BIO 395 RESEARCH MENTOR LIST

To set up a BIO 395 research experience you should contact a faculty member whose research area interests you and discuss possible projects. When you decide on a particular mentor, and you and the mentor have agreed that you may work in the lab, you must fill out a BIO 395 Research Contract and submit it the Biology Department, 101 TH Morgan, within one month of the beginning of the semester in which you are registered for BIO 395. New contracts must be submitted each semester you register for BIO 395, even if you are just continuing the same project. Biology needs to know which lab you are in so we can request a grade at semester’s end.

This list of potential mentors is organized by College and by Department and represents a cross-section of labs doing biological research across campus. This list is NOT inclusive; there are many other acceptable mentors. You may work with someone 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’s and department’s web address is included so you can scan other, non-listed faculty member’s research areas as well.

Be sure to fill out the contract completely. The most important parts are your mentor’s name and address (so we know who to get a grade from) and the description of the research you propose to carry out. Follow the directions stating your hypothesis (the moon is made of green cheese), how you intend to test it (send a rocket containing mice to the moon and send a rocket with a mouse counter but no mice one month after the first one), and how you will interpret possible results (if there are lots of mice present after a month then the moon could be made of cheese and the hypothesis is supported).

The work you propose must be biological and it must be experimental. This means that you have to do actual experiments to determine whether your hypothesis is valid or not. Literature reviews and other passive reading or studying of other peoples’ work does NOT qualify as research and those contracts will not be approved. If BIO 395 is not the appropriate way to get credit for your proposed work then you can consider EXP 396 (Experiential Education). Many activities that are not research can still be carried out for academic credit as EXP 396. Contact Experiential Education by going to room 116 Stuckert Bldg, 0494, or calling 257-3632.

If you want to work with a mentor in the Biology department you should consider applying for a Ribble Undergraduate Research Scholarship. Ribble Scholarships are worth $1,500 per year. Ribble scholars must be Kentucky residents and must do their research in a Biology department faculty member’s laboratory. Further criteria are: junior or senior status when the research begins, excellent achievement and promise in biology, potential for a productive research experience as exemplified by the written research plan, and need for the scholarship to enhance your education.

College of Arts and Sciences

Biology Department: http://www.as.uky.edu/Biology/

Carol Baskin
Department: Biology
Location: 120 MDR3
Mail address: 101 Morgan Bldg., 0225
Campus phone: 257-3996
E-mail: ccbask0@uky.edu

Research area and interests:
Life cycle ecology of herbaceous plants, with particular reference to the ecology, biogeography, and evolution of seed dormancy and germination.
Philip Bonner  
Department: **Biology**  
Location: 213 MDR3  
Mail Address: 101 Morgan Bldg., 0225  
Campus phone: 257-3117  
E-mail: pbonner@uky.edu  
**Research area and interests:**  
Axon growth and branching during development and regeneration.

Vincent Cassone  
Department: **Biology**  
Location: 302 TH Morgan  
Mail Address: 101 Morgan Bldg., 0225  
Campus phone: 76766  
E-mail: vcass2@uky.edu  
**Research area and interests:**  
Chronobiology & Neuroscience

Robin L. Cooper  
Department: **Biology**  
Location: 225 TH Morgan  
Mail Address: 675 Rose St., 0225  
Campus phone: 257-5950  
E-mail: RLCOOP1@email.uky.edu  
Lab webpage: [http://web.as.uky.edu/Biology/faculty/cooper/default.htm](http://web.as.uky.edu/Biology/faculty/cooper/default.htm)  
**Research area and interests:**  
Research goals of my laboratory are to understand the physiological mechanisms involved in synaptic plasticity among neurons in vivo and in situ. We are also interested in general comparative physiological processes.

Philip H. Crowley  
Department: **Biology**  
Location: 113 MDR3  
Mail Address: 101 Morgan Bldg., 0225  
Campus phone: 257-1996  
E-mail: pcrowley@uky.edu  
Lab webpage: [http://web.as.uky.edu/biology/faculty/crowley/phil.html](http://web.as.uky.edu/biology/faculty/crowley/phil.html)  
**Research area and interests:**  
My students and I address a broad range of ecological topics from physiological to ecosystem levels, with animals, plants, and disease organisms, using both empirical methods (lab, field and semi-field experimentation; comparative and descriptive studies) and theoretical methods (analytical, numerical, and simulation modeling). We also use interdisciplinary approaches, such as comparative analysis of decision making, emphasizing the role of game theory. We welcome undergraduate researchers, particularly those whose interests fit with ongoing graduate-student research in the lab.

Elizabeth Debski  
Department: **Biology**  
Location: 201 MDR#3  
Mail address: 101 Morgan Bldg., 0225  
Campus phone: 323-9537  
E-mail: debski@uky.edu  
**Research area and interests:**
My laboratory investigates the mechanisms underlying activity-dependent organization of the visual system.

**Scott Gleeson**  
Department: **Biology**  
Location: 109 MDR3  
Mail Address: 101 Morgan Bldg., 0225  
Campus phone: 323-3284  
E-mail: skglees@uky.edu  
**Research area and interests:** Understanding of plant adaptations and their community consequences, particularly the acquisition of and competition for multiple limiting resources.

**Doug Harrison**  
Department: **Biology**  
Location: 300B T.H. Morgan  
**Mail address:** 101 Morgan Bldg., 0225  
Campus phone: 257-6275  
E-mail: dough@uky.edu  
**Research area and interests:**  
My primary research interest is in the transduction of developmental signals for cell proliferation and differentiation, specifically focusing on the Janus kinase (JAK) signaling pathway in the fruit fly, *Drosophila melanogaster*.

**Grace Jones**  
Department: **Biology**  
Location: 304A T.H. Morgan  
Mail Address: 101 Morgan Bldg., 0225  
Campus phone: 257-3795  
E-mail: gjones@uky.edu  
**Research area and interests:** Nuclear Receptor Signaling

**Rebecca Kellum**  
Department: Biology  
Location: 314A T.H. Morgan  
Mail address: 101 T H Morgan Building  
Campus phone: 257-9741  
E-mail: rkellum@uky.edu  
**Research area and interests:**  
Research in the Kellum lab is focused on the roles of heterochromatin proteins in the mechanics of chromosome segregation and gene regulation in the genetically tractable model system of *Drosophila melanogaster*. Particular emphasis is on the activities of two heterochromatin proteins, the highly conserved HP1 protein and its telomeric partner (HOAP), in regulating the critical decision in the sex determination pathway of *Drosophila*.

**Jim Krupa**  
Department: **Biology**  
Location: 108 MDR3  
Mail Address: 101 Morgan Bldg., 0225  
Campus phone: 257-8417  
E-mail: bio149@uky.edu  
**Research area and interests:**
One aspect of my research involves groups of undergraduates involved in field-oriented research. Projects typically involve aspects of mammal ecology at the University of Kentucky’s 11,000 acre Robinson Forest. Studies have included flying squirrel ecology, the impact of fire on small mammals such as the white-footed mouse, and the abundance, distribution, and ecology of the Allegheny woodrat.

Catherine Linnen
Department: Biology
Location: 200A T.H. Morgan
Mailing Address: 101 Morgan Bldg., 0225
Campus phone: 323-3160
E-mail: Catherine.linnen@uky.edu
Lab webpage: http://www.uky.edu/~cli242/Linnen_Lab/Home.html
Research area and interests:
I use plant-feeding insects as models to understand how adaptation to different habitats (in this case, different host plants) drives the formation of new species. To address these questions, my lab combines a variety of approaches, including: fieldwork, behavioral studies, genetic crosses, population genetics, phylogenetics, and genomics.

Nicholas McLetchie
Department: Biology
Location: 102 MDR#3
Mail address: 101 Morgan Building
Campus phone: 257 6786
E-mail: mclet@uky.edu
Lab webpage: http://wort.uky.edu/~mclet
Research area: My research program focuses on elucidating the factors resulting in an entire plant species or population being dominated by one sex. Such factors include variation in offspring sex ratios and sex differences in growth, asexual reproduction, survival and sex expression.
Possible research projects for undergraduates: The majority of student projects deal with detecting sex differences at the whole plant level (life histories), at the physiological level (photosynthesis related traits) and, at the morphological and molecular level (genetic variation). I try to match the project with the student interests, ongoing research and availability of resources within the lab. Students are welcome to visit the lab.

Peter M. Mirabito
Department: Biology
Location: 319 T.H. Morgan
Mail Address: 101 Morgan Bldg., 0225
Campus phone: 257-7642
E-mail: pmmira00@uky.edu
Research area and interests:
Function of the Anaphase-Promoting Complex or Cyclosome (APC/C) in Aspergillus nidulans, Functional Genomics of Mitosis.

Ann Morris
Department: Biology
Location: 215 T.H. Morgan Bldg.
Mail address: 101 Morgan Bldg., 0225
Campus phone: 257-8823
E-mail: ann.morris@uky.edu
Lab webpage: http://www.as.uky.edu/academics/departments_programs/Biology/Biology/faculty_research/faculty/morris/
Research area and interests:
Our laboratory studies cellular differentiation and gene expression in the vertebrate retina, the photosensitive lining at the back of the eye. The light-capturing neurons of the retina are the photoreceptors. Rod photoreceptors
mediate dim light vision, whereas cone photoreceptors mediate daytime and color vision. Photoreceptor degeneration associated with ocular diseases such as retinitis pigmentosa (RP), macular degeneration, and retinal detachment is a significant cause of visual impairment and blindness, for which there is currently no cure. One promising avenue of research is to study the retinas of vertebrate animals that innately possess the capacity to regenerate retinal neurons following injury. For this reason, the zebrafish retina represents a valuable model system in which to study the mechanisms of neural progenitor proliferation, differentiation, and photoreceptor regeneration. One of the projects in my laboratory involves identifying the genetic pathways that mediate photoreceptor development and regeneration in zebrafish. A second project involves the generation of zebrafish models of human retinitis pigmentosa in which we have temporal control over photoreceptor degeneration and regeneration. Overall, our research spans several areas of interest, including developmental biology, genetics, molecular and cellular biology, and neuroscience.

Bruce O’Hara
Department: Biology
Location: 334 T.H. Morgan
Mail address: 101 Morgan Bldg., 0225
Campus phone: 257-2805
E-mail: bohara@uky.edu

Research area and interests:
My laboratory uses molecular and genetic approaches to better understand sleep and circadian rhythms. We have also developed an automated method of monitoring sleep and wake in mice allowing for non-invasive and large-scale studies in many inbred and outbred mouse populations, and also in preclinical studies of how drugs or brain injury interact with and influence sleep.

Jeffrey L. Osborn
Department: Biology
Location: 115 T.H. Morgan (office) 205 MDR3 (lab)
Mail address: 101 T.H. Morgan Bldg., 0225
Campus phone: 257-3988
E-mail: jeffrey.osborn@uky.edu

Research area and interest:
The laboratory of Dr. Jeffrey Osborn provides a specialized environment where all students experience "science in action". The physiological research laboratory focuses upon the neural control of renal sodium and water balance and the role of renal sympathetic nerves in the control of blood pressure.

Brent Palmer
Department: Biology
Location: 204 T.H. Morgan
Mail Address: 101 Morgan Bldg., 0225
Campus phone: 257-5824
E-mail: bpamler@uky.edu

Research area and interests:
My research program focuses on conservation of wildlife species, using comparative reproductive biology and endocrinology. I specialize in lower vertebrates, particularly turtles and tortoises.

Edmund B Rucker
Department: Biology
Location: 313 T.H. Morgan
Mail Address: 101 Morgan Bldg., 0225
Campus Phone: 257-2175
E-mail: ebru222@uky.edu

Research area and interests:
Molecular Genetics and Transgenics

**Brian Rymond**  
Department: **Biology**  
Location: 335A T.H. Morgan  
Mail address: 101 Morgan Bldg., 0225  
Campus phone: 257-5530  
E-mail: rymond@uky.edu  
**Research area and interests:** Using genetic and proteomic approaches to investigate the mechanism of spliceosome assembly and the fidelity of pre-mRNA splicing

**Robert Craig Sargent**  
Department: **Biology**  
Location: 115 MDR3  
Mail Address: 101 Morgan Bldg., 0225  
Campus phone: 257-8742  
E-mail: csargent@uky.edu  
**Research area and interests:** My research combines original theory with laboratory and field experiments to study the ecology and evolution of reproductive and life-history strategies in teleost fishes. Most of my current research focuses on conflicts of interest (e.g. "the battle of the sexes," intrasexual competition for mates, parent/offspring conflict), and their implications for the fish mating systems. My research program integrates several levels of biological organization and includes elements of population biology, sensory physiology, and genetics.

**Jeremiah Smith**  
Department: **Biology**  
Location: 311 T.H. Morgan  
Mailing address: 101 Morgan Bldg., 0225  
Email: jjsmit3@uky.edu  
**Research area and interests:** The unique selective pressures and functional constraints that vertebrate lineages have experienced over deep evolutionary time have resulted in a diversity of different mechanisms that mediate recombination (meiotic and mitotic), gene duplication, and the evolution of novel functional elements and developmental mechanisms. I am generally interested in understanding how vertebrate genomes evolve at the molecular level and how these changes contribute to the evolution of development. Ongoing studies take advantage of the deep evolutionary history of key vertebrate groups (including lamprey and salamander) in order to better understand how novel genomic functions arise and contribute to an organism's biology.

**Randal Voss**  
Department: **Biology**  
Location: B453 BBSRB  
Mail address: 101 Morgan Bldg., 0225  
Campus phone: 257-9888  
E-mail: srvoss@uky.edu  
**Research area and interests:** I am interested in understanding how and why some organisms can regenerate their limbs and spinal cord, while others, including humans, cannot. I am studying salamanders because they show the greatest regenerative potential of all vertebrates. I also study the genetic basis of species differences, especially differences that are thought to have arisen through the evolutionary process of natural selection.
David Weisrock  
Department: **Biology**  
Location: Rm 117 MDR#3  
Mail address: 101 Morgan Bldg., 0225  
Campus phone: 257-2249  
E-mail: dweis2@uky.edu  
Lab web page: [http://sweb.uky.edu/~dweis2/The_Weisrock_Lab/Front_Page.html](http://sweb.uky.edu/~dweis2/The_Weisrock_Lab/Front_Page.html)  

**Research area and interests:**  
Research in the Weisrock Lab combines genetics, genomics, and evolutionary biology. Much of our research centers on using genetics to resolve the geographic boundaries of species in nature, reconstruct the relationships among these lineages, and address the mechanisms that have led to their formation.

David F. Westneat  
Department: **Biology**  
Location: Rm 104 MDR#3  
Mail address: 101 Morgan Bldg., 0225  
Campus phone: 323-9499  
E-mail: biodfw@uky.edu  
Lab Webpage: [http://web.as.uky.edu/biology/faculty/Westneat/Personal/westneat.html](http://web.as.uky.edu/biology/faculty/Westneat/Personal/westneat.html)  

**Research area and interests:**  
We study the ecology of social behavior, including dominance and aggression, social foraging, parental care, mate choice, and signaling, mostly in birds. We typically have projects for undergraduates in all semesters, including summer. These can range from working outside with free-living birds, subjects in aviaries, or lab analyses of samples. For more information, please visit the Westneat lab homepage.

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**Chemistry**  
[http://www.chem.uky.edu/](http://www.chem.uky.edu/)  

Stephen Testa, Ph.D.  
Department: **Chemistry**  
Location (building and room number): CP-315  
Mail address: 315 Chemistry-Physics Building, 0055  
Campus phone: 257-7076  
e-mail: testa@uky.edu  

**Research area and interests:**  
Developing and characterizing novel catalytic RNAs that repair genetic mutations at the RNA level. Diseases of interest include breast and lung cancers and muscular dystrophies.

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**Psychology**  
[http://www.uky.edu/AS/Psychology/](http://www.uky.edu/AS/Psychology/)  

Michael T. Bardo  
Department: **Psychology**  
Location: 110A Kastle  
Mail address: Dept Psychology, 110A Kastle, 0044  
Campus phone: 257-6456  
e-mail: mbardo@uky.edu  

**Research area and interests:**  
Psychopharmacology, behavioral neuroscience  
**Possible research projects for undergraduates:**  
1. Assessment of the environmental and genetic factors that increase risk for drug abuse using rodent models. Both behavioral and neurochemical levels of analysis are being pursued.  
2. Development of novel medications for the treatment of stimulant abuse, including methamphetamine and nicotine. This work is being pursued with colleagues in the College of Pharmacy.
Susan Barron  
Department: Psychology  
Location: Kastle 208  
Mail Address: Department of Psychology, Kastle Hall, 0044  
Campus phone: 257-5401 (office), 257-2864 (lab)  
e-mail: sbarron@uky.edu  
Research area and interests: Prenatal drug effects, alcohol-related neurotoxicity.  
Possible research projects for undergraduates: Research projects that undergraduates are involved with examine the effects of prenatal drug exposure on behavioral outcome using a rodent model. In addition, students work on projects in which we use pharmacological manipulations to try and reduce alcohol-related damage to the CNS.

Peter R. Giancola  
Department: Psychology  
Location: 207K Kastle Hall  
Mail Address: Department of Psychology, Kastle Hall, 0044  
Campus phone: 257-4502  
e-mail: peter@uky.edu  
Research area and interests: Alcohol-Related Aggression; Neuropsychological Aspects of Violence.  
Possible research projects for undergraduates: Many projects are available.

Mark A. Prendergast  
Department: Psychology  
Office: B449 BBSRB  
Phone: 257-6120  
e-mail: prender@email.uky.edu  
web page: http://www.as.uky.edu/academics/departments_programs/Psychology/Psychology/faculty_research/faculty/mark_prendergast/Pages/default.aspx  
Areas of interest: My laboratory is interested in studying the biochemical pathways activated by Central Nervous System toxins to produce neurodegeneration. Our work is heavily focused on examination of alcohol-related brain damage and the role that stress hormone systems play in alcohol dependence. We employ both live animal and cell culture models. Students working in my laboratory can expect to gain experience with use of rodent brain cell culture, microscopy, immunohistochemistry and ELISA.

Thomas Zentall  
Department: Psychology  
Location: Kastle Hall 202B  
Phone: 257-4076  
e-mail: zentall@uky.edu  
Research area and interests: comparative cognition, social learning in aniamls, animal memory, concept learning in animals, timing in animals, spatial learning in animals  
Possible research projects for undergraduates: Undergraduates take part is several research projects as part of a larger team. The projects vary a lot from semester to semester. Together with a graduate student each undergraduate selects one or two experiments as the focus of their attention during the semester.  

College of Agriculture http://www.ca.uky.edu/  

Thomas G. Barnes Associate Extension Professor  
Department: Department of Forestry  
Campus phone: 323-1031  
e-mail:
Research area and interests: Many projects are available. Most of my research at the present time is focused on the effects of imazapic on native plants, particularly wildflowers. Potential studies could be done in the greenhouse or in the field.

Thomas M. Chambers
Department: Veterinary Science
Location: 443 Gluck Equine Research Center
Mail address: 108 Gluck Equine Research Center, speedsort 0099
Campus phone: 257-4757 ex 81126
e-mail: tmcham1@uky.edu
Research area and interests: equine influenza, influenza viruses, West Nile virus
Possible research projects for undergraduates: viral gene nucleotide sequencing, horse vaccination efficacy studies, antibody response studies

E. Gus Cothran
Department: Veterinary Science
Location: 205 Animal Pathology Bldg.
Mail address: 101 Animal Pathology, 0076
Campus phone: 257-3777
e-mail: gcothran@uky.edu
Research area and interests: Genetic mapping of the horse and the alpaca. Population genetics and conservation genetics of domestic and feral horse populations.
Possible research projects for undergraduates: Synteny mapping of genes in horse or alpaca using a somatic cell hybrid panel.

Charles Fox
Department: Entomology
Location: Ag Science Center North room S-307B
Mail address: Entomology, 0091
Campus phone: 257-7474
e-mail: cfox@uky.edu
Research area and interests: Evolutionary ecology and behavior

Bernhard Hennig
Department: Animal Sciences, College of Agriculture
Location: 204 Funkhouser Bldg. (or 213 Garrigus Bldg.)
Mail Address: 204 Funkhouser Bldg. (or 213 Garrigus Bldg.)
Campus phone: 257-6880
e-mail: bhennig@uky.edu
Research area and interests: Dietary lipids, inflammatory mediators and vascular endothelial cell dysfunction. The primary focus of our research is to determine the molecular mechanisms that underlie the inappropriate overproduction of growth factors by cancer cells. Most of our studies are centered on the gene encoding platelet-derived growth factor (PDGF), which has been strongly implicated as a mediator of malignant growth in cancers of the breast, brain and bone. Having recently identified DNA response elements that are critical for both activation and repression of PDGF gene transcription, our current goals are to 1) identify the polypeptide transcription factors that bind to these elements and mediate their regulatory functions, 2) determine the extent to which these functions are related to growth factor overexpression in human cancers and 3) develop new strategies to treat cancer based on our new knowledge of PDGF gene transcription, either by restoring regulatory control of PDGF and other growth factor genes, or possibly by targeting for destruction cancer cells whose regulatory functions are compromised.
Possible research projects for undergraduates: 1. Examine gene expression profiles in panels of human cancer cell lines, with a focus on gene products involved in PDGF transcriptional control; 2. Analyze the binding of nuclear polypeptide factors to either positively or negatively acting DNA elements in the PDGF gene.
Subba R Palli
Department: Entomology
Location: S225 Ag. Science N 0991
Campus Phone: 257-4962
e-mail: rpalli@uky.edu
Webpage: http://www.uky.edu/~rpalli/
**Research area and interests:** Hormonal regulation of insect development
**Possible research projects:** We use a variety of post-genomics technologies including RNA interference, microarray, quantitative real-time PCR etc. to determine the function of gene products that play key roles in hormonal regulation of development, reproduction and insecticide resistance. Opportunities for training in physiology, biochemistry, toxicology, molecular biology and genome biology are available.

Todd Pfeiffer
Department: Agronomy
Location: 329 Plant Science Building
Mail address: 329 Plant Science Building, 0312
Campus phone: 257-5020 x80771
e-mail: tpfeiffe@uky.edu
**Research area and interests:** role of meiotic recombination in increasing variation, sorghum and soybean plant breeding
**Possible research projects for undergraduates:** molecular markers in plant breeding and studies in selection for differences in recombination

Christopher L. Schardl
Department: Plant Pathology
Location: S-321E Agricultural Sciences-N
Mail address: S-305 ASCN 0091
Campus phone: 257-8758
e-mail: schardl@uky.edu
**Research area and interests:** Molecular biology, biochemistry, molecular evolution.
Elucidate steps in biosynthesis of an insecticidal alkaloid from a symbiotic fungus; Use gene sequences to study evolution of mutualistic symbionts from pathogenic ancestors; Clone genes for secondary metabolism and determine likely functions via computer database searches.
**Possible research projects for undergraduates:** Students can participate in studies of the genetic basis of germination and dispersal and perform studies of natural selection in the field.

College of Dentistry
http://www.mc.uky.edu/Dentistry/

Students enrolled in BIO395 who are interested in working with one of the College of Dentistry faculty mentors listed below are asked to contact Dr. Karen Novak (323-8705, knova2@uky.edu) prior to selecting their mentor.

**College of Dentistry Mentors**
(Additional information can be obtained from the following web site:
http://www.mc.uky.edu/cohr

Cynthia S. Beeman, D.D.S., Ph.D.
Department: Oral Health Practice, Orthodontics
Location: D-442 Chandler Medical Center
Mail Address: D-442 Chandler Medical Center
Campus Phone: 859-323-5122
e-mail: cbeeman@pop.uky.edu
**Research Area and Interests:** Techniques in orthodontic clinical research will be introduced to the
student. These orthodontic research techniques are routinely employed to measure craniofacial growth and development and the efficacy of treatment in clinical trials. The student will learn cephalometric analyses, space analyses, craniofacial growth predictions and tooth size analyses and their use in orthodontic clinical research.

Jeffrey L. Ebersole  
Department: Oral Health Practice  
Location: D544 Dental Science Building  
Mail address: D544 Dental Science Building  
Campus Phone: 859-323-5357  
e-mail: jleber2@uky.edu  
Research area and interests:  
(1) To characterize the use of a murine model for studies delineating the bacterial and host components that contribute to both soft and hard tissue destruction caused by these pathogens. We have used this model to provide comparative characteristics of soft tissue destruction and host responses by various oral pathogens. Additionally, the model has been utilized to evaluate alterations in virulence capacity induced by in vitro and in vivo environmental conditions. This model system is also be used to discriminate the characteristics of the host response that may provide innate and acquired immune protection from the virulence of these microorganisms.  
(2) To utilize the nonhuman primate model of periodontitis to evaluate host-bacterial interactions in the chronic inflammatory disease. We have used this model system of infection to examine the local and systemic host responses, which may control destructive periodontal infections. The nonhuman primate model has been used to manipulate the components and kinetics of the host inflammatory/immune response. Additionally, this model is now being used to explore the oral-systemic infection linkage.  
(3) To delineate the macromolecules of these bacteria that elicit the production/secretion of various host inflammatory mediators (ie. arachidonate metabolites) and cytokines (ie. IL-1ß, IL-6, IL-8, GM-CSF) from non-immune cells (ie. gingival fibroblasts, epithelial cells). This has included the isolation and characterization of various proteins (eg. leukotoxin, momps, heme binding proteins, cystalysin), LPS molecules (eg. P. gingivalis, A. actinomycetemcomitans, C. rectus, T. pectinovorum), and structures (eg. outer membrane vesicles, fimbria, capsular polysaccharide) from periodontal pathogens. These have been used to evaluate the capacity of individual bacteria to stimulate pro- and anti-inflammatory host responses.  

Possible research projects for undergraduates: Examination of host responses to oral treponemes associated with HIV periodontitis. Determination of host responses linking oral disease to systemic health problems.

C. Brad Huang  
Department: Dentistry Research and Graduate Studies  
Location: HSRB 161  
Mail address: HSRB 161  
Campus phone: 257-4427  
e-mail: chuan2@uky.edu  
web page: http://www.mc.uky.edu/COHR/huang.htm  
Research area and interests: Oral microbiology and immunology; Oral infection, inflammation, and HIV reactivation  
Possible research projects for undergraduates: Oral infections associated with the gingival margin and subgingival sulcus leads to host inflammatory responses. Gingivitis is primarily a response to the bacteria in plaque. This “disease” affects nearly everyone in the population worldwide, at some time during their life. Periodontitis is a multifactorial disease that encompasses the hard and soft tissue, microbial colonization (with/without invasion), inflammatory responses, and adaptive immune responses. Gingivitis, periodontitis and caries affect as large a proportion of the global population as any modern disease known to mankind. The goal of my research is to use the newest biotechnology and techniques to study the oral infection and inflammation, and to understand the molecular pathways and mechanisms which cause these diseases. I have a lot of experience in working with Bio395 students. Current research projects include anti-caries, anti-periodontal and gingival diseases, protease inhibitors, Interaction between the oral bacteria and HIV-1 infected latent cells, and natural products.

Lakshmyya Kesavalu  
Department: Oral Health Science/Center for Oral Health Research  
Location: 159 Health Science Research Building
**Research Area and Interests:** To study the role of oral periodontal bacteria (*Porphyromonas gingivalis*, *Tannerella forsythensis*, and *Treponema denticola*, *Fusobacterium nucleatum*) in the progression of periodontitis and host-response to infection.

**Possible research projects for undergraduates:**
1. To determine the effect of synergistic pathogenic consortium *P. gingivalis*, *T. forsythensis*, and *T. denticola* infection in an *in vivo* rat model of alveolar bone resorption.
2. To determine interbacterial synergistic virulence effects and antibody response to *P. gingivalis*, *T. forsythensis*, and *T. denticola* in an *in vivo* calvarial bone resorption model.
3. To determine the host genomics by cDNA microarray technology.
4. Examine *in vitro* antimicrobial activity of compounds against periodontal anaerobic bacteria.

**Mengtao Li**
Department: Center for Oral Health Research
Location: MN326E
Mail address: Center for Oral Health Research
Campus Phone: 323-0011
e-mail: ml4@email.uky.edu

**Research area and interests:** Molecular virology. I am interested in the pathogenesis of Kaposi’s sarcoma associated herpesvirus/human herpesvirus 8 (KSHV/HHV8) and human immunodeficiency virus (HIV).

**Possible research projects for undergraduates**
1. the role of viral interferon regulatory factor (vIRF) in the development of Kaposi’s sarcoma.
2. the mechanism of viral cyclin (k-cyclin) in disrupting cell cycle control.
3. HIV gene activation in oral epithelial cells.

**Craig S. Miller**
Department: Oral Health Practice
Location: MN118
Mail address: College of Dentistry
Campus Phone: 323-5598
e-mail: cmiller@popluky.edu
Website: [http://www.mc.uky.edu/microbiology/miller.asp](http://www.mc.uky.edu/microbiology/miller.asp)

**Research area and interests:** Herpes virus latency and reactivation (see above web site for additional information) Salivary biomarkers in oral health and systemic disease

**Possible research projects for undergraduates:** Identification of genes important in reactivation. Identification of proteins critical for reactivation. Lab bench experience in virology, cell culture, latent infections, ELISA

**Richard J. Mitchell, Ph.D.**
Department: Oral Health Practice
Location: D641 Medical Center; College of Dentistry
Mail address: 800 Rose Street; Campus 0297
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**Research area and interests:** Bonding polymer dental filling materials to enamel and dentin.

**Possible research projects for undergraduates:** 1) the effects of storage in “aging” solutions on the bond strength of polymers to dentins; 2) the development of fracture mechanics tests for measuring bond strength of resins to dentin.

**John Novak, BDS, LDS, MS, PhD**
Department: Oral Health Practice, College of Dentistry
Office Location: 401, Health Sciences Research Building (Bosomworth Bldg)
Mail address: 1095 V.A. Drive, 40536-0305
Campus phone: 323-5159
Karen Novak, D.D.S., Ph.D.
Department: Oral Health Practice
Location: 406B Health Sciences Research Building
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Campus phone: 323-8705
e-mail: knova2@uky.edu

Research area and interests: Our overall focus is studying the oral cavity as a source of infection and inflammation that may have an impact on other areas of the body, other medical conditions, and the aging process.

Karen Novak, D.D.S., Ph.D.
Department: Oral Health Practice
Location: 406B Health Sciences Research Building
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Research area and interests: Evaluation of the efficacy of antimicrobial peptides against oral biofilms. With the increasing development of antimicrobial resistance to traditional antibiotics, new technologies are needed to combat infections that cause human disease. Oral infections are rarely life threatening but have a significant impact on quality of life, economics, and oral and systemic health. The use of systemic antibiotics for the management of oral infections, especially in cases of the biofilm-associated diseases dental caries and periodontal disease, has not received considerable support because of the implications for the emergence of antibiotic resistance in medically important pathogens. However, the use of topical chemotherapeutic agents is gaining considerable support but the development of such agents is lagging behind the potential applications. We are evaluating the efficacy of natural and synthetic antimicrobial peptides against oral pathogens, grown both planktonically and in biofilms, in an attempt to develop new agents to fight oral infections.

Possible research projects for undergraduates:
Evaluation of efficacy of antimicrobial peptides against oral biofilms.

Judy Skelton
Department: Oral Health Science, Division of Public Health Dentistry
Location: 1117 South Limestone
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Research area and interests:
- Public Health/Service Research especially related to health promotion and disease prevention. Currently involved in educational and treatment program for pregnant women in rural KY clinics with a focus on pre-term-low birth weight relationships between periodontal disease and pregnancy.
- Educational Research related to how people learn, instructional and assessment methods that are most effective to improve student learning
- Behavioral survey research

Juan F Yepes
Department: Oral Health Practice, College of Dentistry
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Web Page: http://webteach.mc.uky.edu/OD820/

Research area and interest: Salivary gland disorders including Hypersalivation and hyposalivation, Burning mouth syndrome, and oral lesions.

Possible research projects for undergraduates: The goal of our research is to collect, organize and analyze data from patients with salivary gland disorders, burning mouth syndrome and oral lesions including erosive lichen planus. The student will collaborate with the collection of the data and will have the opportunity to observe patients in my clinic.
Kimberly W. Anderson  
Department: Chemical Engineering  
Location: 163c Anderson Hall  
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Campus phone: 257-4815  
e-mail: kanderson@engr.uky.edu  
Research area and interests: My research interests focus on cell/cell interactions and cell/material interactions. Specifically, our current projects focus on using mammalian cells to create cell-based biosensors for detecting physiological and environmental toxins, the interactions of cancer cells with microvasculature endothelial cells during metastasis formation, protein adsorption to surfaces and the role of these proteins in hemocompatibility, and biofouling of surfaces by microbial cells.  
Possible research projects for undergraduates: Research projects related to the research areas described above are available for undergraduate students.

J. Zach Hilt  
Department: Chemical and Materials Engineering  
Location: FPAT 163A  
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Campus phone: 257-9844  
e-mail: hilt@engr.uky.edu  
Research area and interests: Intelligent polymers, biomimetic materials, bio-inspired materials, and diagnostic & therapeutic microdevices. In our laboratory, science and engineering fundamentals are applied to the rational design, synthesis and characterization, and application of novel macromolecular materials. We are particularly interested in designing and fabricating intelligent polymer networks to exhibit unique properties providing for application as recognition and/or actuation elements in innovative devices for microsensing, microarray, and other micro- and nanoscale applications, primarily of medical and biological significance. For example, we design and develop biomimetic recognitive polymer networks. These polymers mimic biological recognition pathways and at the same time exhibit other abiotic properties that are more favorable, such as greater stability in harsh environments. These biomimetic polymer networks are advantageous because they can be tailored to bind any molecule with controlled selectivity and affinity, provided that certain interactions exist.

Christine Trinkle  
Department: Mechanical Engineering  
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e-mail: trinkle@engr.uky.edu  
webpage: http://www.engr.uky.edu/me/faculty_staff/trinkle.html  
Research area and interests: Microfluidic Systems, Micro-scale Design and Fabrication, MEMS, Biologically-Inspired Design, Precision Machine Design  
Possible research projects for undergraduates: The biological research in our lab focuses on producing novel methods of tissue engineering and studying cells ex vivo. This includes studying the interaction of cells with surface biochemical patterns and microscale topography. The overall goal is to generate well-controlled biomimetic microenvironments that increase cell viability and specificity ex vivo.
Phillip Bridges
Department: Clinical Sciences
Location: 124C Charles T. Wethington Building
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Research area and interest: Oviductal physiology
Possible research projects for undergraduates: Our research is focused on the regulation of oviductal function. Several aspects of oviductal physiology are under study, including the regulation of epithelial cell function during fertilization and early embryonic development, as well as the cyclic changes that are required to maintain luminal patency and oviductal health.

Geza Bruckner
Department: Clinical Sciences/Clinical Nutrition
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Research area and interests: Lipid metabolism, cardiovascular disease, hepatic lipidosis, phytoestrogens.

Scott Livingston
Department: Physical Therapy and Rehabilitation Science
Location: 204C Charles T. Wethington Building, 0200
Phone: 859-218-0478
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Research area and interests: Current research in the Concussion Assessment Research Lab (CARL) involves the acute assessment of concussions among middle school, high school, and collegiate athletes. Our aim is to quantify the electrophysiological changes associated with mild TBI and determine the clinical utility of MEPs following sports-related concussion. Investigation of MEPs in an athletic population will increase our understanding of the pathophysiology of concussive injuries and, ultimately, will assist in the management and safe return to play of the athlete with mild TBI.

Brian Noehren
Department: Physical Therapy and Rehabilitation Science
Location: 204D Charles T. Wethington Building, 0200
Phone: 859-218-0581
e-mail: b.noehren@uky.edu
Research area and interests: I am a researcher in the division of Physical Therapy who specializes in the understanding of lower extremity injury biomechanics. I am interested in injuries such as knee pain, ACL, and Osteoarthritis. In my lab we look at the mechanics that maybe related in part to the development of these and other 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. We have several ongoing studies and many more in development and are always looking for individuals who may be interested in helping out in the lab.
Tim L. Uhl  
Department: Athletic Training in Rehabilitation Science  
Location: 210C Charles T. Wethington Building, 0200  
Phone: 323-1100 ext.80858  
e-mail: tluhl2@uky.edu  
Research area and interests: I am Associate Professor in the Division of Athletic Training in the Department of Rehabilitation Sciences within the College of Health Sciences. Dr. Uhl is a licensed physical therapist, a certified athletic trainer, and a fellow of the National Athletic Trainers’ Association. I received my BHS in Physical Therapy from the University of Kentucky in 1985, a Master of Science in Kinesiology from the University of Michigan in 1992, and a Doctor of Philosophy in Education/Sports Medicine from the University of Virginia in 1998. I joined the faculty at UK in August 1999.  
I am the co-director of the Musculoskeletal Laboratory, located in the C.T. Wethington Building. My research interest and topics focus on shoulder biomechanics, electrophysiological response to exercise, and overload injuries associated with sports and work. I have recently established a relationship with a local automanufacturing company to help them develop more specific screening process of their workforce. Additionally, I am involved with developing databases to evaluate outcomes of physical therapy. I am willing to take on a student that has similar interest with the above mentioned research interests.

College of Pharmacy  
http://www.mc.uky.edu/pharmacy/

E. Penni Black  
Department: Pharmaceutical Sciences  
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Campus phone: 323-5898  
e-mail: penni.black@uky.edu  
website: http://pharmacy.mc.uky.edu/faculty/EstherBlack.php  
Research area and interests: Targeting therapies in lung cancer using genomic signatures of response; mining genomic signatures of response to understand the underlying biology.  
Possible research projects for undergraduates: We use genomic signatures of response to therapy to understand the underlying biology of the response in lung cancer. We use cell culture model systems for investigating the roles of genes comprising the signature in lung cancer. Cell culture systems are amenable to ectopic expression and characterization of genes of interest as well as RNA interference technology to transiently inhibit gene expression for characterization purposes.

Wooin Lee  
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Location: Rm 444 & 447, College of Pharmacy Bldg.  
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web page: http://pharmacy.mc.uky.edu/faculty/WooinLee.php  
Research area and interests: Roles of drug transporters in determining chemotherapy response, Impact of genetic variations in cancer therapy  
Possible research projects for undergraduates: The goal of our research is to understand the roles of drug uptake or efflux transporters in determining chemotherapy response. It has been increasingly recognized that certain membrane transporters not only affect cellular drug exposure, response and toxicity, but also regulate cellular processes such as proliferation and apoptosis. Using cell-based systems and molecular, biochemical and immunohistochemical techniques, our laboratory investigates the functional implications of transporters overexpressed in cancer and the regulatory mechanisms underlying its overexpression in tumors. In particular, we assess the potential role of these transporters in determining chemotherapy sensitivity, tumoral behavior and clinical outcomes in cancer patients. In addition, we investigate how genetic variations influence chemotherapy response, focusing on the genes involved in drug metabolism and transport. Undergraduates working in the lab
will gain experience with cell culture and standard molecular and biochemical techniques and conduct experiments at the bench to gain a better understanding of how individuals respond to chemotherapy differently. For more information and a list of selected publications, please visit my webpage.

**John Littleton**  
Department: **Pharmaceutical Sciences**  
Location: Ky Tobacco Research & Development Center, Room 127  
Mail address: University of Kentucky, Cooper & University Drives, Lexington KY 40546-0236  
Campus phone: 257-1085  
e-mail: jlittlet@uky.edu  
**Research area and interests:** neurotoxicity and drug dependence, experimental therapeutics  
**Possible research projects for undergraduates:**  
We have several projects, mainly supported by NIH, using high throughput pharmacological screening to evaluate synthetic compounds, or extracts from plants (including Kentucky native plants) or mutant plant cell cultures. Active compounds or extracts are then evaluated for neuroprotective properties in mamalian cell culture models of drug-induced neurodegeneration. The projects would provide excellent experience for students interested in a career in the pharmaceutical or biotechnology industries, or in pursuing these subjects in an academic setting.

**Robert A. Lodder, Ph. D.**  
Department: **Pharmaceutical Sciences, College of Pharmacy**  
Location: A123 ASTeCC  
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Campus phone: 257-9232  
e-mail: Lodder@uky.edu  
**Research area and interests:** (see [http://www.pharm.uky.edu/](http://www.pharm.uky.edu/) for details).  
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.  
**Possible research projects for undergraduates:**  
Astrobiology  
Astrotoxicology and Pharmacology  
Energy transfer model of living organisms  
General purposes biosensor/chemical sensor  
Lab on a chip  
PH sensitive reporter gene NPF  
Prediction of blue mold outbreaks using satellite images  
MARENIR for glucose determination in diabetes  
Magnetoelastic antibody sensor  
Fluorescence based phosphate sensor  
Electrorheological fluid microfluidics  
Tin oxide array sensors for gas analysis  
IR NSOM imaging of superconducting films

**Royce Mohan**  
Department: **Ophthalmology & Visual Sciences and Pharmaceutical Sciences**  
Location: 166 HSRB  
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**Research area and interests:** The Mohan lab employs chemical, biological and pharmacological approaches in cells and mice to identify and investigate new classes of therapeutic targets for angioproliferative eye diseases. We have interests in corneal diseases that acquire the growth of new blood vessels (angiogenesis) resulting in corneal blindness, and are investigating natural products that block and reverse this serious ocular condition. We also are
interested in diseases at the back of the eye (retina) that result from a condition known as gliosis, and are investigating new pharmacological approaches to inhibit this serious condition that causes retinal blindness.

Kim Nixon  
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web page: [http://pharmacy.mc.uky.edu/faculty/KimberlyNixon.php](http://pharmacy.mc.uky.edu/faculty/KimberlyNixon.php)  

**Research area and interests:** Mechanisms of and development of novel treatments for alcoholic brain damage  
**Possible research projects for undergraduates:** The Nixon lab studies various mechanisms that contribute to neurodegeneration from excessive alcohol intake in rodent models of alcoholism. Our main project is on the role of neural stem cells in both alcoholic neuropathology and recovery from alcohol-induced neurodegeneration. The lab also studies various drugs and behaviors that affect both cell death and cell birth mechanisms during excessive alcohol intake. Neuroanatomical, biochemical and behavioral techniques are used to answer these questions. Undergraduates gain hands on experience with rodent handling, pharmacology, brain tissue histology, immunohistochemistry, ELISAs, Western blotting, light microscopy and possibly confocal microscopy. A two semester commitment is required. Excellent students may compete for paid research assistantships through the Department of Pharmaceutical Sciences Summer Undergraduate Research Program.

Todd D. Porter  
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web page: [http://www.uky.edu/Pharmacy/ps/porter/](http://www.uky.edu/Pharmacy/ps/porter/) (follow the link at the lower left entitled “Information for prospective students”)

**Research area and interests:** Cholesterol biosynthesis  
**Possible research projects for undergraduates:** We are currently looking at the regulation of cholesterol synthesis by post-translational mechanisms, including modulatory proteins and protein kinase pathways. Research in my lab typically uses biochemical assays, bacterial expression of cloned mammalian proteins with enzyme purification, and biochemical and whole-cell assays with cultured hepatoma cells, freshly isolated hepatocytes, and subcellular fractions from rat liver.

College of Medicine  

**Anatomy and Neurobiology**  
[http://www.mc.uky.edu/neurobiology/](http://www.mc.uky.edu/neurobiology/)

Dr. Marilyn J. Duncan  
Department: **Anatomy and Neurobiology**  
Location: HSRB 424 and 426  
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Campus phone: 3-4718  
e-mail: mjdunc0@uky.edu  

**Research area and interests:** circadian rhythms and aging and serotonin  
**Possible research projects for undergraduates:** Specific projects vary over time, but may involve the following topics and methods:
1) Effects of age on serotonergic regulation of gene expression in brain regions regulating circadian rhythms (project involves administration of drugs to hamsters, monitoring of circadian rhythms of wheel running, tissue sectioning, in situ hybridization and image analysis)
2) Interactions between the circadian pacemaker and neurons regulating reproduction (project involves monitoring circadian rhythms of wheel running and reproductive state, preparing tissue sections, conducting immunohistochemistry and/or in situ hybridization and image analysis)

3) Neurochemical identification of the neurons in the hamster brain that possess specific serotonin receptors or estrogen receptors (project involves immunohistochemistry using dual antibodies)

Greg A. Gerhardt, Ph.D.
Department: Anatomy and Neurobiology, Neurology and Psychiatry
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e-mail: gregg@uky.edu

Research area and interests: Parkinson's disease, Normal Aging, Attention Deficit Hyperactive Disorder (ADHD), Brain machine interfaces, Microelectrode development for brain recording.

Dr. Gerhardt’s laboratory focuses on studies of the dopamine neurotransmitter system in animal models of Parkinson’s disease. For these studies, his lab uses both the 6-hydroxydopamine-lesioned rat model and the MPTP-lesioned 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 of the normal and parkinsonian brain. A major finding for these studies is that there is a severe disruption of dopamine regulation in the parkinsonian brain. This disruption of the control of dopamine may relate to some of the movement problems seen in this CNS disease. His laboratory is currently investigating the use of growth factors, such as GDNF, to restore function to damaged dopamine neurons.

Another area of research in his laboratory involves studies of movement abnormalities in aging. Such studies are performed in the cerebellum and striatum of young and aged Fischer 344 rats, and in young and aged nonhuman primates. His recent studies have shown that dopamine and norepinephrine synapses change in their ability to regulate neurotransmitter release through changes in the monoamine transporters. This lack of regulation or change in the regulation of neurotransmitter signaling may account for some of the motor abnormalities that are seen in aged animals and humans.

A major focus 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. This forms the basis for the Center for Sensor Technology.

Possible research projects for undergraduates: Microelectrode recordings in D4 knockout mice, freely moving measures of dopamine, glutamate and choline in animal models of Parkinson’s disease, Development of new recording technologies for measures of neurotransmitters in the brains of mice and rats, Effects of GDNF on dopaminergic systems in young and aged rats.

Kurt F. Hauser, Ph. D.
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Diane M. Snow
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Pam Stein
Department: Anatomy and Neurobiology
Location: MN 210 Chandler Medical Center
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Campus phone: 859-323-5591
Email: pam.stein@uky.edu
Research interests: Investigating potential associations between periodontal disease and cognitive deficits
Possible research projects for undergraduates: Most of our research has been epidemiological but do plan to begin a murine or non-human primate model soon. Students could help with this research. In addition, I often conduct research in the gross anatomy lab that will help dentists, physicians, surgeons in their clinical procedures. For example, determining the location of arteries and nerves and patterns of variability in innervations. Students could help with dissections, data collection or data analysis.

Anesthesiology  http://www.mc.uky.edu/anesthesiology/

Elzbieta P. Wala
Department: Anesthesiology
Location: MDR3, Rm. 208
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e-mail: epwala@uky.edu
Research area of interest: novel therapies for pain
Possible research projects: The aim of our research is to develop an innovative therapy for treatment of pain, in particular chronic refractory pain. The novel chemical molecules and/or combinations of drugs (physical mixtures, co-drugs) are characterized for analgesic effectiveness in rodent models of pain (i.e. acute nociception, neuropathy, persistent inflammatory pain). The side effects also are assessed using several behavioral tests. Undergraduate student working in lab will gain experience in basic science pain research including, preclinical evaluation of efficacy and toxicity of potential analgesics; the development and validation of new and existing pain models; determination of mechanisms (i.e. mu-kappa, delta-opioid, central and peripheral nicotinic receptors, NMDA) of pain processes; data handling, analysis and presentation.

Joseph R. Holtman, Jr.
Department: Anesthesiology and Pain Medicine
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Research area and interests: Preclinical and clinical studies in the area of pain

Behavioral Sciences  http://www.mc.uky.edu/behavioralscience/

Thomas H. Kelly, Ph.D.
Department: Behavioral Science, College of Medicine
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e-mail: thkelly@uky.edu
Research area and interests: Clinical Psychopharmacology, Women's Health, Individual Differences in Drug Abuse Vulnerability
Possible research projects for undergraduates: Students are welcome to collaborate on all aspects of ongoing research, based on schedule availability and interests
Craig Rush
Department: Behavioral Science
Location: 127 College of Medicine
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Campus phone: 323-6130
e-mail: crush2@uky.edu
Research area and interests: Human Behavior Pharmacology.

Internal Medicine  http://www.mc.uky.edu/internalmedicine/

Stephen A. Brown, Ph.D.
Department: Internal Medicine
Location: VA Medical Center, room C301
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Research area and interests: My laboratory studies the effects of irradiation and radioprotective agents in the field of bone marrow transplantation (BMT). Irradiation is used in BMT as leukemia therapy and to ablate the immune system of the BMT recipient prior to transplantation. However, this treatment also damages normal tissues and induces a generalized inflammatory response—both of which are undesirable. Our specific studies are (1) to reduce the irradiation induced inflammatory response using standard radioprotective agents and determine the effects of this treatment on the development of acute graft-versus-host-disease and the graft-versus-leukemia effect and (2) to develop new, novel radioprotective agents. These studies are done using standard mouse models of BMT.
Possible research projects for undergraduates: Projects in which undergraduates participate in include: (1) testing radioprotective agents in mice and perhaps tissue culture cells, (2) testing various drugs to reduce the irradiation induced inflammatory response and (3) performing various assays to measure the inflammatory response. All projects usually require working with mice.

Nympha B. D'Souza
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C-304, 1101 VA Drive, Lexington, KY 40502
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Research area and interests: Research projects are focussed on "Host Immune defenses in lung and liver in general and during bacterial infections in immunocompromised hosts." Undergraduate students will be trained in some state of the art techniques and will be involved in current ongoing projects targeted at understanding how and why people who consume large amounts of alcohol are susceptible to pneumonias (lung infections) which otherwise are easily cleared by individuals not consuming alcohol or those consuming very moderate amounts of alcohol. Also, our interest is in understanding the steps by which alcoholics develop liver cirrhosis. Understanding the mechanisms by which alcohol impairs immunity will help in developing new therapeutic interventions for treatment of these individuals. Students will pursue small projects within the framework of the large project so as to be able to work independently after receiving sufficient hands-on training.

Microbiology and Immunology  http://www.mc.uky.edu/microbiology/

Subbarao Bondada
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Sarah E.F. D’Orazio, Ph.D.
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Research area and interests: Immune responses against intracellular bacterial pathogens
Possible research projects for undergraduates: The goal of our research is to understand the type of immune responses that can protect individuals from developing life-threatening infections with Listeria monocytogenes. Some of the projects in the lab are focused on understanding the bacterial factors that trigger innate immune responses. Other projects focus on the differential susceptibility of T cells isolated from either inbred mouse strains or human peripheral blood to rapidly secrete the pro-inflammatory cytokine interferon-gamma after Listeria monocytogenes exposure. Undergraduates working in the lab could gain experience with molecular cloning techniques, protein expression, transfection of mammalian cells, and cellular assays to test immune functions.

Yousef Abu Kwaik
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Research area and interests: Molecular mechanisms of bacterial pathogenesis.
Possible research projects for undergraduates: Legionella pneumophila is the causative agent of Legionnaires’ disease, a potentially fatal pneumonia. The ability of the bacteria to cause disease is totally dependent on intracellular replication within macrophages and epithelial cells in the alveolar spaces. We are studying the molecular interactions of Legionella pneumophila with mammalian and protozoan cells.

Anthony Sinai
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Location: MS366
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Research area and interests: Molecular Parasitology/ Infectious Diseases/ Cell Signaling
Possible research projects for undergraduates: The primary focus of my laboratory is the protozoan parasite Toxoplasma gondii, an agent of clinical significance in immunocompromised individuals such as those with HIV-AIDS and organ transplant recipients. We are particularly interested in understanding how the parasite subverts function of the infected host cell establishing a replication permissive niche. Current studies focus on the manipulation of the pathways of programmed cell death or apoptosis. Our studies are dissecting both the parasite and host components in the parasite-directed inhibition of apoptosis. Studies linking these changes to intermediary metabolism in the infected cell are of particular interest.
Undergraduates accepted into the laboratory will have a true independent project in order to obtain hands on experience into both the intellectual and technical aspects of research in the biological sciences.
Brett Spear  
Department: **Microbiology and Immunology**  
Location: MS433 Medical Sciences  
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**Research area and interests**: Transcriptional Regulation, Developmental Genetics, Transgenic and Gene Knock-out mice  
**Possible research projects for undergraduates**: Depends on the interests of the student and the time they wish to commit. Cloning projects, work with tissue culture cells are projects that can be completed in a semester. Longer term projects could include some mouse work.

Susan Straley  
Department: **Microbiology, Immunology, and Molecular Genetics**  
Location: 360 Willard Medical Sciences Building.  
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web page: [http://www.mc.uky.edu/microbiology/straley.asp](http://www.mc.uky.edu/microbiology/straley.asp)  
**Research area and interests**: Mechanisms of pathogenesis in plague  
**Possible research projects for undergraduates**: We are determining how a virulence protein called YopM interferes with innate defenses against the plague bacteria and how three surface proteins collaborate to promote survival of the plague bacteria in tissues. Undergraduates participate in these projects by applying recombinant DNA technology to create new bacterial strains that allow us to test hypotheses for virulence functions. In some cases, undergraduates make the tests for functions in tissue culture infection models. The strains we study are attenuated and do not cause disease from a superficial route.

Jerold G. Woodward  
Department: **Microbiology and Immunology**  
Location: UKMC, MN426  
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e-mail: jwood1@uky.edu  
**Research area and interests**: T cell tolerance, transgenic mouse models of autoimmune disease, autoimmune uveitis, HIV vaccines. The role of HIV Tat in the modulation of T cell function.  
**Possible research projects for undergraduates**: 1.) Cloning T cells from mice which induce autoimmune disease upon adoptive transfer; 2.) Isolation of T cell receptor genes and construction of transgenic mice; 3.) Investigation of the HIV Tat protein and its effect on mouse T cells. Possible research projects for undergraduates: Neuroanatomy of the brain, neuroendocrinology and brain-behavior relationships.

**Molecular and Cellular Biochemistry**  
[http://www.mc.uky.edu/biochemistry/](http://www.mc.uky.edu/biochemistry/)  

Trevor Creamer  
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**Research area and interests**: The Role of Intrinsic Disorder in the Regulation of Calcineurin  
**Possible research projects for undergraduates**: The goal of our research is to understand how the phosphatase calcineurin is regulated. Calcineurin is of wide interest because it is involved in neuronal signaling, cardiac development and activation of T cells in the immune system. Calcineurin is activated when the calcium-sensing protein calmodulin binds to a regulatory domain. This domain of calcineurin is disordered (i.e. devoid of stable
structure). We are also interested in other proteins involved in calcineurin regulation, including CHP, which is structurally similar to calmodulin but has the opposite effect (i.e. inhibits calcineurin), and Rcan1, which also inhibits and is itself a completely disordered protein. Some of the methods we use include molecular biology for the expression of proteins and mutants thereof, standard protein purification techniques, fluorescence spectroscopy, circular dichroism, NMR spectrometry and analytical ultracentrifugation. Undergraduates in the laboratory would primarily be involved in characterizing interactions between calcineurin and its regulating proteins using fluorescence and circular dichroism. Molecular biology and protein purification are also possibilities.

Robert Dickson
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Location: 210 Combs
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Research area and interests: Part of my research effort focuses on understanding which signal transduction pathways control aging and life-span. Another part of my research focuses on signal transduction pathways that govern cell growth in both normal and abnormal states including cancer. Finally, we study how cells protect themselves against stresses including high temperature and high salt. In all of these research areas we aim to understand how the signaling pathways work and what cellular processes they regulate. We use a variety of molecular, biochemical, genetic and immunological techniques in the laboratory.
Possible research projects for undergraduates: Would be happy to discuss possible projects with students

Louis Hersh
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Research area and interests: Alzheimer's disease, gene regulation
Possible research projects for undergraduates: Expression and purification of recombinant proteins. Analysis of their properties.

Jianhang Jia
Department: Molecular and Cellular Biochemistry
Location: 741 S. Limestone, BBSRB Rm373
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Research area and interests: Hedgehog (Hh) signaling and its roles in cancer.
Possible research projects for undergraduates: Dr. Jia studies molecular mechanisms of Hh signaling (R01 GM079684; ACS 114887; AHA NSDG0830009N), which is associated with patterning, cell proliferation, and morphogenesis. His group has shown that the seven-pass transmembrane protein Smoothened (Smo) transduces Hh signals by directly recruiting a Costal2-fused (Cos2-Fu) complex and that Smo activation requires phosphorylation by PKA and casein kinase I, leading to increased Smo cell-surface levels and signaling activity. In addition, his laboratory uncovered a feedback mechanism by which Fu promotes Smo hyperphosphorylation and cell-surface accumulation by antagonizing Cos2. Most recently, his laboratory identified and characterized PP4 and PP2A as phosphatases that influence Hh signaling by regulating Smo and Ci, respectively. Since abnormal Smo activation results in such cancers as basal cell carcinoma and medulloblastoma, these studies will provide insights into fundamental developmental problems and new avenues for cancer diagnosis and therapy. The goal of Dr. Jia’s research is to understand the molecular mechanisms of the Hedgehog signaling pathway, using Drosophila (fruit-fly) as a model system. Current projects in the Jia Lab are to determine how Hh activity gradient can be translated into different thresholds of downstream gene expression, to identify and characterize smo-interacting genes that play critical roles in Hh signal transduction, and to evaluate the roles of Hh signaling components in cancer formation.
Harry LeVine III  
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Research area and interests: Misfolding of proteins in chronic neurodegenerative diseases.  
Possible research projects for undergraduates: The laboratory studies the misfolding of proteins in chronic neurodegenerative diseases. One particular project involves working with normal and familial mutants of the synaptic protein α-synuclein involved in Parkinson’s and the Lewy body variant of Alzheimer’s disease. These proteins can be purified from yeast or bacterial cells engineered to overexpress these proteins. The in vitro polymerization behavior of these α-synuclein variants will be compared by biophysical and spectroscopic techniques. ELISA assays will be constructed and used to quantify the soluble monomeric and oligomeric forms of α-synuclein in in vitro assays. If successful, the assay will be used to evaluate soluble oligomer and monomer content of Parkinson’s, AD, and PD/Lewy body brain tissue and cerebrospinal fluid from the Sanders-Brown Brain Bank. OBJECTIVES: Students will become familiar with protein overexpression, chromatographic and other protein purification methods, polymerization kinetics, and ELISA format immunoassays.

Chunming Liu  
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Research area and interests: The Wnt/β-catenin signaling pathway plays important roles in early development, stem cell renewal, and tumorigenesis. In addition, Wnt signaling is crucial in the organization and maintenance of the human intestinal epithelium. In this pathway, many different components work together to transduce an external signal into changes in gene expression within the target cell. Upon binding its receptor, the Wnt ligand ultimately results in the stabilization of cytoplasmic β-catenin, which is then free to enter the nucleus and activate transcription through its interaction with the TCF/LEF family of transcription factors.

Richard McCann  
Department: Molecular and Cellular Biochemistry  
Location: MS672 (Moving to new building in Spring 2005)  
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Campus phone: 3-1796  
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Research area and interests: Cell adhesion and motility in cell differentiation and cancer; protein-protein interactions; molecular virology; molecular parasitology; molecular evolution. These projects will provide a wide range of experience, from biochemistry to bioinformatics, for a student contemplating graduate school in any of the biomedical sciences.  
Possible research projects for undergraduates: Any of the above, depending on the commitment of the student. Please note that serious research requires at least 20 hours per week, on a flexible schedule. This level of effort will usually result in authorship on one or more scientific papers.

Tianyan Gao  
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Research area and interests: Our 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.
Normal physiological functions of our body are controlled by signaling proteins in cells. Anything that disturbs the activity balance of these proteins contributes to human diseases such as cancer. Some proteins function to promote cell growth, and abnormal activation of these proteins provide the ammunition necessary to circumvent the body’s natural defenses. Thus, they are considered oncogenic (cause the development of tumors). To offset the insult presented by oncogenic proteins, our body produces natural defense proteins called tumor suppressors to counteract and prevent the formation and progression of tumors. PHLPP is one of these tumor suppressor proteins that help our body to fight off cancer.

Recently, we found that loss of PHLPP expression is commonly associated with colon cancers and re-introduction of PHLPP into colon cancer cells inhibits tumorigenesis. The long-term goal of my lab is to understand the physiological function of PHLPP and the molecular mechanisms underlying PHLPP-mediated regulation in cancers. In addition, we have developed PHLPP knockout mouse models in our lab to further investigate the physiological role of PHLPP. The results from our studies will aid in developing novel therapeutic strategies in cancer treatment by using PHLPP as a target.

**Possible research projects for undergraduates**: The research conducted in my lab is currently funded by a 4-year Research Scholar Grant from the American Cancer Society and an R01 grant from NCI. The lab is located on the 3rd floor of BBSRB, as a part of the newly established cancer research group supported by the Markey Cancer Center. We combine molecular biological, biochemical, and genetic approaches in our research. The PI has previous experience training graduate and undergraduate students. Once an undergraduate student joins the lab, he/she will be involved in one of the ongoing research projects supervised by one of the postdoctoral fellows in the lab and the PI herself. We will provide the necessary training for the student to gain research experience and the results generated by the student can be used in future publications.

**Qingjun Wang**  
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**Research area and interests**: Autophagy is a lysosomal degradation pathway that plays important roles in a variety of essential cellular processes and many devastating human diseases. The Wang lab takes an integrated approach that combines mouse genetics, proteomics and cell biology to study (i) all key steps of the mammalian autophagy pathway including signaling and regulation, (ii) roles of autophagy in the healthy brain and that undergoes neurodegeneration, and (iii) roles of autophagy in other human diseases such as cancer.

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**Pathology and Laboratory Medicine** [http://www.mc.uky.edu/pathology/](http://www.mc.uky.edu/pathology/)

**Charlotte S. Kaetzel, Ph. D.**  
**Department:** Pathology and Microbiology/Immunology  
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**Research area and interests**: Molecular Immunology  
Possible research projects for undergraduates: Transcriptional regulation of gene expression in human intestine and colon cancer; immunology of intestinal infections.

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**Pharmacology** [http://www.mc.uky.edu/pharmacology/](http://www.mc.uky.edu/pharmacology/)

**Rolf Craven**  
**Department:** Molecular and Biomedical Pharmacology  
**Location:** 213 Combs Building, Markey Cancer Center  
**Mail address:** 213 Combs Bldg  
**Campus phone:** 323-3832
Research area and interests: Cancer signaling and experimental therapeutics

Possible research projects for undergraduates: The goal of our research is to understand the pathways that control tumor cell survival and spread. Our laboratory uses a combination of cell lines and mouse model systems to study the role of signaling pathways in tumor growth. Some of the methods we use to study tumor growth include molecular biology (such as RNAi), biochemical and immunohistochemical techniques, as well as more sophisticated methods such as lentiviral expression vectors and mouse xenograft systems for modeling tumor metastasis. Undergraduates working in the lab will gain experience with molecular biology (recombinant DNA research), protein analysis (such as western blot analysis and cell staining), reviewing the scientific literature and building hypotheses.

Michael Kilgore
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Research area and interests: Molecular biology and tissue culture. My lab is focused on understanding how endogenous and exogenous substances, like dietary fatty acids, function as hormones to regulate the growth and progression of breast cancer.
Possible research projects for undergraduates: projects related to environmental contaminants and endothelial cell activation; lipid and cytokine mediated endothelial cell dysfunction and protection by selected nutrients.

Susan Kraner
Department: Molecular and Biomedical Pharmacology
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Research area and interests: role of ion channels in muscle and brain aging and degenerative diseases (muscular dystrophy, Alzheimer's Disease)
Possible research projects for undergraduates: Western blot analyses of proteins in brain and muscle, general molecular biology projects (cloning, mutagenesis, DNA sequencing, use of databases to analyze clones), expression of reporter genes in cell culture and CAT assays, and with good progress, building recombinant adenoviruses

Rina Plattner
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Research area and interests: Abl family of nonreceptor tyrosine kinases, cellular signaling, cancer research

Steven Post, PhD
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Research area and interests: The goal of our research is to increase our understanding of the involvement of intracellular signal transduction pathways in cardiovascular disease.
Possible research projects for undergraduates: The research projects in our lab primarily focus on examining the activation and regulation of specific intracellular signaling pathways that are thought to be involved in cardiovascular disease.
Francisco H. Andrade, Ph.D.
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Research area and interests: Motor systems and neuromuscular diseases
Possible research projects for undergraduates:
(1) compare expression levels of proteins of interest in skeletal muscles and motor nuclei
(2) effects of aging on function and metabolism of skeletal muscles and motor nuclei
(3) gene expression profiling and bioinformatics
(4) identification of biomarkers in selected neuromuscular diseases

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Research area and interests: Molecular biology of neuronal death in development and disease.

Gregory I. Frolenkov
Department: Physiology
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Research area and interests: Cellular and molecular mechanisms of mechanoreception in the inner ear. For more information see: http://www.mc.uky.edu/physiology/people/frolenkov.asp
Possible research projects for undergraduates: We use mouse models with targeted gene deletion (knockout) or deafness-related mutations to determine the function of specific proteins. The function is assessed at the whole animal, cellular, and molecular levels. We use patch-clamp techniques, calcium imaging, live cell confocal microscopy, scanning electron microscopy, and in vivo electrophysiology techniques for hearing assessment. We also develop emerging nanotechniques to visualize individual proteins at the surface of a living cell and to probe their function. Undergraduates may be a part of any of our projects or develop their own small projects depending on their interests and the level of commitment.

Lu-Yuan Lee
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Research area and interests: Role of TRPV channels in the regulation of airway function.
Possible research projects for undergraduates: The main objective of this research project is to investigate the mechanisms underlying the sensitizing effect of hyperthermia on vagal bronchopulmonary C-fiber sensory nerves. Our hypothesis is that the hyperthermia-induced hypersensitivity is primarily mediated through the temperature-sensitive transient receptor potential vanilloid type (TRPV) ion channels that are expressed on C-fiber neurons. Using a well-established animal model of asthma, the proposed studies will further test the hypothesis that chronic airway inflammation induced by allergen sensitization causes the lung temperature to increase and also up-regulates the sensitivity and/or expression of TRPV channels; together, they enhance the sensitizing effect of hyperthermia on
pulmonary C fibers. Some of the experiments will be conducted in human subjects and asthmatic patients in collaboration with Dr. Don Hayes, Assistant Professor of Pediatrics. In summary, the students working with me on this project will learn how to identify the important questions and to perform experiments in the study of the mechanisms underlying the hyperthermia-induced hypersensitivity of these sensory nerves in the airways, and the role of TRPV channels in regulating the sensitivity and function of these neurons.

Sandra J. Legan  
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Research area and interests:  
Neuroendocrine and circadian control of luteinizing hormone (LH) release and effects of prenatal exposure to opioids on the hypothalamic-pituitary-adrenal axis.  
Possible research projects for undergrads: The overall goal of the major project in my laboratory is to elucidate the neuroendocrine and circadian mechanisms controlling the preovulatory LH surge, and answer the question: what is the mechanism that controls the circadian timing of the preovulatory LH surge? Current experiments are investigating the role of circadian phase advances and of circadian clock genes in control of the LH surge and the identification of the neurotransmitters that constitute the output signal from the suprachiasmatic nuclei (SCN) to the gonadotropin releasing hormone (GnRH) neurons. The second project in my laboratory is focused on the mechanisms whereby prenatal exposure to opiates permanently alters the response to stress. We are investigating the effects of prenatal oxycodone on the neuropeptides and neurotransmitters that control the HPA axis, and how these are differentially affected by sex hormones. Students will have the opportunity to learn advanced neuroendocrinology, neuroanatomy, and circadian biology. Techniques that they will learn or assist with include: jugular cannulation, stereotaxic surgery, anesthesiology, collecting and processing blood samples, radioimmunoassay for determination of plasma hormone concentrations, and immunohistochemistry for localization of clock genes and the neuropeptides mediating control of LH and ACTH secretion.

Tim McClintock  
Department: Physiology  
Location: MS535/MS585 Medical Center  
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Research area and interests:  
Molecular biology of olfaction, adult neurogenesis and neuroregeneration.  
Possible research projects for undergraduates (optional): Undergraduates select from numerous research opportunities in my laboratory. Examples include cloning genes, working on functional genomics projects to identify genes expressed specifically in certain tissues or specifically in response to stimulation of a tissue, performing functional expression studies of cloned genes and localizing the expression of protein or mRNA encoded by cloned genes.

Melinda Wilson  
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web page: http://www.mc.uky.edu/physiology/people/wilson.asp  
Research area and interests:  
Mechanisms of estrogen action.
Edward D. Hall  
Department: **Spinal Cord & Brain Injury Research Center**  
Location: Currently Bosomworth Health Science Research Building, Room 232, but will move to 3rd floor of Biological and Biomedical Sciences Research Building (corner of Limestone and Virginia Avenues).  
Mail address: BBSRB, B483  
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**Research area and interests:** Pathophysiology and Neuroprotective Pharmacological Treatment of Acute Spinal Cord & Brain Injury  

Jonathan Lifshitz  
Department: **Spinal Cord & Brain Injury Research Center; Anatomy & Neurobiology; Physical Medicine & Rehabilitation**  
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[http://www.mc.uky.edu/neurobiology/research/lifshitz.asp](http://www.mc.uky.edu/neurobiology/research/lifshitz.asp)  
**Research area and interests:** Neurological Dysfunction and Rehabilitation after Diffuse Traumatic Brain Injury  
**Possible research projects for undergraduates:** Moderate, diffuse traumatic brain injury (i.e. concussion) results in multifocal metabolic and structural pathology in both man and animal, which can disrupt and impair specific neural circuits. Circuit disruption and reorganization could underlie the various symptoms associated with post-traumatic morbidity (e.g. balance, cognitive, executive function), broadly categorized as post-concussion syndrome. The goal of our research is to identify disrupted circuits, explore the biological basis of the disruption and devise rational therapeutic interventions to alleviate the dysfunction. To achieve these goals, we implement a broad array of surgical, behavioral, cellular and histological procedures to isolate specific aspects of injury and recovery.  

Andrew Bernard  
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**Research area and interests:** Red blood cell transfusion effects on immunity  
**Possible research projects for undergraduates:** Our research program is dedicated to understanding the mechanisms by which red blood cell transfusion suppresses immunity. RBC’s suppress T lymphocyte proliferation in response to antigen and this correlates with clinical evidence of higher infection rates in transfused patients. We use donated but unused red blood cells obtained from the UK blood bank to perform in vitro experiments using discarded T lymphocytes from blood donors. Experiments involve cell culture, flow cytometry and proliferation assays.  

Cherry Croft  
Department: **Surgery, Cardiothoracic**  
Lab Location: MA1A  
Office Location: MN 265  
Phone: 323-3718
Research area and interests: Chronic lung diseases are now the third leading cause of death in America, claiming the lives of over 400,000 annually with a cost of $154 billion\cite{1}. As chronic lung disease reaches end stage, lung transplantation becomes the only choice for effective treatment. With the scarcity of suitable donor lungs, however, the average time on the waiting list is 12.4 months with 14% of patients dying on the waiting list. A narrow window of opportunity exists for lung transplantation in any patient who is sick enough to benefit from the operation, but healthy enough to survive the months of waiting for a donor lung and subsequent surgery. Thus, there is a critical need for a respiratory support strategy which can serve as a bridge to lung transplantation. Unfortunately, no suitable long-term ambulatory bridge to lung transplantation exists. Recent success in the use of ambulatory ventricular assistance has stimulated research toward the development of a device to serve as a bridge to lung transplantation. In this application, a new artificial lung (AL) will be developed for long-term respiratory support. The fibers in the new AL will be coated with an ultra-thin PTFE membrane layer which will result in better gas exchange performance and lower blood resistance. The new AL will also have an even blood flow pattern to eliminate blood stagnancy, thereby reducing the occurrence of thrombosis. The significance of this project is that a new AL will be developed that will provide long-term ambulatory respiratory support for bridge to lung transplant use. Furthermore, completion of this research will also result in an AL prototype ready for clinical testing.

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Research area and interests: Cancer biology, gene therapy and tumor cell radiosensitization.  
Possible research projects for undergraduates: Study mechanistic interaction between TNF and radiation.

Joseph Zwischenberger  
Department: Surgery, Cardiothoracic  
Lab Location: MA1A  
Office Location: MN 264  
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Research area and interests: Chronic lung diseases are now the third leading cause of death in America, claiming the lives of over 400,000 annually with a cost of $154 billion\cite{1}. As chronic lung disease reaches end stage, lung transplantation becomes the only choice for effective treatment. With the scarcity of suitable donor lungs, however, the average time on the waiting list is 12.4 months with 14% of patients dying on the waiting list. A narrow window of opportunity exists for lung transplantation in any patient who is sick enough to benefit from the operation, but healthy enough to survive the months of waiting for a donor lung and subsequent surgery. Thus, there is a critical need for a respiratory support strategy which can serve as a bridge to lung transplantation. Unfortunately, no suitable long-term ambulatory bridge to lung transplantation exists. Recent success in the use of ambulatory ventricular assistance has stimulated research toward the development of a device to serve as a bridge to lung transplantation. In this application, a new artificial lung (AL) will be developed for long-term respiratory support. The fibers in the new AL will be coated with an ultra-thin PTFE membrane layer which will result in better gas exchange performance and lower blood resistance. The new AL will also have an even blood flow pattern to eliminate blood stagnancy, thereby reducing the occurrence of thrombosis. The significance of this project is that a new AL will be developed that will provide long-term ambulatory respiratory support for bridge to lung transplant use. Furthermore, completion of this research will also result in an AL prototype ready for clinical testing.