
# 2020 Annual Report

**2019 photo (no photo taken in 2020 due to COVID19 pandemic)**

## Overview

2020 was a most turbulent year as in person activities were suspended in March for the entire year due to the COVID19 pandemic. The NCI-funded R25 UofL Cancer Education Program was cancelled as were the other NIH-funded medical student research programs. The summer undergraduate research symposium and Research!Louisville similarly were canceled, and most of the didactic teaching was presented online. As described in the report the department continued to prosper despite these challenges.

The Department of Pharmacology and Toxicology was credited with $4.8M in NIH funding for FY2020 which ranked 42nd among all Departments of Pharmacology in US medical schools. This funding included a new five-year NIEHS P30 Center for Integrative Environmental Health Sciences (led by Dr. Chris States). A new recruitment video was produced at posted at https://www.youtube.com/watch?v=6rpJXe8ExVs. Four individual predoctoral fellowships were awarded to graduate students in pharmacology & toxicology. UofL's highest graduate student honor in 2020 also was a pharmacology and toxicology graduate.

Some of the highlights of the year are presented below with hyperlinks to further information:

**Jennifer Toyoda and Aaron Whitt receive top research poster presentation awards at 2020 annual meeting of the NIEHS Superfund Research Program**

**Jamie Young awarded Guy Stevenson Award for Excellence in Graduate Studies at 2020 UofL commencement**

**Tyler Gripshover presents research at annual meeting of the Superfund Research Program**

**Professor Chris States awarded $6.5M from NIEHS to establish Center for Integrative Environmental Health Sciences**

**Drs. Ken Palmer and Joshua Fuqua awarded $8.5M from Department of Defense to develop a nasal spray to prevent serious respiratory infections such as COVID-19**

**UofL Pharmacology and Toxicology Graduate Students Top Award Recipients at 2020 annual meeting of the Ohio Valley Society of Toxicology**

**Professors States and Whittemore receive UofL distinguished research awards**

**Fourth pharmacology & toxicology graduate student awarded individual predoctoral fellowship**

**Mengwei Jiang, PhD candidate in pharmacology and toxicology awarded NIH Ruth L. Kirschstein Predoctoral National Research Service Award**

**Professor Geoffrey Clark leads efforts in cancer treatment targeting RAS protein**

**PhTx PhD student Sophie Sears awarded individual NIH F31 predoctoral fellowship**

**New research shows promise in fighting the novel coronavirus**

**Professor Kenneth Palmer leads the Center for Predictive Medicine in coronavirus research**

**Pharmacology & Toxicology faculty honored by School of Medicine**

**Pharmacology and Toxicology Graduate Students and Postdocs Win Top Research Presentation Awards**

## MISSION

The Department of Pharmacology and Toxicology will ensure academic excellence and achievement of regional, national, and international recognition for the quality of its educational, research, and service activities. Guided by the University of Louisville and the School of Medicine Strategic Plans, the mission of the Department of Pharmacology and Toxicology focuses on five broad objectives:

- Provide instruction in pharmacology and toxicology of the highest quality for the education and preparation of medical, dental, and other health care professional students. Emphasis is placed on the fundamental principles necessary for life-long learning and the essential knowledge required for rational, effective, and safe use of drug therapy.
- Advance biomedical knowledge through high quality research and other scholarly activities, particularly in pharmacology and toxicology and other areas of focus within the University of Louisville and School of Medicine Strategic Plans.
- Provide robust research and educational experiences in pharmacology and toxicology for the education and training of future biomedical scientists who will provide and advance biomedical education, research, and service.
- Provide instruction of the highest quality in pharmacology and toxicology appropriate for students at the undergraduate, graduate, and postgraduate levels.
- Provide service to the School of Medicine, the Health Sciences Center, the University, of Louisville, the Commonwealth of Kentucky, professional organizations, the nation, and the world.

## Faculty Promotions

Leah J. Siskind, PhD was promoted to professor of pharmacology and toxicology effective July 1, 2020.

## New Appointment of Primary Faculty

Mayukh Banerjee**,** Ph.D. was appointed assistant professor, tenure track effective October 1, 2020.

Over 225 million individuals globally, including 2.9 million in USA are chronically exposed to arsenic from environmental sources, leading to multi-organ cancerous and non-cancerous adverse health outcomes. Skin is the major target organ, with well-characterized non-cancerous, pre-cancerous and multiple cancer outcomes. While several mechanisms are postulated to be responsible for arsenic-induced carcinogenesis, a clear picture is yet to emerge. Disruption of cell cycle progression through altered cyclin expression is a universally accepted mechanism, but how arsenic mechanistically brings about such changes remain to be explored. Employing a well-established model of arsenic-induced skin cancer (HaCaT cells exposed continuously to 100 nM sodium arsenite for 28 weeks), RNA-seq and pathway analyses, we demonstrated that arsenic altered multiple cell cycle regulatory pathways simultaneously suggesting abrogation of cell cycle progression. Many of these dysregulated pathways engage in extensive molecular crosstalk by sharing key regulatory cyclins. Normal cell cycle progression is tightly coordinated by regulating the ubiquitination mediated degradation of cyclins in a cell cycle phase specific manner.

## New Appointments of Associate Faculty

**Joseph Chen, Ph.D.**
Assistant Professor, Department of Bioengineering
Ph.D. in Biomedical Engineering, Vanderbilt University, 2015

**Research Interests:** Research interests include investigating the mechanobiological drivers of disease progression, with a focus on neurodegeneration and glioblastoma invasion. His lab leverages tools from the fields of biomaterials, biomechanics, and gene editing to tease out the underlying mechanobiological pathways in disease.

## Faculty Retirements

**Paul N. Epstein, Ph.D.**
Professor, Department of Pediatrics
Carol B. McFerran Chair in Pediatric Diabetes Research
Ph.D., Pharmacology, Baylor College of Medicine (1981)

## Associate Faculty Departures

**Bradley B. Keller, M.D.**
Professor of Pediatrics and Bioengineering
Kosair Charities Chair and Chief, Division of Pediatric Heart Research
M.D., Pennsylvania State University (1985)

**Shizuka Uchida, Ph.D.**
Associate Professor, Department of Medicine
Ph.D., Molecular Biology, Japan Advanced Institute of Science and Technology (2007)

## FACULTY WITH PRIMARY APPOINTMENTS

**Mayukh Banerjee, Ph.D.**
Assistant Professor

Over 225 million individuals globally, including 2.9 million in USA are chronically exposed to arsenic from environmental sources, leading to multi-organ cancerous and non-cancerous adverse health outcomes. Skin is the major target organ, with well-characterized non-cancerous, pre-cancerous and multiple cancer outcomes. While several mechanisms are postulated to be responsible for arsenic-induced carcinogenesis, a clear picture is yet to emerge. Disruption of cell cycle progression through altered cyclin expression is a universally accepted mechanism, but how arsenic mechanistically brings about such changes remain to be explored. Employing a well-established model of arsenic-induced skin cancer (HaCaT cells exposed continuously to 100 nM sodium arsenite for 28 weeks), RNA-seq and pathway analyses, we demonstrated that arsenic altered multiple cell cycle regulatory pathways simultaneously suggesting abrogation of cell cycle progression. Many of these dysregulated pathways engage in extensive molecular crosstalk by sharing key regulatory cyclins. Normal cell cycle progression is tightly coordinated by regulating the ubiquitination mediated degradation of cyclins in a cell cycle phase specific manner.

**Brian P. Ceresa, Ph.D.**
Pharmacology Thread Director for School of Medicine Curriculum
Professor

The Ceresa lab studies the epidermal growth factor receptor (EGFR) and its role in tissue biology/wound repair and cancer. The EGFR has an essential role in many developmental processes and for homeostasis of a number of tissues, such as the cornea, epidermis, and colon. In addition, the EGFR is overexpressed and/or hyperactivated in a number of cancers, including lung, breast, gastric, pancreatic, and melanomas. The Ceresa lab is interested in the molecular mechanisms that regulate the magnitude and duration of EGFR signaling. Understanding how EGFR signaling is dysregulated may provide clues to the diagnosis, prognosis, or treatment of cancer. Conversely, deliberately perturbing these regulatory processes is a strategy to enhance corneal epithelial wound healing. They use a variety of experimental strategies to answer our scientific questions – from purified proteins, primary and immortalized cell lines, isolated animal tissues, and whole animals.

**Shao-yu Chen, Ph.D.**
Professor

Dr. Chen has conducted alcohol-related birth defects research for more than 20 years. His research program focuses on elucidation of cellular and molecular mechanisms of alcohol-induced birth defects. In his laboratory, a combination of state-of-the-art approaches, including RNA interference, microRNA technology and ultrasound-guide in utero microinjection are integrated with cell and whole embryo culture systems, as well as in vivo mouse and zebrafish models of Fetal Alcohol Spectrum Disorders (FASD) to elucidate the molecular mechanisms underlying FASD. Dr. Chen's laboratory has been successfully conducting innovative and pioneering research in various areas, including Nrf2, Siah1 signaling pathways and the microRNAs involved in ethanol-induced apoptosis and birth defects. These studies have provided important information regarding the mechanisms underlying ethanol-induced birth defects. His research has also clearly shown the effectiveness of a number of agents, including antioxidants, the neuroprotective peptides, and microRNA mimics, in the prevention of alcohol-induced apoptosis and structural abnormalities in embryos. These findings are expected to validate possible molecular targets and yield innovative strategies for the prevention of FASD and give hope that antioxidants, certain peptides or microRNA mimics could lessen the effects of prenatal alcohol exposure in the children of women who are unable to curtail their alcohol abuse while pregnant.

**Geoffrey J. Clark PhD**
Professor

Ras is arguably the most important oncogene of all and may drive more than 30% of human cancers. Yet it has defied efforts to target it therapeutically. One of the most fascinating and poorly understood aspects of Ras biology is that deregulated Ras activity can promote cell death. These Ras death pathways are subverted in human tumors, allowing the transforming effects of activated Ras to dominate. I have spent a large part of the last 15 years defining the signaling mechanism used by Ras to kill cells and trying to understand how they are subverted in cancer. These studies have focused extensively on the RASSF family of Ras death effectors, the majority of which were first identified and cloned by my group. I also have a program involving the development of novel small molecules that act directly or indirectly to suppress Ras driven tumorigenesis. The laboratory utilizes a variety of cellular and molecular biology techniques to pursue these studies.

**Jonathan H. Freedman, Ph.D.**
Professor

Dr. Freedman's research interests can be divided into two broad categories: basic and applied. The tools developed as part of the applied research program are used to advance basic research. Likewise, mechanistic information derived through basic research projects is adapted and then developed into applied protocols. The basic research program involves understanding how exposures to environmental factors contribute the development and/or exacerbation of human diseases. Our group is focused in the roles of transition metals (cadmium and zinc) and diet in the etiology of cancer, metabolic syndrome (e.g., type II diabetes) and Autism Spectrum Disorder. We are applying a systems biological approach; where interactions among phenotypes, genetics, transcriptomics and environmental factors at the molecular, cellular, organ and whole organism level are characterized in an integrated manner. This holistic approach allows us to develop novel models to delineate the mechanism(s) by which multiple factors come together to produce human disease. Our group utilizes model organisms (*Caenorhabditis elegans* and mice) and mammalian cell culture, as well as high-throughput screening technologies to explore the environmental contributions to these human diseases.

The applied research program is focused on the development of alternative organisms for *in vivo* toxicological testing. This project is part of the international effort to reduce, refine and replace mammalian species in toxicity testing. We utilize the technologies and statistical methods already developed in the laboratory for high-throughput toxicity testing using *C. elegans* to other biomedically-relevant model organisms; *Daphnia*, *Drosophila*, Zebrafish and *Xenopus*.

**Joshua L. Fuqua, Ph.D.**
Assistant Professor

Development of proteins and biologic for therapeutic and diagnostic indications in infectious disease, cancer, and neurodegenerative disease. Dr. Fuqua has experience in preclinical product development ranging from drug manufacturing to toxicology studies. He has familiarized himself with Project Management and Regulatory Affairs applications in the pharmaceutical industry through external certificate programs and practice.

**Ramesh Gupta, Ph.D.**
Professor, Agnes Brown Duggan Chair of Oncological Research

Dr. Gupta's current major interests are to develop new prevention and treatment strategies by intervention with dietary constituents (such as berries, common spices), novel subcutaneous polymeric implantable devices embedded with test agents for systemic and local delivery, and milk-derived exosomes as nano carriers for oral delivery of both standard drugs and natural agents with therapeutic activity, as well as identify molecular targets. The common experimental models and laboratory techniques performed routinely in his laboratory include, cell culture, wild-type and xenograft models for lung cancer and breast cancer, $^{32}$P-postlabeling DNA adduct assay, qPCR, western, tumor imaging, and HPLC coupled with various detectors. His laboratory was the first to demonstrate that berries are effective beyond the GI tract by showing significant inhibition of estrogen-mediated breast cancer and lung cancer. The ongoing work with phenolics isolated from these berries have demonstrated that berry phenolics can have significant synergistic activity towards anti-proliferation, apoptosis and anti-inflammation due to attack of different bioactives on distinct or overlapping protein targets against lung cancer. These findings have been confirmed in cell culture and tumor models. His laboratory's present major thirst is on drug delivery for enhanced therapeutic response. The most recent development is a novel technology for oral delivery of drugs using bovine milk-derived exosomes (biological nanoparticles) as a carrier for small drug molecules, as well as macromolecules such as siRNAs. This technology is emerging as a major drug delivery technology in the field with potentially wide therapeutic applications. His laboratory has trained numerous graduate students, postdoctoral scholars, residents, undergraduates and High School students. His laboratory is currently supported by a postdoctoral fellow, two PhD students and two junior faculty.

**Kyung U. Hong, Ph.D.**
Assistant Professor

Arylamine N-acetyltransferases (NATs) express a well-defined genetic polymorphism in humans that modifies drug and xenobiotic metabolism. Our laboratory has previously characterized the genetic variants of NAT2 and shown that they result in expression of protein of varying enzymatic activity or stability. Recent GWAS studies have reported that some of these genetic variants within the NAT2 gene are tightly linked to insulin resistance and high serum triglyceride level in humans, suggesting a previously unrecognized yet important role of these enzymes in development of metabolic disorders. However, the precise mechanism by which NAT2 exerts this role and whether or not this role is modified by NAT2 genetic polymorphism is currently unknown. Importantly, the role of NAT2 in insulin resistance and metabolism has not been investigated in model systems of human origin. Our research involves using human primary hepatocytes, adipocytes and

myoblasts and characterizing their responses to insulin while modulating cellular NAT2 level or activity. Human primary hepatocytes that harbor defined genetic polymorphisms of NAT2 will be also employed to see if naturally occurring genetic variants of NAT2 in humans have differential effects on cellular metabolism and insulin sensitivity.

**Joshua L. Hood M.D., Ph.D.**
Assistant Professor

Dr. Hood's lab is focused on the translational design and implementation of biology inspired nanomedicine supported by nanoscale biologic extracellular vesicle (EV) investigations. Understanding EV function and nanocarrier properties in the context of tumor angiogenesis, macrophage function and pre-metastatic niche formation are explored in the context of melanoma, lung and liver cancer. Other derivative projects include development of small EV/exosome-based biomarkers for cancer and synthetic nanomedicines to combat pathogenic EVs and similarly structured viruses. Our long-term goal is to develop and translate personalized EV-based diagnostics and therapeutics for cancer.

**David W. Hein, PhD**
Peter K. Knoefel Endowed Professor and Chair

Dr. Hein's research program in molecular epidemiology identifies individuals genetically susceptible to the development of cancer from environmental and occupational chemicals in order to focus treatment and prevention public health strategies on those at greatest risk. His research in pharmacogenetics/genomics and personalized medicine improves understanding of the genetic causes for drug failure and/or drug toxicity in order to optimize clinical drug therapy for each individual patient. His research in functional genomics improves understanding of the mechanistic and clinical consequences of genetic variation in the biotransformation of carcinogens and drugs.

**La Creis Renee Kidd, Ph.D., M.P.H.**
Our Highest Potential Endowed Chair and Associate Professor

Dr. Kidd's research focuses on the utilization of state of the art bioinformatics tools to identify and validate genetic susceptibilities related to cancer risk and poor disease prognosis (i.e., high tumor grade/stage, disease/biochemical recurrence). Although Dr. Kidd is intrigued by major cancer malignancies, a majority of her work has centered on prostate cancer. Her earlier work focused on complex

interactions among xenobiotic metabolism, DNA repair, oxidative stress-related genes, and angiogenesis in relation to prostate and breast cancer outcomes. She was a lead author on the first study on the role of genomic anomalies in the chemokine ligand 5 (CCL5) and chemokine receptor 5 (CCR5) associated genetic alterations in prostate cancer risk among men of African and Caribbean Descent (Hered Cancer Clin Pract. 2012 Nov 20; 10(1): 16). A majority of her work focuses on understanding the role genetic plays in high cancer incidence and mortality rates among underserved populations. She has 3 patents for important prostate cancer predictors from her population-based studies (61/240089, 61/313,595, 61/655,243). Dr. Kidd was a significant contributor of a multi-center genome wide study for genetic susceptibility genes for prostate cancer among men of African and European descent.

Since 2012, Dr. Kidd's lab started to work on the role of miRNAs in prostate cancer in partnership with her former graduate student (Dominique Reed) and various faculty members engaged in basic research. Micro-RNAs (miRNAs), are non-coding RNAs that regulate the expression of genes. Dr. Kidd became interested miRNAs after learning these mini gene regulators can suppress or accelerate aggressive cancer behavior by inhibiting the expression of oncogenic or tumor suppressor genes, respectively. MiRNAs are promising cancer biomarkers for many reasons. First, miRNAs are stably expressed in tumor tissue and biological fluids (i.e., urine, serum, plasma). Second, they regulate the expression of genes involved in the hallmarks of cancer (e.g., cell proliferation, cell survival, anchorage independent growth, invasion, migration, cell survival, angiogenesis). Third, dysregulation of miRNAs corresponds with aggressive prostate cancer phenotypes. Fourth, tissue/blood-based miRNAs may distinguish between lethal and non-lethal forms of cancer. Fifth, miRNAs may help investigators find potential therapeutic targets for the effective treatment of cancer.

Recently, Dr. Kidd's lab demonstrated the up-regulation of one particular miRNA, miR-186-5p in metastatic prostate cancer cell lines and serum from prostate cancer patients. Her lab also demonstrated a decrease in cell proliferation, colony formation and cell invasion in miR-186 depleted metastatic prostate cancer cell lines. Based on pre-clinical studies, the decrease in cell invasion may be related to an up-regulation of AKAP12 following the repression of miR-186 in metastatic prostate cancer cell lines. Presumably, AKAP12, a tumor suppressor gene, inhibits pAkt, which in turn suppresses beta-catenin, a gene essential for cell invasion, epithelial mesenchymal transition and chemo-sensitivity. These findings are currently under review for publication consideration in BMC Cancer.

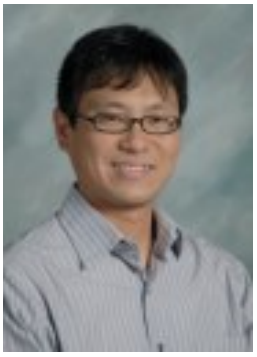
It is her hope that her research findings will lead to the discovery of therapeutic targets for the effective treatment of aggressive and lethal forms of cancer. Such efforts will help to reduce the burden of this disease among cancer patients and their families.

**J. Calvin Kouokam, Ph.D.**
Assistant Professor.

My main research focus is the development of plant produced proteins for the treatment of human diseases. Our current projects involve safety, pharmacodynamic and pharmacokinetic evaluation of antivirals targeting HIV-1 and other enveloped viruses, including HSV-2. Notably, we are assessing the safety and efficacy of the potent antiviral lectin Griffithsin (GRFT) in the context of colorectal pathologies (e.g. ulcerative colitis and colorectal cancer). In addition, we are interested in plant derived lectins as anticancer agents. Such lectins will be produced in Nicotiana benthamiana plants. Finally, we plan in the near future to assess natural products from various African plants for their therapeutic activities.

**Igor S. Lukashevich, M.D., Ph.D., D.Sc.**
Professor

Dr. Lukashevich research interest includes pathogenesis of liver dysfunctions caused by highly pathogenic RNA viruses causing hemorrhagic fevers (HFs). In collaboration with Dr. Arteel's team, he discovered a novel mechanism of liver involvement in pathogenesis of viral HFs. According to this mechanism, the virus-induced pathophysiological hepatocyte proliferation is accompanied by cell cycle arrest and contributes to expansion of the infection to parenchymal cells. Elevated levels of plasma transaminases are likely explained, at least in part, by aborted hepatocyte proliferation causing apoptotic events and induction of oval cells, the "second line" of liver protection against the injury. These results may lead to the development of new therapeutic interventions for devastating diseases caused by HF viruses (e.g., Lassa, Machupo, Ebola). Development of new preventive vaccines based on advanced vaccine technologies is another scientific avenue in Dr. Lukashevich lab. He designed several promising vaccine candidates against Lassa HF, the most prevalent HF in West Africa, and against South American HFs. He co-invented infectious DNA (iDNA) technology to improve existing and experimental live-attenuated vaccines against Yellow Fever, Venezuelan Equine Encephalitis, Japanese Encephalitis, and Chikungunya. This technology combines advantages of naked DNA immunization and high efficacy of live-attenuated vaccines. The iDNA-launched vaccines are "manufactured" in vaccinated individuals and do not require traditional vaccine manufacturing facility and technology.



**Nobuyuki Matoba, Ph.D.**
Professor

Dr. Matoba's research is focused on the development of protein pharmaceuticals. To this end, they utilize a plant-based transient protein production system. This technology enables quick transition of candidate proteins from discovery and preclinical studies to clinical testing and ultimately provides cost-effective vaccines and therapeutics for developing countries. They employ multidisciplinary experimental methodologies including protein engineering, biochemistry, analytical chemistry, antiviral research and immunology. Currently, one of their projects is developing a vaccine against inflammatory bowel disease and colitis-associated colon cancer. Another project is investigating the cancer diagnostic and therapeutic potentials of a "lectibody", an antibody-lectin chimera that can recognize a broad spectrum of cancer cells. Our projects are funded by NIH, DoD and Helmsley Charitable Trust.

**Kenneth E. Palmer, Ph.D.**

Professor & Helmsley Chair in Pharmaceutical Plant-based Research; Director, Center for Predictive Medicine

Dr. Kenneth Palmer's primary research focus is in developing vaccines and antivirals that address pathogen diversity and counteract immune evasion strategies. His laboratory has been developing a lectin, Griffithsin, as a broad-spectrum antiviral biopharmaceutical for prevention of human immunodeficiency virus and genital herpes virus transmission. This product is advancing to a first-in-humans clinical trial. Dr. Palmer is the Director of the University of Louisville Center for Predictive Medicine, which has state-of-the-art facilities for BSL-3 biocontaiment research. His group is developing broad-spectrum antiviral strategies for prevention and treatment of emerging and re-emerging viral infections of public health concern, including highly pathogenic influenza and coronaviruses. Dr. Palmer is the Helmsley Charitable Trust Endowed Chair in Plant-based Pharmaceutical Research, which recognizes that the core products and technologies that drive his research program originate in plants or use plants as recombinant protein expression systems. The Palmer laboratory is supported by grants from the National Institutes of Health and private philanthropy from the Helmsley Charitable Trust.

**Leah J. Siskind, Ph.D.**

Professor; Director, Graduate Program

The Siskind laboratory has several different areas of interest and combines expertise at the biophysical, molecular, cellular, and animal level with the goal of translating findings to the clinic. The laboratory has several areas of focus. First, the Siskind laboratory aims to protect the kidney from the toxic effects of chemotherapeutics so that they can be more effectively utilized to treat cancer. Current chemotherapies such as cisplatin often have the deleterious side-effect of kidney toxicity which in almost 30% of cancer patients limits their use. Data from the Siskind laboratory indicates that repeated dosing of chemotherapeutics induces pro-fibrotic signaling pathways in the kidney, leading to long-term loss of kidney 0function. The Siskind laboratory aims to target these signaling pathways to protect the kidney from chemotherapeutics so that they can be utilized better to reduce tumor burden. In addition, the Siskind laboratory in collaboration with the laboratory of Dr. Levi Beverly studies fundamental cancer cell biology utilizing 3-dimentional models of tumors in culture to understand how interactions between cancer cells and the extracellular matrix alters tumor cell proliferation, migration, invasion, and metastasis. In a collaboration with the laboratories of Drs. Beverly and Clark, the Siskind lab aims to develop a porcine model of lung cancer. They aim to determine if pigs represent a model system that more closely resemble the progression and metastasis of human cancer patients. Furthermore, the lab aims to treat pigs with standard of care chemotherapeutic regimens, exactly as human patients would be treated, and determine if tumors demonstrate a similar response, as seen in patients. Finally, they aim to determine if pigs can be used as a model for the testing of immune-modulatory therapeutics that are now being tested in humans. Interestingly, they have found that the most exciting the therapies used in humans that target CTLA4 and PD-1 also bind to their porcine counterpart, raising the exciting possibility that these therapeutics will be able to be used in co-clinical trials in pigs to guide their usage in humans.

**Zhoe-Hui (Joe) Song, Ph.D**
Professor

The current research focuses of Dr. Song's laboratory are the molecular targets of cannabinoids. Cannabinoids are composed of three categories, including phytocannabinoids (the active chemical components of cannabis), endocannabinoids (the cannabinoid-like substances in our body), and synthetic cannabinoids. We are studying the ligand binding and signal transduction mechanisms of CB1 and CB2 cannabinoid receptors, two proven molecular targets for cannabinoids. In addition,

we are investigating GPR3, GPR6 and GPR12, a family of orphan receptors that have been recently shown by us to be novel molecular targets for cannabidiol (CBD). CBD is the major non-psychoactive of marijuana and has been proposed to have therapeutic potentials for a variety of illnesses, including glaucoma, neurological/psychiatric disorders and cancer. Therefore, our research on GPR3, GPR6 and GPR12 will not only help to understand the mechanisms of action for CBD, it will also explore the viability of these three receptors as novel therapeutic targets.

**J. Christopher States, Ph.D.**
Professor; Vice Chair for Research

The major interests of the laboratory are arsenic toxicology, DNA repair and development of mitosis disrupting drugs for cancer chemotherapy. Currently, the laboratory is investigating the role of miRNA dysregulation in arsenic induced skin carcinogenesis. The lab has determined miRNA profiles of arsenic-induced squamous and basal cell carcinomas and premalignant hyperkeratoses. Currently, the lab is extending these results by characterizing miRNA and mRNA expression changes that occur during arsenic transformation of a human keratinocyte cell line. These studies led to characterization of differential alternative mRNA splicing as well. Dysregulation of miRNA expression and alternative mRNA splicing lead to disturbances in the proteome and dysfunction of molecular machines, such as those involved in DNA damage signalling and repair. The interest in mitotic disruption includes investigation of both structural and numerical aneuploidy induced by miR-186 overexpression. Compounds that inhibit function of the anaphase promoting complex/cyclosome that may lead to new cancer chemotherapeutics are also under investigation. Other interests include induction of chronic adult diseases by early life/in utero arsenic exposure and enhancement of cisplatin sensitivity by co-administration of arsenicals.

**John P. Wise, Sr., Ph.D**.
Professor

The Wise Laboratory studies cancer and seeks to understand how environmental chemicals transform normal cells into tumor cells. Their work focuses on chromosomes and how changes in the number and structure of chromosomes leads to cancer. The Wise Laboratory has made important advances in understanding DNA damage, DNA repair, mitosis, and centrosome biology; discovering how chemical impacts on these processes lead to chromosome instability and carcinogenesis. The

Wise Laboratory then compares these outcomes in humans, to similar endpoints in whales, alligators and sea turtles to discover novel adaptations and to better conserve wildlife. In addition, to these efforts, The Wise Laboratory pioneers studies on how zero gravity changes these processes during space exploration. Some of the new directions in the Laboratory include stem cell research, autophagy and three-dimensional cell culture as they consider how metals impact or create cancer stem cells in their carcinogenic mechanism and preventative studies as they seek to understand if natural products like berries and beets can reduce or reverse toxicity. The Wise Laboratory contextualizes their studies in a "one" environmental health perspective, which considers data from their studies of wildlife, domestic animal, and ecosystem health, together with data from their human health studies. Thus, work in the Wise Laboratory includes laboratory-based mechanistic investigations using state-of-the-art cellular and molecular toxicology tools in their laboratories on the UofL Medical School campus combined with ship-and-shore-based work at field sites in Vieques, Puerto Rico; Cape Canaveral, Florida; and the Gulfs of Maine, Mexico and California.

**Sandra S. Wise, Ph.D.**
Assistant Professor

Dr. Wise's research interests include how environmental chemicals, such as hexavalent chromium, depleted uranium and oil and dispersed oil products, can transform normal cells into cancer cells. These studies have focused on DNA repair deficiency and its impact on chromosome instability as a driving mechanism to cellular transformation and the development of disease. Currently, she is pursuing how cells exposed to these chemicals induce DNA and chromosomal damage yet are able to survive and evade the normal cell death pathways that should occur in order to protect the organism from disease.

## Faculty with Secondary Appointments

**Juhi Bagaitkar, Ph.D.**
Assistant Professor
Ph.D., Oral Immunology and Infectious Diseases, University of Louisville (2010)

**Research Interests:** To understand the immunological consequences of apoptotic cell clearance during inflammation and infection.

**Gregory Barnes, Ph.D.**
Professor, Department of Neurology
M.D., University of Kentucky (1992)
Ph.D., Biochemistry, University of Kentucky (1990)

**Shirish Barve, Ph.D.**

Professor, Department of Medicine
Ph.D., Molecular Pathogenesis, University of Kentucky (1990)

**Research Interests:** Effects of alcohol on molecular mechanisms of cytokine action, gene expression and liver injury.

**Levi J. Beverly, Ph.D.**

Associate Professor, Department of Medicine
Ph.D., Molecular Genetics, Biochemistry and Microbiology, University of Cincinnati (2007)

**Research Interests:** Regulation of anti-apoptotic proteins in cancer progression and treatment.

**Aruni Bhatnagar, Ph.D., FAHA**

Smith and Lucille Gibson Chair and Professor, Department of Medicine;
Director, Envirome Institute
Ph.D., Kanpur University, India (1985)

**Research Interests:** Cardiovascular toxicology; oxidative mechanisms of cardiovascular disease; lipid peroxidation in atherosclerosis; gene expression; secondary complications of diabetes.

**Michael E. Brier, Ph.D.**

Professor, Department of Medicine
Ph.D., Industrial and Physical Pharmacy, Purdue University (1986)

**Research Interests:** Clinical pharmacokinetics/dynamics; Drug dosing in renal failure.

**Jian Cai, Ph.D.**

Assistant Professor, Department of Medicine
Ph.D., Pharmacology and Toxicology, University of Louisville (1999)

**Research Interests:** Application of mass spectrometry in biomedical research; Drug and metabolite identification and quantification; Protein identification and post-translational modification; Hemoglobin adducts as biomarkers of chemical exposure and pathogenesis.

**Jun Cai, M.D., Ph.D.**

Assistant Professor, Department of Pediatrics
M.D., Tianjin Medical College (1993)
Ph.D., Biochemistry and Molecular Biology, Tianjin Medical University (1997)

**Lu Cai, M.D., Ph.D.**

Professor, Department of Pediatrics, Director of Pediatric Research Institute
M.D., Norman Bethune University of Medical Sciences (1983)
Ph.D., Radiation Biology/Oncology, Norman Bethune University of Medical Sciences (1987)

**Research Interests:** Diabetic cardiomyopathy and nephropathy

**Matthew C. Cave, M.D.**

Associate Professor, Department of Medicine
M.D., University of Kentucky (2001)

**Research Interests:** Steatohepatitis and liver cancer related to environmental and occupational chemical exposures; Complementary and alternative medicine in liver disease; Alcoholic and nonalcoholic fatty liver disease; Treatment of Hepatitis C.

**Joseph Chen, Ph.D.**

Assistant Professor, Department of Bioengineering
Ph.D. in Biomedical Engineering, Vanderbilt University (2015)

**Research Interests:** Research interests include investigating the mechanobiological drivers of disease progression, with a focus on neurodegeneration and glioblastoma invasion. His lab leverages tools from the fields of biomaterials, biomechanics, and gene editing to tease out the underlying mechanobiological pathways in disease.

**Jason A. Chesney, M.D., Ph.D.**

Professor and Brinkley Chair in Lung Cancer Research, Department of Medicine
Ph.D., Biomedical Sciences/Immunology, University of Minnesota (1997)
M.D., University of Minnesota (1998)

**Research Interests:** Novel regulators of cancer cell metabolism; identification of emerging viruses and the development of immune-based therapies against widely metastatic cancers.

**Daniel J. Conklin, Ph.D.**

Professor, Department of Medicine
Ph.D., University of Notre Dame (1995)

**Research Interests:** Environmental cardiology; cardiovascular toxicology.

**Chendil Damodaran, Ph.D.**

Associate Professor, Department of Urology
Ph.D., Environmental Toxicology (Cancer Biology), University of Madras (1984).

**Research Interests:** Identifying novel therapeutic compounds of natural origin that possess anti proliferative properties in prostate cancer cells, both androgen-dependent and – independent.

**Ayman El-Baz, Ph.D.**

Associate Professor and Chair of Bioengineering
Ph.D., Electrical and Computer Engineering, University of Louisville (2006)

**Research Interests:** Dr, El-Baz directs UofL's BioImaging Laboratory. The primary focal point of the BioImaging Lab is to develop and implement innovative and ground-breaking techniques for use in image-guided surgeries, and the creation of non-invasive image-based diagnostic systems, which can help to revolutionize the early diagnosis of numerous diseases and brain disorders.

**Wenke Feng, Ph.D.**

Associate Professor, Department of Medicine
Ph.D, Biochem/Biotech, University for Bodenkultur (1998)

**Research Interests:** Mechanisms of alcoholic liver disease; Mechanisms of nonalcoholic steatohepatitis; Tissue hypoxia and diabetic complications.

**Herman B. Frieboes, Ph.D.**

Associate Professor, Department of Bioengineering
Ph.D., Biomedical Engineering, University of California, Irvine (2006)

**Research Interests:** Develop and apply realistic, predictive biocomputational models integrated with clinical and laboratory data to study disease progression and treatment; design of patient-specific therapies; and design of multiscale biocomputational models to describe the complex interactions between treatment and the immune system.

**Lelia Gobejishvili, Ph.D.**

Assistant Professor, Department of Medicine
Ph.D. Physiology. I. Beritashvili Institute of Physiology, Georgian Academy of Sciences (1995)

**Research Interests:** Alcohol induced changes in innate immunity; alcohol mediated epigenetic changes of pro-inflammatory cytokines; role of phosphodiesterase 4 enzymes in a) modulating cAMP signaling in hepatic parenchymal and non-parenchymal cells (e.g. Kupffer cells, hepatic stellate cells) and b) pathogenesis of alcoholic and non-alcoholic liver disease.

**Evelyne Gozal, Ph.D.**

Associate Professor, Department of Pediatrics
Ph.D., Toxicology, University of Southern California (1997)

**Research Interests:** Signal transduction pathways involved in neuronal cell survival and neuronal cell death during hypoxia; cellular mechanisms underlying brain adaptation to chronic and intermittent hypoxia; identification of the kinases and transcription factors activated by hypoxia, leading to gene induction and to adaptation to oxygen deprivation.

**Petra Habberzettl, Ph.D.**

Assistant Professor, Department of Medicine
Ph.D., Biochemistry, Heinrich-Heine University (2006)

**Research Interests:** Mechanisms for vascular and cardiometabolic injury from air pollution.

**Michal Hetman, M.D., Ph.D.**

Professor, Department of Neurological Surgery
Endowed Professor of Molecular Signaling
M.D., Warsaw Medical School (1994)
Ph.D., Experimental and Clinical Medicine, Polish Academy of Sciences (1997)

**Research Interests:** Role of signaling kinases in neuronal repair and demise.

**Bradford G. Hill, Ph.D.**

Assistant Professor, Department of Medicine
Ph.D., Biochemistry, University of Louisville (2007)

**Research Interests:** The broad theme of my research entails understanding how changes in metabolism contribute to cardio-metabolic health and disease. This involves the critical examination of glycolysis, mitochondria, and other pathways of intermediary metabolism and the development of causal relationships between metabolic defects or signatures and (patho)physiology.

**Steven P. Jones, Ph.D.**

Professor, Department of Medicine and University Scholar
Director, Diabetes and Obesity Center
Ph.D., Physiology, Louisiana State University Health Sciences Center, Shreveport (2002)
Postdoctoral Fellowship, Mitochondrial Biology, Johns Hopkins University (2004)

**Research Interests:** My group is interested in understanding why the heart fails and developing strategies to mitigate pump failure. We are primarily focused on the immunometabolic factors that reshape the extracellular matrix in the remodeling ventricle.

**Swati Joshi-Barve, Ph.D.**

Assistant Professor, Department of Medicine
Ph.D., Biochemistry, University of Kentucky (1992)

**Research Interests:** Mechanisms of Steatohepatitis (nonalcoholic and alcoholic fatty liver disease); Mechanisms of Alcohol-induced Immune Dysfunction; Mechanisms of Hepatocellular Carcinoma.

**Irina Kirpich, Ph.D., M.P.H.**

Assistant Professor, Department of Medicine
Ph.D., Biology and Physiology, Pomor State University (1997)
M.P.H, University of Louisville (2014)

**Research Interests:** Gut-liver interactions in alcoholic and non-alcoholic liver disease; alcohol and dietary fat mediated intestinal and liver injury; gut barrier, microbiome, probiotics; epigenetics and hepatic steatosis; Oxidized Metabolites of Linoleic Acid (OXLAMs).

**Donghan Lee, Ph.D.**

Associate Professor, Department of Medicine
James Graham Brown Chair of Structural Biology
Ph.D., Biophysics, Swiss Federal Institute of Technology (2003)

**Research Interests:** Molecular recognition between biomolecules such as protein-protein, protein-DNA, protein-carbohydrate, protein-ligands; design NMR experiments and development of associated theory.

**Chi Li, Ph.D.**

Associate Professor, Department of Medicine
Ph.D., Molecular Biology, Columbia University (1998)

**Research Interests:** Mechanisms of apoptotic pathways initiated from different intracellular organelles. Molecular and cellular mechanisms that affect inflammation and immunity.

**Yan Li, M.D., Ph.D.**

Associate Professor, Department of Surgery
M.D., Liaoning University of Chinese Medicince (1987)
Ph.D., Chengdu University of Chinese Medicine (1998)

**Research Interests**: Investigation of preventive strategies and possible mechanisms behind non-alcoholic steatohepatitis, a potential precursor of liver cancer.

**Robert C.G. Martin, II, M.D., Ph.D.**

Professor and Sam and Lolita Weakley Endowed Chair in Surgical Oncology
M.D., University of Louisville (1995)
Ph.D., Pharmacology & Toxicology, University of Louisville (2008)

**Research Interests:** Genetic predisposition to cancer.

**Craig J. McClain**

Professor, Department of Medicine
M.D., University of Tennessee-Memphis (1972)

**Research Interests:** Role of cytokines in liver injury and other forms of hepatotoxicity, interactions with nutrition and toxicology.

**Kelly M. McMasters, M.D., Ph.D.**

Professor and Chair, Department of Surgery
Ph.D., Cell and Developmental Biology, Rutgers University (1988)
M.D., University of Medicine and Dentistry of New Jersey (1989)

**Research Interests:** Melanoma therapies-Adenovirus-mediated gene therapy; Radio guided surgery for breast, melanoma, and parathyroid tumors as well as gastrointestinal, hepatic, and pancreaticobiliary tumors

**Michael L. Merchant, Ph.D.**

Associate Professor, Department of Medicine
Ph.D., Chemistry, University of Arkansas (1994)

**Research Interests:** Translational research - the discovery and understanding of biomarkers of renal disease; Basic Research - Mechanisms of renal function decline and fibrosis; Basic Research - Mechanisms for the transition from acute to chronic disease.

**Tamer Mohammed, Ph.D.**

Assistant Professor, Department of Medicine
Ph.D., Cardiovascular and Molecular Medicine, University of Manchester (2008)

**Research Interests:** Identification of novel therapies for heart failure focusing on endogenous heart repair and regeneration mechanisms.

**Chin K. Ng, Ph.D.**

Associate Professor, Department of Radiology
Ph.D., Medical Physics, University of Wisconsin (1989)

**Research Interests:** Validating and characterizing novel imaging probes for multimodality imaging (MRI, PET, SPECT, CT and Optical); Exploring approaches for

early detection and monitoring of treatment efficacy of multiple diseases such as infectious diseases, cancer, spinal cord injury, brain diseases, diabetes and heart diseases; Developing thermal laser ablation devices for treating spinal metastases in a MRI environment.

**Matthew A. Nystoriak, Ph.D.**
Assistant Professor, Department of Medicine
Ph.D., Pharmacology, University of Vermont (2010)

**Research Interests:** Regulation of vascular calcium signaling and blood flow in diabetes.

**Martin G. O'Toole, Ph.D.**
Assistant Professor, Department of Bioengineering
Ph.D., Chemistry, University of Louisville (2008)

**Research Interests:** Development of stimulus-responsive biomaterials for use in medical applications of drug-delivery, wound healing, and tissue engineering. Development of stimulus-responsive biomaterials of clinical relevance for diagnosing and treating various diseases.

**Timothy E. O'Toole, Ph.D.**
Assistant Professor, Department of Medicine
Ph.D. Biological Chemistry, University of Michigan (1987)

**Research Interests:** To develop a molecular understanding of the cardiovascular pathology induced by exposure to air pollution or volatile organic compounds.

**M. Michele Pisano, Ph.D.**
Professor, Department of Surgical and Hospital Dentistry
Ph.D., Anatomy, Thomas Jefferson University (1985)

**Research Interests:** Molecular developmental toxicology; gene-environment interactions in normal and abnormal embryonic development; growth factor directed cellular signal transduction in embryonic cell growth and differentiation.

**Shesh N. Rai, Ph.D.**
Professor, Department of Bioinformatics and Biostatistics
Wendell Cherry Chair in Clinical Trial Research
Ph.D., Statistics, University of Waterloo (1993)

**Research Interests:** Clinical Trials, Survival Analysis, Bioinformatics, Mixed Effects Model, Sample Survey, Quantitative Risk Assessment

**Craig S. Roberts, M.D.**
Professor and Chair, Department of Orthopaedic Surgery
M.D., New York University (1986)

**Research Interests:** Orthopaedic trauma, fractures and their complications and outcomes.

**George C. Rodgers, M.D., Ph.D.**
Professor, Department of Pediatrics
Humana Chair of International Pediatrics
Ph.D., Organic Chemistry, Yale University (1964)
M.D., State University of New York (1975)

**Research Interests**: Toxicokinetics in drug overdoses and pharmacokinetics in pediatric disease states.

**David A. Scott, Ph.D.**
Professor, Department of Oral Immunology & Infectious Diseases
Ph.D., Microbiology and Immunology, McGill University (1997)

**Research Interests:** Tobacco-induced alterations to microbial-associated molecular patterns of Porphyromonas gingivalis; Tobacco-induced alterations to innate-pathogen interactions; Tobacco alkaloid amplification of endogenous anti-inflammatory pathways; Identification of gingivitis- and periodontitis-specific infrared molecular signatures.

**Theodore Smith, Ph.D.**
Associate Professor, Department of Medicine
Ph.D., Experimental Psychology, Miami University (1992)

**Research Interests:** Health promotion in urban environments

**Sanjay Srivastava, Ph.D.**
Professor, Department of Medicine
Ph.D., Chemistry, University of Lucknow (1993)

**Research Interests:** Delineating the mechanisms by which environmental pollutants cause endothelial activation, vascular inflammation, insulin resistance and atherosclerosis.

**Jill M. Steinbach-Rankins, Ph.D.**
Assistant Professor, Department of Bioengineering
Ph.D., Bioengineering, Arizona State University (2009)
**Research Interests:** Design and development of drug and gene delivery vehicles for physiologically difficult-to-deliver-to microenvironments.

**Janice E. Sullivan, M.D.**
Professor and Vice Chair for Research, Department of Pediatrics
M.D., University of Minnesota (1988)

**Research Interests:** Clinical Pharmacology with a focus on underserved and rural populations; Mentoring.

**Yi Tan, Ph.D.**
Assistant Professor, Department of Pediatrics
Ph.D., Biomedical Engineering, Chongqing University (2004)

**Research Interests:** Signaling pathways and therapeutic strategies in diabetic complications including cardiomyopathy, cardiac insulin resistance, stem cell mobilization and ischemic angiogenesis.

**Walter H. Watson, Ph.D.**
Assistant Professor, Department of Medicine
Ph.D., Toxicology, University of Kentucky (1999)

Oxidative stress and redox signaling; Mechanistic toxicology; Alcoholic and nonalcoholic fatty liver disease.

**Scott R. Whittemore, Ph.D.**
Professor and Vice Chair for Research, Department of Neurological Surgery
Scientific Director, Kentucky Spinal Cord Injury Research Center
Ph.D., Physiology and Biophysics, University of Vermont (1982)

**Research Interests:** Using undifferentiated precursor cells, gene therapies, and transplanted neurons, the lab seeks to understand the development of these key components of the vascular and nervous system at the molecular and genetic level in order to protect them from damage and/or promote their regeneration.

**Marcin Wysoczynski, Ph.D.**
Assistant Professor, Department of Medicine
Ph.D. Pomeranian Medical University (2009)

**Research Interests:** Innate immunity in myocardial repair.

**Jun Yan, M.D., Ph.D.**
Professor, Department of Surgery and Endowed Chair in Translational Research
M.D., Jiangsu University School of Medicine (1985)
Ph.D., Immunology, Shanghai Jiaotong University School of Medicine (1997)
**Research Interests:** Immunotherapy and vaccines for treatment of cancer and infectious diseases.

**Xiang Zhang, Ph.**D.

Professor, Department of Chemistry
Ph.D., Bioanalytical Chemistry, Purdue University (2001)

**Research Interests:** Molecular systems biology, by exploiting practical and efficient high throughput technologies for analyses of complex mixtures to facilitate the development of preventive, predictive and personalized medicine for the promotion of health and wellness.

## FACULTY WITH EMERITUS APPOINTMENTS

**Benz, Frederick W.,** Professor Emeritus, Ph.D., Pharmacology, University of Iowa (1970).

**Chen, Theresa,** Professor Emerita; Ph.D., University of Louisville (1971).

**Hurst, Harrell E.,** Professor Emeritus, Ph.D., Toxicology, University of Kentucky (1978).

**Kang, Y. James,** Professor Emeritus, Ph.D., Toxicology and Zoology, Iowa State University (1989)

**Nerland, Donald E.,** Professor Emeritus, Ph.D., Medicinal Chemistry, University of Kansas (1974)

**Pierce Jr., William M.,** Professor Emeritus, Ph.D., Pharmacology and Toxicology, University of Louisville (1981)

**Rowell, Peter P.,** Professor Emeritus, Ph.D., Pharmacology and Therapeutics, University of Florida (1975).

**Williams, W. Michael,** Professor Emeritus, Ph.D., University of Louisville (1970); M.D., University of Louisville (1974).

## FACULTY WITH ADJUNCT APPOINTMENTS

**Osama El-Tawil,** Adjunct Professor of Pharmacology and Toxicology, PhD, Toxicology, University of Medicine and Dentistry of New Jersey/Cairo University (1997)

**Adrian J. Fretland,** Adjunct Assistant Professor of Pharmacology and Toxicology; PhD, Pharmacology and Toxicology, University of Louisville School of Medicine (2000)

**John C. Lipscomb,** Adjunct Associate Professor of Pharmacology and Toxicology; PhD, Pharmacology and Toxicology, University of Arkansas for Medical Sciences (1991)

**Kevyn E. Merten,** Adjunct Assistant Professor of Pharmacology and Toxicology, PhD, Pharmacology and Toxicology, University of Louisville School of Medicine (2007)

**Kristin J. Metry-Baldauf,** Adjunct Assistant Professor of Pharmacology and Toxicology; PhD, Pharmacology and Toxicology, University of Louisville School of Medicine (2007)

**Arnold J. Schecter,** Adjunct Professor of Pharmacology and Toxicology, MD, Howard University Medical School (1962); MPH, Columbia University (1975)

**Irina Tcherepanova,** Adjunct Professor of Pharmacology and Toxicology; PhD, Molecular Pharmacology, Albert Einstein College of Medicine (1996)

**Joshua M. Thornburg,** Adjunct Assistant Professor of Pharmacology and Toxicology, PhD, Pharmacology and Toxicology, University of Louisville School of Medicine (2007)

**Eric M. Vela**, Adjunct Assistant Professor of Pharmacology and Toxicology, PhD, Virology and Gene Therapy, University of Texas Sciences Center at Houston (2005)

## ADMINISTRATIVE STAFF

| | |
|---|---|
| **Lisa Bentley** | Sponsored Awards Assistant |
| **Sonya Cary** | Fin/Ops Department Manager - HSC |
| **Kelly Holland** | Administrative Associate |

## 2020 NEW GRADUATE STUDENT CLASS

Daniel Gomes
B.A., Biochemistry, Earlham College

Raphael Jigo
Bachelor of Health Sciences in Medical Laboratory Sciences, University of Kentucky

Lucy Sloan
B.A., Neuroscience, Colorado College

Kate Tarvestad
B.S., Neuroscience and Behavior, University of Notre Dame

## Graduate Students

Attia, Rasha
Bakhaty, Omar
Bodduluri, Neil
Croom-Perez, Taylor
Dent, Mathhew
Dwenger, Marc
El-Baz, Nagwa
ElNagdy, Mohamed
Gomes, Daniel
Gripshover, Tyler
Habel, Mariam
Hoffman, Nicholas
Jiang, Mengwei
Jigo, Raphael
Kim, Christine
Krueger, Austin
Laun, Alysa
Lu, Haiyan
Lykoudi, Angeliki
McFall, Samantha
Meaza Isusi, Idoia
Miller, Hunter
Orwick, Andrew
Raph, Sean
Reeves, Micaela
Richardson, Andre
Sears, Sophie
Shrader, Sarah
Slone, Lucy
Tarvestad, Kate
Taylor, Breandon
Toyoda, Jennifer
Walls, Kennedy
Warner, Jeffrey
Wei, George
Whitt, Aaron
Williams, Aggie

## 2020 Graduates (next page)

**Student Degree Year Faculty Mentor(s) Title of Thesis/Dissertation**

| | | | | |
|---|---|---|---|---|
| Jamie L. Young Ph.D. | Ph.D. | 2020 | Lu Cai, M.D., Ph.D. | The effects of whole life, low dose cadmium exposure on high fat diet-induced NAFLD and the role of zinc |
| Jian (Joseph) Jin | Ph.D. | 2020 | Matthew C. Cave, M.D. | Effects of polychlorinated biphenyls on nonalcoholic fatty liver disease: Role of the aryl hydrocarbon receptor |
| Jeffrey B. Warner | M.S. | 2020 | Irina A. Kirpich, Ph.D. | Soluble expoxide hydrolase inhibition: A novel therapeutic strategy in alcoholic liver disease |
| Rachel M. Speer | Ph.D. | 2020 | John P. Wise, Sr., Ph.D. | Mechanisms of chromate-induced suppression of RAD51: A one environmental health approach |
| Mariam Refaat Zaky Habil | M.S. | 2020 | David W. Hein, Ph.D. | *N*-Acetyltransferase 2 (*NAT2*) genotype polymorphism in cryopreserved human hepatocytes and Chinese hamster ovary (CHO) cells |
| Desmond R. Harrell Stewart | Ph.D. | 2020 | Geoffrey J. Clark, Ph.D. | A novel role for RASSF1A in the regulation of RAS activation |
| Shuhan (Ellen) Meng | Ph.D. | 2020 | Chi Li, Ph.D. | Exosomes from embryonic stem cells as a prophylactic vaccine against lung cancer |
| Jordan B. Lynch | Ph.D. | 2020 | Daniel J. Conklin, Ph.D. | Tobacco product-derived aldehydes: Effects on circulating angiogenic cells & implications for cardiovascular disease |
| Fengyuan (Linda) Li | Ph.D. | 2020 | Wenke Feng, Ph.D. | Dual role of antimicrobial peptide cathelicidin in alcohol-associated liver disease |
| Lexiao (Monica) Jin | Ph.D. | 2020 | Daniel J. Conklin, Ph.D. | The cardiovascular effects of tobacco product-derived aldehydes: Contribution of Transient Receptor Potential Ankyrin-1 |
| Yuxuan Zheng | Ph.D. | 2020 | Walter H. Watson, Ph.D. | The role of Slc7a11 in controlling extracellular and intracellular redox environments of lung fibroblasts - potential targets for intervention in aging and idiopathic pulmonary fibrosis |
| Yihong (Summer) Li | Ph.D. | 2020 | Shao-yu Chen, Ph.D. | Sulphorophane protects against ethanol-induced apoptosis and teratogenesis |

| | | | | |
|---|---|---|---|---|
| | | | | through epigenetic modulation of anti-apoptotic genes |
| Adrienne Bushau-Sprinkle | Ph.D. | 2020 | Eleanor Lederer, M.D. | Mechanistic insight of the role of NHERF1 in cisplatin-induced acute kidney injury |

## FACULTY HONORS

**Chen, Shao-Yu**

- Distinguished University Scholar, University of Louisville
- Appointed to the Publication Committee, Society for Birth Defects Research and Prevention.
- Appointed to Associate Editor of the Journal of Hazardous Materials (Impact factor: 9.038).

**Hong, Kyung**

- Nominated for the Excellent Instructor award (Fall 2020), School of Dentistry, University of Louisville.

**Kidd, LaCreis**

- Multicultural Teaching Award, University of Louisville, School of Medicine
- Coming to America: Bridging the Gap Award - This Award identifies selfless individuals who are working for the betterment of the global inclusion of Black people in their various communities and workspace. By tackling issues and differences through cultural exchange, education, empowerment and humanitarian
- "Our Highest Potential" Endowed Chair in Cancer Research, James Graham Brown Cancer Center, University of Louisville (UofL), School of Medicine

**Lukashevich, Igor**

- 2019-2020 Continuation of Distinguished University Scholar Award.

**States, Christopher**

- Society of Toxicology Global Senior Scholar Exchange Program – Host (activities post-poned due to COVID)
- 2020 University of Louisville Distinguished Faculty Award for Outstanding Scholarship, Research and Creative Activity in Basic and Applied Sciences

- UofL Distinguished University Scholar

**Wise, John**
- Distinguished University Scholar, University of Louisville

## STUDENT HONORS

**Haiyan Lu (Wise, J)**
- Second place, short oral presentation award, Ohio Valley Chapter of the Society of Toxicology

**Sophie Sears (Siskind)**
- Fellowship Received:
  Title: Role of macrophages in cisplatin-induced kidney injury and progression to chronic kidney disease
  Agency: National Institute of Diabetes and Digestive and Kidney Diseases
  Grant number: F31DK126400
  PI: Sophia Sears

**Andrew Orwick (Siskind)**
- Fellowship Submitted:
  NIH F31, Submitted December 8, 2020; Title: The role of mitochondrial biogenesis in repeated low-dose cisplatin-induced kidney injury and the progression to chronic kidney disease; to be reviewed at study section on February 10, 2021; role: Primary Sponsor

**Sarah Shrader (Song)**
- Ms. Sarah Shrader: Awarded Autism Speaks Predoctoral Fellowship January 1, 2020- December 31, 2022).
- Ms. Sarah Shrader: International Cannabinoid Research Society travel award certificate for the annual meeting at Galway, Ireland (meeting canceled due to COVID).

**Rachel Speer (Wise, J)**
- Graduate Dean's Citation Award, (Rachel Speer), University of Louisville.
- Celebrating Women in Toxicology Award, (Rachel Speer), Women in Toxicology Special Interest Group of the Society of Toxicology

**Jennifer Toyoda (Wise, J)**
- First place, platform presentation award, (Jenifer Toyoda), Ohio Valley Chapter of the Society of Toxicology

- Second place, graduate student award, (Jenifer Toyoda), Carcinogenesis Specialty Section of the Society of Toxicology

**Aggie Williams (Wise, J)**

- First place, poster presentation award, (Aggie Williams), Ohio Valley Chapter of the Society of Toxicology

## PHARMACOLOGY & TOXICOLOGY PUBLICATIONS

**Faculty with Primary Appointments and Students/Post-Doctoral Fellows**


1. Arnold, F. W., M. V. Burns, K. Mahmood, D. Aden, Fumanek S., M. Tella, C. Glick, A. Raghuram, L. Beavin, R. Cavallazzi, D. Balcom, L. Wolf, K. E. Palmer, R. Carrico, and J. A. Ramirez. 2020. 'Endemic human coronaviruses in hospitalized adults with community-acquired pneumonia in the city of Louisville Kentucky', *University of Louisville Journal of Respiratory Infections*, 4.
2. Arnold, F. W., and J. L. Fuqua. 2020. 'Viral respiratory infections: a cause of community-acquired pneumonia or a predisposing factor?', *Curr Opin Pulm Med*, 26: 208-14.
3. Arnold, F. W., M. Mahmoud, A. Prabhu, D. Aden, A. Raghuram, M. V. Burns, L. Beavin, D. H. Chung, K. E. Palmer, and J. A. Ramirez. 2020. 'COPD exacerbation caused by SARS-CoV-2: a case report from the Louisville COVID-19 surveillance program', *University of Louisville Journal of Respiratory Infections*, 4.
4. Baldauf, K. J., R. A. Salazar-Gonzalez, M. A. Doll, W. M. Pierce, Jr., J. C. States, and D. W. Hein. 2020. 'Role of Human N-Acetyltransferase 2 Genetic Polymorphism on Aromatic Amine Carcinogen-Induced DNA Damage and Mutagenicity in a Chinese Hamster Ovary Cell Mutation Assay', *Environ Mol Mutagen*, 61: 235-45.
5. Banerjee, M., A. P. Ferragut Cardoso, A. Lykoudi, D. W. Wilkey, J. Pan, W. H. Watson, N. C. Garbett, S. N. Rai, M. L. Merchant, and J. C. States. 2020. 'Arsenite Exposure Displaces Zinc from ZRANB2 Leading to Altered Splicing', *Chem Res Toxicol*, 33: 1403-17.
6. Bushau-Sprinkle, A., M. T. Barati, K. B. Gagnon, S. J. Khundmiri, K. Kitterman, B. G. Hill, A. Sherwood, M. Merchant, S. N. Rai, S. Srivastava, B. Clark, L. Siskind, M. Brier, J. Hata, and E. Lederer. 2020. 'NHERF1 Loss Upregulates Enzymes of the Pentose Phosphate Pathway in Kidney Cortex', *Antioxidants (Basel)*, 9.
7. Carlisle, S. M., P. J. Trainor, K. U. Hong, M. A. Doll, and D. W. Hein. 2020. 'CRISPR/Cas9 knockout of human arylamine N-acetyltransferase 1 in MDA-MB-231 breast cancer cells suggests a role in cellular metabolism', *Sci Rep*, 10: 9804.
8. Chandrasekaran, B., N. R. Dahiya, A. Tyagi, V. Kolluru, U. Saran, B. V. Baby, J. C. States, A. Q. Haddad, M. K. Ankem, and C. Damodaran. 2020. 'Chronic exposure to cadmium induces a malignant transformation of benign prostate epithelial cells', *Oncogenesis*, 9: 23.
9. Corman, J. M., K. T. Hamorsky, J. W. Shepherd, E. Hiatt, J. L. Fuqua, and K. E. Palmer. 2020. 'Stability of plasmid and viral banks supporting the cGMP manufacture of Q-Griffithsin from a TMV-based viral vector', *J Biotechnol*, 320: 74-76.
10. Dent, M., and N. Matoba. 2020. 'Cancer biologics made in plants', *Curr Opin Biotechnol*, 61: 82-88.
11. Dubey, B., M. Jackson, C. Zeigler-Johnson, K. Devarajan, R. E. Flores-Obando, N. McFarlane-Anderson, M. Tulloch-Reid, W. Aiken, K. Kimbro, D. Reed, L. R. Kidd, D. Gibbs, S. Kumar, and C. Ragin. 2020. 'Interactive effect of TLR SNPs and exposure to sexually transmitted infections on prostate cancer risk in Jamaican men', *Prostate*, 80: 1365-72.
12. Dwenger, M., J. Moore, and M. A. Nystoriak. 2020. 'Influence of Cardiac Workload on

Vascular Pyridine Nucleotide Redox State', *Circulation*, 142.
13. Eapen, P., J. Cates, R. Mundell, K. E. Palmer, and J. L. Fuqua. 2020. 'In Preparation for Outdoor Pharming: Griffithsin Can Be Expressed in Nicotiana excelsiana and Retains Activity After Storage as Silage', *Front Bioeng Biotechnol*, 8: 199.
14. Elnagdy, M., S. Barve, C. McClain, and L. Gobejishvili. 2020. 'cAMP Signaling in Pathobiology of Alcohol Associated Liver Disease', *Biomolecules*, 10.
15. Ferragut Cardoso, A. P., K. T. Udoh, and J. C. States. 2020. 'Arsenic-induced changes in miRNA expression in cancer and other diseases', *Toxicol Appl Pharmacol*, 409: 115306.
16. Gu, X., R. Sun, L. Chen, S. Chu, M. A. Doll, X. Li, W. Feng, L. Siskind, C. J. McClain, and Z. Deng. 2020. 'Neutral Ceramidase Mediates Nonalcoholic Steatohepatitis by Regulating Monounsaturated Fatty Acids and Gut IgA(+) B Cells', *Hepatology*.
17. Habil, M. R., M. A. Doll, and D. W. Hein. 2020. 'N-acetyltransferase 2 acetylator genotype-dependent N-acetylation of 4-aminobiphenyl in cryopreserved human hepatocytes', *Pharmacogenet Genomics*, 30: 61-65.
18. Haghani, A., R. Johnson, N. Safi, H. Zhang, M. Thorwald, A. Mousavi, N. C. Woodward, F. Shirmohammadi, V. Coussa, J. P. Wise, Jr., H. J. Forman, C. Sioutas, H. Allayee, T. E. Morgan, and C. E. Finch. 2020. 'Toxicity of urban air pollution particulate matter in developing and adult mouse brain: Comparison of total and filter-eluted nanoparticles', *Environ Int*, 136: 105510.
19. Hardesty, J. E., J. B. Warner, Y. L. Song, E. C. Rouchka, C. Y. Chen, J. X. Kang, C. J. McClain, D. R. Warner, and I. A. Kirpich. 2020. 'Transcriptional signatures of the small intestinal mucosa in response to ethanol in transgenic mice rich in endogenous n3 fatty acids', *Sci Rep*, 10: 19930.
20. Harp, K. O., F. Botchway, Y. Dei-Adomakoh, M. D. Wilson, J. L. Hood, A. A. Adjei, J. K. Stiles, and A. Driss. 2020. 'Hemoglobin Genotypes Modulate Inflammatory Response to Plasmodium Infection', *Front Immunol*, 11: 593546.
21. Harrell Stewart, D. R., and G. J. Clark. 2020. 'Pumping the brakes on RAS - negative regulators and death effectors of RAS', *J Cell Sci*, 133.
22. Harrell Stewart, D. R., M. L. Schmidt, H. Donninger, and G. J. Clark. 2020. 'The RASSF1A Tumor Suppressor Binds the RasGAP DAB2IP and Modulates RAS Activation in Lung Cancer', *Cancers (Basel)*, 12.
23. Hong, K. U., M. A. Doll, A. Lykoudi, R. A. Salazar-Gonzalez, M. R. Habil, K. M. Walls, A. F. Bakr, S. S. Ghare, S. S. Barve, G. E. Arteel, and D. W. Hein. 2020. 'Acetylator Genotype-Dependent Dyslipidemia in Rats Congenic for N-Acetyltransferase 2', *Toxicol Rep*, 7: 1319-30.
24. Jin, J., B. Wahlang, H. Shi, J. E. Hardesty, K. C. Falkner, K. Z. Head, S. Srivastava, M. L. Merchant, S. N. Rai, M. C. Cave, and R. A. Prough. 2020. 'Dioxin-like and non-dioxin-like PCBs differentially regulate the hepatic proteome and modify diet-induced nonalcoholic fatty liver disease severity', *Med Chem Res*, 29: 1247-63.
25. Johnson, D. M., J. D. Jokinen, M. Wang, T. Pfeffer, I. Tretyakova, R. Carrion, Jr., A. Griffiths, P. Pushko, and I. S. Lukashevich. 2020. 'Bivalent Junin & Machupo experimental vaccine based on alphavirus RNA replicon vector', *Vaccine*, 38: 2949-59.
26. Johnson, D. M., K. J. Sokoloski, J. D. Jokinen, T. L. Pfeffer, Y. K. Chu, R. S. Adcock, D. Chung, I. Tretyakova, P. Pushko, and I. S. Lukashevich. 2020. 'Advanced Safety and Genetic Stability in Mice of a Novel DNA-Launched Venezuelan Equine Encephalitis Virus Vaccine with Rearranged Structural Genes', *Vaccines (Basel)*, 8.
27. Kim, C., J. C. States, and B. P. Ceresa. 2020. 'Chronic and acute arsenic exposure enhance EGFR expression via distinct molecular mechanisms', *Toxicol In Vitro*, 67: 104925.
28. Kuhn, J. H., S. Adkins, D. Alioto, S. V. Alkhovsky, G. K. Amarasinghe, S. J. Anthony, T. Avsic-Zupanc, M. A. Ayllon, J. Bahl, A. Balkema-Buschmann, M. J. Ballinger, T. Bartonicka, C. Basler, S. Bavari, M. Beer, D. A. Bente, E. Bergeron, B. H. Bird, C. Blair, K. R. Blasdell,

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# PHARMACOLOGY & TOXICOLOGY ABSTRACTS

**Faculty with Primary Appointments and Students**

## Ceresa, Brian

1. Assessing the role of chronic arsenic in disrupting the EGFR-signaling axis. C. Kim and **B. Ceresa**, Society of Toxicology 2020 (virtual)
2. Collagen Mimetic Peptides (CMPs) as a bioengineering tool to repair damaged collagen substrates and basement membranes and facilitate corneal epithelial growth. Baratta, R.O., Ousler, G.W., Del Buono, B., Calkins, D.J, **Ceresa, B.P**., ARVO 2020 (virtual)
3. Knockdown of c-Cbl Enhances EGFR-mediated Cell Migration by Diverting the Active Receptor from the Lysosome. **Ceresa, B.P.**, Ahmed, O., ARVO 2020 (virtual)

## Chen, Shao-Yu

1. Yuan F, Fan H, Li Y, Lu L, Liu J, Chen S-Y. Dysregulation of enhancers and aberrant expression of their cognated genes contribute to ethanol-induced craniofacial defects in zebrafish embryos. Alcohol Clin Exp Res 44: S1, 54A, 2020.
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4. 4. Fan H, Yuan F Lu L, Liu J, Chen S-Y. Ethanol-induced disruption of coordinated migration of neural crest cells and placode cells is mediated by exosomes derived from neural crest cells. Alcohol Clin Exp Res 44: S1, 53A, 2020.

## Hein, David

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4. Hong, K.U., Doll, M.A., Lykoudi, A., Salazar-González, R.A., Habil, M.R., Walls, K.M., Bakr, A.F., Ghare, S.S., Barve, S.S., Arteel, G.E. and Hein, D.W.: Acetylator genotype-dependent dyslipidemia in rats congenic for N-acetyltransferase 2. Proceedings of the annual meeting of the Ohio Valley Society of Toxicology, November 2020.

5. Walls, K.M., Salazar-González, R.A., Hein, D.W., and Hong, K.U.: Depletion of arylamine N-acetyltransferase 2 results in dysregulation of gluconeogenic and lipogenic genes in HepG2 hepatocellular carcinoma cell line. Proceedings of the annual meeting of the Ohio Valley Society of Toxicology, November 2020.
6. Habil, M. R., Doll, M.A. and Hein, D.W.: Differences in acetyl coenzyme A affinity between N-acetyltransferases NAT1 and NAT2. Proceedings of the annual meeting of the Ohio Valley Society of Toxicology, November 2020.
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**Hong, Kyung**

1. "Depletion of arylamine N-acetyltransferase 2 results in dysregulation of gluconeogenic and lipogenic genes in HepG2 hepatocellular carcinoma cell line." Kennedy M. Walls, Raul A. Salazar-Gonzalez, David W. Hein, Kyung U. Hong. 2020 Ohio Valley Chapter Society of Toxicology (Nov 2020).
2. "Acetylator Genotype-Dependent Dyslipidemia in Rats Congenic for N-Acetyltransferase 2." Kyung U. Hong, Mark Doll, Angeliki Lykoudi. Raúl Salazar-González, Mariam Habil, Kennedy Walls, Alaa Bakr, Smita Ghare, Shirish Barve, Gavin Arteel, David W. Hein. 2020 Ohio Valley Chapter Society of Toxicology (Nov 2020).

**Hood, Joshua**

1. Burroughs, M. J.; Bardi, G. T.; Hood (corresponding author), J. L. Liver tumor-derived exosomes (small extracellular vesicles) induce macrophage polarity. Extracellular Vesicle and Circulating Nucleic Acid (EVCNA) Journal; American Society for Exosomes and Microvesicles, 2020 conference 2020.

**Kidd, Lacreis**

**1.** Okeke, C.,Kidd, L.R., Impact of Mitogen-activated Protein Kinase (MAPK14/p38) Sequence Variant Partners on Aggressive Prostate Cancer,Research Louisville!, Louisville, Kentucky, September 2019
**2.** Okeke, C.,Kidd, L.R., Impact of Mitogen-activated Protein Kinase (MAPK14/p38) Sequence Variant Partners on Aggressive Prostate Cancer,Undergraduate SSRP/R25 Research Poster Symposium, Louisville, Kentucky, August, 2019
**3.** Kidd, L.R., Hein, D.W. Strategies to Enhance the UofL R25 Cancer Education Experience. Research Louisville!, Louisville, Kentucky, September, 2019.
**4.** Kidd, L.R., Hein, D.W. Strategies to Enhance the UofLR25 Cancer Education Experience. South East Regional IDEA Conference, Louisville, Kentucky, November, 2019.

**Kouokam, Calvin**

1. Kiahra Burns, Dakotah Cathey, Milena Mazalovska and J. Calvin Kouokam. Not Just for Kissing: Mistletoe Against Cancer? Transient Expression of Mistletoe Lectin II in Nicotiana benthamiana and its Anticancer Activity (KBRIN Poster Day, August 2, 2019. Louisville, KY, USA)
2. Milena Mazalovska, Dakotah Cathey, J. Calvin Kouokam. Transiently expressed mistletoe lectin II in nicotiana benthamiana shows anticancer activity in vitro through induction of apoptosis (Research!Louisville 2019)
3. Kiahra Burns, Dakotah Cathey, Milena Mazalovska and J. Calvin Kouokam. Transient Expression in Nicotiana benthamiana and Anticancer Activity of Mistletoe Lectin II (Annual Meeting of the Kentucky Academy of Science 2019 at Berea College), 2nd place in Cellular & Molecular Biology section.

**Lukashevich, Igor**

1. Kevin J Sokoloski, Peter Pushko, **Igor S Lukashevich**
   Novel Venezuelan Equine Encephalitis Vaccine V4020 has Increased Safety and Stability over TC-83. *2020 ASM Biothreats* meeting, Abstracts. January 28–30, 2020, the Hyatt Regency Crystal City, Arlington, VA
2. Irina Tretyakova, Dylan M Johnson, Alexander Tibbens, **Igor S Lukashevich**, Peter Pushko
   Development of manufacturing process for reassortant Lassa virus vaccine ML29.
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**Palmer, Kenneth**

1. DeMarco JK, Severson WE, DeMarcoDR, Gabbard JD, **Palmer KE**. Activation of Macrophages Enhances Susceptibility to SARS-CoV2 Antibody-Dependent Enhancement and Promotes Damage to Downstream Epithelial Cells. 2020 Infectious Disease Society of America Annual Meeting.

**Siskind, Leah**

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**Song, Zhao-Hui (Joe)**

1. Shrader S, Mellen, N, Barnes, G and Song ZH. Cannabidiol as a behavioral modulator in autism spectrum disorders. International Cannabinoid Research Society Annual Conference, Galway, Ireland, June 2020 (canceled due to COVID-19).

**States, Christopher**

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1. Banerjee M, Ferragut Cardoso AP, Lykoudi A, Wilkey DW, Watson WH, Garbett NC, Merchant ML, Pan J, Rai SN, States JC. Arsenite Alters Structure and Function of Alternative Splicing Regulator ZRANB2 by Displacing Zinc from Zinc Finger Motifs; The Toxicologist, Supplement to Toxicological Sciences, 174 (1), abstract # 2632 (2020)
2. Lykoudi A, Ferragut Cardoso A, Wu, J, Wise S, States J. Overexpression of hsamiR-186 Induces Anchorage-Independent Growth and Chromosomal Alterations in Arsenic-Exposed Human Keratinocytes: A Preliminary Study. The Toxicologist, Supplement to Toxicological Sciences, 174 (1), abstract # 2622 (2020)
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1. Lykoudi A, Ferragut Cardoso AP, Wise SS, States JC. MiR-186 overexpression exacerbates the arsenic-induced chromosomal instability associated with skin carcinogenesis. Ohio Valley Chapter Society of Toxicology, University of Louisville, Louisville, KY, November 1, 2020
2. Ferragut Cardoso AP, Banerjee M, Al-Eryani L, Sayed M, Park JW, States JC. Chronic Arsenic Exposure Induces Unique Alternative Splicing Landscapes at Each Stage of Cutaneous Squamous Cell Carcinoma Development. Ohio Valley Chapter Society of Toxicology, University of Louisville, Louisville, KY, November 1, 2020

**Wise, John**

1. Croom-Perez, T., Young, J.L., Xu, J., Meaza, I., Lu, H., Wise, S.S., Cai, L., and Wise, Sr., J.P. Characterizing a Mouse Model for the Effects of Whole Life, Low Dose Cadmium Exposure, and High Fat Diet on the Lung. Toxicological Sciences, 168(1): 3430, 2020.
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3. Toyoda, J.H., Martino, J., Kondo, K., and Wise, Sr., J.P. Prolonged Particulate Hexavalent Chromium Exposure Disrupts Centrosome Regulation Proteins and Causes Centrosome Amplification. Toxicological Sciences, 174(1): 2607, 2020.

4. Wise, Jr., J.P., Lu, H., Toyoda, J.H., Speer, R.M., Croom-Perez, T., Meaza Isusi, I., Wise, S.S., Young, J.L., Tan, Y., Hoyle, G., Isakov, R., Jaggers, H., Wise, Sr., J.P., and Cai, L. Genotoxicity in the Heart-Brain Axis Following Inhalation of Hexavalent Chromium [Cr(VI)] in a Rat Model. Toxicological Sciences, 174(1): 3130, 2020.
5. Lu, H., Browning, C.L., and Wise, Sr., J.P. Why Do Whales Have Lower Cancer Rates: Whale Cells Avoid Particulate Chromate Induced Homologous Recombination Repair Inhibition. Toxicological Sciences, 174(1): 1339, 2020.
6. Meaza, I., Speer, R.M., Toyoda, J.H., and Wise, Sr., J.P. Particulate Hexavalent Chromium Induces Cytotoxicity and Genotoxicity in Female and Male Fin Whale Cells. Toxicological Sciences, 174(1): 2565, 2020.
7. Wise, S.S., and Wise, Sr., J.P. The Fate of Cells that Escape Cr(VI)-induced Cell Death. Toxicological Sciences, 174(1): 2603, 2020.
8. Toyoda, J.H., Martino, J., Speer, R.M., and Wise, Sr., J.P. Hexavalent Chromium Decreases Securin Expression and Increases Separase Substrate Cleavage in Human Lung Cells. Presented at the Ohio Valley Society of Toxicology (OVSOT) Annual Meeting, November 2020.
9. Lu, H., Wise, S.S., Toyoda, J.H., Speer, R.M., Bolt, A., and Wise, Sr., J.P. Whale Cells Are Resistant to Cr(VI)-Induced Loss of Homologous Recombination Repair. Presented at the Ohio Valley Chapter of the Society of Toxicology (OVSOT) annual meeting, November 2020.
10. Meaza, I., Speer, R.M., Toyoda, J.H., Lu, Y., Xu, Q., Walter, R., Kong, M. and Wise, Sr., J.P. Particulate Hexavalent Chromium Altered the Expression of miRNAs Involved in Carcinogenesis Pathways. Presented at the Ohio Valley Chapter of the Society of Toxicology (OVSOT) annual meeting, November 2020.
11. Williams, A.R., Browning, C.L,. Meaza, I., Toyoda, J., and Wise, Sr., J.P. Rad51 Paralogs Are Key Targets for Loss of Homologous Recombination Repair in Metal Carcinogenesis. Presented at the Ohio Valley Chapter of the Society of Toxicology (OVSOT) annual meeting, November 2020.
12. Toyoda, J.H., Martino, J., Speer, R.M., and Wise, Sr., J.P. Hexavalent Chromium Decreases Securin Expression and Increases Separase Substrate Cleavage in Human Lung Cells. Presented at the NIH/NIEHS Superfund Research Program Annual Meeting, December 2020.

**Wise, Sandra**

1. Croom-Perez, T., Young, J.L., Xu, J., Meaza, I., Lu, H. Wise, S.S., Cai, L., and Wise, Sr., J.P. Characterizing a Mouse Model for the Effects of Whole Life, Low Dose Cadmium Exposure, and High Fat Diet on the Lung. Toxicological Sciences, 168(1): 3430, 2020.
2. Wise, Jr., J.P., Lu, H., Toyoda, J.H., Speer, R.M., Croom-Perez, T., Meaza Isusi, I., Wise, S.S., Young, J.L. Tan, Y., Hoyle, G., Isakov, R., Jaggers, H., Wise, Sr., J.P., and Cai, L. Genotoxicity in the Heart-Brain Axis Following Inhalation of Hexavalent Chromium [Cr(VI)] in a Rat Model. Toxicological Sciences, 174(1): 3130, 2020.
3. Wise, S.S., and Wise, Sr., J.P. The Fate of Cells that Escape Cr(VI)-induced Cell Death. Toxicological Sciences, 174(1): 2603, 2020.
4. Lu, H., Wise, S.S., Toyoda, J.H., Speer, R.M., Bolt, A. and Wise, Sr., J.P. Whale Cells Are Resistant to Cr(VI)-Induced Loss of Homologous Recombination Repair. Presented at the Ohio Valley Chapter of the Society of Toxicology (OVSOT) annual meeting, November 2020.

5. Lykoudi, A., Caroso, A.P.F., Wise, S.S., States, J.C. MiR-186 overexpression exacerbates the arsenic-induced chromosomal instability associated with skin carcinogenesis. Presented at the Ohio Valley Chapter of the Society of Toxicology (OVSOT) annual meeting, November 2020.
6. Lu H., Browning C.L., Wise, S.S., Speer, R.M, Liu, K.J., and Wise, Sr., J.P. How Chromium Induces Genomic Instability: Lessons from Human and Whale Cells. To be presented at the 16th International Symposium on Recent Advances in Environmental Health Research, Jackson, Mississippi.

## RESEARCH GRANTS ACTIVE

### Ceresa, Brian

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| NIH/NEI EY028911 | c-Cbl Antagonists for Corneal Epithelial Regeneration | PI (30%) | Ceresa | 1/1/19 – 1/31/24 | $1,925,088 |
| NIH/NIEHS T32 ES011564 | UofL Environmental Health Sciences Training Program | Mentor | Hein/Wise | 4/1/16 – 3/31/21 | $2,183,597 |
| NIH/NCI R01CA193220 | Ubiquilin1 Regulates EMT and Metastasis of Human Lung Adenocarcinoma | Co-I (1%) | Beverly | 08/1/15 – 07/31/20 | $1.7M |
| NIH/NEI T35EY026509 | Summer Vision Sciences Training Program | Co-PI (5%) | Ceresa/ Guido | 07/1/17 – 04/28/22 | $193,732 |
| NIH/NCI R25 CA134283 | UofL Cancer Education Program | Mentor | Hein/Kidd | 9/4/11 – 4/1/21 | $318,584 |

### Chen, Shao-yu

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| NIAAA/**RO1** AA021434 | Role of microRNA in ethanol-induced apoptosis and teratogenesis | PI | Shao-yu Chen | 07/2013 – 06/2021 | $1,125,000 (direct cost) |
| R01 NIAAA/ AA028435 | Role of exosomes in the coordinated migration of neural crest cells and placodes and ethanolinduced | PI | Shao-yu Chen | 8/1/2020 – 7/31/2025 | $1,953,438 |
| NIAAA/**P50** AA024337 Alcohol Center grant | The role of nutrition in the development/progression of alcohol-induced organ injury.<br><br>Project 3: Sulforaphane-mediated epigenetic modulation of ethanol-induced apoptosis and teratogenesis | Project 3 PI | Craig McClain | 05/2016 – 04/2021 | $8,000,000.000 (Total Budget)<br><br>Project 3 budget:<br><br>$750,000.00 (Direct cost) |
| NIEHS/**T32** ES011564 | UofL environmental health sciences training program | Faculty mentor | David Hein | 07/2016 – 06/2021 | $2,311,000.00 |

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|---|---|---|---|---|---|
| NIEHS/**T35** ES014559 | Summer Environmental Health Sciences Training | Faculty mentor | States | 04/2016 03/2021 | $190,000.00 |
| P30 NIEHS/ ES030283 | University of Louisville Center for Integrated Environmental Health Sciences | Member | States | 7/15/20 – 3/31/25 | $6,473,751 |
| NCI/**R25** CA134283 | Cancer Education Program for Professional and Undergraduate Students | Faculty mentor | David Hein/ LaCreis Kidd | 04/2017 – 03/2022 | $1,620.000 |

## Clark, Geoffrey

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| CDMRP (DOD)NF180094 | Novel Inhibitors of MPNST | PI | | 01/07/2019 -2/06/2022 | 525K |
| NCI R21 R21CA216722 | A novel RALGEF inhibitor for Pancreatic cancer | PI | | 2018-2021 | 275K Direct |
| Qualigen LCC | Development of RAS inhibitors | PI | Co-I Trent Bates | 01/05/2019 30/11/2021 | ~700K |
| R25CA134283 | University of Louisville Cancer Education Program | Mentor | Hein | 09/01/16-08/31/21 | $1,500,000 |

## Freedman, Jonathan

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| NIEHS R01ES028102 | The Role of Autophagy in Cadmium Induced Prostate Carcinogenesis | PI | Freedman | 12/01/2017-11/30/2022 | 1,934,000 (total) |
| NIEHS/T32 ES011564 | UofL Environmental Health Sciences Training Program | Member | Arteel | 06/2016 - 05/2021 | $2,211,776 ($2,183,597 direct) |
| NIEHS/T35 ES014559 | Summer Environmental Health Sciences Training Program | Member | Prough | 04/2016 - 03/2021 | $190,00 ($175,000 direct) |
| 9th Framework Programme European Commission | Precision Toxicology | Scientist | Colbourne | 2/2021 – 1/2026 | £20,000,000 |
| NIEHS/P42 ES023716 (Training Core) | Molecular and Cellular Mechanisms of Cardiometabolic Toxicity of VOCs | Co-Director | Srivastava/ Hein | 4/2017-3/2024 | $1,669,954 (Direct) |

## Fuqua, Joshua

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| University of Louisville – Innovation Grant Proposal | Developing and Characterizing Pegylated Griffithsin variants to improve systemic pharmacokinetic and immunogenicity to treat influenza. | PI | Fuqua Hamorsky Arnold | 08/01/19 – 07/31/2020 NCE through 6/302021 | $99,953 |
| NIH/NIAID U19AI113182 Core A | Griffithsin-based rectal microbicides for Prevention of Viral Entry (PREVENT) Core A: Administrative | Program Manager | Palmer | 07/01/14 – 6/30/2019 NCE through 6/30/2021 | $250,571 |
| NIH/NIAID U19AI113182 Core D | Griffithsin-based rectal microbicides for Prevention of Viral Entry (PREVENT) Core D: Regulatory Affairs Core | PI | Fuqua | 07/01/14 – 06/30/2019 NCE through 6/30/2021 | $296,603 |
| NIH/NIAID R44AI150235Phase1/2 Fast-Track SBIR | Deimmunization of Griffithsin for Topical Prophylaxis Against HIV and HSV-2 (UofL Subaward) | Co-I(1% Salary in Year 1, 20% Salary in years 2-4) | Palmer | Phase 1 : 12/20/2019– 11/30/2020 Phase 2: TBD | $89,516 ~$728,000 |
| Leona M. and Harry B. Helmsley Charitable Trust/2014-PG-MED001 | Preclinical development of epicertin enema for the treatment of ulcerative colitis | Co-I (5%) | Matoba | 12/1/19 – 6/30/20 | $390,000 (total direct costs) |
| NIH/NCI 3P30 CA047904 32S5 | Cancer Center Support Grant Supplement: Clinical evaluation of a QGRFT nasal spray for prevention of SARS-CoV-2 | Co-I (5%) | Ferris | 9/21/20 – 7/31/21 | $1,042,029 |
| DoD/W15QKN-16-9-1002 | PREVENT-CoV: A Q-Griffithsin Intranasal Spray | Co-PI (65%) | Palmer | 12/3/30 – 11/30/21 | $8,547,848 (total costs) |
| Metro Louisville Government | Co-Immunity (Wastewater) | Co-I (25%) | Bhatnagar | 7/1/20 - 12/30/20 | $3,003,403 (total cost) |
| KY State Government | COVID-19 Wastewater Pilot Program | Co-I (5%) | Bhatnagar | 8/1/20– 10/1/20 | $17,694 total direct cost |

## Gupta, Ramesh

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| PureTech Health, Boston | Sponsored Research Funding | PI | Gupta | 9/17– 8/20 | $750,000 |

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|---|---|---|---|---|---|
| NCI SBIR Phase II CA-221487-01 | Exosomal Drug Delivery | MPI | Gupta, Spencer | 09/17– 8/21 | $1,700,000 |
| 3P Bio Contract | Effect of Exosomal Formulations on Lung and Breast cancer | MPI | Gupta, Aqil | 07/18– 6/21 | $173,250 |
| 3P Bio Contract | "Exosomes and eExosomes - Biodistribution and Efficacy" | MPI | Gupta, Aqil | 9/20-8/22 | $300,00 |
| PureTech Health, Boston | Sponsored Research Funding | PI | Gupta | 9/18– 8/21 | $500,000 |
| PureTech Health, Boston | Sponsored Research Funding | PI | Gupta | 9/17– 8/20 | $750,000 |

## Hein, David

| Agency/ Number | Title | Role | PI | Project Period | Award |
|---|---|---|---|---|---|
| NCI R25- CA134283 | University of Louisville Cancer Education Program | Contact PI | Hein & Kidd | 04/01/17-03/31/22 | $1,593,000 |
| NIEHS T35- ES014559 | Summer Environmental Health Sciences Training Program | Mentor | States | 05/15/16 – 03/31/21 | $186,540 |
| NIH P20- GM113226 | Hepatobiology and Toxicology COBRE | Director for faculty career development; project lead renovation & alternations | McClain | 06/10/16 – 03/31/21 | $11,530,145 |
| NIEHS T32 ES011564 | UofL Environmental Health Sciences Training Program | Contact PI | Hein and J. Wise | 07/01/16 – 06/31/21 | $2,314,825 |
| NIH-NIEHS/P30 ES030283 | University of Louisville Center for Integrated Environmental Health Sciences | Faculty member | States | 07/15/20 - 06/30/25 | $6,473,751 |
| NIEHS P42-ES023716 subproject 7663 | Superfund Training Core | PI | Hein | 09/01/17 – 03/31/22 | $440,700 |
| Society of Toxicology | First integrated international workshop: acetyltransferases, sulfotransferases, and UDP-glucuronosyltransferases | PI | Hein | 11/02/19-06/30/21 | $2,000 |

## Hong, Kyung

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|---|---|---|---|---|---|
| University of Louisville, EVPRI, Research II Grant | Effect of Heterocyclic Amines and NAT2 Metabolism on Insulin | PI | Hong | 06/01/20 – 05/31/21 | $10,000 |

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|---|---|---|---|---|---|
| University of Louisville, School of Medicine, Basic Research Grant | Effect of Heterocyclic Amines and NAT2 Metabolism on Insulin Sensitivity | PI | Hong | 10/01/20 – 09/30/21 | $25,000 |

## Hood, Joshua

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| Elsa U. Pardee Foundation | Tuning exosomes to activate anti-lung cancer macrophages | PI | Hood | 10/01/18-9/30/21 | $185,241 |
| 2 R25 CA134283-06A1 | University of Louisville Cancer Education Program | Faculty Mentor | Hein, Kidd | 4/1/17 - 3/31/22 | $1,593,000 |
| U of L Hepatobiology and Toxicology COBRE Pilot Project Application | Differential modulation of immune-relevant RNAs in hepatocellular carcinoma-derived small extracellular vesicles by M1 vs. M2 polarized Kupffer cell conditioned media | PI | Hood | 2/1/20 - 3/31/21 | $156,250 |
| 2 P20 GM113226-06 | Extracelluar vesiclebased immunotherapy for hepatocellular carcinoma | PI (Project 2) | McClain | 4/1/21-3/31/26 (pending) | $11,722,500, $1,094,100 (Hood) |

## Kidd, LaCreis

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| NIH, NIEHS T32-ES011564 | UofL Environmental Health Science Training Program | Mentor | Hein | 04/1/16-3/31/21 | $2,310,776 |
| R25-CA134283-06 | University of Louisville Cancer Education Program | Co-I, Cancer Education Coordinator Mentor | Hein/ Kidd | 9/1/17-08/31/21 | $1,620,000 |

## Kouokam, Calvin

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| CPM/BRU | Laboratory start up | PI | Kouokam | 7/17- 6/20 | $645,425 |
| UofL Center for Integrative Environmental Health Science (CIEHS) | The inflammatory response in human lung cells after exposure to particulate hexavalent chromium [Cr(VI)], | Co-I | Kouokam/ Wise Jr. | 10/20 – 3/21 | $5,000 |

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|---|---|---|---|---|---|
| | a key event in Cr(VI) carcinogenesis | | | | |

## Lukashevich, Igor

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| NIH/NIAD R43AI152717-01 | Novel Chikungunya vaccine with rearrangement genome | PI on sub | | 04/03/20-03/31/22 | $80,000 |
| NIH/NIAID 1R56AI1357700 | Reverse Genetics to Forward The Pan-Lassa Fever Vaccine Lead Candidate ML29 | MPI | | 08/01/20-7/31/20 NCE | $256,666 |

## Matoba, Nobuyuki

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| Leona M. and Harry B. Helmsley Charitable Trust 2014-PG-MED001 | Preclinical development of epicertin enema for the treatment of ulcerative colitis | PI | Matoba | 12/01/19–6/30/20 | $390,000 (total direct costs) |
| NIH/NIDDK 1 R01 DK123712-01A1 | Preclinical validation of oral therapeutic lead proteins targeting epithelial GM1 ganglioside for ulcerative colitis therapy | PI | Matoba | 06/20/20 – 03/31/24 | $1,247,930 (total direct costs) |
| NIH/NCI 3P30 CA047904 32S5 | Cancer Center Support Grant Supplement: Clinical evaluation of a QGRFT nasal spray for prevention of SARS-CoV-2 | Subcontract Co-I | | 09/21/20 – 7/31/21 | $1,042,029 |
| DoD/Medical CBRN Defense Consortium MCDC2006-010 | PREVENT-CoV: A Q-Griffithsin Inranasal Spray | Co-I | Palmer | 12/03/20–11/30/21 | $8,547,848 (total costs) |
| NIH NIAID/ U19 AI113182-6663 | Griffithsin-based Rectal Microbicides for PREvention of Viral ENTry (PREVENT) Core C: Pharmacokinetics and Pharmacodynamics Core | PI | Matoba | 7/01/14 – 6/30/19 | NCE |
| NIH NCI / 1R21CA216447-01A1 | Investigation of a lectibody targeting tumor-associated oligomannose glycans | PI | Matoba | 2/08/18 – 1/31/20 | $239,250 (total direct costs) |

## Palmer, Kenneth

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| NIH/NIAID U19 AI113382 | Griffithsin-based rectal microbicides for Prevention of HIV Entry (PREVENT) | Program Director | Palmer | 07/01/14 –06/30/20 | $2,242,842, in NCE |
| NIH/NIHLB U01HL127518 | The EXCITE Program: Expediting Commercialization, Innovation, Translation and Entrepreneurship | Member, Intenal Advisory Board | Bates, Miller, Krentsel | 03/20/15-02/28/20 | $996,487 |
| NIH/NIGMS P20 GM 125504 | Functional Microbiomics, Inflammation and Pathogenicity | Member, Internal Advisory Board | Lamont | 03/01/18-02/28/23 | $2,544,491 |
| NIH/NIAID 1UC6AI066844 | Center for Predictive Medicine for Biodefense | PI and Director | Palmer | 09/01/05 - 08/31/30 | Construction grant with ongoing operations obligations $21,945,188 |
| NIH/NCI 3P30 CA047904 32S5 | Cancer Center Support Grant Supplement: Clinical evaluation of a QGRFT nasal spray for prevention of SARS-CoV-2 | PI of subaward | Ferris | 09/21/20 - 7/31/21 | $1,042,029 |
| NIH/NIAID R44AI150235 | Deimmunization Griffithsin Microbicide | PI of subaward | Bailey-Kellogg | 12/20/19 11/30/20 | $89,516 (UofL subaward) |
| Qualigen Inc. | AS1411 to Prevent or Treat COVID-19 | PI | Palmer, Bates | 11/15/20-05/14/21 | $430,432 |
| DoD/W15QKN-16-9-1002 | PREVENT-CoV: A Q-Griffithsin Intranasal Spray | Program Director | Palmer | 12/02/20-11/30/21 | $8,547,848 |
| NIH/NCATS 1U18 TR003787-01 | A handheld microchip for GC analysis of breath to screen for COVID-19 | Co-Investigator | Fu, Nantz | 12/21/21 –11/30/22 | $1,026,672 |
| Various, including philanthropy, JHFE, JG Brown Foundation, Owsley Brown Family Foundation | The Co-Immunity Project | Co-PI | Bhatnagar, Palmer | 05/01/20-04/30/21 | $1,136,751 (CPM component) |

## Siskind, Leah

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| NIH 1R01DK124112-01 | The role of neutral ceramidase in acute kidney injury and progression to chronic kidney disease | PI (25%) | Siskind | 1/10/20-12/31/23 | $322,500 Annual Direct Costs |
| NIH R01 DK124112-01S1 | Administrative supplement to 1R01DK124112-01 for equipment purchase | PI | Siskind | 9/1/2020-12/31/23 | $52,500 Direct Costs |
| NIH F31 DK126400-01 | Role of macrophages in cisplatin-induced kidney injury and progression to chronic kidney disease | Sponsor | Sears | 5/1/20 – 4/30/23 | $32,123 Annual Direct Costs |
| NIH R01 DK115406 | CSN8 regulation of S1P-enriched extracellular vesicles to modulate NAFLD by gut-liver axis | Co-I (10%) | Deng | 07/20/18-4/30/23 | $270,000 Annual Direct Costs |
| Clinical and Translational Pilot Research Projects to the HSCRO | Establishing a standard of care chemotherapy regimen in pigs to study nephrotoxicity | PI | Siskind | 5/1/2019-4/30/2020 | $50,000 Direct Costs |

## Song, Zhao-Hui (Joe)

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| R25CA134283-06 | University of Louisville Cancer Education Program | Faculty Mentor | David W. Hein and LaCreis R. Kidd | 9/1/16 -8/31/21 | $1,620,000 |
| R21EY030186-01 | The effect of cannabidiol and the role of GPR3 in experimental autoimmune uveitis | Multi-PI | Hui Shao<br>ZH Song | 4/1/19-3/31/21 | $423,500 |
| Autism Speaks Predoctoral Fellowship #11863 | Phytocannabinoids as Behavioral and Immunological Modulators in Autism Spectrum Disorders | Primary Mentor | Sarah Shrader | 1/1/20-12/31/22 | $70,000 |

## States, Christopher

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| NIH-NIEHS 5R01ES027778-03 | MECHANISM FOR ARSENIC INDUCED CARCINOGENESIS | PI | States | 8/1/17 – 7/31022 | $413,059 (current year costs) |
| NIEHS 1P30ES030283-01A1 | UNIVERSITY OF LOUISVILLE CENTER FOR INTEGRATIVE ENVIRONMENTAL HEALTH SCIENCES | PD | States | 7/15/20-3/31/25 | $6,473,751 (total costs); $1,170,401 (current year total costs) |
| NIEHS 1R21ES030334-01A1 | ALTERNATIVE SPLICING IN ARSENICAL SKIN CARCINOGENESIS | PI | States | 7/14/20-6/30/22 | $429,000 (total costs) $234,000 (current year total costs) |
| NIH/NCI R25CA134283-09 | University Of Louisville Cancer Education Program | Mentor | Hein | 09/14/11-03/31/22 | $3,089,675 (total costs) |
| NIH/NIEHS, T32ES011564-15 | UofL Environmental Health Sciences Training Program | Mentor | Hein | 07/01/04 –06/30/21 | $2,316,985 (total costs) |
| NIH-NIEHS 5T35ES014559-15 | SUMMER ENVIRONMENTAL HEALTH SCIENCES TRAINING PROGRAM | MPI (corr) | States | 4/1/06 – 4/30/21 5/1/19-4/30/21 | $39,852 (current year total costs) |
| NIH-NIGMS 5P20GM113226-05 | Hepatobiology and Toxicology COBRE | Mentor | McClain | 6/10/16 – 03/31/21 | $11.5M |

## Wise, John

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| NIEHS/R01 ES016893 | Particulate Cr(VI) Toxicology in Human Lung Epithelial Cells and Fibroblasts | PI | Wise, J. | 07/01/08 - 10/31/23 | $3,090,764 |
| Kentucky Lung Cancer Research Program | Particulate Hexavalent Chromium-Induced Exosome Release in Human Lung Cells | PI | Wise, J. | 07/01/18 - 06/30/21 | $150,000 |
| University of Louisville School of Medicine | Survival Pathways in Metal Induced Carcinogenesis | Collaborator | Wise, S. | 06/15/18-05/14/20 | $25,000 |
| NIEHS/T32 ES011564 | UofL Environmental Health Sciences Training Program | PI (Multi) | Hein & Wise, J. | 04/01/16-03/31/21 | $2,183,597 |
| NCI/R25CA134283 | University of Louisville Cancer Education Program | Mentor | Hein and Kidd | 09/01/16-08/31/21 | $1,500,000 |
| NIGMS/P20GM113226 | Hepatobiology & Toxicology COBRE | Mentor | McClain | 06/10/16-03/31/21 | $11,250,000 |

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| NIEHS/T35ES014559 | Summer Environmental Health Sciences Training Program | Mentor | Prough | 04/01/06 – 04/30/21 | $516,565 |
| NIEHS/P30 ES030283 | University of Louisville Center for Integrated Environmental Health Sciences | Deputy Director | States | 04/01/20-03/31/25 | $7,700,000 |
| Bureau of Ocean Energy Management 13087812 | Demonstration Project, Integrating DNA Profiles, Genomics and Photo-Identification Data | Collaborator | Baker | 09/01/20-08/31/22 | $426,932 |

## Wise, Sandra

| Agency/Number | Title | Role | PI | Project Period | Budget Award |
|---|---|---|---|---|---|
| NIEHS/R01 ES016893 | Particulate Cr(VI) Toxicology in Human Lung Cells | Co-I | Wise, J. | 07/01/08 - 10/31/23 | $3,090,764 |
| NIEHS/1RO1ES02778-01A1 | Mechanism for arsenic induced carcinogenesis | Co-I | States | 07/01/17-06/30/22 | $2,488,085 |
| University of Louisville, School of Medicine | Survival Pathways in Metal Induced Carcinogenesis | PI | Wise, S. | 06/15/18-05/14/20 | $25,000 |

## REASEARCH GRANTS SUBMITTED

### Ceresa, Brian

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| NIH/NEI | Zeb1 regulation of corneal neovascularization | Co-I (2.5%) | Y. Liu | 4/1/21 – 3/31/26 | $1,953,959 |
| NSF | Center for Health Organization Transformation | Co-I (1%) | Jennings | 8/1/15 – 7/31/20 | $100,000 |
| NIH/NEI | EGFR Ubiquitylation in Corneal Epithelial Homeostasis | Co-PI (20%) | Ceresa/ Li | 4/1/21 – 3/31/26 | $2,434,619 |

### Chen, Shao-Yu

| Agency/Number | Title | Role | PI | Proje ct | Budget Request |
|---|---|---|---|---|---|
| R01/NIAAA | The role of intestinal microRNA-194 in alcohol-associated liver disease | Co-I | Feng | 4/1/2021 – 3/31/2026 | $1.743,080 |
| P50/NIAAA AA024337 | The role of nutrition in the development/progression of alcohol-induced organ injury. | Project 3 PI | McClain | 5/1/2021- 4/30/2026 | $8,989,168 $1,435,200 (project 3) Impact score: 17 |
| P20/NIGMS GM113226 | UofL Hepatobiology and Toxicology COBRE | Mentor | McClain | 04/01/2021- 03/31/2026 | $11,722,500 Impact score :25 |
| T35/NIEHS ES014559 | Summer Environmental Health Sciences Training Program | Mentor | States | 4/1/2021 – 3/31/2026 | $290,347 |
| T32/NIEHS ES011564 | UofL Environmental Health Sciences Training Program | Mentor | Hein/Wise | 7/1/2021 – 6/30/2026 | $2,575,255 Impact Score: 20 |

### Clark, Geoff

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| NCI R21 | Novel inhibitors of Lung Cancer | PI | | 2020-2022 | 275K Direct |
| KYNETIC | A novel IL-6 inhibitor to prevent COVID-19 induced lung and kidney damage | PI | | 2020-2021 | 50K Direct |
| Kosair Charities | Small molecule inhibitors of PD-1 for Immune Checkpoint Therapy in Pediatric brain cancer | PI | | 2021-2021 | 35K Direct |
| CDMRP | Novel inhibitors of Lung cancer | PI | | 2020-2022 | 300K Direct |

### Freedman, Jonathan

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| NIEHS/R21 ES030780-01 | Impact of Cadmium Exposure on Autism Spectrum Disorder Pathogenesis | PI | Freedman | 7/2019-6/2021 | $275,000 |

## Fuqua, Joshua

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| RFA-OD-20-015 U01 | Integrated Population Testing and Wastewater Analysis for Community Surveillance Project | Co-I | Bhatnagar | 12/1/2020 – 11/30/2025 | $3,996,502 |
| 3R01AI139671-01 | Griffithsin nanoparticle-based lateral flow assay for point of care coronavirus diagnostics | Co-PI | MPI Steinbach-Rankins Fuqua Hamorsky | 07/01/2020 – 06/30/2022 | $1,555,246 |
| R41 STTR Subaward NIAID PA-19-270 | Novel Griffithsin-Based Platform for Point of Care HIV Diagnosis | PI | Fuqua | 12/1/2020 – 11/31/2021 | $114,325 |
| CDC / BAA 75D301-20-R-67897 | Detecting Coronaviruses with GriffithsinConjugated Nanoparticles | Co-Pi | MPI Steinbach-Rankins Fuqua Hamorsky | 7/1/2020 – 6/30/2022 | $1,193,792 |

## Gupta, Ramesh

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| NCI R01 | "Exosomal Formulations of Anthocyanidins for Treatment of Triple-Negative Breast Cancer" | PI | Gupta | 11/01/20 – 10/31/25 | $1,925,000 (Scored but not funded) |
| NCI R01 | "Exosomal-Anthos for Prevention and Treatment of Breast Cancer" | PI | Gupta | 11/01/20 – 10/31/24 | $1,925,000 (Total) |
| NIH SBIR Fast Track | Exosome-mediated siRNA delivery | MPI | Gupta, Spencer | 7/01/20 – 6/30/23 | $2,304,000 (Total) |
| NCI R01 | "Exosomal Anthocyanidins for Lung Cancer" | PI | Gupta | 7/01/21 – 6/30/23 | $2,457,949 |
| NIAAD STTR Phase I | "Antiviral Activity of Nano Formulations of Herb and Spice extracts against CoV-2" | MPI | Gupta, Spencer | 4/01/21 – 3/01/23 | $599,488 |

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|---|---|---|---|---|---|
| NIAAD STTR Phase I | "Exosome-Mediated Delivery of siRNA Therapeutics against SARS-CoV-2" | MPI | Gupta, Spencer | 4/01/21 – 3/01/23 | $572,687 (Scored but not funded) |
| NCI STTR Phase I | "Exosome-Mediated siKRAS Delivery for Treatment of Lung Cancer" | MPI | Gupta, Spencer | 4/01/21 – 3/01/22 | $310,669 (Scored but not funded) |

## Hein, David

| Agency/ Number | Title | Role | PI | Project Period (requested) | Budget Request |
|---|---|---|---|---|---|
| NIEHS T32-ES011564 | UofL Environmental Health Sciences Training Program | PI | Hein & J. Wise | 07/01/2021-06/30/2026 | $2,575,255 |
| NIEHS T35-ES014559 | Summer Environmental Health Sciences Training Program | Mentor | States | 04/01/2021 – 03/31/2026 | $290,347 |
| Australian Research Council DP210102958 | Understanding mitochondrial regulation-how do the arylamine N-acetyltransferases coordinate mitochondrial function and dynamics | Co-I | Minchin (University of Queensland) | 01/01/2021-12/31/2021 | |
| NIEHS R21ES032581-01 | Effect of Heterocyclic Amines and NAT2 Metabolism on Insulin Sensitivity | PI | Hein & Hong | 09/01/2020-08/31/2022 | $429.104 |
| UofL Center for Integrative Environmental Health Sciences | Gene-environmental interactions of novel psychoactive chemicals substituting for illegal drugs of abuse | PI | Hein | 09/01/2020-08/31/2021 | $40,000 |
| UofL Center for Integrative Environmental Health Sciences | Role of Arylamine *N*-Acetyltransferases in Mitochondria | Collaborator | Hong | 09/01/2020-08/31/2021 | $50,000 |
| UofL School of Medicine | Effect of Heterocyclic Amines and NAT2 Metabolism on Insulin Sensitivity | Faculty Mentor | Hong | 10/01/2020 – 09/30/2021 | $21,028 |
| Kentucky Network for Innovation & Commercialization (KYNETIC) program | Point of care test to determine acetylator phenotype | PI | Salazar-Gonzalez & Hein | 01/01/2021-06/30/2021 | $50,000 |
| NIEHS R03-ES033355 | Gene-environmental interactions of novel psychoactive chemicals | PI | Hein & Salazar-Gonzalez | 07/01/2021-06/30/2023 | $156,250 |
| NIEHS R21ES032581-01A1 | Effect of Heterocyclic Amines and NAT2 Metabolism on Insulin Sensitivity | PI | Hein & Hong | 07/01/2021-06/30/2023 | $429.625 |

## Hong, Kyung

| Agency/Number | Title | Role | PI | Project | Budget Request |
|---|---|---|---|---|---|
| NIEHS R21 ES032581-01 | Effect of Heterocyclic Amines and NAT2 Metabolism on Insulin Sensitivity | MPI | Hein Hong | 10/01/20 – 09/30/22 | $429,104 Unfunded |
| NIEHS R21 ES032581-02 (* Resubmission) | Effect of Heterocyclic Amines and NAT2 Metabolism on Insulin Sensitivity | MPI | Hein Hong | 03/01/21 – 02/28/23 | $424,794 Pending |
| University of Louisville, CIEHS pilot project | Role of Arylamine *N*-Acetyltransferases in Mitochondria | PI | Hong | 9/1/2020 – 8/31/2021 | $50,000 Unfunded |
| University of Louisville, EVPRI, Research II Grant | Effect of Heterocyclic Amines and NAT2 Metabolism on Insulin Sensitivity | PI | Hong | 06/01/2020 – 05/31/2021 | $10,000 Funded |
| University of Louisville, School of Medicine, Basic Research Grant | Effect of Heterocyclic Amines and NAT2 Metabolism on Insulin Sensitivity | PI | Hong | 10/01/2020 – 09/30/2021 | $25,000 Funded |

## Hood, Joshua

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| Melanoma Research Alliance | Development of Exosome-Based Melanoma Immunotherapy | PI | Hood | 6/1/21-5/31/24 | $348,001 |
| MSM-RCMI pilot grant | Role of miR-1976 in malaria pathogenesis | Co-I | Driss, (Morehouse School of Medicine, Atlanta, GA) | 7/1/21-6/30/22 | $50,000 |
| NIH NIAID | Assessing the therapeutic potential of melittinized nanoparticles against invasive candida species | PI | Hood (lead), Kouokam (MPI) | 9/1/20-8/31/22 | $429,125 |
| UofL Basic Grant Program, SOM | Evaluating the potential of therapeutic nanoparticles developed to destroy lipid enveloped viruses to also inhibit the growth of invasive candida | PI | Hood (lead), Kouokam (MPI) | 1/1/20 – 3/31/21 | $25,000 |
| Cancer Research Institute | Activating anti-tumor macrophages with immunotherapeutic exosomes to treat melanoma | PI | Hood | 7/1/21-6/30/23 | $200,000 |

## Kouokam, Calvin

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| R21AI156335 | Assessing the therapeutic potential of melittinized nanoparticles against invasive candida species | Co-I | Hood/ Kouokam | 9/1/2021-8/31/2022 | $275,00 |
| UofL School of Medicine/Basic Grant Program | Evaluating the potential of therapeutic nanoparticles developed to destroy lipid enveloped viruses to also inhibit the growth of invasive Candida species | Co-I | Hood/ Kouokam | 10/1/2020-9/30/2021 | $25,00 |

## Lukashevich, Igor

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| NIH/NIAD 1 R01 AI156139-01 | Safety and Attenuation of Novel VEEV Vaccine with Rearranged Genome | PI on sub | | 12/01/20-11/30/25 | $1,876,100 |

## Matoba, Nobuyuki

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| Kynetic grant | Anti-cancer Activity of a Lectibody Targeting Ovarian Cancer-associated Oligomannose Glycans | Co-PI | Dent/ Matoba | | $50,000 direct costs |
| W81XWH-19-OCRP-PA Ovarian Cancer Research Program 2020GRANT12902681 | High-Mannose Glycans as a Potential Target for Ovarian Cancer Immunotherapy | PI | Matoba | 9/1/21–8/31/23 | $250,000 direct costs |
| NIH/NCI 3P30 CA047904 32S5 | Cancer Center Support Grant Supplement: Clinical evaluation of a QGRFT nasal spray for prevention of SARS-CoV-2 | Subcontract Co-I | Ferris | 09/21/20 – 7/31/21 | $1,042,029- *Funded* |
| DoD/Medical CBRN Defense Consortium MCDC2006-010 | PREVENT-CoV: A Q-Griffithsin Inranasal Spray | Co-I | Palmer | 12/03/20–11/30/21 | $8,547,848 (total costs) - *Funded* |
| NIH/NIEHS (T32-ES011564) | UofL Environmental Health Sciences Training Program | Faculty Mentor | Hein/ Wise | 7/1/21 – 6/30/26 | $2,575,255 (total) |
| NIH/NIDDK T35 | Summer Endocrine Research Training Program | Faculty Mentor | Klinge | 4/1/21 – 3/31/26 | $290.347 (total) |

## Palmer, Kenneth

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| NIH/NIAID 3U19 AI118182-05 NOSI Supplement | PREVENT-CoV: a Nasal Spray to prevent coronavirus infection | PI | Palmer | 07/01/20 – 06/30/21 | $2,939,757 *Not funded.* |
| NIH/NCI 1 U54 CA260524-01 | Partnership in Immunology, Virology, Oncology and Translation (PIVOT) | Contact MPI | Palmer, Bates, Chesney, Yan | 10/01/20 – 09/30/2025 | $11,232,748 *Not Funded.* |

## Siskind, Leah

| Agency/Number | Title | PI | Project Period | Budget Request |
|---|---|---|---|---|
| NIH 1R01CA264876-01 | Controlling Cancer Metastasis via Stimulation of Trained Innate Immunity By Natural Compound Beta-Glucan | Yan<br>Role: Co-I (5%) | 7/1/2021-6/30/26 | |
| DoD Idea Award | Cancer-associated mesenchymal cells drive metastasis of lung cancer | Beverly<br>Role: Co-I (7.5%) | 7/1/2021-6/30/2023 | $350,000 total direct costs |
| 2 R01 CA193220-06 | Ubiquilin proteins regulate metastasis of human lung adenocarcinoma | Beverly<br>Role: Co-I | 3/1/2021-2/28/2026 | $1,250,000 total direct costs |
| NIH R01GM140095 | Understanding the physiological and pathophysiological functions of Ubiquilin proteins | Beverly<br>Role: Co-I (10%) | 6/1/2021-5/31/2026 | $1,762,752 total direct costs |
| NIH R01CA255869 | Targeting methionine metabolism and SAM biosynthesis in MLL rearranged leukemia | Beverly<br>Co-I (10%) | 6/1/2021-5/31/2026 | $1,250,000 total direct costs |
| NIH R01CA264202 | Bi-directional cross-talk between cancer cells and the cancer microbiome fuels lung tumor progression | Beverly<br>Co-I (10%) | 9/1/2021 – 8/31/2026 | Total direct costs $1,936,797 |

## Song, Joe

| Agency/Number | Title | Role | PI | Project | Budget Request |
|---|---|---|---|---|---|
| Kentucky Network for Innovation and Commercialization (KYNETIC) | Repurposing cannabiol for autism spectrum disorders with an extended release formulation | PI | ZH Song | 7/1/20 – 6/30/22 | $200,000 |

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|---|---|---|---|---|---|
| NIH R03TR003661-01 (Priority Score 40, pending) | The potential roles of GPR3 in regulating Intraocular pressure | PI | ZH Song | 2/1/21 – 1/31/22 | $153,631 |
| DoD AR200118 | The potential therapeutic effects of cannabidoil and cannabidivarin for autism spectrum disorders | PI | ZH Song<br>GN Barnes (Partnering PI) | 10/1/21 – 9/30/24 | $500,000 direct |

## States, Christopher

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| NIEHS, R35ES032861-01 | Mechanisms of Arsenic Induced Carcinogenesis | PI | States | 03/01/21 - 02/28/29 | $7,508,000 |
| NIEHS, T35ES014559-16 | Summer Environmental Health Sciences Training Program | PI | States | 04/01/21 - 03/31/26 | $290,347 |
| NIEHS, R01ES033195-01 | Novel Mechanisms of Electrophile-Mediated Inflammation in the liver | Co-I | Watson | 7/1/21- 6/30/26 | Total: $2,369,460.00 |
| NIEHS, R01ES032609-01 | Mechanism of Cadmium-induced carcinogenesis | Co-I | Damodaran | 9/1/21 - 8/31/26 | Total: $2,653,444 |

## Wise, John

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| NIEHS/ R01 ES033014 | Hexavalent Chromium Impacts that Drive Permanent and Heritable Numerical Chromosome Instability | PI | Wise | 04/01/21- 03/31/26 | $3,580,446 |
| NIEHS/R35 ES032876 | Chromosome Instability in Metal-Induced Lung Cancer | PI | Wise | 04/01/21- 03/31/29 | $9,391,608 |
| NIEHS/T32 ES011564 | UofL Environmental Health Sciences Training Program | PI (Multi) | Hein & Wise,J. | 07/01/21- 06/30/26 | $2,575,255 |
| NSF 19-501 | Collaborative Research: AccelNet: One Health and Global Conservation- | Collaborator | Ottinger | 10/01/20- 09/30/23 | $1,225,936 |

| | | | | | |
|---|---|---|---|---|---|
| | Networks of Convergent Research and Education | | | | |
| European Union/SEP-210641438 | Multi-component novel nanomaterials and multi-scale approaches for an advanced safe-by-design regulatory framework | Partner Laboratory | Kohl | 04/01/20-03/31/25 | $8,745,000 euro |

## Wise, Sandra

| Agency/Number | Title | Role | PI | Project Period | Budget Request |
|---|---|---|---|---|---|
| NIEHS/R01 ES033014 | Hexavalent Chromium Impacts that Drive Permanent and Heritable Numerical Chromosome Instability | Co-I | Wise | 04/01/21 - 03/31/26 | $3,580,446 |
| NIEHS/ R35 ES032876 | Chromosome Instability in Metal-Induced Lung Cancer | Co-PI | Wise | 04/01/21-03/31/29 | $9,391,608 |

# INVITED SCIENTIFIC PRESENTATIONS

**Faculty with Primary Appointments**

**Chen, Shao-yu**

1. Enhancer-mediated transcriptional dysregulation in neural crest cells and ethanol-induced teratogenesis. University of Louisville Alcohol Research Center, Louisville, KY. Feb. 3 2020.

**Freedman, Jonathan**

1. Presentation to the leadership group of the Institute for Environmental Health Solutions at UNC-CH

**Fuqua, Joshua**

1. Wastewater Virology for SARS-CoV-2 at Research!Louisville. Sept. 15th , 2020
2. Regional Biocontainment Laboratory: AS1411 & Q-GRFT. State Health Commissioner Steven Stack, MD Visit. Nov. 18th, 2020.

**Hein, David**

1. Two plenary presentations scheduled for international meetings were postponed due to the COVID-19 pandemic.

**Hood, Joshua**

1. Hood (corresponding author), J. L. Induction of Macrophage Polarity by Liver Tumor-Derived Exosomes (small extracellular vesicles). Annual American Society for Exosomes and Microvesicles (ASEMV) Conference, 2020.

**Kouokam, Calvin**

1. **Kouokam JC.** Invited Speaker for the GRFT-PREVENT Annual meeting. November 6, 2018: **"Safety studies of Q-GRFT in cultured cell lines and mice with DSS- induced colitis"**.

**Lukashevich, Igor**

1. Dylan M Johnson, Kevin J Sokoloski, Peter Pushko, **Igor S Lukashevich** Novel Venezuelan Equine Encephalitis Vaccine V4020 has Increased Safety and Stability over TC-83. *2020 ASM Biothreats* meeting, January 28–30, 2020, the Hyatt Regency Crystal City, Arlington, VA
2. Irina Tretyakova, Dylan M Johnson, Alexander Tibbens, **Igor S Lukashevich**, Peter Pushko Development of manufacturing process for reassortant Lassa virus vaccine ML29. *2020 ASM Biothreats* meeting, January 28–30, 2020, the Hyatt Regency Crystal City, Arlington, VA

**Matoba, Nobuyuki**

1. Invited seminar, "Plant-made EPICERTIN as a novel biotherapeutic for inflammatory bowel disease" Current Progress in Biotechnology (DEB/ECH294) Friday

Seminar Series, University of California Davis Biotechnology Program, Daviess, CA, November 6, 2020.

**Siskind, Leah**

1. Invited Speaker, Gordon Conference on Glycolipids and Sphingolipids, March 2020, Italy

**States, J. Christopher**

1 "MicroRNA Dysregulation and Chromosome Instability in Arsenic Carcinogenesis", Department of Molecular Biology and Genetics, Democritus University of Thrace, Greece, 3/20/20

2 "M.S./Ph.D. Program in Pharmacology & Toxicology at the University of Louisville", Department of Molecular Biology and Genetics, Democritus University of Thrace, Greece, 3/20/20

**Wise, John**

1 Invited Speaker: "Chromium-Induced Chromosome Instability from a One Environmental Health Perspective". Presented at the University of New Mexico, Albuquerque, New Mexico.

2 Speaker: "Chromium-Induced Chromosome Instability from a One Environmental Health Perspective". Presented at the University of Louisville, Louisville, Kentucky.

3 Several presentations cancelled due to travel restrictions around COVID-19

# INVENTIONS, DISCLOSURES, LICENSE/OPTION AGREEMENTS, PATENT AWARDS, AND BUSINESS STARTUPS

**Faculty with Primary Appointments**

**Clark, Geoff**

- INHIBITORS OF THE RAS ONCOPROTEIN, METHODS OF MAKING AND METHODS OF USE THEREOF. Filed Nov. 20, 2020

**Fuqua, Joshua**

- "GRIFFITHSIN-BASED MICROBIAL DETECTION." Fuqua JL, Steinbach-Rankins J, Palmer KE, Hamorsky KT. Filed March 25, 2020, Provisional application 62/994,724.
- • "ANTI-VIRAL COMPOSITIONS AND METHODS OF MAKING AND USING." Fuqua JL, Hamorsky KT. Filed September 10, 2020, as application PCT/US2020/050200.
- • "COMPOSITIONS AND METHODS FOR PREVENTION OF CORONAVIRUS INFECTION." Fuqua JL, Palmer KE. Provisional Filed May 20, 2020, ULRF20072-01.
- • Founded GROW Biomedicine, LLC in 2019 – UofL focused Biotech start-up o Received an STTR in 2020 1R41AI152919-01 Phase 1 STTR Awarded 4/01/20 – 3/31/2021 NIH / NIAID $299,874 GROW Biomedicine Q-GRFT Enema Development Supporting a Multi-Administration Clinical Study Role: PI

**Gupta, Ramesh**

- Patents filed in 2020 - Non-Provisional Utility Patent Application PCT application filed on January 27, 2020 titled "Exosome-Mediated Transfection for Delivery of Nucleic Acids". Inventors: **Gupta R**, Munagala R, Jeyabalan J, Wallen M, Spencer W and Aqil F.
- Licensing/Sublicensing - Milk exosome technology developed in Dr. Gupta's lab at UofL was licensed to 3P Biotechnology, Inc. for all applications in 2017. 3P Biotechnologies licensed this technology for human pharmaceuticals to PureTech Health, a clinical-stage Biotech company in Boston in August 2017, followed by sublicensing for delivery of anti-sense oligos to Hoffman La Roche, the 2nd largest Pharmaceutical company in July 2018.
- Business startups - Dr. Gupta founded a biotechnology company (3P Biotechnologies, Inc.) which became operational in 2013. 3P acquired exclusive license of the UofL milk exosome drug delivery technology in February 2017. 3P has licensed this technology for applications to human pharmaceuticals to PureTech Health and Hoffman Las Roche. 3P continues to explore possibilities of licensing to other applications (human nutraceuticals, veterinary pharmaceuticals etc.).

**Matoba, Nobuyuki**

- ULRF Research Disclosures:
    1. Anti-ovarian cancer activity of Avaren-Fc (ULRF #20034)
    2. Spray dried formulation of a cholera toxin B subunit variant ($CTB^{SEKDEL}$) (ULRF #21021)
- Patent awarded: Patent Number: US 10,758,605 B2 (awarded on Sep 1, 2020) Title: Compositions and methods for treating cancer and promoting wound healing
- Business startup: Chief Scientific Officer (2019 – present), GROW Biomedicine LLC (Louisville, KY)

**Palmer, Kenneth**

- Issued US Patent: O'Keefe; Barry R., Moulaei; Tinoush, *Palmer; Kenneth* E. , Rohan; Lisa C., Fuqua; Joshua L. , Kramzer; Lindsay F. US Patent 10,501,507. "Griffithsin mutants"
- Established TWO CLIA Diagnostic Laboratories, and oversaw operations of the CPM Emerging Infectious Diseases Laboratory (CLIA), which conducted over 10,000 COVID-19 tests during the pandemic.
- Co-Founded GROW Biomedicine LLC, a Kentucky-based biotech startup company.

**States, J. Christopher**

- States JC, Wu J. "Immortalized human keratinocytes (HaCaT) stably expressing hsa-miR-186", Applied Biological Materials, Inc., non-exclusive license, 8/6/2020
- States JC, Taylor BF, Trent JO. Compounds for treating cancer, for administering, and for pharmaceutical compositions. US Patent # 10,849,863; 12/1/20

## DEPARTMENTAL COURSES

Pharmacology instruction in the medical school curriculum was provided in an integrated Disease and Therapeutics course. Dr. Brian Ceresa served as thread director.

Pharmacology and Dental Therapeutics course (BMSC 807-05; 4 credits) to dental (D3) students. Dr. David Hein served as course director and Joshua Hood and Calvin Kouokam served as course co-directors.

Pharmacology course (DHED 402- 4 credits) to students in the Dental Hygiene Program. Dr. Kyung Hong served as course director.

The Department team taught several courses for graduate students. The individual courses and course directors are listed below:

- PhTx 641; Pharmacology I -3 credits (Dr. Leah Siskind)
- PhTx 642; Pharmacology II – 3 credits (Dr. Joe Song)
- PhTx 606; Seminar -1 credit (Dr. Kyung Hong)
- PhTx 625; Scientific Writing – 2 credits (Dr. Ken Palmer)
- PhTx 618; Topics-Statistics – 2 credits (Dr. La Creis Kidd)
- PhTx 619; Research (Dr. Leah Siskind)
- PhTx 643, Toxicology I – 3 credits (Dr. John Wise)
- PhTx 644, Toxicology II – 3 credits (Dr. Geoff Clark)
- PhTx 661, Molecular Toxicology- 3 credits (Dr. Chris States)
- PhTx 631, Introduction to Human Risk Assessment – 1 credit (Dr. John Lipscomb)

# STANDING COMMITTEES

**Department of Pharmacology and Toxicology**

**Graduate Affairs and Committee**
Dr. Leah Siskind (Chair)
Dr. Geoff Clark (ex officio)
Dr. Kyung Hong (ex officio)
Dr. Brian Ceresa
Dr. Zhao-hui (Joe) Song
Dr. Nobuyuki Matoba
Student rep: Austin Krueger
Student rep: Jenny Toyoda

**Graduate Recruitment and Admissions Committee**

Dr. Geoff Clark (Chair)
Dr. Leah Siskind (Ex officio)
Dr. Brian Ceresa
Dr. Shao-yu Chen
Dr. John Wise Sr.
Dr. Nobuyuki Matoba
Dr. La Creis Kidd

**SIBUP/Grievance Committee**

Dr, Nobuyuki Matoba (Chair)
Dr. Ramesh Gupta
Dr. Zhao-hui (Joe) Song
Dr. Michael Merchant

**Teaching Evaluation Committee**

Dr. John Wise Sr. (Chair)
Dr. Joshua Hood
Dr. Joshua Fuqua
Dr. Kyung Hong

**Climate, Diversity & Inclusion Committee**

Dr. La Creis Kidd (Chair)
Dr. Calvin Kouokam
Dr. John Wise Sr.