April 2013.

“Nitrite modulates mitochondrial function through fusion in normoxia.” International Meeting of the Role of Nitrite in Health and Disease, Pittsburgh, PA, May 2013.


TrMAD regional meeting

International Nitric Oxide Meeting

University of Nevada Reno

Mitochondria and Cellular Metabolism Symposium; Montevideo, Uruguay

Mitochondrial Bioenergetics and Metabolism Course; Montevideo, Uruguay

**Shivendra Singh, Ph.D.**

*Professor*

Session Speaker, 4th International Conference on Drug Discovery & Therapy, Dubai, UAE. Title: Prostate Cancer Prevention with Bioactive Food Components, February 14, 2012.

Integrative Medicine Program at the University of Texas M. D. Anderson Cancer Center, Houston, TX. Title: Bioactive Food Components and Cancer Chemoprevention, March 20, 2012.


Elkin Lecture, Emory University Winship Cancer Institute, Atlanta, GA. Title: Biomarkers of Cancer Prevention by Dietary Isothiocyanates, January 11, 2013.

University of Texas, Austin, TX. Title: Bioactive Food Components and Cancer Chemoprevention: Cancer Prevention with Dietary Isothiocyanates, March 29, 2013.

Phytochemicals and Cancer Prevention. Department of Pharmacology and Toxicology, University of Arkansas for Medical Sciences, Little Rock, AR, April 2014.


Robert Sobol, Ph.D.
Associate Professor

Base excision repair and NAD+ Biosynthesis crosstalk - Understanding and exploiting PARP activation-induced cellular energy modulation. Université Laval, Quebec City, Canada.

DNA repair and NAD+ Biosynthesis crosstalk: Understanding and exploiting PARP activation-induced cellular energy modulation. Department of Biochemistry, Carver College of Medicine, University of Iowa, February 8, 2012.


The interplay of PARP1, Polß and XRCC1 in response to DNA Damage. Laboratory of Molecular Pharmacology, Center For Cancer Research, National Cancer Institute, NIH, May 11, 2012.

The interplay of PARP1, Polß and XRCC1 in response to DNA Damage. UNT Health Science Center; College of Pharmacy, May 29, 2012.

Base excision repair, PARP and NAD+ biosynthesis crosstalk in response to DNA damage. 3rd Erling Seeberg Symposium, Trondheim and Ørland, Norway, June 2012.


Coordination of DNA polymerase beta, XRCC1 and PARP1 in DNA repair and cell metabolism. NIEHS, Laboratory of Structural Biology Annual Retreat, Chapel Hill, North Carolina, September 17, 2012.


PARP1 - A mediator of genotoxin response pathway crosstalk. University of North Texas, Department of Molecular Biology and Immunology Seminar, Denton, TX, February 4, 2013.

Proteosome-mediated regulation of base excision repair. LUMC, Department of Toxicogenetics, Leiden, Netherlands, February 4, 2013.


Coordinated response of PARP1 and PARG to facilitate DNA repair pathway choice. FEBS Workshop, Nucleotide Excision Repair and Interstrand Crosslink Repair- From Molecules to Man, Smolenice, Slovakia, June 9, 2013.

DNA damage-induced PARP1 hyperactivation negatively regulates glycolysis independently of NAD$^+$ depletion. PARP2013 – 19th International Conference on ADP-ribosylation, Quebec City, Canada, September 6-9, 2013.


Proteosome-mediated regulation of base excision repair. V-FARM DNA, V Fundamental Aspects of DNA Repair and Mutagenesis, Sao Paulo, Brazil, October 31-November 2, 2013.

Development of a high throughput Comet platform and its applications. 11th ICEM, Symposium: Comet takes off, Foz do Iguassu, Brazil, November 3-6, 2013.

Exploring the PARP-interactome in the cellular response to genotoxins. 11th ICEM, Symposium: Survival and death pathways triggered by chemotherapeutics, Foz do Iguassu, Brazil, November 3-6, 2013.

Proteosome-mediated regulation of base excision repair. University of Toledo, College of Medicine, Department of Biochemistry & Cancer Biology, November 21, 2013.

Laura Stabile, Ph.D.
Research Associate Professor

Lung Cancer SPORE Investigators’ Annual Meeting, Rockville, MD, July 2013.


Adam Straub, Ph.D.
Assistant Professor

Putting the brakes on nitric oxide signaling: the emerging biology of hemoglobin and methemoglobin reductase in vascular cells. West Virginia University, Morgantown, WV, March 2014.

Ben Van Houten, Ph.D.
Professor


Department of Genetics, Albert Einstein College of Medicine, Yeshiva University, New York, NY, April 4, 2012.


73rd Harden Conference - Machines on genes II - The central dogma at the interface of biology, chemistry and physics. “The xeroderma pigmentosum group E mutation (K244E) in DDB2 of a UV-damaged DNA-binding protein (UV-DDB) results in DNA sliding and loss of damage binding specificity” St Anne's College, Oxford, UK, August 19-23, 2012.


Department of Animal Biology & Comparative Oncology Seminar Series, University of Pennsylvania, PA, April 17, 2013.

Department of Chemistry, University of Illinois, Chicago, IL, October 1, 2013.

Department of Genetics, Erasmus University Medical Center, Rotterdam, Holland, October 7, 2013.

Scientific Crosstalk, 8th International Graduate School of Life Sciences Symposium. “Watching DNA repair, one molecule at a time: The use of single molecule techniques to investigate nanomachines.” Wurzburg, Germany, October 9-10, 2013.

V Meeting in Fundamental Aspects of DNA Repair and Mutagenesis, (Invited Speaker) "Communication between mitochondria and the nucleus - a novel approach to cancer chemotherapy" University of Sao Paulo, SP, Brazil, October 31- November 2, 2013.

11th International Conference on Environmental Mutagens (Invited Speaker) "Watching DNA repair one molecule at a time: UV-DDS stoichiometry, dynamics and implications in xeroderma pigmentosum" and 'Watching DNA repair, one molecule at a time: reconstituting nucleotide excision using quantum-dot labeled proteins." Foz Do Iguaçu, Brazil, November 3-8, 2013

Department of Microbiology and Molecular Genetics, University of Vermont, Burlington, VT, November 20, 2013.


DNA Damage, Mutation & Cancer - Gordon Research Conference (Invited Speaker) 'Watching Nucleotide Excision Repair, One Molecule at a Time" Ventura Beach Marriott, Ventura, CA, March 16-21, 2014.

Department of Biochemistry & Molecular Biology, University of Kent, Canterbury, UK, October 17, 2014.

Department of Biochemistry & Molecular Biology, University of Miami, FL, May 30, 2014.

Jean-Pierre Vilardaga, Ph.D.
Associate Professor


“Non-Canonical Signaling of GPCR.” The Great Lakes GPCR Annual Retreat, Quebec, Canada, 2013.

Keystone Symposia, plenary session GPCRs: Structural Dynamics and Functional Implications, 2014

ENDO 2014 annual meeting, Endocrine Society, 2014.

Rudolf Virchow Center for Experimental Biomedicine, University of Würzburg, Germany, 2014.

Charité Universitétmedizin Berlin, Symposium on Translational Medicine, Germany, 2014.

University of Montreal, Institute for Research in Immunology and Cancer, Distinguished Scientist lecture, Canada, 2014.

Dario Vitturi, Ph.D.
Research Instructor


Nobunao Wakabayashi, Ph.D.
Assistant Professor

Gordon Research Conference, Cellular & Molecular Mechanisms of Toxicity, Proctor Academy, Andover, NH August 11-16, 2013.
“The Keap1Nrf2 Signaling Pathway: Role in Disease and Pharmacological Approaches.” The Society for Free Radical Biology and Medicine’s Annual Meeting, Seattle, WA, November 19-23, 2014.

The Environmental Response IV, Sendai, Japan, February 28-March 2, 2014.

Q. Jane Wang, Ph.D.
Associate Professor

Center for Aging Research, Basic Medicine Institute, Beijing University, 2012.


Institute of Molecular Biology, Three Gorges University Medical College, Yichang, Hubei province, China, 2012.

New Drug Discovery and Development Center, Zhujiang Hospital, Southern Medical University, Guangzhou, Guangdong province, China, 2012.

Department of Cell Biology, Southern Medical University, Guangzhou, Guangdong province, China, 2012.


GTC 8th Protein Kinases in Drug Discovery, Boston, MA, 2013.

Institute of Molecular Biology, Three Gorges University Medical College, Yichang, Hubei province, China, 2013.

Translational Cancer Research Forum, Center from Translational Medicine, Key Laboratory of Longevity and Ageing-related Diseases, Ministry of Education, China, and Guangxi Medical University, Nanning, Guanxi, China, 2013.

Session 5-1: Targeting Protein Kinases, BIT's 11th Annual Congress of International Drug Discovery Science & Technology, Therapy and EXPO, Haikou, Hainan, China, 2013.


Stacy Gelhaus Wendell, Ph.D.
Research Assistant Professor

FASEB Conference on Phospholipid Metabolism and Signaling in Cancer & Inflammation, Niagara Falls, NY, 2014.

Nitrate-Nitrite NO Society Meeting, Cleveland, OH, 2014.

17th International Carbonyl Workshop, Skytop, PA, 2014.

Lin Zhang, Ph.D.
Associate Professor
“Role of PUMA in targeted anticancer therapies” Chengdu Institute of Biology, Chinese Academy of Sciences, June 19, 2012.

Invited Speaker and Session Chair, in Second Tianjin Forum on Tumor Microenvironment, Nankai University, Tianjin, P.R. China, June 22-24, 2012.

Roswell Park Cancer Institute, Buffalo, NY, January 18, 2013.

Guangxi Medical University, Nanning, P.R. China, June 3, 2013.

The Third Military Medical University, Research Institute of Daping Hospital, Chongqing, P.R. China, June 5, 2013.

University of Oklahoma School of Medicine, August 5, 2013.

Department of Pharmaceutical Sciences and Experimental Therapeutics, University of Iowa, October 15, 2013.

The 22nd Asia Pacific Cancer Conference, Tianjin, China, October 31-November 2, 2013.

SUNY Stony Brook, December 9, 2013.

University of Minnesota Center for Drug Design January 15, 2014.

Nankai University, Tianjin, China, June 27, 2014.

International Forum on the Frontier Life Sciences, Sichuan University, Chengdu, China, July 5, 2014.

International Symposium on Translational Medicine (ISTM), Guangxi Medical University, Nanning, China, Nov. 19-21, 2014.
Teaching Activities
Educational Credit Units Summary
<table>
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<tr>
<th>MS-1 and MS-2</th>
<th>def of unit</th>
<th>ECURVs</th>
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**ADMINISTRATIVE**

| MS-1 and MS-2 Total ECUs | 756.0 |

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**PRECEPTING**

| MS-3 and MS-4 Total ECUs | 0.0 |

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**TEACHING**

| MS-3 and MS-4 Total ECUs | 0.0 |

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**Medical Student Program Total ECUs** 185.0

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**Graduate Student Program Total ECUs** 4282.0
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# Summary of Faculty ECU's

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**Total Faculty Reporting: 36**

**Total ECU's for Pharmacology and Chemical Biology:** **5223.0**
Teaching Awards

Joan Lakoski, Ph.D.
Professor

Member, Academy of Master Educators, 2009-2014

Guillermo Romero, Ph.D.
Associate Professor

Distinguished Mentor Award, Biomedical Graduate Student Association, 2013-2014

Post-doctoral Fellows

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<td>Kristal Tucker</td>
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<td>Li Yang</td>
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<tr>
<td>Yongbei Yu</td>
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<tr>
<td>Wenjie Yuan</td>
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<tr>
<td>Qiangmin Zhang</td>
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<tr>
<td>Xuefeng Zhang</td>
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<td>Altschuler</td>
</tr>
<tr>
<td>Chao-Ming Zhou</td>
<td>Research Associate</td>
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</tr>
<tr>
<td>Fangdong Zou</td>
<td>Research Associate</td>
<td>Zhang</td>
</tr>
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Faculty Data
# Current Faculty

## Primary Faculty

<table>
<thead>
<tr>
<th>Name</th>
<th>Academic Title</th>
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<tbody>
<tr>
<td>Daniel Altschuler</td>
<td>Associate Professor</td>
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<tr>
<td>Palaniappa Arjunan</td>
<td>Research Instructor</td>
</tr>
<tr>
<td>Alessandro Bisello</td>
<td>Associate Professor</td>
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<tr>
<td>Dinara Bulgari</td>
<td>Research Assistant Professor</td>
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<tr>
<td>Eugenia Cifuentes-Pagano</td>
<td>Research Instructor</td>
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<tr>
<td>Gabor Csanyi</td>
<td>Research Instructor</td>
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<tr>
<td>W. Chet de Groat</td>
<td>Distinguished Professor</td>
</tr>
<tr>
<td>Donald DeFranco</td>
<td>Professor</td>
</tr>
<tr>
<td>Julie Eiseman</td>
<td>Research Professor</td>
</tr>
<tr>
<td>Bruce Freeman</td>
<td>Professor and Chairman</td>
</tr>
<tr>
<td>Peter Friedman</td>
<td>Professor</td>
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<tr>
<td>William Furey</td>
<td>Professor</td>
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<tr>
<td>Ferruccio Galbiati</td>
<td>Associate Professor</td>
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<tr>
<td>Eun-Ryeong Hahm</td>
<td>Research Instructor</td>
</tr>
<tr>
<td>Ryan Hartmaier</td>
<td>Research Instructor</td>
</tr>
<tr>
<td>Jing Hu</td>
<td>Assistant Professor</td>
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<tr>
<td>Yi Huang</td>
<td>Research Assistant Professor</td>
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<tr>
<td>Edwin Jackson</td>
<td>Professor</td>
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<tr>
<td>Tija Jacob</td>
<td>Assistant Professor</td>
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<tr>
<td>Yu Jiang</td>
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<tr>
<td>Thomas Kensler</td>
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<tr>
<td>Nicholas Khoo</td>
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<tr>
<td>Joan Lakoski</td>
<td>Professor</td>
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<tr>
<td>Jack Lancaster</td>
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<td>Adrian Lee</td>
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<td>Edwin Levitan</td>
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<tr>
<td>Tatyana Mamonova</td>
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<tr>
<td>Carola Neumann</td>
<td>Visiting Associate Professor</td>
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<tr>
<td>Steffi Oesterreich</td>
<td>Professor</td>
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<tr>
<td>Roderick O’Sullivan</td>
<td>Visiting Assistant Professor</td>
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<tr>
<td>Patrick Pagano</td>
<td>Professor</td>
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<tr>
<td>Michael Palladino</td>
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<tr>
<td>Wei Qian</td>
<td>Research Instructor</td>
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<tr>
<td>Guillermo Romero</td>
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<tr>
<td>James Roppolo</td>
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<tr>
<td>Francisco Schopfer</td>
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<tr>
<td>Sruti Shiva</td>
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<tr>
<td>Shivendra Singh</td>
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<tr>
<td>Robert Sobol, Jr.</td>
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<tr>
<td>Laura Stabile</td>
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<tr>
<td>Adam Straub</td>
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<tr>
<td>Ben Van Houten</td>
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<tr>
<td>Jean-Pierre Vilardaga</td>
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<tr>
<td>Dario Vitturi Iglesias</td>
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<tr>
<td>Daniela Volonte-Galbiati</td>
<td>Research Assistant Professor</td>
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<tr>
<td>Nobunao Wakabayashi</td>
<td>Visiting Research Assistant Professor</td>
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<thead>
<tr>
<th>Name</th>
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<tr>
<td>Vanessa Wehbi</td>
<td>Visiting Research Instructor</td>
<td>Carolyn Anderson</td>
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<td>Stacy Gelhaus Wendell</td>
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<td>Christopher Bakkenist</td>
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<td>Steven Wendell</td>
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<tr>
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<tr>
<td>Carolyn Anderson</td>
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<td>Naoki Yoshimura</td>
<td>Professor</td>
<td>Urology</td>
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</tbody>
</table>
New Faculty

Jack Lancaster, Ph.D., Visiting Professor
Cheng Zhang, Ph.D., Visiting Assistant Professor

Membership in Professional Societies

Bruce Freeman, Ph.D.
Professor and Chair
American Association for the Advancement of Science
American Chemical Society
American Heart Association
American Physiological Society
American Society for Cell and Molecular Biology
American Thoracic Society
Biochemical Society
Society for Free Radical Biology and Medicine

Daniel Altschuler, Ph.D.
Associate Professor
The Endocrine Society

Palaniappa Arjunan, Ph.D.
Research Instructor
American Crystallographic Association
Pittsburgh Diffraction Society

Dr. Alessandro Bisello
Associate Professor
American Society for Bone & Mineral Research
Endocrine Society
American Heart Association

Dinara Bulgari, Ph.D.
Research Instructor
Society for Neuroscience

M. Eugenia Cifuentes-Pagano, Ph.D.
Instructor
American Cancer Society

Donald DeFranco, Ph.D.
Professor
American Association for the Advancement of Science (AAAS)
Endocrine Society
Society for Neuroscience

W. Chet de Groat, Ph.D.
Distinguished Professor
Rho Chi Pharmaceutical Honor Society
Philadelphia Physiological Society
American Association for the Advancement of Science
Sigma Xi
American Society for Pharmacology and Experimental Therapeutics
Society for Neuroscience
Pittsburgh Neuroscience Society
New York Academy of Sciences
Urodynamics Society
International Brain Research Organization
American Gastroenterological Association
International Medical Society of Paraplegia
Society for Basic Urologic Research
Mid-Atlantic Pharmacology Society
American Motility Society
International Continence Society
The American Autonomic Society
The Dana Alliance for Brain Initiatives
International Society for Autonomic Neuroscience (Member of Executive Committee)
International Spinal Cord Society

Julie Eiseman, Ph.D.
Research Professor
American Association for Cancer Research
FASEB
American Association for the Advancement of Science
Society of Toxicology
SPIE

Peter Friedman, Ph.D.
Professor
American Physiological Society
American Society for Biochemistry and Molecular Biology
American Society for Bone and Mineral Research
American Society of Pharmacology & Experimental Therapeutics
Endocrine Society
Salt & Water Club
Society of General Physiologists
British Society for Endocrinology
International Bone & Mineral Society

William Furey, Ph.D.
Professor
American Crystallographic Association
Pittsburgh Diffraction Society
New York Academy of Sciences
American Association for the Advancement of Science
American Society for Biochemistry and Molecular Biology
Ferruccio Galbiati, Ph.D.
Associate Professor
American Society of Pharmacology & Experimental Therapeutics
American Society of Cell Biology
American Physiological Society
American Association for Cancer Research

Eun-Ryeong Hahm, Ph.D.
Research Instructor
American Association for Cancer Research

Jing Hu, Ph.D.
Assistant Professor
American Association for Cancer Research

Yi Huang, M.D., Ph.D.
Research Assistant Professor
American Association for Cancer Research

Edwin Jackson, Ph.D.
Professor
American Heart Association
American Society for Pharmacology and Experimental Therapeutics
Council for High Blood Pressure Research

Tija Jacob, Ph.D.
Assistant Professor
American Society for Pharmacology and Experimental Therapeutics
Society of General Physiologists
Society for Neuroscience

Yu Jiang, M.D., Ph.D.
Associate Professor
American Society for Microbiology
American Society for Pharmacology & Experimental Therapeutics
American Society of Genetics
American Society for Biochemistry and Molecular Biology

Thomas Kensler, Ph.D.
Professor
American Association for the Advancement of Science
American Association for Cancer Research
Society of Toxicology
American Society for Pharmacology and Experimental Therapeutics
Oxygen Society
American Chemical Society: Division of Chemical Toxicology

Nicholas Khoo, Ph.D.
Research Assistant Professor
Society for Free Radical Biology and Medicine
Biomedical Engineering Society
South East Lipid Research

**Joan Lakoski, Ph.D.**

*Professor*

American Association for the Advancement of Science
American Society for Pharmacology & Experimental Therapeutics
The Endocrine Society
International Society for Developmental Neuroscience
International Society of Neuroendocrinology
Serotonin Club
Sigma Xi
Society for Neuroscience
American Endocrine Society
Women Executives in Science and Healthcare
National Postdoctoral Association
Association for Clinical Research Training
Society for Clinical and Translational Science

**Adrian Lee, Ph.D.**

*Professor*

American Association for Cancer Research
International Society of IGF Research
The Endocrine Society
American Association for the Advancement of Science
American Society for Molecular Biology and Molecular Biology

**Edwin Levitan, Ph.D.**

*Professor*

Society for Neuroscience

**Tatyana Mamonova, Ph.D.**

*Research Instructor*

American Biophysical Society

**Carola Neumann, M.D.**

*Visiting Associate Professor*

Society for Free Radical Biology and Medicine
American Association for Cancer Research

**Steffi Oesterreich, Ph.D.**

*Professor*

American Association for Cancer Research
The Endocrine Society
Women in Endocrinology
Women in Cancer Research
American Society for Biochemistry and Molecular Biology
American Society for Pharmacology and Experimental Therapeutics
Patrick Pagano, Ph.D.
*Professor*
American Heart Association
Basic Science Council
Circulation Council
Council for High Blood Pressure Research
American Physiological Society
American Association for the Advancement of Science
Society for Free Radical Biology and Medicine
International Society for Free Radical Research

Michael Palladino, Ph.D.
*Associate Professor*
Genetics Society of America
Society for Neuroscience
American Society for Pharmacology and Experimental Therapeutics

Guillermo Romero, Ph.D.
*Associate Professor*
American Society for Pharmacology and Experimental Therapeutics
Endocrine Society
American Society of Cell Biology

James Roppolo, Ph.D.
*Research Assistant Professor*
American Association for the Advancement of Science
Society for Neuroscience
The New York Academy of Sciences

Francisco Schopfer, Ph.D.
*Research Associate Professor*
American Heart Association
Society for Free Radical Biology and Medicine

Sruti Shiva, Ph.D.
*Assistant Professor*
Society for Free Radical Biology (Elected to Council 2010)
Nitric Oxide Society
American Heart Association
American Society of Pharmacology and Experimental Therapeutics

Shivendra Singh, Ph.D.
*Professor*
American Society for Pharmacology and Experimental Therapeutics
American Society for Biochemistry and Molecular Biology
Society of Toxicology
International Society for the Study of Xenobiotics
American Association for Cancer Research
Robert Sobol, Ph.D.
Associate Professor
American Association for the Advancement of Science
American Association for Cancer Research
American Society for Microbiology
American Society for Cell Biology
Environmental Mutagen Society
American Chemical Society
International Society for Cell & Gene Therapy of Cancer
American Society for Pharmacology and Experimental Therapeutics

Laura Stabile, Ph.D.
Research Assistant Professor
National Lung Cancer Partnership
American Association for Cancer Research
Association for Women in Science
International Association for the Study of Lung Cancer

Adam Straub, Ph.D.
Assistant Professor
American Physiological Society
Microcirculation Society
American Heart Association
Nitric Oxide Society

Bennett Van Houten, Ph.D.
Professor
Environmental Mutagen Society
American Association for Cancer Research
American Chemical Society
American Society for Pharmacology and Experimental Therapeutics

Jean-Pierre Vilardaga, Ph.D.
Associate Professor
Endocrine Society
Biophysical Society
American Society for Pharmacology and Experimental Therapeutics
American Society for Bone and Mineral Research
American Society for Biochemistry and Molecular Biology

Dario Vitturi, Ph.D.
Research Instructor
Society for Free Radical Biology and Medicine
American Heart Association
Nitric Oxide Society

Daniela Volonte, Ph.D.
Research Assistant Professor
American Society of Cell Biology
American Association for Cancer Research
Nobunao Wakabayashi, Ph.D.
Research Assistant Professor
Japan Society for Bioscience, Biotechnology and Agrochemistry
The Molecular Biology Society of Japan
The Japan Biochemical Society
American Association for Cancer Research
American Society for Microbiology

Q. Jane Wang, Ph.D.
Associate Professor
American society for Pharmacology and Experimental Therapeutics
American Association for Cancer Research
American Association for the Advancement of Science

Stacy Gelhaus Wendell, Ph.D.
Research Assistant Professor
American Society for Mass Spectrometry
American Chemical Society
National Postdoctoral Association
Society for Free Radical Biology and Medicine
American Society for Biochemistry & Molecular Biology
American Thoracic Society

Steve Wendell, Ph.D.
Assistant Professor
National Postdoctoral Association

Steven Woodcock, Ph.D.
Research Instructor
American Chemical Society
Society for Free Radical Biology and Medicine

Lin Zhang, Ph.D.
Associate Professor
American Association for Cancer Research
American Association for the Advancement of Science
American Society for Pharmacology and Experimental Therapeutics
Three Year Bibliography


Charles RL, O Rudyk, O Prysyazhna, A Kamynia, J Yang, C Morisseeau, BD Hammock, BA Freeman and P Eaton. Protection from hypertension in mice by the Mediterranean diet is mediated by nitro fatty acid inhibition of soluble epoxide hydrolase. PNAS 111:8167-8172.


Daniel Altschuler, Ph.D.
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**Eugenia Cifuentes-Pagano, Ph.D.**

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**Donald DeFranco, Ph.D.**

*Professor*


W. Chet de Groat, Ph.D.

Distinguished Professor


**Julie Eiseman, Ph.D.**

*Research Professor*


**Peter Friedman, Ph.D.**

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**William Furey, Ph.D.**

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**Ferruccio Galbiati, Ph.D.**

*Associate Professor*


**Eun-Ryeong Hahm, Ph.D.**

*Instructor*


**Ryan Hartmaier, Ph.D.**

*Research Instructor*


Jing Hu, Ph.D.
Assistant Professor


Yi Huang, M.D., Ph.D.
Research Assistant Professor


Edwin Jackson, Ph.D.
Professor


activation and CRP levels and are depleted in HIV-1 infection regardless of viral suppression. AIDS 27:1545–1555, 2013.


Schuler, P.J., Saze, Z, Hong, C-S., Muller, L., Gillespie, D.G., Cheng, D., Harasymczuk, M., Mandapathil, M., Lang, S., Jackson, E.K., and Whiteside, T.L.: Human CD4⁺CD39⁺ regulatory T cells produce adenosine upon co-expression of surface CD73 or contact with CD73⁺ exosomes or CD73⁺ cells. Clinical & Experimental Immunology 177: 531-543, 2014.


Tija Jacob, Ph.D.
Assistant Professor


Yu Jiang, Ph.D.
Associate Professor


Thomas Kensler, Ph.D.

Professor


Nicholas Khoo, Ph.D.

Research Assistant Professor


Jack Lancaster, Ph.D.

Professor


Adrian Lee, Ph.D.

Professor


**Edwin Levitan, Ph.D.**

*Professor*


Tatyana Mamonova, Ph.D.
Research Instructor


Carola Neumann, M.D.
Visiting Associate Professor


Steffi Oesterreich, Ph.D.
Professor


Roderick O’Sullivan
Assistant Professor


Patrick Pagano, Ph.D.
Professor


Michael J. Palladino, Ph.D.
Associate Professor


Wei Qian, Ph.D.
Research Instructor


Guillermo Romero, Ph.D.
Associate Professor


Romero, G. The role of the cell background in biased signaling. In Biased Signaling in Physiology, Pharmacology and Therapeutics, Brian J Arey (Editor), Academic Press, Waltham, MA, pp. 41-79.

James Roppolo, Ph.D.
Research Assistant Professor


Francisco Schopfer, Ph.D.
Research Assistant Professor


**Sruti Shiva, Ph.D.**

*Associate Professor*


Shivendra Singh, Ph.D.
Professor


Robert Sobol, Ph.D.  
Associate Professor


Laura Stabile, Ph.D.

Research Assistant Professor


**Ben Van Houten, Ph.D.**

*Professor*


Jean-Pierre Vilardaga, Ph.D.
Associate Professor


Dario Vitruri, Ph.D.
Research Instructor


Daniela Volonte, Ph.D.
Research Assistant Professor


**Nobunao Wakabayashi, Ph.D.**  
*Research Assistant Professor*


**Q. Jane Wang, Ph.D.**  
*Assistant Professor*


**Vanessa Wehbi, Ph.D.**  
Research Instructor


**Stacy Gelhaus Wendell, Ph.D.**  
Research Assistant Professor


Steven Woodcock, Ph.D.
Research Instructor


Lin Zhang, Ph.D.
Associate Professor


Peng, R., Tong, J.S., Li, H., Yue, B., Zou, F., Yu, J. and Zhang, L. (2013) Targeting Bax interaction sites reveals that only homo-oligomerization sites are essential for its activation. Cell Death and Differentiation


Financial Plan
Executive Summary

I. Mission and Goals
The principal goal of the Department of Pharmacology and Chemical Biology is the creation of an intellectual and physical environment in which teaching and research in Pharmacology and Chemical Biology are pursued as one common enterprise. The major responsibilities of the Department are to: (1) educate medical students and physicians in the rationale for drug selection; (2) train contemporary pharmacologists; (3) develop new knowledge in the biomedical sciences; and (4) provide information about existing and emerging drugs to members of the University of Pittsburgh Medical Center, the University of Pittsburgh and the general community.

The philosophical approach of the Department is guided by the view that the field of Pharmacology exhibits a unique combination of characteristics that distinguish it from other basic medical sciences. Pharmacology encompasses a broad range of interests extending from the abstract domain of the physical chemistry of ligand-receptor interactions to the therapeutic use of drugs in patients. Thus, Pharmacology has stronger clinical ties than most other basic science disciplines. In the current revised medical curriculum, the faculty inculcates both core pharmacological principles and places them in the context of specific organ systems and bodily functions. Collectively, we provide a key educational experience to both medical and graduate students. Our faculty members also maintain vigorous research programs that are interactive and interdisciplinary. We have bridged with the Department of Chemistry in a unique and constructive manner through our activities in Drug Discovery.

The goals of the Department are:

- To be one of the top five NIH funded Departments of Pharmacology in the USA.
- To define pharmacological research for the 21st century.
- To improve the presence of Structural Pharmacology and Drug Discovery at the University of Pittsburgh.
- To educate premier future basic researchers, physician-scientists and teachers.
- To enhance the quality of graduate students matriculating and graduating from our PhD program at the University of Pittsburgh.

II. Departmental History and Status:
Major growth in the Department of Pharmacology and Chemical Biology occurred within the last 6 years after a new Chair was recruited and new funds were directed to the Department. As evidenced by the tremendous growth in research support funds, faculty publications, numbers of postdoctoral fellows and the number of members on the Graduate Faculty, we have evolved to become one of the top departments in the country based on our extramural research support and our impact on postdoctoral training. Last year we were ranked eighth in the nation for NIH funding among the more than 100 medical school departments and this year we were ranked seventh. Our Department now views its primary peer programs to be the following institutions: Yale University, University of Michigan, University of North Carolina, University of Pennsylvania, University of Virginia, Emory University, University of Texas Southwestern, University of Washington, Washington University, Vanderbilt University and the Johns Hopkins University.

III. Strengths:
In January 2006, Dr. Bruce A. Freeman was appointed Chair of the Department of Pharmacology and Chemical Biology to lead our strong cohort of well-funded and nationally recognized pharmacologists, cell and chemical biologists and geneticists. The department has about 50 primary faculty and 35 secondary faculty that contribute to the missions of the department. The members of the Department of Pharmacology and Chemical Biology are highly interactive with frequent co-authorship and co-funding. In spite of challenging times, our faculty
members are well-funded, with departmental primary faculty currently receiving $7.4 million in total direct annual costs and $10.3 million in total annual costs. During the past five years, the Department has emphasized cell signaling as an area of excellence. These interests address primary themes such as cancer, cardiovascular, renal and neurobiology. We are now extending this research focus to include two new areas of excellence: drug discovery and structural pharmacology. To supplement our training in these areas, the Department of Pharmacology has an NIH Predoctoral Training Grant in Pharmacological Sciences. The faculty also is well recognized for both their Medical School and Graduate School teaching. The prominence of our faculty members is recognized by their important leadership positions with Centers and Institutes, such as the UPCI, the PINDS, the Drug Discovery Institute, the School of Medicine and the University.

IV. Initiatives:
The Department will initiate a search for two or three new faculty members. The Department also intends to continue to replace aging equipment, renovate laboratory space and in this context, relocate faculty within thematic areas. We will also continue developing a strong interdisciplinary Drug Discovery Program, The Department will continue to partner with the emerging programs in Computational and Structural Biology as we emphasize Structural Pharmacology in faculty recruiting processes.

**SWOT Analysis**

**Strengths**

Since John S. Lazo assumed the Chair, the Department of Pharmacology and Chemical Biology has grown from three tenure-stream faculty to 42 faculty of which 22 are either tenured or in the tenure stream. This growth reflects department-initiated recruitment as well as “opportunistic” recruitments in collaboration with the UPCI that have benefited both the UPCI and the University. Thus, six of our current tenure stream faculty members are physically located within the UPCI as well as 9 nontenure stream faculty. One tenure stream faculty member is physically located in the Center for Clinical Pharmacology. Virtually all faculty are well-funded, with the Department currently receiving more than $6.9 million in total direct annual costs, approximately $2.0 million of which is co-credited to the UPCI or the Center for Clinical Pharmacology because the faculty members have appointments and space there. Our research success reflects strong independent investigator-initiated research support, a key factor for the development of future thematic research projects. We have already begun to define areas for interactive intra-institution research teams. During the past five years, the Department has emphasized cellular signaling and communication as an area of excellence. These interests are spread over three existing disease/organ areas: cancer, cardiovascular/renal and neurobiology. We are now intending to complement this research focus on cellular signaling with two new areas of excellence: drug discovery and structural pharmacology.

The members of the Department of Pharmacology and Chemical Biology have extensive interactions with other Basic Science Programs. In particular, strong collaborative relationships exist with School of Medicine faculty studying cellular communication and signaling, including faculty from the Departments of Cell Biology and Physiology, Molecular Microbiology and Genetics, Pathology, Neurobiology, and Immunology. Topics of interest range from protein phosphorylation and dephosphorylation, cell cycle checkpoints, G proteins, receptor biology, cell death, pain, combinatorial chemistry, neurotransmitters, channels and redox signalling. Forceful relationships with clinical elements of the Medical Center also exist. These include strong collaborative projects with the Departments of Medicine, Surgery, Anesthesiology, Critical Care Medicine, Pediatrics, Neurology, Urology, Psychiatry and Pathology. The laboratories of members of the Department of Pharmacology house advanced fellows from several clinical units: Pulmonary Medicine, Medical Oncology, Surgery, Anesthesiology and Critical Care Medicine. Interactions also exist with the key Centers and Institutes within the Medical Center and Main Campus including the CNUP, UPCI and the Vascular Medicine Institute. These activities reflect the strong commitment of the Department of Pharmacology to engage in translational research and to provide a
The Department of Pharmacology and Chemical Biology was honored that it was selected to receive an NIH Predoctoral Training Grant in Pharmacological Sciences. This was the only new graduate Training Grant for Pharmaceutical Sciences to be awarded by the NIH in 1994. Moreover, our program was one of only a few recently initiated grants to be renewed for a second cycle. The acquisition of this training grant, which supports four students, was a primary goal of the Department for several years and we are proud to have obtained it.

In addition to their splendid research record, the faculty has displayed outstanding teaching records, both in the Medical School and Graduate School courses. We believe this is due primarily to placing special emphasis on quality teaching and limiting the student interactions of those teachers rated less effective by the students. Our faculty members have also assumed important leadership positions with Centers and Institutes, such as the UPCI, the School of Medicine and the University. To summarize, we have created:

- Strong research activities and NIH grant support
- Interactive faculty
- Interdisciplinary program with the Department of Chemistry
- NCI funded Program Project on Drug Discovery
- Funded NIH Predoctoral Training Grant in Pharmacological Sciences
- NCI funded Specialized Program of Research Excellence in Lung Cancer
- Focus on Cell Communication, Drug Discovery and Structural Pharmacology
- Outstanding teachers of medical and graduate students, e.g. Professor de Groat, who is a five-time winner of the School of Medicine “Golden Apple Award”.

**Weaknesses**

During the past five years tenured and non-tenured faculty left the Department. We expect that one of our prized lecturers, Professor de Groat, will select retirement within the next three years. Thus, the Department must continue to recruit new faculty to ensure quality teaching to medical school students and retain the critical mass required to be among the top five programs nationally. The curriculum for medical students is routinely being reviewed so that we can develop more blueprints for teaching pharmacology to medical students. We are encouraged by the medical students who realized the importance of strong pharmacological training not only for scoring highly on board examinations but also for treating patients. A basic introductory lecture series on classical pharmacology is currently deemed essential to the current organ system-based training of medical students.

The Department was criticized in the most recent review of its Training Grant that it had too few junior faculty members. To allow the Department to function effectively and to achieve critical mass, additional faculty will be needed.
Currently there are only two program project-type research grants (PO1, P50) within the Department of Pharmacology and Chemical Biology; the national emphasis on specific disease areas lends itself to programmatic efforts and the Department should exploit this. The increased awareness of the productive aspects of linking contemporary chemistry with modern biology also should be an area in which Pharmacology plays a key role. Indeed, we organized a response to an NIH Request for Proposals on Molecular Targets Laboratory, because of the close research links between these two programs. The Department has now focused on Cellular Signaling and Communication as a major theme. We also believe our interest in Drug Discovery and Structural Pharmacology is both timely and institutionally appropriate. In contrast to the Cellular Signaling and Communication, we have not yet reached critical mass in Drug Discovery and Structural Pharmacology. We plan to fortify these areas by recruiting new faculty members in a manner that would complement the academic mission of the University.

There are limited amounts of pharmaceutical research dollars awarded to the Department of Pharmacology and Chemical Biology. The Department has not placed enough emphasis on obtaining funding from pharmaceutical organizations but rather has paid more attention to Federal dollars. We are now placing more focus on the commercial sector to support research, but intellectual property issues and data sharing are still hurdles.

There continues to be a need for capital investment within the Department of Pharmacology and Chemical Biology to replace aging equipment and to advance our depth in new technological capabilities. The rapid advances in new technologies mandate that new investments be made for our faculty and trainees to maintain our national competitive standing. In summary, we need to:

- Maintain critical mass of faculty
- Grow and better integrate space and facilities for research
- Limited financial research support from pharmaceutical and biotechnology firms and budget cuts at the National Institutes of Health

**Opportunities**

During the past four years there has been a remarkable and unprecedented growth in drug discovery and development in the US. Both large pharmaceutical firms and biotechnology companies have invested heavily to exploit this new knowledge. Consequently, major new therapeutic advances directed against important disease groups are now emerging. The completion of the Human Genome Project has increased the number of potential therapeutic targets by more than one order of magnitude. The future challenge will be to identify the drugs that will interact with these emerging biochemical and molecular targets. Because of the unique attributes at the University of Pittsburgh that place Chemistry physically close to Biology, we posit:

- There is a unique opportunity for a few academic institutions to participate and profit from this changing paradigm in drug discovery. The Bayh-Dole Act now allows resourceful Universities the opportunity to replace the income lost from managed care with income derived from its intellectual property. A strong Department of Pharmacology is a vital component of such an activity.
- There will be a significantly increased industrial and academic need for well-trained graduates from Ph.D. granting programs with a concentration in Pharmacological Sciences and Drug Discovery. A strong Department of Pharmacology and Chemical Biology is a vital component of such an activity.
- Important new knowledge and reagents continue to emerge that are relevant to many biological systems and all aspects of cell communication. A strong Department of Pharmacology and Chemical Biology is a vital component of such an activity.
- Advances in Structural Biology and Bioinformatics should make it possible in the near future to optimize small molecules that are more selective and potent towards their molecular targets. The area of Structural Pharmacology will be grown to be a vital component of the Department of Pharmacology.
- Ph.D., D.M.D. and M.D. students will need to become even more cognizant and thoughtful about the highly
selective therapies of the future that may be used based on the genetic profile of each patient. A strong Department of Pharmacology is a vital component of such an activity.

The University of Pittsburgh is uniquely situated to participate in defining future research and graduate education in Pharmacology and in recruiting to its campus some of the best students. The University of Pittsburgh’s advantages are:

- A cohort of dedicated faculty members, who are eager to teach graduate students
- The presence of strong existing programs in neuroscience, virology, tumor immunology, cancer biology, developmental biology, structural biology and computational biology
- The presence of strong clinical programs
- A growing drug discovery enterprise

Barriers
One of the greatest threats to the Department of Pharmacology and Chemical Biology would be to lose its vigor and enthusiasm during the current downward trend in NIH funding. Currently the program is nationally identified as a model of growth. This has helped in the recruitment of new faculty. Nonetheless, other institutions have become eager to develop programs in drug discovery and to enhance their pharmacology departments. We believe it is likely that they will seek to recruit our valuable faculty.

Initiative and Implementation Strategies

- To achieve the overall goal of becoming one of the top three Departments of Pharmacology in the next three years, the Department will recruit new faculty members during the next few years. The Department of Pharmacology and Chemical Biology intends to focus on the three defined areas of research interest previously identified: Cellular Communication, Structural Pharmacology and Drug Discovery. In particular, the Department will continue to partner with the new Drug Discovery Institute, providing unique instrumentation, archived chemical libraries and specialized research services and teaching for members of the University and UPMC.
## University of Pittsburgh School of Medicine
### Statement of Revenues and Expenses – June 30, 2014

<table>
<thead>
<tr>
<th>Revenue</th>
<th>Hard Money</th>
<th>Self Supporting</th>
<th>Discretionary and Restricted</th>
<th>Research</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>School of Medicine - ECU</td>
<td>465,598</td>
<td></td>
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<td>465,598</td>
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<tr>
<td>Indirect Cost Recovery</td>
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<td>Direct Grants</td>
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<td>Endowment Income</td>
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<td>Other Revenue</td>
<td>-</td>
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<td></td>
<td>541,562</td>
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<tr>
<td><strong>Total Revenue</strong></td>
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<td>37,130</td>
<td>581,704</td>
<td></td>
<td>10,279,155</td>
</tr>
</tbody>
</table>

| Expense                                      |            |                 |                              |          |             |
| Medical Faculty Salary                       | 2,063,159  | -               | 136,520                      | 2,098,319| 4,297,998   |
| Other Faculty Salary                         | -          | 45,476          | 633,387                      |          | 678,863     |
| Staff Salary                                 | 930,598    | 29,102          | 227,798                      |          | 2,043,142   |
| Medical Faculty Fringes                      | 515,303    | -               | 43,133                       | 500,708  | 1,059,144   |
| Other Faculty Fringes                        | -          | 18,963          | 247,756                      |          | 266,719     |
| Staff Fringes                                | 344,374    | 831             | 78,626                       | 237,759  | 661,590     |
| **Subtotal Compensation**                    | 3,853,434  | 29,933          | 550,516                      |          | 9,007,456   |

| Other Expense                                | 1,196,855  | 38,881          | 553,175                      |          | 3,893,292   |
| Transfers (intra-department)                 | 63,435     | -               | -105,532                     |          | -42,097     |
| Transfers (inter-department)                 | -          | -               | -                            |          | -           |
| **Subtotal Other Operating**                 | 1,260,290  | 38,881          | 447,643                      |          | 3,851,195   |

| Stepdown                                     | 2,530,316  |                 | 0                            |          | 2,530,316   |

| Total Expense                                | 7,644,040  | 68,814          | 998,159                      |          | 15,388,967  |
|                                               | -4,661,673 | -31,684         | -416,455                     | 0        | -5,109,812  |

| June 30, 2013 Fund Balance                    | 4,089,619  |                 |                              |          |             |
| Restricted Net Activity Year to Date          | -79,792    |                 |                              |          |             |
| Prior Year Settlement Transfer                |            |                 |                              |          |             |
| Current Month end Restricted Fund Balance     | 4,009,827  |                 |                              |          |             |
| SOM Quasi Endowment Market value – March 2014 | 1,944,654  |                 |                              |          |             |
| Total Available Balances                      | 5,954,481  |                 |                              |          |             |