POTENTIAL NON-BIOLOGY RESEARCH MENTOR LIST

PLEASE READ!!

To set up an independent research experience (BIO 395 or BIO 398) you should contact a faculty member whose research area interests you and discuss possible projects. You can find Biology faculty's research interests by going through the list of faculty and their research on the Biology Department website. But you may also choose to work with someone outside the Biology Department so long as your project is biological, and your research mentor is willing to let you register for BIO 395 credit for the research (some mentors might want you to register for research credit from their department). This list of *potential* mentors outside the Biology Department is meant to help you identify someone to work with if you are unable to find a lab in Biology. **This list is *NOT* comprehensive; there are *many* other acceptable mentors. You may work with anyone who is not on this list as long as the research is biological and the contract you submit is approved by the Director of Undergraduate Studies.** Note that each College and Department web address is included so you can scan other non-listed faculty member's research areas as well.

College of Arts and Sciences

Department: Psychology, http://www.uky.edu/AS/Psychology/

Michael T. Bardo
Email: mbardo@uky.edu
Website: https://psychology.as.uky.edu/users/mbardo

Research area and interests: My research interests are investigating the neurobehavioral effects of environmental enrichment and social influences on drug self-administration. I am also are interested in medication development for substance use disorders. In addition to behavioral processes, our laboratory conducts work using chemogenetics, immunohistochemistry, stereotaxic surgery and microdialyis with HPLC.

Susan Barron
Email: sbarron@uky.edu
Website: https://psychology.as.uky.edu/users/sbarron

Research area and interests: My research focuses on the effects of prenatal drug exposure using a rodent model. A large part of the work that we do is in the field of behavioral teratology, that is, studying the effects that drug exposure in utero has on later behaviors. Our work focuses primarily on the effects of ethanol as well as ethanol's interactions with other drugs since polydrug exposure is probably more appropriate for modeling clinical populations. We study a variety of behavioral paradigms ranging from simple neonatal assessments and social behaviors to complex cognitive functioning. We are also currently interested in how novel compounds can reduce some of the toxic effects of ethanol on the CNS. Students that receive training in my laboratory have the opportunity to gain expertise in a variety of behavioral, neuroanatomical, neuropharmacological and cell culture techniques..

Thomas Zentall
Email: zentall@uky.edu
Website: https://psychology.as.uky.edu/users/zentall
Lab website: http://uky.edu/~zentall/

Research area and interests: My research interests focus on cognitive behaviors in animals including memory strategies, concept learning, and other human behaviors like gambling and procrastination. The approach my students and I use is to define a behavior that is characteristic of humans and then to examine the conditions under which it can be found in animals to determine the mechanisms responsible for both. This approach examines the relatively unexplored repertoire of animal behavior that has been thought to distinguish humans from other animals. For example, just like humans, pigeons prefer to choose a seldom occuring "jackpot" over a guaranteed overall larger reward. The mechanisms responsible for this suboptimal choice appear to be the same for pigeons as for humans. For more information on my research and laboratory, click here.

College of Agriculture

Department: Dietetics and Human Nutrition; https://dhn.ca.uky.edu/faculty-staff

Robin Shoemaker
Email: robin.shoemaker@uky.edu
Website: http://dhn.createuky.net/RobinShoemaker/

Research area and interests: Sex differences in cardiovascular disease. Dr. Shoemaker is interested in pathophysiologic changes in cardiac metabolism with obesity and heart disease in men versus women, and identifying dietary interventions to improve cardiac outcomes.

Department: Entomology; https://entomology.ca.uky.edu/people/faculty

Charles Fox
Email: cfox@uky.edu
Website: https://entomology.ca.uky.edu/person/charles-fox
Lab website: http://www.uky.edu/~cfox/

Research area and interests: Ecology and the Evolution of Life Histories; examining body size, sexual size dimorphism, egg size, phenotypic plasticity, aging and senescence, maternal effects, inbreeding depression.
Insect-plant interactions: diet evolution, adaptation to host plants.
Insect Behavioral Ecology: egg laying decisions, sexual selection on body size / sexual dimorphism.

Subba Reddy Palli
Email: rpalli@uky.edu
Website: https://entomology.ca.uky.edu/person/subba-reddy-palli
Lab website: https://entomology.ca.uky.edu/pallilab

Research area and interests: Molecular analysis of growth, development, reproduction and xenobiotic response in insect pests and disease vectors with a goal to utilize this information for their control is the main focus of Palli laboratory. Our research program covers a wide variety of subject areas including insect physiology, biochemistry, molecular biology, endocrinology, toxicology, and genomics.
The current areas of our focus include: (1) Mechanisms and applications of RNA interference, (2) Epigenetic, hormonal and nutritional regulation of growth, development, and reproduction, and (3) Molecular analysis of insecticide resistance.

Nicholas Teets
Email: n.teets@uky.edu
Website: https://entomology.ca.uky.edu/person/nicholas-teets
Lab website: http://www.teetslab.com/

Research area and interests: My lab uses an integrative approach to investigate the mechanistic basis of environmental stress tolerance in insects. Environmental stress comes in many forms, and it is a major determinant of species range and pest abundance. Invasive species' distributions are largely determined by stress tolerance, and insect responses to climate change are dependent on their ability to adapt to new stresses. We employ a combination of organismal physiology, genetics, and "omics" to investigate the cellular and molecular mechanisms that allow insects to tolerate adverse conditions. Much of our research focuses on overwintering stress, both in temperate species and species from extreme environments like Antarctica. Long-term applications of our work include: 1) the ability to manipulate the overwintering success and field performance of beneficial insects, and 2) using insights from freeze-tolerant insects to develop new strategies for human organ cryopreservation.

Department: Plant & Soil Sciences; http://pss.ca.uky.edu/people/faculty

Tomo Kawashima
Email: tomo.k@uky.edu
Website: https://pss.ca.uky.edu/person/tomokazu-kawashima
Lab Website: https://kawashimalab.ca.uky.edu

Research area and interests: Molecular, Cellular, and Developmental Biology of Plant Seeds. Although many factors involved in seed development and seed sizes/numbers have been identified, the precise mechanisms of how plants accomplish seed development and control these seed traits are largely unknown. Using the confocal microscopy real-time live-cell imaging approach, we are investigating the molecular mechanisms, cellular dynamics, and evolution of land plant sexual reproduction, especially focusing on stages from fertilization to early seed/embryo development.

Hanna Poffenbarger
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Website:
https://pss.ca.uky.edu/person/hanna-poffenbarger
Lab Website:
https://poffenbargerlab.weebly.com/

Research area and interests: We study basic controls on the flow of carbon and nutrients through soils, use research findings to develop sustainable management practices and resilient production systems, and communicate these practices and the science behind them to researchers, students, and agricultural stakeholders. Our research applies principles of agronomy, ecology, and biogeochemistry to investigate interactions between agricultural management and nutrient cycling using laboratory, greenhouse, and field experiments.

Department: Plant Pathology; http://plantpathology.ca.uky.edu/people/faculty

Mark Farman
Email: farman@uky.edu
Website:
http://plantpathology.ca.uky.edu/person/mark-farman

Research area and interests: The Farman lab uses genomic approaches to study mechanisms of pathogenesis in the fungal phytopathogen, *Magnaporthe oryzae*. Areas of special interest include: fungal genome evolution and dynamics, roles of telomeres in pathogenic variation, methods for high throughput fungal protein localization during host infection.

Department: Veterinary Science; https://gluck.ca.uky.edu/people

Thomas Chambers
Email: tmcham1@uky.edu
Website:
https://gluck.ca.uky.edu/directory/thomas-chambers

Research area and interests: Equine influenza is the leading cause of respiratory disease in Kentucky and the world. My major interest is to study the innate immune responses to the influenza virus and herpes virus. I am also interested in the development of vaccines for influenza and herpes virus. I am involved in infectious disease control and surveillance both nationally and internationally.

Yosra Helmy
Email: yosra.helmy@uky.edu
Website:
https://gluck.ca.uky.edu/directory/yosra-helmy

Research area and interests: Our research is focusing on developing novel therapeutics and antibiotics-alternative approaches, including probiotics, anti-virulence and quorum sensing inhibitors, small molecules, and peptides to mitigate infectious pathogens and antimicrobial resistance (AMR) in animals and in humans. Our research is also focused on understanding the host-pathogen interactions and elucidating the impact of novel therapeutics on the host gut microbiome using molecular and omics-based approaches. We also study epidemiology, antibiotic resistance profiles, genetic diversity, and risk assessment of AMR of foodborne pathogens using molecular tools and genomics for the detection of AMR determinants to combat the increasing threat of AMR.

Martin Nielsen
Email: martin.nielsen@uky.edu
Website:
https://gluck.ca.uky.edu/directory/martin-nielsen

Research area and interests: The mission of the Nielsen Laboratory is to provide solutions for equine parasite control. Research efforts are focused on the following areas: 1. New and improved diagnostic tests. 2. Documentation of drug resistance and investigation of mechanisms behind. 3. Identification and evaluation of sustainable parasite control programs. 4. Developing and evaluating novel treatment modalities. 5. Epidemiology of parasite transmission patterns. 6. The role of helminth parasites in equine health and disease. 7. Parasite biology, genomics, and transcriptomics.

College of Health Sciences: https://www.uky.edu/chs/directory/faculty

Brian Noehren
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Website:
https://www.uky.edu/chs/bwno222

Research area and interests: I am a researcher in the division of Physical Therapy who specializes in the understanding of lower extremity injury biomechanics and muscle function. I am interested in injuries such as knee pain, total joint replacements, ACL reconstructions, and Osteoarthritis. In my lab we look at the alterations in movement mechanics and muscle function that maybe related to the development of these injuries. We also develop and test new and novel treatment interventions. The lab uses 3D models created from motion capture cameras (like the video games). From these models we can measure the joint angles and forces during many activities such as running and walking.

College of Pharmacy; https://pharmacy.uky.edu/office-research-operations/engagement/faculty-research

E. Penni Black
Department: **Pharmaceutical Sciences**
Email: penni.black@uky.edu
Website:
https://pharmacy.uky.edu/people/penni-black

Research area and interests: My research interests lie in understanding the signaling pathways responsible for resistance to targeted therapeutics in lung cancer in order to improve the personalization of cancer therapies. Our lab also utilizes patient outcomes data to anticipate response to therapies that target the immune response in lung cancer.

Jill Kolesar
Department: **Pharmacy Practice & Science**
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Website:
https://pharmacy.uky.edu/people/jill-kolesar

Research area and interests: Dr. Kolesar's research focuses on the drug development of anticancer agents with an emphasis on targeted therapies and biomarkers. She has authored more than 300 abstracts, research articles, and book chapters, and as a principal investigator she has received more than $5 million in research funding from the NCI, American Cancer Society and other sources.

Robert A. Lodder
Department: **Pharmaceutical Sciences**
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Website:
https://pharmacy.uky.edu/people/robert-lodder

Research area and interests: Astrobiology; *in-vivo* chemical analysis and high-resolution imaging of atherosclerotic plaques; near infrared and infrared imaging analysis of lipid metabolism and energy; expenditure, spectrophotometric and electrophoretic analysis of carotid plaque lipoproteins; lipoprotein determination in single cells by near infrared spectromicrography; computerized assignment of near IR absorbances to molecular motions of proteins and peptides.

Tom Prisinzano
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Website:
https://pharmacy.uky.edu/people/thomas-prisinzano
Lab Website:
https://prizlab.createuky.net/

Research area and interests: Research in the Prisinzano group is characterized by rigorous attention to the influence of chemical structure on biological activity. Our studies have predominantly focused on (a) the design and synthesis of novel biological probes for study of the mechanism of action of drugs of abuse and (b) the development of agents for the treatment and prevention of substance use disorder.

Steven Van Lanen
Department: **Pharmaceutical Sciences**
Email: svanlanen@uky.edu
Website:
https://pharmacy.uky.edu/people/steven-van-lanen
Lab website:
http://pharmsci.createuky.net/van-lanen-lab/

Research area and interests: Dr. Van Lanen's research is centered on identifying and characterizing the biosynthetic pathways for bioactive natural products that have unknown or distinct modes of action relative to clinically-used drugs. Natural products currently being investigated include peptidyl nucleoside antibiotics with antifungal or antibacterial activity and sideromycins, or hybrid siderophore-antibiotics. The primary goals are i) to define a mechanism of biosynthesis using in vivo and in vitro approaches, ii) to elucidate the function and mechanism of enzymes that catalyze novel or unusual chemistry, and iii) to manipulate the biosynthetic machinery to rationally prepare novel compounds with improved pharmacological properties.

College of Dentistry; https://dentistry.uky.edu/directory-list (this list includes faculty and staff; there is no filter to search only for faculty)

Craig S. Miller
Department: **Oral Health Practice**
Email: cmiller@uky.edu
Website:
https://dentistry.uky.edu/directory?uid=160

Research area and interests: My current emphasis is to refine the current diagnostic paradigm for periodontal disease in T2DM by proposing that the multiplex information contained within a "data-driven biosignature" will offer a significant improvement in personalized patient management. Also, determining the relationship of periapical infection and systemic infection.

Luciana Shaddox
Department: **Periodontics**
Email: lshaddox@uky.edu
Website:
https://dentistry.uky.edu/directory?uid=3849

Research area and interests: My research involves evaluating immunological, microbiological and genetic factors involved with localized aggressive periodontal disease in children and adolescents; teasing out possible genetic markers and specific inflammatory mechanisms playing a role in this disease; relationship between periodontal disease and type II Diabetes Mellitus and its inflammatory response to bacteria, and how this relationship is associated to diabetics' clinical response to treatment.

Robert Danaher
Department: **Oral Health Practice**
Email: rjdana0@uky.edu
Website:
https://dentistry.uky.edu/directory?uid=65

Research area and interests: The goals of the current project are to 1) define the minimal "window of opportunity" of HDACi treatment sufficient to attenuate pain, 2) establish an operant behavior test to compliment and corroborate classical "reflex" tests that assess pain-related behavior and 3) to identify genes expressed in the spinal trigeminal nucleus caudalis that are involved in the development, maintenance and HDACi mediated resolution of orofacial neuropathic pain using RNA-sequencing technology.

College of Medicine

Department: Behavioral Science; https://medicine.uky.edu/departments/behavioralscience/users (select "Faculty" under "Employee Type" in the search box)

Yang Jiang
Email: yjiang@uky.edu
Website:
https://medicine.uky.edu/departments/behavioralscience/users/yjiang

Research area and interests: Dr. Jiang's research focuses on understanding the neural mechanisms underlying visual perception and cognition in healthy and clinical populations. Her lab is using approaches of psychophysics and cognitive neuroscience, such as functional magnetic resonance imaging (fMRI), and event-related potentials (ERPs). The current projects include developing neurosignatures of memory malfunction and cognitive impairment due to aging or brain damage, and measuring individual differences in behavior, brain responses and genetics associated with cognitive and affective processes.

Joshua Lile
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Website:
https://medicine.uky.edu/departments/behavioralscience/users/jalile2

Research area and interests: Dr. Lile's research efforts is the study of cannabis-use disorder. Currently, this work aims to evaluate the voltage-dependent calcium channel ligand pregabalin as a medication for cannabis-use disorder, as determined using outpatient maintenance procedures to determine pharmacotherapy effects on cannabis use in the laboratory and in the natural environment.

Michael J Wesley
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Website:
https://medicine.uky.edu/departments/behavioralscience/users/mjwe228

Research area and interests: Dr. Wesley uses neuroimaging, noninvasive brain stimulation, clinical pharmacology and behavioral techniques to understand neurobehavioral dysfunctions existing in many clinical disorders, especially those characterized by a lack of volitional control over thoughts, feelings and actions. His primary research focuses on deficits in decision-making and affective processes in individuals with substance use disorders, however, he is also interested in other conditions with overlapping symptomatology including stroke and post-traumatic stress disorder.

Department: Microbiology, Immunology and Molecular Genetics;
https://medicine.uky.edu/departments/microbiology/users (select "Faculty" under "Employee Type" in the search box)

Sarah D'Orazio
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Website:
https://medicine.uky.edu/departments/microbiology/users/sdora2
Lab website:
https://www.doraziolab.org/

Research area and interests: Our group is broadly interested in host-pathogen interactions. Research in my lab is focused on understanding the factors that determine host susceptibility or resistance to infection with the intracellular bacterial pathogen Listeria monocytogenes. We use a variety of bacteriologic and immunologic approaches to study the complex interplay between the virulence strategies of the pathogen and the protective immune responses of the host.

Department: Molecular and Cellular Biochemistry;https://medicine.uky.edu/departments/biochemistry/core-faculty

Jessica Blackburn
Email: jsblackburn@uky.edu
Website:
https://medicine.uky.edu/departments/biochemistry/users/jbl235

Research area and interests: Cancer is a disease of the genome and epigenome, with most cancers developing numerous alterations throughout the course of disease. Many types of human cancers have now been extensively sequenced using next-generation technologies, and the scope of the alterations that are present in most malignancies has been truly eye-opening. Now, in this post-genomic era, we must sort through this wealth of data to identify the genes and pathways that that drive cancer progression, so that useful therapeutics can be developed. Our lab uses zebrafish models of pediatric cancers to help identify these new anti-cancer targets.

Trevor Creamer
Email: Trevor.Creamer@uky.edu
Website:
https://medicine.uky.edu/departments/biochemistry/users/tpcrea0

Research area and interests: The Creamer lab is applying its expertise to the characterization of the function and conformational properties of intrinsically disordered regions (IDRs) within proteins. IDRs are regions of protein sequence that do not appear to adopt a well-defined structure. Our current studies are focused on calcineurin (CaN), a Ser/Thr phosphatase that is activated by calmodulin (CaM) binding. CaN plays essential roles in memory development and retention, cardiac growth, and immune system activation. It has been implicated in numerous disorders including Alzheimer's disease, Down syndrome, cardiac hypertrophy, and autoimmune disorders. The regulatory domain of CaN, which is a CaM substrate, is an IDR. We are investigating the CaM-CaN interaction and how this regulates CaN function.

Robert Dickson
Email: bobd@uky.edu
Website:
https://medicine.uky.edu/departments/biochemistry/users/bobd

Research area and interests: Some people grow old yet show few signs of aging, while others show signs of aging long before they grow old. How can this be? We are trying to identify and understand the signal transduction pathways and cellular processes that control the rate of biological aging and lifespan. Our goal is to develop a way to lower the frequency, slow the progression or delay the onset of age-related diseases including cancer, neurodegeneration, arthritis, cardiovascular pathology and diabetes that diminish health in the elderly and cause the majority of human deaths.

Rebecca Dutch
Email: rebecca.dutch@uky.edu ; but prefers to be contacted through Sabrina Brewer: sabrina.brewer@uky.edu
Website:
https://medicine.uky.edu/departments/biochemistry/users/rdutc2

Research area and interests: The central focus of our research is the synthesis, folding, processing and function of viral glycoproteins. Previous studies of the synthesis and processing of viral glycoproteins in the secretory pathway have led to fundamental discoveries of basic cellular processes, and our research on the folding and processing of paramyxovirus glycoproteins provides insight into both cellular functions and important viral proteins. Our studies on viral proteins aim to elucidate mechanisms of promotion of membrane fusion, and to provide new targets for antiviral treatments. In order for viruses to infect cells, specific viral proteins promote fusion of the viral membrane with the membrane of the host cell. Understanding this process of protein-mediated membrane fusion is the major focus of our work. We study fusion proteins from several different paramyxoviruses. First, we are examining the fusion protein from the Hendra and Nipah viruses, newly emerged diseases in the paramyxovirus family that are highly pathogenic in multiple species including humans, and which are classified as Biosafety Level 4 pathogens. Our laboratory has identified cathepsin L, a cellular endosomal/lysosomal protease, as critical protein for activation of the Hendra and Nipah fusion proteins, and thus a potential drug target. We are also studying the F protein from the paramxyovirus SV5, for which multiple mutants have been made and for which several atomic structures are now known. Finally, we have initiated study of the glycoproteins from human metapneumovirus, a recently identified virus that is a causative agent of severe respiratory disease in infants and young children. Our long-term goal is to understand the specific molecular events in these important membrane fusion processes.

Emilia Galperin
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Website:
https://medicine.uky.edu/departments/biochemistry/users/ega224
Lab website: http://galperinlab.com/

Research area and interests: The Galperin lab is interested in cellular mechanisms underlying developmental disease and tumor progression. For our work, we combine quantitative single cell microscopy, genetic and biochemical approaches in mammalian cells and zebrafish small model organism.

Tianyan Gao
Email: tianyan.gao@uky.edu
Website:
https://medicine.uky.edu/departments/biochemistry/users/tga222

Research area and interests: Precise control of the balance between protein phosphorylation and dephosphorylation is critical for living organisms to maintain normal physiological functions. Dysregulation of signaling pathways that results in disturbing this balance can lead to the development of cancer. Numerous studies have focused on the activation processes of signaling pathways, which are often mediated by protein kinases. However, considerably less evidence is available concerning how and when the signals are shut off by protein phosphatases. My lab focuses on elucidating the functional importance of a novel family of protein phosphatase, PHLPP, in regulating tumorigenesis. We use colon cancer as a model system to study how PHLPP functions in suppressing cancer development and progression. Cancer metabolism is another research focus of my laboratory. We are interested in determining the molecular mechanism by which adipocytes in the tumor microenvironment promote tumorigenesis and progression.

Matthew Gentry
Email: matthew.gentry@uky.edu
Website:
https://medicine.uky.edu/departments/biochemistry/users/msge222

Research area and interests: Our lab studies the role of signal transduction machinery, namely phosphatases and E3 ubiquitin ligases, in neurodegenerative disease and biofuels research. We utilize a multidisciplinary approach that addresses and/or employs methodologies of cell biology, biochemistry, metabolomics, neurodegenerative diseases, genetics, bioinformatics, and phylogenetic relationships in vertebrate and protozoan model organisms, but relies heavily on biochemistry and metabolomics. These applications employ model organisms and tissue culture cells to study basic cell metabolism, which have direct relevance to progressive myoclonus epilepsy and starch-based biofuels.

Louis Hersh
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Website:
https://medicine.uky.edu/departments/biochemistry/users/lhersh

Research area and interests: This laboratory has as a major focus the study of neuropeptidases and their involvement in human disease. It is generally believed that Alzheimer's disease is caused by the accumulation of a peptide called the amyloid beta peptide in the brain of affected individuals. Two peptidases, neprilysin and insulysin, are involved in regulating amyloid beta peptide levels in the brain. It is believed that there is an age dependent decline in the activity of these enzymes which leads to increased amyloid beta peptide levels as a contributing factor to Alzheimer's disease. We are investigating strategies based on gene replacement therapies to use these peptidases to lower brain amyloid beta peptide levels as a method to prevent and treat Alzheimer's disease. We are also studying the role of insulysin in diabetes as this peptidase can cleave insulin, amylin, and related peptide that has been implicated in causing type 2 diabetes.

Kathleen O'Connor
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Website:
https://medicine.uky.edu/departments/biochemistry/users/koco223

Research area and interests: My research focuses on how integrin signaling promotes carcinoma invasion and metastasis with special emphasis on the integrin α6β4. Integrin α6β4 confers an invasive and metastatic phenotype in many types of carcinomas, including triple-receptor negative breast cancer (TNBC). Dissecting the pathways altered by integrin α6β4 has given and will continue to contribute great insight into the processes that perpetuate an invasive and metastatic phenotype. Our overarching long-term goal is to determine how integrin α6β4 drives the aggressive properties of TNBC so that this information can be used to guide precision medicine for TNBC.

David Rodgers
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Website:
https://medicine.uky.edu/departments/biochemistry/users/drodger

Research area and interests: The focus of our work is understanding the basis for enzyme catalysis and developing the ability to manipulate macromolecules for the treatment of diseases and other practical applications. Our studies fall into several broad areas: (1) Protein engineering and the molecular mechanisms of substrate recognition and catalysis; (2) Development of novel therapeutics for psychotic disorders, drug addiction, and pain relief; (3) Molecular bases for severe immunodeficiency disorders and congenital myasthenic syndromes.

Sidney Whiteheart
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Website:
https://medicine.uky.edu/departments/biochemistry/users/whitehe

Research area and interests: (1) Molecular Mechanisms of Platelet Secretion; (2) Role of ADP Ribosylation Factor 6 (Arf6) in Platelet Activation; (3) Structure/Function Analysis of the General Fusion Protein.

Department: Neuroscience; https://medicine.uky.edu/departments/neuroscience/users (select "Faculty" under "Employee Type" in the search box)

Adam Bachstetter
Email: adam.bachstetter@uky.edu
Website:
https://medicine.uky.edu/departments/neuroscience/users/aba237
Lab website:
http://bachstetterlab.org/about

Research area and interests: My research is focused on understanding neuron-glia interactions that underlie complex diseases. The overall goal of my research is to provide fundamental insights into how specific glia responses modify disease outcome, and find druggable targets amenable to selective modulation of those specific functions. I believe that glia-targeted therapeutics are not only possible, but are imperative for preventing and treating neurological disease.

Luke Bradley
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Website:
https://medicine.uky.edu/departments/neuroscience/users/lhbrad2
Lab website:
https://lhbradley1.wixsite.com/bradleylab

Research area and interests: Research in the Bradley laboratory utilizes protein engineering and synthetic biology approaches, at the interface of chemistry and biochemistry, to discover and develop peptide and protein-based molecules as platforms for various biotechnical, neurobiological, and biotherapeutic applications. The long-term goal of the laboratory is to translate this research towards the treatment of neurodegenerative disorders, including Parkinson's disease.

Meifan Amy Chen
Email: meifan.chen@uky.edu
Website:
https://medicine.uky.edu/departments/neuroscience/users/mach248
Lab website: https://www.achenlab.org/

Research area and interests: Reactive astrocytes are key modifiers of CNS disease/injury outcomes. Understanding their regulation, functions, and diversity in the injured CNS is therefore critical to harnessing their therapeutic potential for neural repair. Towards this goal, our lab studies : 1) how astrogliosis is regulated; 2) how reactive astrocytes instruct the injury response of neurons and other types of glia; and 3) how reactive astrocytes can be therapeutically targeted. We address these questions using mouse genetics, mouse spinal cord injury and stroke models, behavioral analyses, molecular and cellular biology, primary cell culture, and genomics. We are uniquely situated in the Spinal Cord and Brain Injury Research Center (SCoBIRC) at the University of Kentucky that provides an outstanding environment for neurotrauma research.

Marilyn Duncan
Email: mjdunc0@email.uky.edu
Website:
https://medicine.uky.edu/departments/neuroscience/users/mjdunc0

Research area and interests: Circadian (24-hour) rhythms govern a wide array of physiological and behavioral processes in virtually all organisms, including humans. By coordinating these processes with internal and external timing signals, circadian rhythms enable us to anticipate and prepare for daily changes in our environment. Robust, well synchronized circadian rhythms are essential for health and optimal physical and mental performance. Attenuation or disruption of circadian rhythms, especially sleep-wake rhythms, impairs cognition and memory and lowers resistance to disease. My research is directed at understanding the neural mechanisms leading to impairments in circadian rhythms during normal aging and in pathological conditions such as Alzheimer's disease, obesity, and diabetes.

Greg Gerhardt
Email: gregg@uky.edu
Website:
https://medicine.uky.edu/departments/neuroscience/users/gregg

Research area and interests: Dr. Gerhardt's laboratory focuses on studies of the dopamine and glutamate neurotransmitter systems in animal models of Parkinson's disease. For these studies, his lab uses both the 6-hydroxydopamine-treated rat model and the MPTP-treated primate model of Parkinson's disease. Using his microsensor techniques, Dr. Gerhardt's lab has investigated the release and uptake of dopamine in the striatum and substantia nigra of the normal and parkinsonian brain. Another area of research in his laboratory involves studies of movement abnormalities in aging. Such studies are performed in the striatum and substantia nigra of young and aged Fischer 344 rats, and in young and aged nonhuman primates. A major research area of Dr. Gerhardt's laboratory is the dynamics of neurotransmitter function in the central nervous system. In order to perform such studies, his lab develops microsensors (5-30 microns) and instrumentation for the rapid, sensitive, and spatially resolved measurement of neurotransmitters and neuromodulators, such as dopamine, norepinephrine, serotonin, nitric oxide, and glutamate. A major goal of these studies is to understand neurotransmitter signaling in biological systems.

April Hatcher
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Website:
https://medicine.uky.edu/departments/neuroscience/users/arich3
Lab website:
https://medicine.mc.uky.edu/hatcherteachingtools/

Research area and interests: Dr. Hatcher is a member of the Special Title faculty series that focuses on embryology, histology, and gross anatomy education for students in a variety of disciplines, including undergraduate students, medical, dental, physician assistant, physical therapy, and graduate students. Dr. Hatcher's scholarly activity is directed toward the development of innovative teaching strategies in the anatomical sciences. Currently, her scholarly activity includes the incorporation of the humanities in anatomy education, the development of 3D models for teaching intricate anatomical concepts, transparency in higher education, and techniques for engagement in the virtual classroom.

Joe Springer
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Website:
https://medicine.uky.edu/departments/neuroscience/users/jspring

Research area and interests: Mitochondrial Function, Inflammation, and microRNA (miRNA) Activity in Traumatic Brain Injury-
The goal of our research is to limit cell loss and the resulting neurological deficits following CNS injury by targeting steps occurring early in the cell death process. Recently, we have focused our efforts on identifying the mitochondrial events responsible for regulating cell survival and death following traumatic brain injury (TBI). Our most recent studies have revealed a novel role for mitochondria in the regulation of cellular miRNA activity and that TBI results in a intracellular compartmental shift of miRNAs regulating inflammation. Two of these inflammatory miRNAs are miR-146a and miR-223, which are known to affect myeloid cell phenotype by down-regulating pro-inflammatory markers while increasing expression markers of anti-inflammation. We are currently investigating nanocarrier-based cell delivery strategies to introduce inflammatory-related miRNA mimics/inhibitors to the injured brain as a way of targeting pro-inflammatory signaling and prompting reparative macrophage expression.

Patrick Sullivan
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Website:
https://medicine.uky.edu/departments/neuroscience/users/patsull

Research area and interests: Traumatic brain (TBI) and spinal cord injuries (SCI) render devastating health problems in the United States with an annual cost of approximately 72 billion dollars. This has initiated an enormous focus on the development and discovery of neuroprotective and/or pro-regenerative agents for the treatment of TBI and SCI. Nevertheless, the underlying mechanism(s) of neuronal degeneration and progressive tissue destruction that occurs following such injuries are not fully understood. To begin exploring the cellular and/or molecular mechanisms underlying the pathophysiology of TBI and SCI, it is important to focus on key regulatory steps in the cell death process. Recent evidence indicates that mitochondria, long-known as the "powerhouse" of the cell, play a pivotal role in the cell death cascade. Thus, the main focus of our laboratory is to advance the field of CNS injury research by mapping key events that result in mitochondrial failure and employing this knowledge in developing novel strategies that target these pathways.

Ramon Sun
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Research area and interests: My scientific philosophy is that I want to find true, clinically relevant and widely applicable mechanisms of disease. Therefore, my lab employs multiple models, from cell-free to animal models, multiple techniques, including metabolomics, histology, genetic manipulations, and pharmacological approaches to tackle complex biological questions. The current research focuses on how N-link glycans affect metabolism and disease progression in Ewing's Sarcoma and late-onset Alzheimer's disease.

Randal Voss
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Research area and interests: Randal uses genetic, genomic, and developmental approaches to identify mechanisms that salamanders remarkably use to regenerate whole organs, including their limbs and spinal cord. He directs the Ambystoma Genetic Stock Center, a National Institutes of Health (NIH) P40 Research Resource Center that provides axolotls (Ambystoma mexicanum) to researchers nationally and internationally.

Department: Pharmacology and Nutritional Sciences;
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Yasir Alsiraj
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Research area and interests: Cardiology, clinical pharmacology, vascular surgery, hormonal analysis, vascular diseases, atherosclerotic vascular diseases, vascular imaging, lipid metabolism

Rolf Craven
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Research area and interests: My lab is investigating signaling pathways that are induced in cancer and allow tumor cells to spread and survive outside of their normal environment. Cancer cells often utilize proteins called tyrosine kinases to send pro-growth signals within the tumor, and one of the most frequently activated tyrosine kinases in cancer is called EGFR. We have identified a protein that binds to EGFR and maintains EGFR levels at the plasma membrane. S2R (sigma-2 receptor)/Pgrmc1 (progesterone receptor membrane component 1) was originally identified as a progesterone receptor. However, S2RPgrmc1 is unrelated to steroid hormone receptors and is a cytochrome that binds to heme and forms complexes with EGFR in cancer cells, with cytochrome P450 proteins in normal cells and possibly with an unknown progesterone receptor.

Analia Loria
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Research area and interests: Dr. Loria is a highly trained cardiovascular scientist with a strong background in cardiovascular physiology, biochemistry and vascular biology of vasoactive peptides, with particular expertise in the effects of renin-angiotensin system (RAS) on the cardiovascular system and is also affiliated with the Saha Cardiovascular Research Center.

Kevin J. Pearson
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Research area and interests: My lab's research interests are in the area of fetal or developmental (metabolic) programming or how maternal diet and behavior (such as exercise) can influence offspring obesity, diabetes, insulin resistance, and cancer. The work that we hope to accomplish over the next several years is summarized below. PROJECT A: Maternal Exercise Protects Offspring from Obesity and Insulin Resistance. PROJECT B: Maternal Exercise Enhances Cancer Protection in Offspring. PROJECT C: Postnatal Complications of Polychlorinated Biphenyl Exposure during Pregnancy.

Rina Plattner
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Research area and interests: The Plattner laboratory studies the process of cancer metastasis and therapeutic resistance. Currently, the laboratory is focusing on the role of ABL kinases during melanoma therapeutic resistance, and has identified a unique drug combination that reverses and prevents BRAF/MEK inhibitor resistance, in vivo. Her laboratory's exciting findings have led to a clinical trial to test this regimen in patients who have failed BRAF/MEK inhibitor therapy, and her current research is focused on dissecting the mechanisms by which ABL kinases drive resistance in different melanoma subtypes.

Frédérique Yiannikouris
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Research area and interests: My research program focuses on the determination of the role of prorenin receptor (PRR) in fat mass growth, the mechanism by which PRR is involved in obesity and its role in the regulation of blood pressure

Department: Physiology; https://medicine.uky.edu/departments/physiology/people

Erhard Bieberich
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Research area and interests: Our lab is interested in understanding the function of lipids, particularly the sphingolipid ceramide, in neural development and neurodegeneration. We have discovered that ceramide is enriched in membranes and compartments (ceramide-enriched compartments) that are critical for the function of primary and motile cilia in neural progenitor cells in brain development and exosomes in Alzheimer's disease. Current and future research is focused on understanding specific ceramide-protein interactions that regulate cell signaling in stem and neuroprogenitor cells, glial cells, and neurons.

Kenneth Campbell
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Lab website:
https://sites.google.com/g.uky.edu/cml/home

Research area and interests: Research in the lab is grounded in muscle biophysics and mathematical modeling of striated muscle function but increasingly moved towards translation. This trend started in 2008 when we initiated a collaboration with a cardiothoracic surgeon to procure myocardium from patients and organ donors. The program took off and our lab has now invested ~100,000 hours (24/7 call for 12 years) building a biobank that contains >10,000 samples from 400 patients. We share these samples with investigators from ~30 institutions around the world and use them in nearly all of our own experiments. Our mission is to help patients who have heart failure by bridging the scientific gaps between molecular, cellular and organ-level function.

Esther Dupont-Versteegden
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Research area and interests: Skeletal muscle plasticity, aging, skeletal muscle atrophy, muscle stem cells, the effect of massage on muscle properties.

Steven Estus
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Lab website:

Research area and interests: In our laboratory, we seek to elucidate the mechanisms underlying the actions of genetic polymorphisms that modulate the risk of disease, especially Alzheimer’s disease (AD). Our goal is to translate these findings into novel approaches to prevent or treat human disease. We are primarily focused on AD genetics because genetic risk factors drive the majority of AD risk. Also, since genetic variants modulate AD risk, then by definition, drugs that act similarly will also modulate AD risk. Hence, we interpret the pathways identified by genetics as validated drug targets. Our experimental approach begins by noting that high throughput genome wide association studies have identified a series of single nucleotide polymorphisms (SNP)s that are robustly associated with AD risk. Hence our goal is to perform molecular genetic studies to identify the mechanisms of action underlying these SNPs. The overall goal of our laboratory is to use human genetics to identify molecular mechanisms that modulate the risk of human disease, especially AD.

John Gensel
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https://medicine.uky.edu/departments/physiology/users/jcge224

Research area and interests: Endogenous microglia and blood-borne monocytes (collectively referred to as CNS macrophages) are activated by CNS trauma and home to the site of injury. Once these cells occupy the CNS, they persist there indefinitely. This phenomenon has been documented extensively in different models of mammalian brain and spinal cord injury and is also a feature of human neurotrauma. I am interested in understanding the biological mechanisms that regulate this ubiquitous response to injury with the goal of manipulating CNS macrophages to promote repair. Ongoing studies are focused on answering these questions: 1) Can a pro-reparative macrophage phenotype be induced after injury using therapeutic interventions? 2) What receptors pathways drive reparative macrophage phenotypes and can those pathways be manipulated after spinal cord injury? 3) What is the function and phenotype of macrophages responding to traumatic brain injury? 4) How does age affect the inflammatory response to neurotrauma? The goal of these studies is to develop therapies that will translate to the human population.

Ming Cui Gong
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Lab website:

Research area and interests: Current research in our laboratory focuses on vascular mechanisms of type 2 diabetes associated hypertension and blood pressure circadian rhythm disruptions More than 170 million people worldwide have diabetes. Hypertension occurs more frequently in these diabetic patients than in those without diabetes. Moreover, when hypertension is superimposed on diabetes, the progression of diabetic complications becomes significantly more severe. However, the mechanisms by which diabetes cause an increase in the incidence of hypertension are not well understood. We and others have found that type 2 diabetic mouse models, db/db mice and high fat-diet fed mice, are hypertensive and vascular smooth muscle tissues isolated from them manifest contractile hyper-reactivity. One of our goals is to elucidate the molecular mechanisms underlying such vascular smooth muscle hyper-reactivity and its role in diabetes associated hypertension. Currently, we are focusing on the role of CPI-17, a myosin phosphatase inhibitory protein that is preferentially expressed in smooth muscle and plays an important role in regulating physiological smooth muscle contraction.

Gregory Graf
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Research area and interests: Dr. Graf's laboratory's research focus is on the relationships between obesity and changes in lipid and lipoprotein metabolism that link obesity to cardiovascular diseases and diabetes. Current projects: (1) to determine how this pump is regulated in the liver such that therapeutics can be developed to accelerate cholesterol elimination in the treatment of both cardiovascular and liver disease; (2) to identify proteins within this alternate pathway and determine whether these are amenable to pharmaceutical development.

Brad Hubbard
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Research area and interests: The research interests of the Hubbard lab lie in understanding and treating pathobiology of military-related mild traumatic brain injury. The biological mechanisms the lab focuses on include neurovascular and blood-brain barrier dysfunction as well as mitochondrial mechanisms of disease.

Lu-Yuan Lee
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Research area and interests: Our long-term objectives are to answer the following questions: (1) What are the physiological and pharmacological properties of the chemosensitive nerve endings in the lung? (2) What are the roles of these sensory nerves in regulating cardiopulmonary functions under normal and various pathophysiological conditions of the airways? (3) What are the endogenous and exogenous chemical substances that can alter the sensitivity of these sensory endings? (4) What are the cellular mechanisms underlying the hypersensitivity of these sensory nerves caused by inflammation of airway mucosa, such as during airway injury or allergic reaction? (5) What is the role of the transient receptor potential vanilloid type 1 (TRPV) ion channels in the airway hypersensitivity (exaggerated cough and bronchoconstrictive responses to inhaled irritants) developed during airway inflammatory reaction?

Hong Lu
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Research area and interests: Cardiovascular diseases are the leading cause of death in the nation and industrialized nations, accounting for nearly 50% of all deaths. Particularly, atherosclerosis is associated with significantly accelerated rates of cardiovascular complications. With the recognition of this evidence, understanding the mechanisms leading to these vascular diseases has become a focus of my research work. I am particularly interested in characterizing the renin angiotensin system by which mechanisms this system initiates and promotes the development of atherosclerosis in a hypercholesterolemic mouse model. I am also interested in the effects of the renin angiotensin system on aneurysm, which is the 13th leading cause of death in the United States. Understanding these mechanisms is of considerable interest as many members of the renin angiotensin system can be pharmacologically inhibited by agents already clinically used to treat hypertension in clinical patients. Since these drugs are currently being further investigated in large randomized trials for their efficacy to prevent and treat cardiovascular diseases, my research might point to molecular mechanisms by which these agents prevent the development of atherosclerosis and aneurysms.

John McCarthy
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Research area and interests: The focus of the laboratory is to better understand the cellular and molecular mechanisms involved in the regulation of skeletal muscle hypertrophy. We are investigating, in collaboration with Dr. Peterson, of the College of Health Sciences here at the University of Kentucky, the compensatory mechanism that allows skeletal muscle to hypertrophy independent of satellite cells, the primary stem cell in adult skeletal muscle. We also have studies underway, in collaboration with Dr. Esser, investigating the regulation of ribosome biogenesis by beta-catenin/c-Myc signaling pathway and its importance in skeletal muscle hypertrophy. In addition to these studies, we are interested in the role that microRNAs have in skeletal muscle plasticity with a primary focus on muscle hypertrophy. More recently, we have begun to explore the role that ribosome specialization may have in adult skeletal muscle plasticity.

Timothy McClintock
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Research area and interests: The olfactory system does two unique things: It detects odors and it replaces injured neurons by activating resident tissue-level stem cells, even in adults. My lab investigates the molecular physiology of both of these processes, but current emphases are on the function and pharmacology of the odorant receptors. Ongoing interests include investigating the mechanisms that underlie the amazing specificity of odorant receptor gene expression and the molecular biology of neural replacement in the olfactory epithelium. Our foundational studies of gene expression in the cell types of the olfactory epithelium guide these studies and provide opportunities to understand how phenotypic differences arise.
Technologically, our approaches range from genomics to biochemistry, anatomy, and behavior. The mouse is our primary experimental model.

Samir Patel
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Research area and interests: Neuroscience, physiology, systems biology, biochemistry, metabolism, cholesterol, mitochondria, liver mitochondria, phospholipids, diabetic cardiomyopathies, energy metabolism, spinal cord surgeries, mitochondrial transplantation, spinal cord injury

Department: Toxicology and Cancer Biology; https://medicine.uky.edu/departments/toxicology/users (select "Faculty" under "Employee Type" in the search box)

Eva Goellner
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Research area and interests: The Goellner Lab focuses on understanding the molecular mechanisms linking DNA repair and DNA damage response pathways with sensitivity to environmental or chemotherapeutic DNA damaging agents.

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Research area and interests:

Nathan Vanderford
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Research area and interests: Cancer disparities, cancer education and training, health promotion

Clinical Departments; https://medicine.uky.edu/clinical-departments

Justin Fraser
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Department: **Neurosurgery**; https://medicine.uky.edu/departments/neurosurgery

Research area and interests: I currently practice both open and endovascular cerebrovascular neurosurgery, which includes providing all facets of interventional treatment for hemorrhagic and ischemic stroke. My research has included both benchwork and clinical efforts, and my current research focus is early detection and therapeutic approaches for ischemic stroke. My clinical background has included publications in the management of acute ischemic stroke, subarachnoid hemorrhage, and interventional management of cerebrovascular disease. I am the principal investigator and site-PI on several clinical studies, including several multicenter clinical trials evaluating aneurysm treatments, as well as multiple registries for treatment of ischemic stroke. I am currently PI for two investigator-initiated Phase I studies of intra-arterial administration of neuroprotective agents in acute stroke. I am also PI of a funded Phase I study to evaluate a point-of-care detection device that uses a drop of whole blood to determine the presence of stroke and traumatic brain injury through a serum biomarker. My most current endeavors focus on translating potential neuroprotective agents into clinical application within the context of current stroke therapy, and evaluating the micro-environment of the vascular elements in the brain during acute large vessel stroke in the human condition.

Simon Fisher
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Department: **Internal Medicine** (Division of Endocrinology, Diabetes and Metabolism); https://medicine.uky.edu/departments/internalmedicine

Research area and interests: Dr. Fisher is Professor of Medicine, Division Chief of Endocrinology, Diabetes and Metabolism. As a principal investigator on NIH and JDRF funded grants, his research investigates the pathophysiology and treatment of diabetes and its complications. More specifically his laboratory studies insulin action, tissue specific cross-talk, complications of diabetes, and hormonal counterregulation. The Fisher laboratory provides a truly interactive and interdisciplinary rich research environment for fostering the scientific development of the undergraduate students, clinical fellows, MD/PhD students, PhD students, and postdoctoral fellows who wish to pursue scientific careers dedicated to diabetes research. Many of his previous undergraduate trainees have progressed to medical school or graduate school and have now assumed independent faculty positions at prestigious academic institutions.

Patrick Hannon
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Department: **Obstetrics and Gynecology;** https://medicine.uky.edu/departments/obgyn

Research area and interests: the Hannon Lab has been dedicated to understanding the role of environmental exposures in women's reproductive health. Dr. Hannon's team primarily focuses on how endocrine-disrupting chemicals cause defects in fertility by disrupting the function of the ovary. Through his research Dr. Hannon aims to discover therapeutic interventions for infertility caused by such occurrences.

John Fowlkes
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Department: **Pediatrics;** https://medicine.uky.edu/departments/pediatrics

Research area and interests: Pediatric metabolic endocrinology, pediatric diabetes

Cherry Ballard-Croft
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Department: **Surgery;** https://medicine.uky.edu/departments/surgery

Research area and interests: Ischemic heart disease is the leading cause of mortality in men and postmenopausal women. Premenopausal women are protected from this injury, suggesting that estrogen protects the heart. Estrogen is thought to exert its cardioprotective effects via estrogen receptors (ERs) which are located in the cytosol, nucleus, mitochondria, and membrane caveolae. The expression of ERs is regulated by estrogen with the type of regulation dependent upon the tissue. The signaling pathways implicated in estrogen action in the heart include p38 MAPK, ERKs, JNKs, PI-3 kinase, and nitric oxide. Our long term goal is to develop a strategy to lower cardiovascular event-related mortality in post-menopausal women. The objective for this project is to determine the role of compartmentalized ER signaling in estrogen cardioprotection. Based on our preliminary studies, we propose the central hypothesis that estrogen protects the heart from ischemia/reperfusion injury through compartmentalized ER-mediated p38 MAPK signaling.

Amanda Saltzman
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Research area and interests: Pediatric urology, testicular cancer, gonadal malignancy