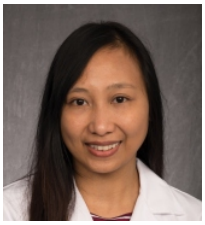
Stritch School of Medicine (SSOM) Press Book



Fritzie S. Albarillo, MD
Assistant Professor of Medicine
Division of Infectious Diseases
Director, Antimicrobial Stewardship Program
Loyola University Medical Center

Summary of Research Activities: Our Antimicrobial Stewardship Program (ASP) is aimed at optimizing patient clinical outcomes while reducing unintended consequences of antimicrobial use including drug toxicities and development of antimicrobial resistance. Our program focuses on clinical research looking into interventions in improving antimicrobial stewardship practices such as developing facility treatment guidelines with the evaluation of provider compliance and impact on patient outcomes, use of clinical decision support system (CDSS), utilization of rapid diagnostic tools and their impact on patient outcomes, medical use evaluation of specific antimicrobials, and implementation of pharmacy-led antibiotic review or time-out. Our program also evaluates and monitors patient outcomes during treatment of infectious diseases in terms of mortality, length of stay, cost, complications of therapy including C. difficile infections, and development of antimicrobial resistance. Lastly, with our partnership with the Infectious Disease and Immunology Research Institute (InDIRI) at Loyola University Chicago's Health Sciences Division, our program is interested in microbiome research. A current project in this area includes surveying the bladder microbiome in patients with Foley catheterization, and the impact of renal transplantation on the recipient's urinary tract's microbiome and correlation with transplant outcomes.

Training Opportunities: Students, fellows or residents who join Dr. Albarillo's research projects can expect to learn about the fundamentals of ASPs and be involved in clinical research on outcomes of patients with infectious diseases and the impact of antimicrobial stewardship. Moreover, they will receive training in the use of CDSS in tracking/monitoring antimicrobial utilization, creating antibiograms, and development of real-time alerts as tools for our ASP to optimize antimicrobial usage. They can also be involved in translational Infectious Diseases research projects in concert with faculty in InDIRI.

Keywords: AIDS; Clostridium Difficile Infection; General Infectious Disease; Prosthetic joint infections; Osteomyelitis

Bital Savir-Baruch, MD
Assistant Professor of Radiology
Department of Radiology, Division of Nuclear Medicine
Loyola University Medical Center

Technical Summary of Research Activities: Our research team is studying the use of Fluciclovine, a PET/CT radiotracer, in the evaluation of prostate and gynecological cancers. Conventional image modalities often fail to predict the extent of disease. Thus, we are interested in evaluating if PET fused to CT will increase diagnostic performance and improve patient outcome. The use of naturally occurring labeled amino acids such as C11- methionine is not optimal for imaging because of increased metabolites in nontarget organs which results in lower target to background ratios.

Fluciclovine is a *synthetic* L-leucine analog PET radiotracer that has been approved for prostate imaging. Fluciclovine will be transported into the cell via Large neutral Amino acid Transporters (systems L: LAT1, LAT3, and LAT4) and Alanine-Serine-Cysteine Transporters (systems ASC: ASCT1, ASCT2).

The projects include two main topics:

- Prospective analysis of fluciclovine uptake in ovarian, endometrial, and cervical cancers.
- Analysis of the clinical use of fluciclovine PET/CT in prostate cancer imaging, using an extensive database.

Non-Technical Summary: Our research team is interested in studying the use of fluciclovine, a PET/CT radiotracer FDA approved for prostate cancer, in the evaluation of gynecological and prostate cancers. PET/CT radiotracers allow you to “follow” some functional mechanism of the cancer cells when imaging the body.

Training Opportunities in Dr. Savir’s Lab: Students, fellows, and/or residents who join Dr. Savir’s lab, can expect to receive training in data collection, data analysis, protocol designing and IRB submission, introduction to PET/CT imaging, and some fundamental knowledge in the field of Radiology and Nuclear Medicine.

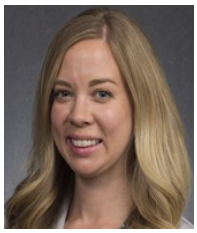
Jordan R. Beach, PhD
Assistant Professor
Cell and Molecular Physiology, Stritch School of Medicine
Loyola University Chicago
Beach Lab Website

Technical Summary of Research Activities: Our lab focuses on understanding how cells create mechanical forces, especially contractile events. These events are particularly important for cells to adhere to the substrate, to one another, and to interpret their mechanical environment. Cell mechanics play critical roles throughout development, tissue homeostasis, and pathological states. With the actin cytoskeleton, the molecular motor myosin 2 is the primary driver of cell-derived contractility. Importantly, cell contractility is dynamically regulated. To control where and when contraction occurs, cells control where and when they assemble myosin 2 filaments. Our lab uses a variety of cell biology techniques, emphasizing advanced quantitative light microscopy, to delineate mechanisms cells use to drive the spatio-temporal assembly and disassembly of myosin 2 filaments. By manipulating the cellular environment, potential regulators, or the actin and myosin directly, we seek to understand how normal and disease cells regulate (and mis-regulate) this process.

Non-Technical Summary: Our lab focuses on understanding how cells create mechanical forces. For example, immune cells and metastatic cancer cells use these forces to crawl around our bodies. Sheets of skin and gut cells use these mechanical forces to create barriers; muscle cells use these same forces to drive contraction. Actin and myosin are the two proteins that largely create these mechanical forces. To understand how cells control these two proteins, we primarily use advanced microscopy techniques to watch cells assemble and disassemble the complex actin-myosin structures. By manipulating the cellular environment, potential regulators, or the actin and myosin directly, we seek to understand how normal and disease cells regulate (and mis-regulate) this process.

Training Opportunities in the Beach Lab: Students, fellows or residents who join Dr. Beach's lab can expect to receive training in cell biology, with an emphasis on cell mechanics and contractility, and advanced microscopy techniques. If you are interested in how cells assemble, maintain, and disassemble complex structures that drive contraction, then come play with us.

Keywords: actin, myosin, cell mechanics, migration, invasion, cancer metastasis, neuronal migration, muscle, smooth muscle, microscopy, biophysics



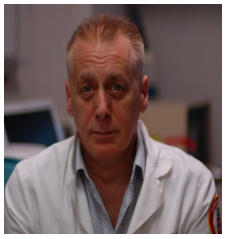
Stacey Bennis, MD, CAQ-SM
Assistant Professor
Department of Orthopaedic Surgery & Rehabilitation (Sports Medicine)
Department of Obstetrics & Gynecology (Female Pelvic Medicine)
Loyola University Chicago – Stritch School of Medicine

Technical Summary of Research Activities: Our Female Pelvic Medicine research group recently submitted an NIH grant to assess social and environmental factors impact toileting behaviors, voiding behaviors, and fluid intake behaviors in high school and collegiate female athletes compared to their nonathlete peers. By using validated self- reported outcomes and objective measures, we are interested in determining specific individual, interpersonal, and institutional risk factors that lead to impaired bladder health in this group of young female athletes who are at high risk for stress urinary incontinence at an early age. Our goal is to improve public health awareness and education about impaired bladder health, which negatively impacts quality of life in upwards of three-quarters of adult women in the United States. Improving prevention and education may help drive a reduction in health care costs for bladder health, which are projected to reach $100 billion annually by 2020. We are also interested in understanding how pelvic floor dysfunction impacts participation and injury rates in female athletes.

Non-Technical Summary: Our research seeks to understand social and environmental risk factors that negatively impact bladder health in young female athletes. We will look at individual, interpersonal, and institutional risk factors. We will compare athletes and non-athletes to see if there are differences in risk factors for bladder health. Altered bladder health impacts up to three-quarters of adult women in the United States. We expect that the knowledge gained will improve bladder health education for young women. In addition, our research may help reduce health care costs and improve quality of life for women throughout their lives.

Training Opportunities: Students, residents, or fellows who join Dr. Bennis and the Female Pelvic Medicine Group can expect to receive training in clinical research focused on improving knowledge about pelvic floor dysfunction in female athletes.

Keywords: Sports medicine, women's health, pelvic pain, female athlete, and pregnancy/postpartum musculoskeletal pain



Maurizio Bocchetta, PhD
Associate Professor
Department of Pathology
Loyola University Chicago

Technical Summary of Research Activities: My laboratory is interested in identifying Notch-independent targets of □-secretase inhibitors (GSIs). GSIs have a very high toxicity towards adenocarcinoma of the lung (ACL) cells, which is poorly recapitulated by Notch genetic inhibition. A combination of hypothesis- and discovery-driven approaches has lead to the identification of the deubiquitinase OTUD6B as an important regulator of growth and proliferation of ACL cells. Preliminary data suggest that OTUD6B may act through the regulation of MYC expression/activity. OTUD6B is a highly conserved gene in Vertebrates. Yet, very little has been published concerning this protein. My main goal: clarify the network of post- translational modifications regulated by OTUD6B splicing isoforms on oncogenic proteins and on the translational initiation complex. This will lead to a better understanding of growth and proliferation of ACL cells, which may lead to innovative therapeutic strategies for the major cause of cancer-related deaths in the United States and throughout the world.

Non-Technical Summary: Adenocarcinoma is the most common type of lung cancer. It is also the form of lung cancer that is most frequently diagnosed in individuals who never smoked, especially women. Because of the asymptomatic nature of early stage lung cancer and the lack of widespread early diagnosis tools, lung cancer is predominantly diagnosed in advanced stages. For this reason, traditional chemotherapy is the primary response to this malignancy. Indeed, specific antitumor-regimens for lung cancer are still insufficient. We study how the deubiquitinase OTUD6B, which is an enzyme that removes critical modifications to other proteins, affects the biology of well- known oncogenic proteins. The long-term objective is, by elucidating these mechanisms, to uncover novel and specific targets for the treatment of deadly adenocarcinoma of the lung.

Training Opportunities in the Bocchetta Laboratory: Students and fellows who join Dr. Bocchetta's laboratory receive training in topics concerning cellular biology, molecular biology and experimental oncology. Students and fellows will follow molecular mechanisms using a wide range of techniques to achieve independence through utilizing multiple creative solutions.

Keywords: Cancer/Carcinogenesis; Gene Regulation; Gene Therapy; Hypoxia

Stanley J Borowicz MS, MD
Assistant Professor
Department of Medicine, Division of Hematology/Oncology
Loyola University Chicago

Technical Summary of Research Activities: My research interests involve understanding how hepatocyte growth factor activator inhibitor type 1 (HAI-1) functions as a tumor suppressor in non-small cell lung cancer. Using in vitro assays and assessing HAI-1 function in human tumor samples, we seek to understand the diverse effects of HAI-1 on tumor cells as well as on the tumor microenvironment. We have shown that HAI-1 expression is lost in approximately one-half of lung adenocarcinoma tumor samples. In vitro, we have shown that restoration of HAI-1 expression results in decreased cancer cell growth and motility. HAI-1 is known to inhibit hepatocyte growth factor activator (HGFA), which is a transmembrane protease responsible for cleavage and activation of hepatocyte growth factor (HGF) and macrophage stimulating protein-1 (MSP-1). These factors are key to activation of cell growth and motility pathways and are key factors in tissue injury repair through binding their respective receptors, MET and RON. We have shown that loss of HAI-1 can affect macrophage phenotype in co-culture experiments, skewing macrophage characteristics towards an M2, pro-tumorigenic phenotype. Our work suggests that loss of HAI-1 can promote a pro-tumorigenic immune microenvironment. Given the recent successes of immunotherapy in the treatment of non-small cell lung cancers, this immunosuppressive function of HAI-1 suggests an attractive therapeutic target for direct and indirect tumor suppression. We have begun experiments into therapeutic drugging of the proteins downstream of HAI-1 in vitro.

Non-Technical Summary: Our laboratory is interested in understanding the parallels between tissue injury repair and cancer growth. We have found that the main system responsible for stopping cell growth and movement at the completion of tissue repair is dysfunctional in lung cancer cells. The key protein that acts as the brakes on tissue repair is called HAI-1. This protein is lost in about half of lung cancer cells and, when it is replaced, can result in stopping uncontrolled tumor cell growth. We have also shown that, when this protein is lost in tumor cells, immune cells that normally would assist in attacking tumor cells, instead, fail to do so and, rather, assist tumor cells in their uncontrolled growth and spread. Therefore, we seek to understand all of the resulting changes in downstream effectors of this protein to identify novel druggable targets for the treatment of lung cancer. We hope that these targets, when blocked with targeted chemical agents, can result not only in slowed tumor growth but also assist in tumor destruction by the immune system.

Training Opportunities in the Borowicz Lab: Dr. Borowicz does not have an active lab at Loyola and currently works with his mentor, Dr. Ajay Rana, at the University of Illinois at Chicago West Side Campus. Students, fellows or residents who join Dr. Borowicz's lab can do so through Dr. Rana at UIC. There, they can expect to receive training in primary scientific methods such as cell and molecular biology and develop their knowledge in cancer cell signal transduction.

Nicholas M. Brown, MD
Assistant Professor of Orthopaedic Surgery
Department of Orthopaedic Surgery
Loyola University Medical Center
LUC Affiliation

Summary of Research Activities: My research is focused on outcomes, complications, and techniques related to hip and knee replacement. I am primarily focused on clinical research but have had some involvement with biomechanical and basic science studies

Non-Technical Summary: Same

Training Opportunities: Students, fellows or residents who work with me can expect to complete a clinical project which will be submitted to a national meeting for presentation and eventually published in a journal.

Susanna C. Byram, MD, PhD
Assistant Professor Department of Anesthesiology
Stritch School of Medicine
Loyola University Medical Center

Summary of Research Activities: The central goal of our research is to elucidate the basic mechanisms underlying neural injury and repair following nerve damage and/or disease, and translate our understanding to the clinical setting. We collaborate on our studies with Dr. Eileen Foecking, PhD., LUHS/LUC, Department of Otolaryngology. Our research is focused in two areas. First, we are investigating the potential neurotoxicity of local anesthetics to injured and/or diseased peripheral nerves. We use several peripheral nerve injury models, including crush and axotomy as well as a model of diabetic peripheral neuropathy, to measure behavioral and molecular endpoints. Second, we are investigating gonadal steroid hormones as neurotherapeutic agents following traumatic brain injury. Specifically, we use a closed- ead repeat mild traumatic brain injury model to study chronic behavioral sequela and secondary neuroinflammatory injury.

Non-Technical Summary:Our laboratory is interested in understanding mechanisms underlying injury and repair of the peripheral and central nervous systems. By comparing the neurotoxic effects of different local anesthetics on diseased or injured nerves, we hope to affect how we care for patients with peripheral neuropathies, neurodegenerative diseases, and traumatic nerve injuries. Additionally, we are interested in the therapeutic potential of gonadal steroids following traumatic brain injury.

Training Opportunities in the Byram/Foecking Lab:Students, fellows or residents who join our laboratory can expect to discover a deeper understanding of neuroscience and receive training in surgical methods, behavioral analysis, and various cellular and molecular techniques.

Edward Campbell, PhD
Professor
Department of Microbiology and Immunology
Loyola University Chicago

Technical Summary of Research Activities: My lab uses quantitative imaging modalities, including fluorescent microscopy and live animal imaging to define the molecular and cellular mechanism of disease pathogenesis. This includes understanding 1) poorly understood aspects of HIV-1 infection, including cytoskeletal trafficking and nuclear import of the viral genome 2) the mechanism by which amyloid proteins, such as alpha-synuclein and tau, propagate between cells in neurodegenerative diseases 3) the role of inflammation in disease pathogenesis, which we examine using a novel transgenic mouse expressing a luciferase based biosensor of caspase-1 activity 4) understanding the basis of learning and memory driven by an endogenous retroviral protein, Arc, which is present in our genome and mediates a poorly understood form of intracellular communication between neurons. While these diverse areas of research are, at first glance, unrelated, they are all rooted in molecular and cellular biology techniques and ideally suited for interrogation using imaging based applications, which we seek to develop and deploy to understand key aspects of human disease.

Non-Technical Summary: Our lab is broadly interested in using imaging- based approaches to understand the molecular and cellular mechanisms of disease. We use state-of-the-art microscopy and complementary molecular and cell biology methods to understand poorly understood aspects of HIV-1 infection of target cells, the cell-to-cell propagation of amyloid proteins in neurodegenerative diseases such as Parkinson's and Alzheimer's disease. We explore the role of inflammation in various diseases, including bacterial infection, inflammatory bowel disease, auto-immune diseases and neurodegenerative diseases using a novel mouse model we developed that allows us to monitor the development and resolution of inflammation.

Training Opportunities in the Campbell Lab: Students, fellows and residents who join Dr. Campbell's lab can expect to develop an understanding of cell biology that allows them to understand a small part of one disease and broadly understand aspects of cell biology which contribute to the development of a large number of human diseases.

Keywords: HIV-1, Inflammation, Neurodegenerative disease, Parkinson's disease, colitis, extracellular vesicles, exosomes, neuroscience

Lee M Cera, DVM, PhD
Assistant Dean Comparative Medicine
Director, Comparative Medicine Facility
Assistant Professor, Department of Pharmacology
Loyola University Chicago

Technical Summary of Research Activities: The Comparative Medicine Facility is responsible for the care and well-being of all research animals. My research focuses on zoonotic diseases, those diseases shared by humans and animals. Along with individuals in the zoo community and public health, we identify emerging infectious zoonotic diseases. Working with Dr. Thomas Meehan at Brookfield Zoo, we outlined chronic wasting disease as it appeared in species other than the cow, elk, deer, and other wild species. A group of public health, infectious disease, and genetics experts are looking at the invasion of new species of ticks into the United States. These ticks carry diseases which have not been identified and pose a serious and growing concern.

Non-Technical Summary: As students, we were taught that some diseases were species-specific meaning they only affected a single species or group of species. Increasingly, and during past decade, we see diseases shared by diverse species and then with humans. In a zoo setting, this is particularly important as some of the new and diverse pathogens can kill species of an entirely different genre. Newly emerging tick diseases, for example, can infect wildlife who share them with our pets and finally with us. Understanding the basis of these diseases and looking at the genomic structure of the tick (and the pathogen) can give us information on how to eradicate or at least control these diseases.

Training Opportunities in Dr.Cera's lab: There are several grants under review which will support student studies in genomics and public health.

Weihang (Valerie) Chai, PhD
Professor
Department of Cancer Biology
Cardinal Bernardin Cancer Center
Loyola University Chicago

Technical Summary of Research Activities: Genome instability is a hallmark of cancer. Faithful DNA replication is important for preventing detrimental replication errors and maintaining genome integrity. DNA replication frequently encounters obstacles arising from both cellular metabolic processes and environmental sources that slow or stall replication forks, disrupting proper progression of replication and threatening genome stability. To protect genome integrity, cells have evolved a panoply of mechanisms to suppress replication fork stalling and rescue stalled replication. Understanding these mechanisms is important for understanding early events in carcinogenesis. In addition, recent research has shown that targeting replication in tumor cells may offer a promising cancer therapeutic approach, in particular for treating cancers harboring mutations in DNA repair genes. The Chai Lab integrates next generation sequencing, molecular biology, cellular imaging methods, as well as in vivo animal models to understand the molecular mechanisms for protecting genome stability under replication stress.

Non-Technical Summary: The overall goal of our research is to understand the molecular mechanisms governing genome stability, and more importantly, to apply the knowledge obtained from our research to target genome maintenance and develop effective drugs to fight against cancer via targeted/precision therapy.

Training Opportunities in the Chai Lab:Students, fellows or residents who join Dr. Chai's lab can expect to receive training with molecular (including next generation sequencing), cell biology, advanced fluorescence microscopy, biochemical and functional assays for DNA repair, chromosome stability, protein-protein interactions, cytogenetics, protein-DNA interaction, and protein function. They also will gain a broad knowledge of how genome instabilities caused by defective DNA repair pathways and/or telomere dysfunction drive tumor formation.

Keywords: Aging/Gerontology; Cancer/Carcinogenesis; Genetics; Genomics; Immunofluorescence; Proteins and Macromolecules; UV Radiation; Microscopy

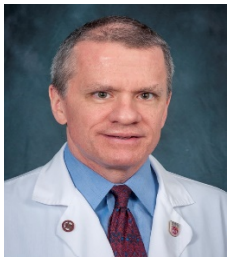
Steven J. Charous, MD, FACS
Professor
Department of Otolaryngology – Head and Neck Surgery
Loyola University Medical Center

Technical Summary of Research Activities:Dr. Charous is interested in both laboratory and clinical research regarding voice and swallowing disorders. In the laboratory, he has focused on nerve grafting and regeneration techniques that can be applied to vocal cord paralysis and facial nerve paralysis. More specifically, his research involves investigating a muscle-nerve-muscle technique in the face and larynx that allows paralyzed muscles to regain function using their symmetric counterpart muscle as a source of reinnervation. He hopes to explore this same technique for increasing muscle strength in swallowing disorders and possibly experimenting with it as a potential for sensory deficits. The above described laboratory research is beginning to be introduced into the clinical realm and its efficacy will need evaluation. In addition, Dr. Charous hopes to pursue further research in voice disorders, oropharyngeal dysphagia and esophageal dysphagia. Collaboration with other specialists and researchers will be sought in the relatively near future. Lastly, Dr. Charous is beginning collaborative research with outside institutions on the costs and value of medical mission trips in various specialties. The impact of medical mission trips and supply/equipment donations to developing countries will also be investigated. This involves cost analysis of various procedures in the U.S. and developing countries, and then attempting to discern the financial and health benefits to those underserved populations.

Non-Technical Summary:Diseases of the larynx can affect voice, swallowing and airway issues. Our research endeavors attempt to develop and refine treatments aimed at disorders affecting this organ. We use a spectrum of ways to perform our research including bench research with laboratory animal models, retrospective chart and investigative literature reviews, as well as clinical applications of new techniques to accomplish our goals.

Training Opportunities with Dr. Charous Students, fellows or residents who work and rotate with Dr. Charous can expect to receive training in the anatomy, physiology, and pathophysiology of diseases of the larynx and related structures, as well as see patients clinically with all types of voice and swallowing disorders. There is also an opportunity for observation of laryngeal surgeries and the writing and publication of manuscripts.

Keywords: Voice and hoarseness, swallowing and dysphagia, nerve graft and nerve regeneration, medical missions.



Joseph I. Clark, MD, FACP
Professor of Medicine
Division of Hematology-Oncology
Loyola University Stritch School of Medicine

Technical Summary of Research Activities: My research interests lie in the field of immunotherapy for cancer, specifically in the diseases of malignant melanoma, renal cell carcinoma, skin cancers and head and neck cancers. My focus is on clinical research and in translational research collaborations with basic scientists in treating these disease entities.

Non-Technical Summary: My research interests lie in the field of immunotherapy for cancer, specifically in the diseases of malignant melanoma, renal cell carcinoma, skin cancers and head and neck cancers. My focus is on clinical research and in translational research collaborations with basic scientists in treating these disease entities.

Training Opportunities with Dr. Clark: Students, residents or fellows who work with Dr. Clark can expect to gain experience in conducting clinical research: writing protocols, navigating the process of getting a trial up and running, conducting the study, gathering and synthesizing the data and ultimately writing up an abstract and/or manuscript for presentation and publication, respectively.

Keywords: immunotherapy, malignant melanoma, renal cell carcinoma, head and neck cancer

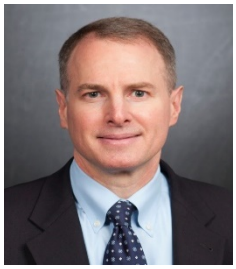
Nina M. Clark, MD
Professor
Co-Director, Infectious Disease & Immunology Research Institute
Department of Medicine, Division of Infectious Diseases
Stritch School of Medicine
Loyola University Chicago

Summary of Research Activities:
My research activities are primarily clinical/translational and focus on the pathogenesis and outcomes of opportunistic infections in immunocompromised hosts. I am also involved in multicenter clinical trials of novel therapeutics for infections.

Non-Technical Summary:
I study how infections affect those with organ transplants and others with compromised immune systems.

Training Opportunities:
Students, fellows or residents who work with Dr. Clark can expect to receive training in how to conduct clinical or translational research on the prevention, epidemiology and outcomes of infections related to organ transplantation.

Keywords: Organ transplants, infection, anti-infective agents, immunosuppression



Scott Cotler, MD
Professor of Medicine
Director, Division of Hepatology
Department of Medicine
Loyola University

Summary of Research Activities: My clinical and translational research focuses on non-alcoholic fatty liver disease (NAFLD) and viral hepatitis. Dr. Eric Kallwitz and I work with a multidisciplinary research team examining clinical, behavioral, and genetic factors to advance understanding the mechanisms and pathways of NAFLD. We are particularly interested in mechanisms responsible for racial disparities in NAFLD disease progression.

I work with Dr. Harel Dahari on mathematical modeling of viral hepatitis dynamics during antiviral treatment including studies of hepatitis C, D, and E. This research has provided new insights into thel life cycle of these viruses and mechanisms of antiviral therapy. Our current focus includes using real time modeling to individualize and optimize therapy for viral hepatitis. We are also using mathematical modeling to study how a hepatitis C vaccine could best be used to limit hepatitis C transmission and achieve disease eradication.

Non-Technical Summary: Non-alcoholic fatty liver disease (NAFLD) is the most common cause of liver disease in the United States. We are studying how lifestyle and genetic factors interact to predispose people to fatty liver disease and cause some people with fatty liver disease to develop progressive liver damage while others do not.

Treatment for hepatitis C has advanced rapidly, while treatments for hepatitis D and E are in their infancy. We are using mathematical modeling to study how to best optimize hepatitis C treatment to individualize duration and limit cost of therapy. We are also using mathematical modeling to examine the efficacy of treatments being developed for hepatitis D and E.

Training Opportunities with Dr. Cotler: Students, fellows or residents who work with Dr. Cotler and the Division of Hepatology can expect to receive training in how to conduct clinical and translational research.

Keywords: liver disease, non-alcoholic fatty liver disease, viral hepatitis, liver cancer, hepatitis C

Harel Dahari, PhD
Associate Professor
Co-Director, Program for Experimental and Theoretical Modeling (PETM), Division of Hepatology, Department of Medicine, Loyola University Chicago www.daharilab.com

Summary of Research Activities: In Dahari lab we conduct research at the intersection of experimental, clinical and theoretical biology with an emphasis on viral infection dynamics and treatment response with a particular focus on hepatitis viruses such as hepatitis C virus (HCV), hepatitis B virus, hepatitis D virus and hepatitis E virus. We apply our interdisciplinary approach across both in vitro and in vivo experimental systems as well as population and patient clinical data with the aim to find and optimize interventions and therapeutics that may ultimately prevent and/or cure these infections. Together with Prof. Susan Uprichard (Co-Director of PETM) and other collaborators from the US and abroad, we perform viral infection experiments in cell cultures and small animal models that provide the basis for developing mathematical models at a molecular level. We also collaborate closely with public health researchers in Chicago and clinicians in our Division of Hepatology as well as many other clinicians in the US and abroad who provide kinetic data from patients during infection and treatment. Our data-driven modeling approach helps provide new insights into the dynamics of viral-host-drug interactions during infection and treatment from the molecular to the population level.

Non-Technical Summary: The strength of Dahari lab and the research we are engaged in rests in the interdisciplinary nature of the research as well as our strong partnerships and global network. Our current area of focus is on the population and patient level of hepatitis containment and treatment. At the population level, we have been working with data sets on a Chicago population of people who inject drugs (PWID) to map containment and treatment strategies for HCV. Our latest research at the individual patient level is a scaled study on real-time patient treatment for HCV to reduce treatment time and costs without sacrificing efficacy referred to as Response Guided Therapy (RGT). In conjunction with Soroka and Rabin medical centers in Israel, this study builds on the success of a small pilot of patients where 50% of the patients responded favorably to shorter treatment times.

Training Opportunities in Dahari lab: Students, postdocs, researchers, fellows or residents who join Dahari Lab can expect exposure to experimental and clinical data and theoretical modeling to provide new insights into the dynamics of viral-host-drug interactions during infection and treatment from the molecular to the population level. Current research and modeling focus also on designing intervention strategies to eliminate HCV in PWID populations and real-time patient-centered math modeling-based RGT.

Keywords: Translational research; mathematical modeling; viral hepatitis dynamics; individualized therapy

Amir Darki, MD, MSc
Associate Professor of Medicine – Cardiology Interventional Cardiologist
Co-Director – Pulmonary Embolism Response Team
Medical Director, Division of Cardiology – Gottlieb Memorial Hospital
Loyola University Medical Center
adarki@lumc.edu

Summary of Research Activities: The Loyola Pulmonary Embolism (PE) Response and Research Team is a multidisciplinary team of specialists with clinical and basic science research interests related to venous thromboembolism. Our research focuses on clinical, hemodynamic, and echocardiographic markers of outcomes in patients presenting with acute PE. Additionally, we collaborate with the Hemostasis and Thrombosis laboratory at the Cardiovascular Research Institute looking at fibrinolysis deficit in PE patients.

Non-Technical Summary:Our research seeks to better understand outcomes of patients presenting with acute PE. We use ultrasounds (heart and lower extremities), six-minute walk tests, invasive cardiac catheterization (small catheters placed in the heart and lung), and blood samples to identify and look at fibrinolysis inhibitors.

Training Opportunities: Students, residents, and fellows who join Dr. Darki can expect to receive training in reading echocardiograms in patients with Pulmonary Embolism and reading lower extremity venous duplex in patients with deep venous thrombosis
Understanding right heart catheterization; understanding and using REDCAP spell out.

Mitchell F. Denning, PhD
Professor
Department of Pathology and Laboratory Medicine
Department of Cancer Biology
Loyola University Chicago

Summary of Research Activities: Technical Summary of Research Activities: Our laboratory seeks to understand the regulation of cell fate decisions (proliferation, differentiation,death) for keratinocytes and melanocytes within the normal epidermis, as well as how these processes become perturbed during ultraviolet radiation- induced skin carcinogenesis. We are focused on protein kinase C signaling pathways as key regulators of epidermal biology and use a variety of molecular, biochemical and cell biological approaches to uncover novel signaling mechanisms. Because cellular responses to ultraviolet radiation are complex, we are interested in the multitude of biological effects elicited by UV radiation, including inflammation, cell cycle arrest, DNA damage repair, and cell death. By understating both physiological and pathological regulatory mechanism in the epidermis, we can test novel preventive and therapeutic approaches to combat the approximately 4.5 million new cases of skin cancers diagnosed annually in the United States.

Non-Technical Summary:While we know UV radiation causes skin cancers and the widespread availability of inexpensive sunscreens can help prevent it, skin cancer remains the most common type of cancer and rates continue to rise. Research in the Denning lab focuses on understanding how UV radiation causes skin cancers and how the effects of UV can be inhibited or reversed to help prevent or treat skin cancers. Our main focus is squamous cell carcinoma, but we research melanoma, too. Dr. Denning's lab identified novel ways in which UV damages skin cells and the lab is working on methods to protect the skin from UV damage, with the potential to prevent UV's harmful effects even several hours after sunlight exposure.

Training Opportunities in the Denning Lab: Students, fellows or residents who join Dr. Denning's lab can expect to receive training in several aspects of skin biology, including normal keratinocyte and melanocyte growth and differentiation control, their responses to ultraviolet and ionizing radiation, and potential approaches for skin cancer prevention and treatment

Keywords: Skin carcinogenesis; Squamous cell carcinoma; Photobiology; Protein kinase C; Keratinocyte

Qunfeng Dong, PhD
Director, Center for Biomedical Informatics
Professor, Department of Medicine
Stritch School of Medicine
Loyola University Chicago

Summary of Potential Research Activities/Specialty:
Our research focuses on developing novel bioinformatics and statistical methods to analyze “big data” in biomedical sciences.

Non-Technical/Lay-language Summary: We are computational biologists who enjoy developing computational methods to analyze large-scale complex biomedical datasets.

Training Opportunities available: For trainees who join our group, they can expect to learn how to develop software and perform data analysis. For students and post-docs who are not part of our group, training opportunities are also available through our computational courses and seminars.

Keywords: Bioinformatics, Statistical Modeling, Machine Learning, Database

Mary Ann Emanuele, MD, FACP
Professor
Department of Medicine, Endocrinology
Stritch School of Medicine
Loyola University Chicago

Summary of Potential Research Activities/Specialty: We are focused on the impact of post-op glycemic control in patients after a solid organ transplant on post-op infection, hospital discharge, rejection rate and readmission

Non-Technical/Lay-language Summary: We are studying the effect of good glucose control in the immediate post-op period after a kidney, liver, heart or lung transplant on infection, hospital stay and need for readmission.

Training Opportunities available: Students, fellows or residents can expect to learn about the best way to achieve optimal glucose control after an organ transplant in individuals on high dose steroids and tube feeding regimens.

Keywords: Glycemic control, organ transplant, infection, high steroids, tube feedings

Sean W. Fanning, PhD
Assistant Professor
Department of Cancer Biology, Stritch School of Medicine
Loyola University of Chicago

Summary of Research Activities: Our laboratory is interested in understanding how nuclear receptor 3-dimensional structures dictate breast cancer pathology or therapeutic response. We have two main research topics of interest. We develop therapeutic small molecules to treat drug-resistant metastatic breast cancer. These compounds are evaluated in a unique platform that employs protein structures, engineered breast cancer cell lines, and mouse models. We also seek to understand the immunomodulatory role of the aryl hydrocarbon receptor (AhR) in triple negative breast cancers (TNBC). AhR is a sensor for environmental toxicants and has recently emerged as a promising target for TNBC. Ultimately, our goal is to develop novel AhR modulators to treat TNBC.

Non-Technical Summary: Nuclear Receptors (NRs) are small molecule-activated transcription factors and key drivers of cancer pathology. Because NR genomic activities are highly dependent on the binding of small molecules to reprogram the transcriptome, they are well ideal therapeutic targets for a diverse range of diseases. In fact, 16% of all FDA approved drugs target NRs. Our goal is to understand how small molecules influence NR structures, alter their genomic activities, and achieve breast cancer-specific therapeutic endpoints. These structures enable the rational design of improved therapeutic small molecules, which will be used as anti-cancer agents to address the unmet therapeutic needs of breast cancer patients.

Training Opportunities in the Fanning Lab: Students, fellows or residents who join Dr. Fanning's lab can expect to receive training in experimental methodologies including structural biology and cellular and molecular cancer biology and will gain a comprehensive understanding of endocrinology and breast cancer.

Keywords: Breast cancer, Nuclear receptors, Protein structure, Drug design and development.

Jawed Fareed, PhD, DSc, FAHA
Professor of Pathology and Pharmacology
Director of Hemostasis and Thrombosis Research Laboratories
Division Director Cardiovascular Institute, Vascular Biology
Chair, Institutional Animal Care and Usage Committee

Summary of Research Activities: My research is focused on the understanding of the pathogenesis of thrombotic and cardiovascular diseases at the molecular and cellular levels. Such disorders as venous thromboembolism including deep venous thrombosis and pulmonary embolism, acute coronary syndrome, atrial fibrillation, thrombotic stroke and more recently COVID-19 associated thrombotic complications are investigated in relation to the inflammatory processes involving cells and receptors. In parallel a broad program on anticoagulant drug discovery and development is ongoing at basic, applied and translational levels. Such drugs as heparin and their synthetic analogues, direct parenteral and oral anticoagulant drugs including antithrombin and anti-thrombin agents are investigated. Biochemical and biologic approaches including cellular and animal models of thrombotic and vascular diseases are utilized to validate the therapeutic targets of anticoagulant drugs. A strong collaboration with the clinical faculty including the Departments of Medicine, Surgery, Neurology and Cancer Biology is in place for the clinical validation of the newer therapeutics with reference to pharmacokinetics and pharmacodynamics of novel drugs. Thromboinflammation represents the main focus of our basic and clinical research programs.

Non-Technical Summary: My research program is focused on the development of newer tests for the diagnosis of clotting and bleeding disorders. Our goal is to optimize the safer use of currently available antocoagulant, antiplatelet and thrombolytic drugs. Our programs are designed to discover newer drugs with better safety and efficacy profiles for the treatment of blood and vascular diseases. We have developed a strong interaction with pharmaceutical industry and other research institutions at national and international levels. Our research also provides training opportunities for medical students, residents and fellows. We also provide guidance and advice to health care providers on newer drugs and devices.

Training Opportunities: There are various ongoing training programs in my laboratories which are related to blood and vascular pharmacology, molecular and cellular approaches to understand the pathogenesis of various diseases such as myocardial infarction, stroke, sepsis and COVID-19 associated thrombogenesis. These opportunities are open to undergraduate students, graduate and medical students, fellows and residents. Short term summer projects, research rotations of varied length and Masters and PhD level degree programs are also available. Advanced collaborative research programs are planned with clinical faculty and pharmaceutical industry.

Keywords: Cardiovascular disease, anticoagulant drugs, thrombosis, bleeding, pharmacology, pathology

Colleen M. Fitzgerald, MD, MS
Professor, Physical Medicine and Rehabilitation (PM&R)
Medical Director, Clinical Research Office Assistant Dean, Medical Student Research (STAR/Research Honors)
Research Director, Division of Female Pelvic Medicine and Reconstructive Surgery
Department of OB/GYNE, Division of FPMRS/Urogynecology
Stritch School of Medicine
Loyola University Chicago

Summary of Research Activities: Dr. Fitzgerald's areas of clinical expertise and research include chronic pelvic pain, pelvic floor myofascial pain and dysfunction, pelvic girdle pain in pregnancy and postpartum, musculoskeletal medicine, pelvic floor disorders and pelvic rehabilitation. Dr. Fitzgerald received her medical degree from Northwestern University Feinberg School of Medicine in 1996 and completed her post-graduate training at the Rehabilitation Institute of Chicago (Shirley Ryan AbilityLab) and Northwestern University Feinberg School of Medicine in 2000, where she served as chief resident. She also received a Masters degree in Clinical Investigation at Northwestern in 2011. She has been at attending physician at Loyola University Chicago since 2012, Medical Director of the Clinical Research Office since 2016.

She is a former National Institutes of Health (NIH) Building Interdisciplinary Research Careers in Women's Health (BIRCWH) Scholar (2008-2012) and NICHD K23 Awardee studying "Mechanistic Distinctions in Female Pelvic Pain Subtypes". She an active women's health clinical researcher as Co-Investigator for the Loyola U01 Prevention of Lower Urinary Tract Symptoms (PLUS) NIDDK grant and has been funded on several other foundation grants including the Interstitial Cystitis Association and the PM&R Foundation. In 2022, she received an R21 from the NICHD entitled "Musculoskeletal and Pelvic Floor Health in Female Chronic Overlapping Pelvic Pain Conditions (The MSK-PELVIC Study)".

Non-Technical/Lay-language Summary:
Chronic pelvic pain (CPP) occurs in up to 25% of adult women. Researchers and medical providers nee to learn more about the best way to evaluate CPP and how it effects overall musculoskeletal (MSK) healt and physical activity. The NICHD R21 study for which Dr. Fitzgerald is the PI will compare ways t evaluate the pelvic floor muscles (PFM) and will also investigate MSK conditions, quality of life an physical activity in women with and without CPP. The proposed work will impact public health b improving our understanding of the PFM exam and clarifying the importance of MSK health and physica activity in CPP.

Training Opportunities available: Students, (postdoctoral) fellows or residents who work under the guidance of Dr. Fitzgerald and the Female Pelvic Medicine team can expect to receive training in women's health clinical research focused on the musculoskeletal pelvis, pregnancy related pain, chronic pelvic pain, pelvic floor myofascial pain and dysfunction and pelvic floor disorders.

Keywords: Healthcare associated infections; multidrug resistant organisms; patient-centered care; rehabilitation medicine; urinary tract infections

Eileen Foecking, PhD
Adjunct Associate Professor
Department of Otolaryngology- Head and Neck Surgery
Loyola University Chicago

Summary of Research Activities: The focus of my laboratory is on peripheral and central nervous system injury and the development of therapeutic strategies for repair and regeneration. We are interested in developing new techniques for facial reanimation following facial paralysis. Additionally, we are studying the role of gonadal steroids and other neurotherapeutic agents in the recovery from the primary and secondary injuries that occur following repeat mild traumatic brain injury. Using multiple behavioral functional tests including vestibular, anxiety, motor, and cognitive together with cellular and molecular neuroscience techniques, we determine the efficacy of these therapies on both acute and chronic functional recovery and the neuroimmune consequences following traumatic brain injury. We are also exploring microRNAs as biomarkers for the severity of the traumatic brain injury and to determine treatment responsiveness.

Non-Technical Summary: My laboratory focuses on the processes that occur following multiple different nerve injuries and injuries to the brain following traumatic brain injury. We explore therapies to improve functional recovery and enhance the repair process in the nerve and/or the brain. We are interested in better understanding the negative consequences that result from these injuries in hope to develop treatment regimens to help patients recovering from such injuries.

Training Opportunities in the Dr. Foecking's Lab: Students, fellows or residents who join Dr. Foecking's lab can expect to receive training in various animal surgical and behavioral techniques, along with cellular and molecular neuroscience techniques. Foecking lab members will also learn how to think critically, develop their independent research, and how to best communicate their data to the neuroscience research community.

Key Words: Traumatic brain injury, Peripheral nerve injury, Therapeutic strategies for repair and regeneration

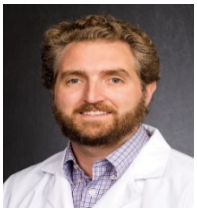
Karen A. Griffin, MD, FASN, FAHA, FACP
Professor, Department of Medicine
Loyola University Chicago
Renal Section Chief, Edward Hines Jr., VA
Chair, American Heart Association's Council on Hypertension

Summary of Research Activities: The focus of research in our laboratories relates to the role of hypertension in the pathogenesis of chronic kidney disease and its progression. More specifically, the potential role of renal autoregulatory mechanisms in providing protection against hypertensive injury and its impairment in various kidney disease states including diabetes and obesity-related nephropathies is being investigated. Our laboratories pioneered the use of BP radiotelemetry and subsequently combined it with the use of chronic renal arterial blood flow probes to investigate the quantitative relationships between BP and renal damage. The development of an investigative team with diverse expertise in renal hemodynamics, signal processing, mathematical modeling and an integrated approach has resulted in novel methods to investigate *real-time* renal hemodynamics in conscious animals that have provided important insights. The goal of our current research is to investigate how renal autoregulatory and hemodynamic mechanisms operate in *real-time* in conscious animals to protect against excessive glomerular BP transmission and hypertensive renal damage using the novel data acquisition and analysis methods developed in our laboratory.

Non-Technical Summary: Our laboratories are interested in understanding how blood pressure influences kidney injury and its progression. Using unique methods of analyzing changes in blood pressure and kidney blood flow in *real-time* in the conscious state allows exploration of the impact of changes in the pressure/flow relationships in different disease conditions that lead to worsening of kidney function over time. Our research will yield insights into how we might be able to alter the kidney's response to changes in blood pressure such that it may be protected against hypertensive injury and its progression.

Training Opportunities in the Bidani, Griffin Labs: Students, fellows or residents who join this lab can expect to receive training in experimental methods in integrative physiology, mathematical modeling, and expertise in the broader area of renal disease and its progression.

Keywords:
Hypertension, glomerulosclerosis, radiotelemetry, artificial intelligence



Patrick A Hagen, MD, MPH
Assistant Professor,
Division of Hematology and Oncology
Loyola University Chicago

Summary of Research Activities: My research focuses on the role of both autologous and allogeneic stem cell transplantation in treating malignant hematological disorders. Specifically, I am interested in plasma cell disorders and am the co-chair of the Multiple Myeloma Research Committee. Currently, I am working on developing two large studies through the Southwest Oncology Group. The first will look at different chemotherapeutic preparatory regimens for 2nd autologous transplants in myeloma. Similarly, we are developing a protocol to examine the role of up-front autologous stem cell transplantation in systemic light chain amyloidosis. I have a grant to evaluate different methodologies of measuring minimal residual disease in multiple myeloma with the goal of increased turnaround time, reduced cost, and the highest possible sensitivity. I also have an investigator sponsored trial (IST) evaluating the role of atorvastatin in reducing chronic graft versus host disease following allogeneic stem cell transplantation. Additionally, I have and IST evaluating T-cell and B-cell populations during maintenance therapy for high risk acute myeloid leukemia after allogeneic stem cell transplantation.

Non-Technical Summary: My clinical research team is interested in determining the best treatment options for patients with multiple myeloma, a type of blood cancer, when it recurs after the initial treatment. We are also studying which treatments cause the cancer to go into the deepest possible remission. In addition, I am evaluating through several studies only available here at Loyola, ways to reduce graft-versus-host disease, a severe complication following allogeneic stem cell transplantation. We are evaluating both additional therapies to be given after transplant as well as analyzing the recovery of the immune system following transplant.

Training Opportunities There are opportunities for students, residents, and fellows to get involved in clinical research both retrospective and prospective studies depending on the experience level and potential time commitment. Students will learn how to write an effective clinical research proposal and in particular learn about plasma cell disorders including multiple myeloma and amyloidosis amongst others.

Keywords: Multiple Myeloma; Amyloidosis; Allogeneic Stem Cell Transplantation; Autologous Stem Cell Transplantation.

William J. Hopkinson, MD
Vice-Chair, Department of Orthopaedic Surgery and Rehabilitation
Professor, Orthopaedic Surgery
Loyola University Medical Center

Summary of Research Activities: Clinical and basic science involving adult reconstruction of the lower extremities, specifically knee and hip diseases. Our interest is in the clinical outcomes of hip and knee replacement surgery, specifically regarding mechanisms of wear and ideal positioning of components. In addition, in collaborative research, we investigate the presence and effects of metabolic and inflammatory biomarkers in degenerative joint diseases. We investigate the relationships of these factors and the effects on the fibrinolytic systems of arthroplasty patients, to predictively identify those markers that may result in adverse outcomes in an aging population.

Non-Technical Summary: Our collaborative research involves several labs on the Health Sciences Campus, specifically the VA Biomechanics lab under Dr. Patwardhan, the laboratory of Dr. John Callaci, and the Pathology and Hematology Lab under Dr. Jawed Fareed. We research the biomechanical aspects of human knee and hip joint replacement and the cellular and inflammatory aspects of bone healing and degenerative arthritis. This research will help us develop insights into the degenerative changes in knee and hip joints and into the associated inflammatory conditions that can lead to complications such as thromboembolic disease.

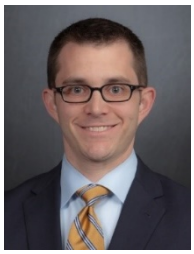
Training Opportunities in Orthopaedic Adult reconstruction: Students and residents working with our team can expect to get broad training in the experimental methods used for evaluation of arthritic conditions and the use of joint replacement to improve function and activities of daily living. This experience covers both Basic Science research into the Biomechanics of joint replacement and cellular response to degenerative joint conditions and the clinical outcomes of Orthopaedic Surgery.

Nasheed M. Hossain, MD
Assistant Professor of Medicine
Department of Medicine, Division of Hematology/Oncology
Loyola University Chicago- Stritch School of Medicine

Summary of Research Activities: Our lab is interested in better understanding the biology of T-cells as it related to cellular cancer therapeutics. We are focused on studying Chimeric Antigen Receptor T-cells to determine how to improve the clinical efficacy of this promising new therapy. We are studying both native and CAR T-cells which are isolated from patient samples using a multi-modal approach. Techniques we are using include flow cytometry to determine circulating levels of CAR T-cells as well as to determine surface markers on CAR^{+} and native T-cells, specifically markers of activation, senescence and immune memory. We are also using single cytokine profiling to determine how native and CAR+ T-cells behavior when activated and how this evolves over time after patients are treated with CAR T-cells. Finally, we are carrying out epigenetic studies of CAR T-cells to determine how the T-cell genomic profile changes over time and how this may impact clinical efficacy and toxicities. We aim to identify biomarkers to predict clinical response and to identify new methods of producing CAR T-cells to improve clinical efficacy, including rate of response and durability of response.

Non-Technical Summary: Our lab is interested in study cells of the immune system, specifically lymphocytes. We are specifically interested in how they are utilized as a therapy for cancer. We are using a multi-prong approach for our studies. This includes looking at the type of markers being expressed on these cells, the type of signal molecules the cells produce as well as the DNA profiles of the cells. We hope to identify specific changes or findings that relate to how well the cancer cell therapies work or may identify ways we can further manipulate the immune cells to make the therapies work better.

Training Opportunities in the Hossain Lab: Students, fellows or residents who join our lab can expect to receive training in experimental methods in cell culture, cancer cell therapy and T-cell epigenetics. The will gain a background in the role of cellular immunotherapies in the clinical setting and the role T-cells play in basic cancer biology. The will also gain background in the assessment and identification of biomarkers in cancer therapies.



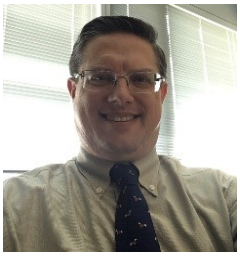
Paul J. Hutchison, MD, MA, HEC-C
Associate Professor of Medicine and Bioethics
Director of Pulmonary and Critical Care
Stritch School of Medicine, Loyola University Chicago

Summary of Potential Research Activities/Specialty: Through collaboration with students, trainees, and faculty, my research focuses on the intersection between medical ethics and the clinical care of patients. Recent projects have examined how clinicians interface with patients when discussing goals for their care, particularly near the end of life. Potential topics for future research include advance directives and advance care planning conversations, inpatient code status and POLST forms, the formation of trust between clinicians and families in the intensive care unit, and ethical considerations surrounding care of unrepresented patients.

Non-Technical/Lay-language Summary: My research focuses on how doctors, nurses, and other clinicians can take better care of patients by listening to their values, preferences, and priorities. Once clinicians understand a patient's personal sense of dignity, they can provide patient-centered recommendations about treatment and care plans for the future. The goal of my work is to improve the way clinicians engage patients in these conversations.

Training Opportunities available: Collaborators and mentees will acquire a solid working knowledge of advance directives and evidence-based strategies for advance care planning conversations. They will learn the process for IRB submission of a research protocol and the utilization of data collection tools such as REDCap. Mentees are expected to work on projects independently while simultaneously prioritizing their educational and patient care responsibilities.

Keywords: Medical ethics, advance directives, POLST, code status, trust



Walter P Jeske, PhD
Professor
Departments of Thoracic & Cardiovascular Surgery and Pathology
Loyola University Chicago

Summary of Research Activities: Our lab is interested in mechanisms of blood coagulation and their modulation by drugs. One aspect of this research relates to developing a better understanding of the pharmacology of heparins, a class of drugs which is used to prevent or treat blood clots in a variety of clinical conditions, including those where blood comes into contact with foreign surfaces. To achieve this, we use a variety of biochemical and cellular assays as well as animal models to compare heparins derived from different sources, to evaluate the biosimilarity of 'generic' low molecular weight heparins, and to study the development of adverse effects of heparins. A second aspect of this research relates to the evaluation of platelet function through the use of flow cytometry. We have applied this technique to the study of novel antiplatelet agents such as allosteric PAR-1 inhibitors and aspirin-phosphatidylcholine complexes. We have used this technique to evaluate the extent of platelet activation in patients suspected of having heparin-induced thrombocytopenia, patients with atrial fibrillation, infants suspected of having necrotizing enterocolitis and in patient populations treated with on-pump or off-pump revascularization, intravascular brachytherapy, drug-eluting stent placement, serotonin reuptake inhibitors or left ventricular assist devices, to better understand the disease process or to characterize the effectiveness of therapy.

Non-Technical Summary: Blood clotting involves the interaction of plasma-based proteins, circulating blood cells and components of the blood vessel wall. Dysfunction of any of these can lead to excessive clotting or bleeding. Such dysfunctions are widely seen in patients with heart disease, cancer, and infection. Using a variety of techniques, we evaluate the effectiveness of drugs that impact different aspects of the blood clotting process and measure markers of blood clotting activation. We anticipate knowledge gained from these studies will be useful in developing safer and more effective blood thinning agents and in identifying patients who can benefit from such therapies.

Training Opportunities in the Jeske Lab: Students, fellows, and residents who join Dr. Jeske's lab can expect to receive training in laboratory techniques used to assess anticoagulant therapy and techniques used to assess platelet function. Students will develop a broad understanding of the hemostatic system, its role in a variety of pathologies and its pharmacologic modulation.

Keywords: platelets, antithrombotic, hemostasis, bleeding, inflammation, endothelium

Stuart Johnson, MD
Professor
Infectious Diseases, Department of Medicine
Stritch School of Medicine, Loyola University Chicago

Andrew M. Skinner, MD, Assistant Professor
Infectious Diseases, Department of Medicine
Stritch School of Medicine, Loyola University Chicago

Summary of Potential Research Activities/Specialty: We are primarily focused on the epidemiology, diagnosis, and management of *Clostridioides difficile* infection (CDI). Our laboratory (Johnson/Skinner/Gerding Lab) at the Hines VA Hospital performs anaerobic culture, strain typing, and susceptibility testing of *C. difficile* isolates as well as other *in vitro* virulence factor investigations. We also have established a hamster model of CDI that mimics many of the important pathogenesis steps in human infection.

Non-Technical/Lay-language Summary: *C. difficile* infection (CDI) is an important hospital-associated and community-associated cause of diarrhea, colitis, and other complications including death. Exposure to the environmentally stable spore form of *C. difficile* and the presence of altered gut resident bacteria (dysbiosis), usually as the result of antibiotic exposure, are the major risk factors for CDI. Immune response, particularly antibodies directed against the major toxins produced by *C. difficile* also help determine the course of disease.

Training Opportunities available: Students, fellows or residents who join Dr. Johnson and Dr. Skinner's research projects can expect to learn about the microbiological and epidemiological aspects of *C. difficile*. In addition, the long-standing clinic at Loyola for patients with recurrent CDI is an opportunity to learn how these patients are clinically managed.

Keywords: *Clostridioides difficile*, pseudomembranous colitis, recurrence, molecular epidemiology.

W. Keith Jones, PhD
Professor, Molecular Pharmacology & Neuroscience
http://www.stritch.luc.edu/pharmacology/
wjones7@luc.edu

Summary of Research Activities: We study the microRNA-gene product interactions after myocardial infarction (MI) and post-MI and the role these play in cell survival, angiogenesis, cell proliferation, and myocardial function. We found that mesenchymal stem cells (MSC) produce extracellular membrane vesicles (EVs or exosomes) containing protein and microRNA cargo and that these MSC-derived EVs enhance cell survival (reducing infarct size in heart and brain), enhance angiogenesis, and increase cell proliferation. The mechanism seems largely to be via transfer of microRNA cargo to target cells followed by modulation of target gene product expression (e.g., reducing pro-cell death proteins and increasing protective proteins). The EVs are taken up by cells in the heart and we explore the way that this occurs, with our results (to date) supporting a viral-like mechanism of membrane fusion and cargo delivery to the cytoplasm. These results directly bear upon therapy for heart attack and for post-MI heart failure. We are modifying EVs for specific therapies.

Non-Technical Summary: Interruption of blood flow causes injury to organs such as the heart and brain. We call this ischemia/reperfusion injury; the outcome is heart attack and stroke, which together cause one third of all deaths in the United States. Because the mechanisms are similar in these organs, and due to recent evidence that the organs communicate during and after such attacks, the Jones lab started to investigate the mechanism of organ-to- organ communication, the effects of this communication on the organs, and evaluate opportunities to reduce and repair injury by modifying this communication. We hope to develop this knowledge to provide new therapeutics for heart disease and stroke victims.

Training Opportunities in the Jones Lab: The Jones lab has a rich tradition of training graduate students, postdoctoral fellows, clinical fellows, and junior faculty over the past 20 years. Many former trainees have pursued careers in industry, government (NIH) and academia. Among them, several are now full time professors with funded research programs, including a Cardiology Chief/Medicine Chair with a funded research operation. The training focus is to teach you to become a rigorous scientist. This requires you to learn to think and act aligned with objective scientific method and requires development of scientific intuition. You will learn how to form an hypothesis, design, perform and evaluate results of experiments, and develop a scientific research project at the frontier of modern medical science. Technically, you will learn molecular biology and pharmacology, extracellular vesicle and stem cell biology, cardiac physiology and pathophysiology and neuroprotection. Lab trainees have opportunities to interact with broad academic and industry networks, and learn to write and present in a rigorous and competitive research environment.

Cara Joyce, PhD
Director, Biostatistics Core, Clinical Research Office
Assistant Professor, Department of Medicine
Stritch School of Medicine, Loyola University Chicago

Summary of Research Activities:
Dr. Cara Joyce serves as study statistician for investigator initiated clinical trials, and provides support that includes database development and randomization, data safety monitoring services, analysis, and results reporting to clinicaltrials.gov. Much of her research has focused on clinical prediction modeling, from development and validation to prospective evaluation of models implemented in real-world settings. She collaborates with physician-scientists across many clinical areas such as Dermatology, Pulmonary/Critical Care, Transplant, Urogynecology, Cardiology, and Oncology. Select research topics of particular focus for Dr. Joyce include medication adherence, modeling of microbiome data, bias assessment in machine learning algorithms, evaluation of clinical decision support tools, and latent class phenotyping.

Non-Technical Summary:
Dr. Joyce is an applied statistician who conducts collaborative clinical research. She works with new and experienced investigators alike in a team science approach to design and plan studies, perform statistical analysis, and disseminate results.

Training Opportunities:
Investigators at Loyola's Health Sciences campus may request statistical consultation from the Biostatistics Core to work with Dr. Joyce or a Core statistician. Students, residents, and fellows with prior training in data analysis may work directly with Dr. Joyce for guidance and practical experience in data management, statistical programming, and model interpretation.

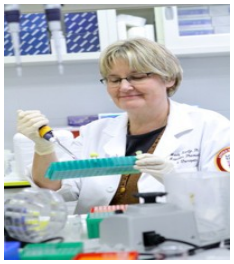
Keywords: biostatistics; clinical prediction modeling; clinical trials; health services and outcomes research.

Simon Kaja, PhD
Assistant Professor
Ophthalmology and Molecular Pharmacology and Neuroscience
Stritch School of Medicine
Loyola University Chicago

Technical Summary of Research Activities: Our laboratory is interested in drug discovery and drug delivery for ophthalmic disorders. In particular, we investigate intracellular signaling pathways that contribute to the generation of cellular oxidative and nitric stress in a variety of cell types, including neurons, glia, and epithelial cells. Employing a broad pharmacological approach that utilizes cell and molecular biology, biochemistry, microscopy and electrophysiology, we aim to identify new drug targets and delivery strategies for two disease indications: neurodegeneration (glaucoma) and ocular surface disease (dry eye disease). As part of our glaucoma program, we are investigating the biomechanical forces and neuron-glia interactions in the optic nerve head to advance gene therapy approaches for this debilitating disease. Our dry-eye disease program focuses on the development of novel topical nanoparticle formulations that exert potent anti-inflammatory and anti-oxidant properties.

Non-Technical Summary: Age-related eye diseases are extremely common and can reduce quality of life and place a significant burden on afflicted individuals. One particular focus of our research is on primary open angle glaucoma, the leading cause of irreversible blindness worldwide. The Kaja Laboratory is investigating the biological triggers and mechanisms responsible for the progression of the disease. Current management of glaucoma includes the use of eye drops that slow down disease progression, but have severe side effects, including dry eye disease. Our long-term goal is to generate novel strategies that can accelerate the development of an urgently-needed cure for glaucoma. At the same time, we are developing novel nanomedicine treatments for dry-eye.

Training Opportunities in the Kaja Lab:Students, fellows, residents or trainees who join Dr. Kaja's lab can expect to receive hands-on training in experimental methods in cellular and molecular neuroscience, pharmacology and microscopy. The training environment in the Kaja lab places a strong emphasis on developing skills in research design, data analysis. statistics and grantsmanship.



Gwendolyn (Wendy) Kartje, MD, PhD
Professor, Dept. of Molecular Pharmacology and Neuroscience
Loyola University Chicago
Chief, Neuroscience Research Hines VA Hospital

Technical Summary of Research Activities: Our laboratory studies how to improve functional recovery by enhancing neuronal plasticity after brain damage from events such as an ischemic stroke and traumatic brain injury (TBI). We have developed a unique approach to block the protein Nogo-A, the main inhibitory protein in the brain and spinal cord. Using anti-Nogo-A immunotherapy, we have shown that new connections from the uninjured contralesional cortex innervate subcortical brain regions that have been deafferented from the brain damage. Using multiple complex behavioral tests of sensorimotor and cognitive function, long-term functional recovery is correlated with neuronal plasticity in adult and aged rodents. We are also investigating adjunct therapies such as electrical stimulation of the impaired forelimb and interventions to reduce reperfusion injury. Overall, our lab aims to develop promising therapeutic interventions at the pre-clinical level to translate these findings into clinical trials to improve functional outcomes in patients suffering from brain damage due to stroke or TBI.

Non-Technical Summary: Our laboratory studies how to improve functional recovery after brain injuries such as stroke and traumatic brain injury (TBI). We use several methods to enhance a process called neuronal plasticity, in which the intact part of the brain takes over the function of the damaged parts. One such method involves jumpstarting the growth of nerve connections to compensate for destroyed brain cells by using a unique immunotherapy. Another method uses electrical stimulation to the nerves of the impaired limbs to improve function. We have shown that the brain is capable of recovering long after damage has occurred, even in elderly patients.

Training Opportunities in the Kartje Lab: Students, fellows, and residents who join Dr. Kartje's lab can expect to receive training in experimental methods in cellular and molecular neuroscience, confocal and super resolution microscopy, neurosurgical techniques in rodents and various rodent behavioral tasks.

Irida Kastrati, PhD
Assistant Professor
Department of Cancer Biology, Cardinal Bernardin Cancer Center
Loyola University Chicago

Technical Summary of Research Activities: Our lab has two ongoing breast cancer projects: **1.) Exploit dimethyl fumarate to uncover druggable vulnerabilities and prevent recurrence of ER+ breast cancers.** Tumor recurrence in ER+ breast cancer disease is the leading cause of breast cancer-related deaths. We found that the immune-modulatory drug dimethyl fumarate (Tecfidera®, DMF) can be used to prevent tumor recurrence. Chemically, DMF will react with protein cysteines to form a stable covalent adduct known as succination. We will (i) determine the efficacy of DMF *in vivo* in clinically-relevant animal models of breast cancer, and (ii) use chemical biology and proteomics to identify critical drug targets driving recurrence. These aims are the basis of our funded DOD grant. Altogether, this work sets the stage for rapidly advancing DMF into the clinic as an effective therapy against lethal recurrent ER+ breast cancers. **2.) SELENOF is a determinant of breast cancer risk and outcome in African American women.** Racial disparities in breast cancer are well documented– African American women die of breast cancer at a much higher rate than Caucasian women. Our hypothesis is that loss of SELENOF, a selenium-containing protein, plays an important role in this disparity. Using an ethnicity tumor tissue microarray we will determine whether differences in SELENOF levels between African Americans and Caucasian women are associated with poor disease outcome. Mechanistically, SELENOF's effects on tumor initiation, overall tumor growth, and response to therapy will be investigated using clinically relevant xenografts models. This work would establish SELENOF as a biomarker of aggressive breast cancer disease that contributes to the disparity experienced by African American women.

Non-Technical Summary:
This year alone, an estimated 276,000 new patients will be diagnosed with breast cancer, making it the most common cancer among American women. Despite major advances in treatment, therapy options for aggressive breast cancers are limited which results in over 42,000 deaths each year. Our longstanding interest is to apply a multi-disciplinary approach to identify fundamental drivers in aggressive deadly breast cancer disease, and evaluate novel therapeutics to improve patient outcome and reduce mortality.

Training Opportunities in the Kastrati Lab:
Students, fellows or residents who join Dr. Kastrati's lab can expect to receive training in basic cancer biology that includes cell culture, cancer assays, and *in vivo* models. In addition, you will learn about the broader effects of hormone action in breast cancer, conduct screens for novel chemical agents, and test new drug candidates for breast cancer therapy.

Keywords: Breast cancer, Selenoproteins, Racial disparity, Therapeutic targets in therapy resistance and recurrence, Drug Development

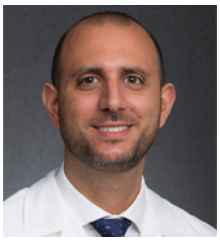
Seongcheol Kim, PhD
Research Associate Professor
Dept. of Cell and Molecular Physiology
Loyola University Chicago
Stritch School of Medicine

Technical Summary of Research Activities: My research team's ongoing efforts to advance knowledge and address unmet medical needs are focused on discovery and development of therapeutic and disease prevention agents. In particular, we exploit to selectively target pharmacological treatments to brain regions experiencing Alzheimer's-type oxidative-nitrosative stress. This hit-to-lead development program is focused on selecting candidates that are Sigma-1 receptor (S1R)-mediated regulators of nitric oxide production, in order to identify therapeutics potentially capable of slowing the progression of AD. Our efforts are primarily pre-clinical and translational and are guided to discover and refine druggable properties for lead compounds by a mechanistic understanding of receptor systems and brain-derived neurotrophic factor (BDNF) signaling pathways that modulate brain inflammation and neurogenesis. Another area of current interest relates to the discovery and development of mechanistically unique eco-friendly, vertebrate safe mosquito and tick repellents for the prevention of arthropod-borne disease transmission to humans, livestock and pets (e.g., West Nile Virus, Dengue, Lyme's disease, Malaria, and various types of encephalitis). This branch of research is premised on interrogation of mechanistic and structure-activity-based hypotheses, often involving the probing of interactions between molecules. Another area of interest is to evaluate the treatment of adjuvant microRNA as a means of enhancing the effectiveness of tamoxifen in treating breast cancer.

Non-Technical Summary: Our laboratory is interested in advancing knowledge and addressing societal needs by solving problems and answering questions of relevance to medicine and the environment. We are focused on preventing initial damage or facilitating recovery from neurodegenerative brain diseases and injury states prevalent in aging populations. Moreover, our innovative approach is to develop novel synthetic mosquito repellents that exploit a different mode of action to provide safe, outdoor, personal protection against disease-carrying mosquitoes. In the breast cancer research, identifying an adjunct therapy that enhances the effect of currently used chemotherapeutics could require much lower doses of the drug required to elicit its effect, which in turn, could significantly mitigate side effects and improve not only tolerance to chemotherapy, but also quality of life associated with cancer treatment.

Training Opportunities in the Singh Lab: Students, fellows or residents who join Dr. Kim's lab can have opportunities for training in pre-clinical *in vitro* and *in vivo* CNS neuropharmacological techniques and/or various applied experimental techniques relevant for jobs in academia, and the biotechnology and pharmaceutical industries.
Dr. Kim's group will have supervised guidance widely by Dr. Singh and interaction with industries such as Animal biotech Inc. and Epigen Biosciences.

Keywords: Alzheimer's disease, brain aging, CNS, BDNF, eco-friendly mosquito repellent, tamoxifen, microRNA, and breast cancer



Menhel Kinno, MD
Assistant Professor
Department of Medicine, Cardiology
Loyola University Chicago
Stritch School of Medicine

Summary of Potential Research Activities/Specialty:
Utilization of multimodality cardiovascular imaging and advanced non-invasive techniques in valvular heart disease, infiltrative cardiomyopathy (such as cardiac amyloidosis), and hypertrophic cardiomyopathy.

Non-Technical Summary: We assess the different cardiovascular imaging techniques such as echo, MRI, CT, and nuclear medicine in evaluating and diagnosing different valulvular disease and heart failure.

Training Opportunities: Students, residents, and fellows can collaborate on different projects that utilized cardiovascular imaging in assessing and predicting outcomes among patients with valvular heart disease and cardiomyopathies.

Keywords: Cardiac CT, cardiac MRI, Echo, amyloidosis, hypertrophic cardiomyopathy.

Sarah Kinsinger, PhD
Director of Behavioral Medicine for Digestive Health
Associate Professor, Dept. of Medicine
Loyola University Medical Center

Summary of Research Activities: Dr. Kinsinger's research centers around understanding the psychological principles that enhance adaptation to chronic illness. Specifically, her research over the past 10 years has focused on coping patterns and predictors of psychological adjustment in patients with chronic gastrointestinal conditions, including irritable bowel syndrome and inflammatory bowel disease. She has collaborated on multiple clinical trials of psychological interventions for chronic illness and is currently funded by Loyola's Research Funding Committee to conduct a pilot study to test the feasibility and acceptability of a self-administered gut-directed hypnotherapy treatment for functional dyspepsia.

Non-Technical Summary: Dr. Kinsinger is a clinical health psychologist specializing in psychological treatments for chronic digestive diseases, including irritable bowel syndrome and inflammatory bowel disease. Their research focuses on understanding personality and coping styles that enhance adjustment to chronic illness, as well as the development of behavioral interventions for patients with digestive diseases. Currently they are conducting a clinical trial to test the effectiveness of a hypnotherapy treatment for functional dyspepsia that is available to patients entirely on-line. This research has the potential to create a new treatment paradigm for functional dyspepsia and establish psychological interventions as an effective, safe, and accessible treatment option for patients with this condition.

Training Opportunities: Opportunities may be available to residents or fellows interested in exploring psychosocial factors and coping mechanisms as they relate to symptom severity and quality of life in patients with chronic digestive disorders.

Key Words: irritable bowel syndrome, chronic illness, cognitive-behavioral therapy, hypnotherapy

Jonathan A. Kirk, PhD
Assistant Professor
Cell and Molecular Physiology
Loyola University Chicago Stritch School of Medicine

Summary of Research Activities: Our primary goal is to understand cardiovascular disease at the level of the sarcomere. This goal is supported by three primary approaches: biophysical assays to assess cellular function, mass spectrometry to discover and quantify changes in post- translational modifications (PTMs) which regulate function, and animal models and human tissue to examine the sarcomere's impact on whole organism physiology. We study a host of cardiovascular diseases that impact the sarcomere, including cardiac dyssynchrony, myocardial infarction, diabetes, inherited cardiomyopathies, and heart failure. By showing how these diseases induce sarcomeric PTMs and the mechanisms by which these modifications alter the force-generating capacity of the sarcomere, we seek to identify molecular targets for therapeutics. Using human cardiac tissue (from explanted failing hearts during heart transplant procedures or rejected donor hearts), we further test the translational potential of the therapeutic targets we discovered.

Non-Technical Summary: Many cardiovascular diseases reduce the heart's normal ability to fill with blood and then pump it throughout the body. This pumping action is driven by the sarcomere, molecular motors that are inside each one of the millions of cells that make up the heart. We use single cell assays to study function in human and animal models of disease to understand what causes the sarcomere to malfunction. Sarcomere function is exquisitely controlled by switches (called post- translational modifications) on the proteins that make up the motors, and we use mass spectrometry to discover which of these have been incorrectly switched on (or off) in disease. We then determine how to reverse these switches and attempt to restore contractile strength to the heart.

Training Opportunities in the Kirk Lab: Students, fellows, and residents who join Dr. Kirk's lab can expect to receive training in general translational cardiovascular science. Specifically, including: biophysical assays to assess single cell function, cardiovascular physiology and pathophysiology, proteomics techniques including mass spectrometry, cardiac muscle mechanics, and sarcomere structure and function.

Keywords: Heart; translational; cardiovascular disease; biophysics; proteomics

Katherine L. Knight, PhD
Professor and Chair
Department Microbiology and Immunology
Stritch School of Medicine
Loyola University Chicago

Summary of Research Activities: The Knight Laboratory researches host-microbe interactions. One line of research is to determine how the intestinal microbiota contribute to the development of B lymphocytes. We use mutant animals that have deleted the immunoglobulin VH gene responsible for encoding most immunoglobulin heavy chains. These animals require intestinal microbes to shape their antibody repertoire, and one focus of research is to use *in vitro* and *in vivo* methods to determine the mechanism by which the microbes induce changes in the B cell repertoire, and shape the antibody repertoire. A second major line of research is to determine how a molecule, exopolysaccharide (EPS), derived from a commensal bacterium, induces anti-inflammatory responses as a result of inhibiting T cell activation. The inhibition is due to EPS generating inhibitory macrophages and dendritic cells, and the goal is to determine how these inhibitory cells are induced by EPS and how they inhibit T cell activation and proliferation. The outcome of EPS administration to animals is decreased disease seen in Traveler's diarrhea, allergy, autoimmunity, sepsis, and graft vs. host disease.

Non-Technical Summary: We study beneficial outcomes from interactions between microbes and the host. We identified a molecule, EPS, from a common soil bacterium that has anti-inflammatory effects on the immune system. This safe and effective molecule, when introduced into recipients, can protect from several inflammatory diseases, including Traveler's diarrhea, bacterial sepsis, allergy, autoimmunity, and graft vs. host disease. Our research is focused on determining the mechanism by which EPS induces an anti-inflammatory response, with the goal of developing a drug for human use. The other major project in the laboratory is to determine how "good" microbes in the intestine contribute to development of a vibrant immune system, especially that of B lymphocytes.

Training Opportunities in the Knight Lab: Students, fellows, and residents who join Dr. Knight's lab can expect to receive training in fundamental immunology, biochemistry, and genetics. They will perform a wide variety of techniques, including flow cytometry, molecular biology techniques, biochemical and immunochemical techniques, and fluorescent microscopy.

Keywords: B lymphocytes; inflammatory diseases; immune cell development;

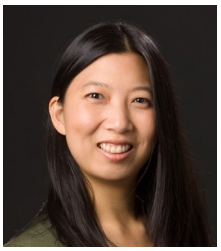
Adinarayana Kunamneni, PhD
Assistant Professor (Research)
Dept. of Medicine, Stritch School of Medicine
Loyola University Chicago

Summary of Research Activities: Our Antibody Discovery and Engineering laboratory interested in the molecular mechanisms of how proteins work and function in biological pathways and have enjoyed contributing in the early stages of developing the Antibody Ribosome display and Phage display libraries and tools for antibody discovery and engineering, exploratory PK, immunogenicity, and *in vivo* efficacy evaluation and enhancements aiming to treat diseases with unmet medical needs. Our current focus is developing tools and technology for antibody discovery and engineering with the ultimate goal of generating antibody diagnostics and therapeutics with desired properties. Ribosome display platform has harnessed the affinity maturation stage, a clever molecular biology tool to give rapid affinity maturation—more rapid than any other ribosome display out there. That has meant applying knowledge of molecular biology to technology in a clever way. Our research projects include COVID-19, Ebola, Zika, Lyme, Chronic pain, Ischemic Stroke, Thrombosis, Obesity, Desmin Myopathy, Lupus and Breast Cancer.

Non-Technical Summary: Our lab is interested in developing single-chain variable fragment (scFv) antibodies with potential as therapeutic or diagnostic agents. Using a unique ribosome display technology is producing mouse antibodies against a variety of peptides and proteins targets. During this process, sequence evolution and screening can be performed simultaneously. We select picomolar affinity antibody fragments from various *in vitro* antibody libraries [immunized antibody library (mouse immunized library)] against peptides and proteins. We can easily construct a ribosome display library which contains 10^{12} or more independent functional members after each randomization step and used for affinity selection. Our aim is to deliver panels of antibodies with high affinity and desired biological activity utilising murine immunization. In addition, the therapeutic use of these scFvs requires replacement of the mouse antibody constant regions with human antibody constant regions. This conversion essentially eliminates the human anti-mouse antibody (HAMA) response that develops in patients that are administered mouse scFvs. The long-term goal of our research is to improve treatment and well-being of patients with COVID-19, Ebola, Zika, Lyme, Chronic pain, Ischemic Stroke, Thrombosis, Obesity, Desmin Myopathy, Lupus and Breast Cancer.

Training Opportunities in the Kunamneni Lab: Students, fellows or residents who join Dr. Kunamneni's lab can expect to receive training in experimental methods in antibody discovery and engineering.

Keywords: Ribosome Display; Phage Display; Antibodies; Therapeutics; Diagnostics



Ivana Y. Kuo, PhD
Assistant Professor
Dept. of Cell and Molecular Physiology
Loyola University Chicago

Summary of Research Activities: Calcium is a ubiquitous intracellular signaling molecule, and dysfunctional signaling underlies many disease states ranging from cardiomyopathies to kidney failure. Our laboratory focuses on how intracellular calcium changes perturb cell function such as contractility for cardiomyocytes, or cell proliferation for renal epithelial cells. We employ a multidisciplinary approach ranging from the single cell, where we image live cell calcium transients, to animal models, where we assess cardiac function with echocardiography. Our research efforts have largely centered around the polycystin proteins and calcium regulatory proteins, which when mutated, result in genetic kidney disease (ADPKD), which is typified by renal cysts. Intriguingly, we have found that this protein is also present in the heart, where it appears to modulate the excitation- contraction coupling of the heart. Our goal: use the polycystin proteins as a template of proteins that can have important calcium signaling roles in multiple tissues. By understanding how such proteins function, we seek to gain a deeper understanding of the complex physiology of the heart and kidney, and harness such proteins as potential targets to restore calcium signaling when it goes awry in disease.

Non-Technical Summary: Cells communicate with each other and this communication is particularly important in organs where the whole organ needs to act cohesively. When communication breaks down, diseases such as heart or kidney failure are the unavoidable outcome. Our laboratory studies how cells use the molecule calcium to communicate with each other, within an organ, and between organs. We focus on how calcium levels within a cell are changed, in heart and kidney cells, and compare the differences between the two cell types. Acknowledging the differences that are shown by comparative studies can give us insights into how to modify and restore impaired calcium communication. We have concentrated our efforts on a calcium modifying protein, polycystin, which when mutated causes the genetic disorder polycystic kidney disease (PKD). We also investigate how this protein functions in the heart because cardiac failure is the leading cause of mortality for the PKD patient population.

Training Opportunities in the Kuo Lab: The Kuo lab welcomes enquiries from students, fellows, and residents curious about how cells and organs function. We encourage all members of the lab to have a multidisciplinary approach where we seek to answer our scientific questions at the cell level with intracellular imaging approaches, electrophysiology and biochemistry, and then complement such studies with non-invasive whole animal disease models.

Eden Lake, MD
Associate Professor
Program Director, Dermatology
Department of Medicine, Stritch School of Medicine
Loyola University Chicago

Summary of Potential Research Activities/Specialty:
As a member of the Medical Dermatology Society and the Society for Dermatology Hospitalists, I participate in national studies on cutaneous drug reactions. I also investigate psychological health with regards to complex medical dermatologic disease, as well as medication trials. Current medication trial involvement includes dupilumab for atopic dermatitis. Connective tissue disease and other complex dermatologic illnesses are also within my research interests.

Non-Technical/Lay-language Summary
Life-threatening drug reactions are complex and can cause severe mental and emotional stress. I research these topics as well as other quality of life studies. I take on projects with medical students and mentor them through the research process.

Training Opportunities available:
Most opportunities are available to our annual research fellow, dermatology residents and medical students. I specifically oversee and support STAR program research projects.

Keywords: DRESS, SJS/TEN, cutaneous drug reactions,
,

Kelly A. Langert, PhD
Assistant Professor
Dept. of Molecular Pharmacology & Neuroscience
Loyola University Chicago- Stritch School of Medicine
Research Health Scientist- Edward Hines, Jr. VA Hospital

Summary of Research Activities: Advances in biomaterials have enabled innovative new strategies to approach the way in which we treat disease. Further, successful novel treatment strategies can advance our understanding of mechanisms of disease. Our lab is focused on exploiting this philosophy as it pertains to inflammatory diseases of the central and peripheral nervous systems. As such, our ongoing projects include: 1) Optimization of a biomimetic, targeted delivery system – This project focuses on coating of biodegradable polymeric nanoparticles with leukocyte cell membranes for delivery to inflamed endothelium. 2) Repurposing of statins – This project focuses on targeted delivery of cholesterol-lowering statins as a novel anti-inflammatory therapeutic. 3) Identifying novel therapeutic targets – This project focuses on elucidating the mechanisms by which statins are anti-inflammatory. This will help us identify new therapeutic targets, and new compounds to put inside our delivery system.

Non-Technical Summary: Research in the Langert Lab incorporates topics in pharmacology, neuroscience, and bioengineering as we work towards the goal of advancing treatment options for inflammatory diseases of the CNS and PNS. Broadly, we are interested in targeted drug delivery- the idea that we can avoid side effects and toxicity by administering therapeutic compounds only to the affected sites. Strategies that we are exploring for targeted delivery include loading drugs into biodegradable polymeric nanoparticles, tuning the size and composition of the nanoparticles to facilitate controlled release, and modifying the nanoparticle surface to allow for adhesion and uptake.

Training Opportunities in the Langert Lab:
Research experiences in the Langert Lab can be tailored to pharmacology, neuroscience, or bioengineering-related aspects of our ongoing projects, pending the interests of motivated students, fellows, and residents. We have active laboratory space in CTRE and at Hines VA Hospital. Techniques and tools that we use include *in vitro* (endothelial cell culture) and *in vivo* (mouse and rat) models of inflammation, as well as materials synthesis and characterization.

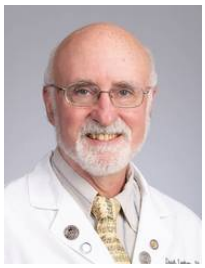
Keywords: Drug delivery, inflammation, endothelial, peripheral nerve, statin

Phong Thanh Le, PhD
Professor
Department of Microbiology and Immunology and
Department of Cancer Biology
Loyola University Chicago
Stritch School of Medicine Maywood, IL

My laboratory studies the biology of human thymic epithelial cells (TECs) in the developmental process of T cells from hematopoietic stem cells (HSCs). We interrogate human T cell development *in vitro* by establishing TEC lines from the pediatric human thymus. These TEC lines are then genetically modified to identify critical genes that support T cell development from the $CD34^{pos}$ HSCs. We have generated TEC line that overexpresses the Notch ligand Delta-like 4, the physiological ligand for the Notch receptor; Notch signaling is essential for initiating T lineage commitment in HSCs and promotes their development into mature T cells. Other molecules being studied are WNT3A and two critical components of the thymoproteasome, PSMB8, and PSMB11; both are involved in the generation of thymic- specific peptides for the generation of mature CD4 and CD8 T cells through the positive selection process. Lastly, a cell-free system established with exosomes from TEC lines is being investigated as an off-the-shelf "drug" to promote HSCs to develop into T cells. Our work has a significant impact on ameliorating T cell engraftment in patients receiving HSC transplant as a treatment for hematopoietic malignancies.

Non-Technical Summary: T cells are essential immune cells to defend against various pathogens. A deficiency in T cells such as the case of HIV or immunodeficiency diseases renders susceptibility to infections by various pathogens and predisposes an individual to cancer. With age, the ability to generate T cells is also reduced, resulting in an immune deficiency in the elderly. My laboratory employs cell culture and molecular techniques to investigate how to generate T cells from hematopoietic stem cells obtained from the bone marrow and umbilical cord blood. The approach is used to ameliorate the generation of T cells in patients receiving stem cells transplant to treat hematologic malignancy diseases. We have developed novel reagents obtained from cells generated from the human thymus to establish a cell-free platform to facilitate the process. The ability to produce the novel reagents in large quantity and in advance, allows us to provide the reagent on demand, thus speeding up and simplifying this therapeutic modality.

Training Opportunities in Le's Laboratory: Students, fellows, or residents who join Dr. Le's lab can expect to receive training in cell culture technique and genetic manipulation of the cultured cells. The trainees will also be trained in analyzing hematopoietic cells at the single cell level and at the cellular as well as at the molecular levels. Lastly, the trainees will gain extensive knowledge in the biology of T cells and their clinical implications.



David J. Leehey, MD
Professor
Department of Medicine, Division of Nephrology
Stritch School of Medicine
Loyola University Chicago

Summary of Potential Research Activities/Specialty: We do clinical studies of diabetic kidney disease. Currently, I am National Chair of a VA Cooperative Study evaluating whether the non-specific phosphodiesterase inhibitor pentoxifylline can improve outcomes in patients with diabetic kidney disease.

Non-Technical/Lay-language Summary: We study whether an older medication, pentoxifylline, can be repurposed to improve outcomes in diabetic patients with kidney disease.

Training Opportunities available: As a large ongoing multicenter study, there are no opportunities for trainees for the above project. However, Dr. Leehey is always interested in trainees who wish to do small projects or write papers about kidney disease.

Keywords (3-5 words that describes your interests): Diabetic kidney disease, kidney diseases.

Max J. Liebo, MD
Associate Professor of Medicine,
Division of Cardiology, Heart Failure/Heart Transplantation Medical Director, Mechanical Circulatory Support Program, Program Director, Advanced Heart Failure/Transplant Fellowship Loyola University Medical Center
Loyola University Chicago/Stritch School of Medicine

Summary of Research Activities: Our research investigates the clinical factors and interventions that influence long term outcomes in patients with heart failure, durable left ventricular assist devices (LVADs), and orthotopic heart transplantation (OHT). We prospectively collect demographic and clinical data as well as biological tissues (blood specimens and cardiac tissue from apical core during LVAD implant, explanted heart during OHT, and surveillance myocardial biopsy specimens after OHT) to be incorporated into three separate institutional outcomes registries for patients with heart failure, LVADs, and OHT. We retrospectively analyze our outcomes databases to identify demographic and clinical characteristics and biomarkers that are predictive of survival and other disease-specific complications (i.e. survival to OHT; LVAD-associated bleeding and thrombosis; OHT-associated coronary vasculopathy and allograft failure; etc.) in these cohorts. We also investigate the effect of medications that slow heart rate in patients with advanced heart failure and inotrope-associated sinus tachycardia and we investigate the effect of continuing (versus discontinuing) cardiac resynchronization therapy (CRT) in patients after durable LVAD implantation.

Non-Technical Summary: Our research seeks to understanding how various clinical and laboratory characteristics can be used to identify risk and improve candidate selection in patients with advanced heart failure (HF), prior to implementation of advanced HF therapies (i.e. LVAD and OHT). We attempt to better understand the role and limitations of a broad range of contemporary mechanical circulatory support devices (MCSDs, both temporary and durable) available to support patients awaiting heart transplantation. Additionally, we investigate the safety and efficacy of a novel medical therapy for patients with advanced heart failure requiring IV inotropic agents to support their heart function, as well as the benefits of contemporary cardiac resynchronization pacing in patients with advanced heart failure supported by a durable LVAD.

Training Opportunities in Dr. Liebo's Lab: Students, fellows, and residents who join Dr. Liebo's lab can expect to receive training in clinical research tools including hypothesis generation, database creation and maintenance, statistical analysis, and abstract/manuscript drafting and editing.

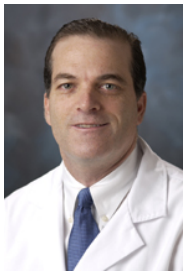
Terry R Light, MD
Professor and Chair Emeritus
Department of Orthopaedic Surgery and Rehabilitation
Loyola University Chicago Stritch School of Medicine

Summary of Research Activities: I am interested in the normal and anomalous development of the human hand. Earlier studies included histologic studies of resected musculoskeletal elements of anomalous hands, review of clinical series of children with congenital hand anomalies including syndactyly, polydactyly, cleft hand, radial dysplasia, ulnar dysplasia, macrodactyly, and early amnion rupture sequence. I have a particular interest in tethers or disruptions of longitudinal growth of forearm or hand bones. These disruptions may result from frostbite, burns, neonatal compartment syndrome, trauma, longitudinal epiphyseal bars, or anomalous fibrous tethers.

Non-Technical Summary: I am interested in understanding the normal and abnormal developmental anatomy and biology and growth of the human hand and forearm. This information helps understand the genesis of congenital limb abnormalities – a condition found in children throughout the world. These conditions create functional and aesthetic challenges for affected children and adults. This information is helpful in designing effective treatment for these disorders.

Training Opportunities in Dr. Light's Lab: Students, fellows, and residents who work with Dr. Light gain experience in literature review, IRB submission process, clinical case review and manuscript authorship.

Keywords: Congenital Hand, Growth Plate Injury, Bone Growth



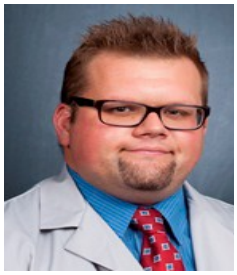
John J. Lopez, MD
Professor, Department of Medicine
Division of Cardiology, Director Interventional Cardiology Research
Stritch School of Medicine, Loyola University Medical Center

Summary of Potential Research Activities/Specialty:
Dr. Lopez working group focuses on intravascular imaging of coronary vessels, and atherosclerosis progression. We work with intravascular Optical Coherence Tomography and Intravascular Ultrasound Imaging via a database of > 800 imaging studies. They study clinical questions related to coronary plaque progression, plaque phenotypes and features of the fibrous cap on coronary atherosclerotic lesions. Their efforts also involve a longstanding collaboration with biomedical and medical imaging engineers from the University of Iowa, who are interested in novel methods of automating analysis of intravascular images, including use of machine learning.

Non-Technical Summary: Dr. Lopez focuses on analyzing images of coronary vessels in patients with coronary artery disease, using novel tools to analyze features of atherosclerosis. The images they use involve the ability to study coronary atherosclerosis with OCT, a tool that allows us to image plaque morphology at a resolution of 10microns, to better understand the features of atherosclerotic plaque in both stable and unstable coronary syndromes.

Training Opportunities: Dr. Lopez working group consists of medical students, residents, cardiology fellows and interventional cardiology fellows who have at least some dedicated time for clinical/translational research. They have a long history of working with the Stritch STAR program, and with the Department of Medicine resident research program. Researchers in our group will be trained and become familiar with analyzing intravascular imaging studies.

Keywords: coronary artery disease, intravascular imaging, atherosclerosis



Michael Majewski, MD
Associate Professor/ Associate Program Director
Department of Anesthesiology
Loyola University Medical Center

Summary of Research Activities: I have been involved in both small (N less than 100) and large multi-center trials at Loyola. As a clinical physician, I have been involved in studies related to regional and neuraxial anesthesia, transesophageal echocardiography, and cardiopulmonary bypass. We just published an analysis on 2D vs. 3D TEE measurement of the left atrium. I am in the initial stages of two cardiac surgery studies: one will look at acute kidney injury (AKI) incidence after cardiopulmonary bypass and another will look at venous oxygen saturation as a predictor of outcomes after cardiac surgery.

Non-Technical Summary:My research projects look at outcomes after cardiac surgery or regional anesthesia, and has the aim of providing guidance on best clinical practice on the basis of evidence that emerges from research, including my own.

Training Opportunities in Dr. Majewski's Lab: Students, fellows, and residents who join Dr. Majewski to assist in these projects will learn about all aspects of smaller research projects such as generation of a protocol, submitting a proposal to the institutional review board (IRB), data collection, statistical analysis, and publication and presentation. Interest in cardiac anesthesia, regional anesthesia, or resident education is beneficial as projects tend to cluster around one of these three areas.

Keywords: regional anesthesia, cardiothoracic anesthesia, transesophageal echocardiography, resident education

Herbert L. Mathews, PhD
Professor of Microbiology and Immunology
Stritch School of Medicine
Loyola University of Chicago

Summary of Research Activities: Physiological and psychological stressors impact the immune system, resulting in the dysregulation of normal immune homeostasis. Such dysregulation has a particular impact upon individuals who are debilitated or are compromised by medical intervention. These individuals are especially susceptible to invasive agents either of exogenous or endogenous origin. This lab focuses on understanding the impact of these stressors on the immune system to determine the molecular basis by which immune dysregulation results from these stressors, and to explore methods by which the immune system can return to normal homeostasis.

Non-technical summary: My research evaluates the effects of psychosocial and physiological distress on immune function in a number of different clinical paradigms. The focus: immune effector genes and function, and physiological and psychological constructs. My research places special emphasis on understanding the epigenetic basis for psychosocial-distress mediated immune-dysregulation.

Training Opportunities in the Mathews Lab: Students or fellows who join the Mathews lab can expect to receive training in cell and molecular immunology and epigenetics, including statistical approaches to large data sets.

James F. McDonnell, MD
Professor, Director of Pediatric
Ophthalmology & Adult Ocular Alignment
Loyola University Chicago

Summary of Research Activities: My research involves exploring the neuroprotective effect of natural compounds in ischemic and light-induced injury. We have used a rat model of retinal ischemia as well as phototoxicity to study the protective effects of compounds such as resveratrol, sulphoraphane, Kaempferol, (and even AZT) in ischemia and reperfusion injury as well as in phototoxic injury of retinal tissue.

Non-Technical Summary: My research focuses on understanding how natural compounds can be used in acute settings to preserve brain function in acute ischemic injuries such as stroke, trauma, and oxidative injury. Ultimately, we would like to develop a combination supplement that would ameliorate the effects of ischemic, traumatic, and oxidative neural injury. My research also explores supplements that can be used preventatively to preserve neural function in patients at high risk of neural ischemia or trauma, such as sports injuries.

Training Opportunities in Dr. McDonnell's (and Dr. Bu's) Lab's: Students can join ongoing studies in conjunction with Ping Bu, PhD in her lab (and me) and can expect to receive training in experimental methods involved in the rat model study. Additionally, trainees will develop heightened knowledge/expertise within the broader area of ischemic/reperfusion injury as well as antioxidant natural compounds.

Ruben Mestril, PhD
Assistant Dean, Basic Science Research & Postdoctoral Affairs
Professor of Physiology & Medicine
Research Integrity Officer

Summary of Research Activities: My research interests concentrate on the protective role of the heat shock proteins (hsps). A significant part of my work centers on the protective role of the hsps against myocardial ischemia. Through my research, I investigate how the hsps (a family of proteins present in all mammalian cells), protects skeletal muscle tissue against muscle injury. We have used a well-defined model of frostbite. Our studies showed that overexpression of a heat shock protein (hsp70) in transgenic mice preserves muscle tissue integrity by minimizing oxidative stress following cryolesion or frostbite as compared to muscle from wild type mice. We are working on using a non-toxic heat shock inducing compound, Alvespimycin (17-DMAG) which, when administered after frostbite injury, significantly minimizes skeletal muscle injury. This result raises the possibility that heat shock protein-inducing compounds may provide the basis of therapeutic strategies to ameliorate and reduce the recovery period following muscle atrophy.

Non-Technical Summary:
Many diseases and injuries including traumatic skeletal muscle injuries are debilitating and require bed-confinement and lengthy rehabilitation periods because of muscle atrophy. Treatments that can minimize skeletal muscle atrophy could lead to a faster recovery. Several studies show that heat shock proteins protect skeletal muscle against injury because they serve as the cell's own internal protective mechanism. Our previous studies show that administration of an hsp-inducing compound several minutes following frostbite injury, preserves muscle morphology and potentially functional capabilities. This raises the possibility that administrating hsp-inducing compounds may be an important therapeutic approach to minimizing skeletal muscle injury.

Training Opportunities in the Mestril Lab: Students, fellows, and residents who join Dr. Mestril's lab can expect to receive training in muscle cell and molecular physiology, as well as the function of the heat shock proteins.

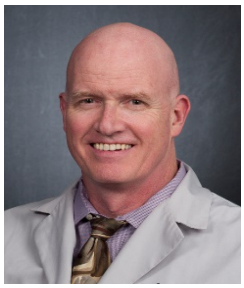
Whelton Miller, PhD
Assistant Professor
Department of Medicine, Department of Molecular Pharmacology & Neuroscience, Bioinformatics Program and Institute for Racial Justice
Loyola University Chicago

Summary of Potential Research Activities/Specialty: Understanding fundamental relationships starting from the quantum level can be essential to understanding the overall system. The Miller lab takes several computational approaches, including visualization, transition state modeling, ab initio, Density Functional Theory (DFT), and Molecular Dynamics (MD) for theoretical design and study of small molecular (organic) compounds, organometallic and inorganic compounds, computer-aided drug design (CADD), protein-ligand & protein-protein interactions, and structural electronic effects.

Non-Technical Summary: Dr. Miller's current research involves using computational chemistry techniques for theoretical design and study of chemical compounds, with a primary research focus on medicinal chemistry.

Training Opportunities: Students (undergraduate & graduate), postdoctoral scholars, and medical students who work in the Miller Lab can expect to receive training in computational science, with applications in translational research and precision medicine. Dr. Miller is always looking forward to more opportunities for minority student development and enrichment in the STEM-related disciplines.

Keywords: Bioengineering, Biophysics, Computer Aided Drug Design, Computational Science, Molecular Dynamics, Quantum Mechanics



Dennis M. Moore, MD
Assistant Professor
Department of Otolaryngology-Head and Neck Surgery
Loyola University of Chicago
Loyola University Medical Center

Summary of Research Activities: Dr. Moore's research interests include early identification of microbiology in external otitis, the role of PET/CT in the diagnosis of Necrotizing External Otitis, the natural history of Tiny Vestibular Schwannoma, the role of cochlear implantation in hearing loss rehabilitation in patients with vestibular schwannoma, and the acoustic properties of pulsatile tinnitus as recorded by bone conduction.

Non-Technical Summary: External otitis (swimmer' ear) is a common infection in children and especially adult diabetic patients. Evaluating a point of care test to identify the specific infective organism would be very helpful. Vestibular schwannoma (VS) is a benign tumor of the covering of the hearing nerve frequently requiring MRI imaging. Understanding the natural growth patterns of very small VS will allow quicker, less invasive MRI imaging. In addition, cochlear implants have just recently been introduced to treat severe hearing loss in patients with a treated or observed VS. Pulsatile tinnitus, usually described by affected patients as a rhythmic swishing sound in the ear, is usually evaluated by using a stethoscope. Alternative methods of listening/recording the sounds of pulsatile tinnitus are being explored, including bone conduction.

Training Opportunities: Students, fellows or residents who work and rotate with Dr. Moore's lab can expect to receive training in the anatomy, physiology and pathophysiology of diseases of the ear and related structures as well as see patients clinically with all types of ear disorders.

Keywords: External Otitis, Vestibular Schwannoma, Cochlear Implants, Pulsatile Tinnitus

Bryan C. Mounce, PhD
Assistant Professor
Department of Microbiology and Immunology
Loyola University Chicago

Summary of Research Activities: The Mounce laboratory has interests in virus- host interactions, specifically how viruses interact with metabolites within the cell. Within the human body, polyamines are abundant molecules, involved in several cellular and physiological processes. As obligate intracellular pathogens, viruses must use cellular machinery and materials to replicate successfully. We established roles for polyamines in replication diverse viruses, such as enteroviruses, arthropod-borne viruses (aboviruses), and respiratory viruses. Using biochemical, molecular, and cellular techniques, we probe how these viruses use polyamines and how we can target polyamines to reduce virus infection. The lab's overall goal is to define the mechanics of how viruses interact with cellular metabolic systems and how we can use small molecule inhibitors to target virus infection by altering cellular metabolism.

Non-Technical Summary: Viruses and cells battle for resources: the virus usurps cellular resources to replicate itself and produce more viruses, while the cell uses its resources to fight against viral infection and maintain its own processes. The Mounce lab focuses on how viruses and cells compete for polyamines, a valuable resource for both. Polyamines are small, positively charged molecules that have several functions in the context of the cell, including roles in nucleic acid conformation, regulating the cell cycle, and altering cellular translation. In addition, polyamines are important for many different viruses, from chikungunya virus to enterovirus to rabies virus. We are interested in how viruses use polyamines, as well as how viruses and cells "fight" for polyamines. Further, because the polyamine pathway is a notable therapeutic target, we are interested in how we can use inhibitors of polyamine biosynthetic enzymes to treat viral infection and, perhaps, other diseases.

Training Opportunities in the Mounce Lab: Students who join the Mounce lab will develop skills in molecular biology, cellular biology, biochemistry, and evolutionary biology. Work in the lab is focused on understanding mechanistic viral phenomena, at the level basic science and translational research levels.

Clodia Osipo, PhD
Associate Professor
Microbiology and Immunology, Cancer Biology
Loyola University Chicago

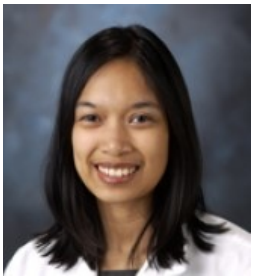
Summary of Research Activities: I am an experienced chemist and cancer biologist with over 25 years of training, expertise, and a love for science. My desire to eradicate cancer stem cells comes from personal experiences. My maternal aunt and a very good friend died from complications due to cancer. I feel a very strong commitment to finding a cure for cancer in order for more people to spend time with their families.

The Osipo laboratory focuses on determining mechanisms responsible for drug resistance in breast cancer. The main focus is the role of Notch signaling in cancer stem cells and how current standard of care increases canonical and non-canonical Notch-dependent cancer cells that are resistant and responsible for tumor recurrence. Collaborations are key to our success and include a team of basic scientists and clinicians including other Notch experts (Dr. Lucio Miele), medical oncologists (Dr. Kathy Albain), breast pathologists (Dr. Ping Tang), estrogen signaling (Dr. Suzanne Fuqua), and biostatisticians (Dr. Susan Hilsenbeck). Together, we strive to eradicate breast cancer.

Non-Technical Summary: How would you eliminate a beehive in your backyard? You could try to stamp out each bee individually, but they seem to come back, sometimes more aggressively. The key to eliminating a beehive is to eliminate the queen bee (responsible for generating the bees). A breast cancer is comprised of many different types of cells, similar to a beehive. A cancer stem cell is like a queen bee; it generates the entire tumor. Current therapies are very good at eliminating most of the tumor cells, but leave behind the cancer stem cell. This cell can resist most cancer therapies and remains alive to generate a new tumor that sometimes is more aggressive than the first. The Osipo lab focuses on discovering how to eliminate the cancer stem cell to prevent the tumor from returning and spreading. We test new ways to block a signaling pathway referred to as Notch, to kill cancer stem cells. The goal: prevent the tumor from returning and hopefully save lives.

Training Opportunities in the laboratory of Dr. Osipo: Students, fellows, and residents who join Dr. Osipo's lab will receive training in basic breast cancer biology using cell culture and animal models. Trainees will become experts in drug resistance and gain an understanding of how signaling pathways contribute to response and resistance to current and new treatments.

Keywords: Breast Cancer, Notch, Drug resistance, DAXX, MLL2, KMT2D, EPS, Probiotic, Cancer Stem Cells



Rochella Ostrowski, MD, MS
Associate Professor of Medicine, Division of Rheumatology
Department of Medicine
Loyola University Medical Center

Summary of Research Activities: Dr Ostrowski works with residents, fellows, and medical students on clinical research projects that investigate outcomes in general rheumatologic conditions. Most recent publications have involved the evaluation of relationships between anti-CCP titers and risk for interstitial lung disease, and cardiovascular risk. Additional topics of interest include include rheumatoid arthritis and giant cell arteritis. Currently, Dr Ostrowski is in collaboration with other investigators to investigate outcomes in sarcoidosis, including cardiac sarcoidosis.

Non-Technical Summary: Dr Ostrowski works with residents, fellows, and medical students on clinical research projects that investigate outcomes in general rheumatologic conditions. Most recent publications have involved the evaluation of relationships between anti-CCP titers and risk for interstitial lung disease, and cardiovascular risk. Additional topics of interest include include rheumatoid arthritis and giant cell arteritis. Currently, Dr Ostrowski is in collaboration with other investigators to investigate outcomes in sarcoidosis, including cardiac sarcoidosis.

Training Opportunities in the Ostrowski: Students, fellows or residents who work with Dr Ostrowski can expect to receive training in data collection and interpretation, as well as methodology and manuscript writing for completed research projects.

Toni R. Pak, PhD
James R. DePauw Professor and Chair
Department of Cell and Molecular Physiology
Loyola University Chicago Stritch School of Medicine

Summary of Research Activities: Our laboratory focuses on identifying the molecular mechanisms that drive nuclear receptor signaling in the brain and how those signaling pathways change across the lifespan. We currently have three major projects: 1) Ligand-independent estrogen receptor beta (ERβ) signaling in the aged brain. We have uncovered 3 key molecular factors that direct ligand-independent function of ERβ in the aged brain: receptor phosphorylation, alternative RNA splicing, and coregulatory protein interactions. We propose that these three processes are inter-linked and each contribute to the overall ERβ signaling signature in diverse tissues. 2) Regulation of microRNAs in the brain by estrogens, alcohol, and aging. Regulation of miRNAs is temporally specific to ensure appropriate production of select mature miRNAs at the correct life stages. Our long-term goal for this project is to gain a better understanding of how estrogens, age, and alcohol impact canonical miRNA biogenesis pathways. 3) Neurobiological consequences of adolescent binge alcohol exposure. We have demonstrated that adolescent binge-pattern EtOH exposure leads to dysregulation of glucocorticoid receptor (GR) signaling in the brain, which results in dysfunction of the adolescent and adult neuroendocrine stress response. In addition, we have shown that alcohol causes epigenetic changes through differential DNA methylation patterns and miRNA signatures that are propagated through future generations.

Non-Technical Summary: Nuclear steroid receptors are a large family of proteins that regulate genes. These receptors are required for mediating virtually all aspects of the body's main functions such as embryonic development, feeding behavior, thirst, reproduction, thermoregulation, stress responses, memory formation, and many more. Alterations to the normal signaling pathways of these receptors can result in a variety of diseases such as cancer, cardiovascular disease, obesity, and anxiety/panic disorders. Hormones are important activators for many of these receptors, however hormone levels can vary dramatically on a daily, monthly and annual basis and also across the lifespan. Therefore, these receptors must adapt to these changing hormone levels by modifying the cellular pathways they use to regulate genes. Our laboratory studies how these receptors change these pathways using molecular biology and proteomics approaches.

Training Opportunities in the Pak Lab: Students, fellows or residents who join Dr. Pak's lab can expect to receive training in RNA biology (including non-coding RNA), genetics/epigenetics, proteomics/mass spectrometry, neuroscience, molecular biology, and steroid hormone biochemistry.

Keywords: microRNA, noncoding RNA, brain, aging, estrogen, stress, epigenetics

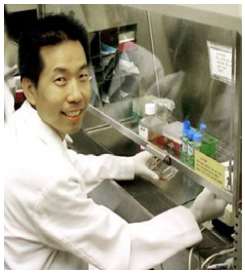
Amy Lauren Pittman, PhD
Associate Professor
Department of Otolaryngology, Head & Neck Surgery
Stritch School of Medicine
Loyola University Chicago

Summary of Research Activities: Dr. Pittman's area if interest is in clinical outcomes of reconstructive surgery after head and neck cancer. Specifically, her area of clinical expertise is microvascular free flaps utilized for reconstruction. They are mainly based in clinical research and that is where most of her research experience and time has been spent. Most of their outcomes of interest center around improving surgical outcomes in terms of function (speech, swallowing) as well as aesthetic form.

Dr. Pittman has also collaborated with Dr. Eileen Foecking and the basic neuroscience lab. They have worked on developing animal models for studying peripheral nerve injury and treatments. They have also developed an animal model for looking at wound healing in oro-cutaneous fistulae in rats.

Non-Technical Summary: Head and neck cancer surgery technically difficult and has been wrought with challenges. The goal of reconstruction has always been to preserve as much function and aesthetic form. Despite many advances in reconstructive techniques our research is aimed at identifying and improving wound healing, speech and swallowing, and aesthetic outcomes.

Training Opportunities: Students, fellows or residents who join Dr. Pittman's lab can expect to receive training in basic head and neck anatomy, physiology and disease process. They will research and gain an understanding of reconstructive techniques and why they are employed. As most of the research is clinical, the research experience would likely entail IRB writing, data collection, analysis and development of a manuscript.

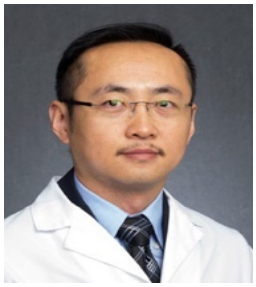


Liang Qiao, MD, Professor
Department of Microbiology and Immunology
Stritch School of Medicine
Loyola University Chicago

Summary of Research Activities:
My laboratory seeks to develop vaccines against pathogens and cancer using papillomavirus-like particles as a delivering vector. This vector is mucosa-tropic and activates antigen presenting cells, making it especially potent as a mucosal vaccine vector. We have made vaccines against HPV, HIV and colorectal cancer. Other vaccines against HCV and ZIKV are in progress. We study how innate immune cells are regulated and we plan to modulate innate immune signals to treat tumors and inflammatory diseases.

Non-Technical Summary: My laboratory seeks to develop vaccines against infectious diseases such as AIDS, hepatitis, and Zika virus infection. We also develop treatments for colorectal cancer. We use the shell of papillomaviruses to develop these vaccines and treatments. The shell does not cause any disease and it can be modified so that it can be used as a vaccine or treatment. We also study cells that fight against pathogens naturally and develop approaches to modulate them for therapies.

Training Opportunities in the laboratory of Dr. Qiao: Students, fellows or residents who join Dr. Qiao's lab can expect to receive training in immunology, vaccinology, and immunotherapy



Wei Qiu, PhD
Associate Professor
Department of Surgery, Department of Cancer Biology
Loyola University Chicago

Summary of Research Activities: Our laboratory studies the molecular mechanisms involving hepatocellular carcinoma (HCC) and alcoholic liver disease (ALD). Specifically, we investigate molecular signaling pathways that drive or mediate the development of HCC and ALD. Using molecular and cell biology techniques, state-of-art cell imaging, transgenic and knockout mouse models, and clinical samples, the goal is to advance our understanding of how HCC and ALD initiate and develop, which is critical for identifying more effective therapeutic strategies for the prevention and treatment of HCC and ALD. In addition, we are interested in studying the resistance mechanisms of FDA-approved targeted therapies (sorafenib, cabozantinib and immunotherapy) for HCC, which will help improve the efficacy of these drugs in treating HCC.

Non-Technical Summary: Our laboratory studies the molecular mechanisms involving hepatocellular carcinoma (HCC), the most common type of liver cancer and alcoholic liver disease (ALD). Using complementary methods including molecular and cell biology techniques, state-of-art cell imaging, transgenic and knockout mouse models, and clinical samples, we seek to advance our understanding of how HCC and ALD initiate and develop. This understanding will help us identify more effective therapeutic strategies for the prevention and treatment of HCC and ALD. We also study the resistance mechanisms of targeted therapies (sorafenib, cabozantinib and immunotherapy) for HCC, which will help improve the efficacy of these drugs as treatments for HCC.

Training Opportunities in the Qiu Lab: Students, fellows or residents who join Dr. Qiu's lab will receive training in experimental methods in molecular and cell biology techniques, and in vitro and *in vivo* liver cancer and ALD models. Trainees will develop heightened knowledge/expertise wthin the broader area of liver diseases.

Keywords: Cancer/Carcinogenesis; Liver Functions

Seth L. Robia, PhD
Professor, Department of Cell and Molecular Physiology
Co-Director, Cardiovascular Research Institute
Loyola University Chicago Office

Summary of Research Activities: Dr. Robia studies how the SERCA calcium pump governs the dynamic changes in calcium in the heart to coordinate muscle contraction and relaxation. Human heart failure is associated with disordered cardiac calcium handling, so SERCA is an important therapeutic target. We use a variety of biochemical and biophysical techniques to study transporter structure-function relationships including fluorescence spectroscopy, biochemistry, and molecular dynamics simulations. Key research methods used in the Robia lab include advanced fluorescence methods such as fluorescence resonance energy transfer and time-resolved fluorescence spectroscopy. We also use classical membrane protein biochemistry and molecular biology techniques to investigate how cardiac ion transport is regulated in health and disease.

Non-Technical Summary: The major focus of research in the Robia lab is a class of proteins called transport ATPases. These proteins are enzymes that use the energy of ATP to move small molecules across biological membranes. Transporters are critically important for the normal function of all cells. Diverse transporters pump nutrients in, pump toxins out, or create ion gradients used for cell signaling. We are particularly interested in a calcium transporter called SERCA. This pump is at the center of cardiac calcium handling. By increasing the pump's activity, the strength of the heart is increased to improve performance during exercise. Human heart failure is associated with disordered cardiac calcium handling, so SERCA is an important therapeutic target.

Training Opportunities in the Robia Lab: Students and fellows in the Robia lab become experts in biochemistry, molecular biology, fluorescence microscopy, cell culture, and cardiac physiology. Former students have received fellowships at institutions including Johns Hopkins, Northwestern, and Vanderbilt.

Keywords: Biophysics; Calcium Signaling; fluorescence; Heart Microscopy

Meharvan (Sonny) Singh, PhD
Vice Provost for Research, Loyola University of Chicago
Vice Dean of Research, Stritch School of Medicine
Professor, Dept. of Cell and Molecular Physiology
Loyola University Chicago

Summary of Research Activities: Our laboratory is interested in understanding how gonadal hormones, particularly estrogens, progestins and androgens, regulate brain function and influence the trajectory of brain aging or the development of age-associated neurodegenerative diseases. More specifically, we investigate the cellular and molecular mechanisms by which these hormones regulate the survival of brain cells (neurons and glia). Using cellular, molecular, biochemical and morphometric (microscopy) tools, the goal is to advance our understanding of how hormones function in the adult and aging brain so that we may be in a better position to identify safer and more effective therapeutic strategies for the prevention of age-related disorders like Alzheimer's disease and certain brain cancers (like glioblastoma multiforme). In addition, this research aims to identify biomarkers that predict disease risk as well as the success of a hormone-based intervention, and support the development and application of precision (personalized) medicine.

Non-Technical Summary: Our laboratory is interested in understanding how hormones, particularly estrogen, progesterone and testosterone, regulate brain function, in both health and disease states. Using complementary methods that allow the exploration of which elements of the brain cell's machinery, including DNA and RNA, are altered, we expect to advance our understanding of how hormones function in the adult and aging brain, and why men and women differ in their risks for various brain disorders that include Alzheimer's disease, stroke and cancer. We expect that the knowledge gained will help lead to safer and more effective treatments for the prevention of such age-related disorders. In addition, our research will yield insight into how we might use the measurement of certain proteins in blood to gauge the risk for a particular disease, in addition to predicting the effectiveness of a hormone in treating brain dysfunction.

Training Opportunities in the Singh Lab: Students, fellows or residents who join Dr. Singh's lab can expect to receive training in experimental methods in cellular and molecular neuroscience, in addition to developing heightened knowledge/expertise within the broader area of estrogen, progesterone and/or androgen function in the adult and aging brain.

Keywords: Estrogen, progesterone, Alzheimer's disease, Stroke, Neuroprotection

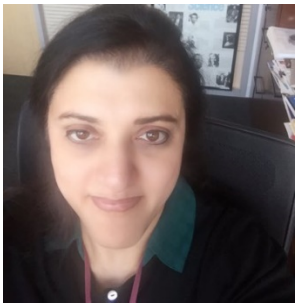
William Small Jr., MD
Professor and Chairman
Department of Radiation Oncology
Director, Cardinal Bernardin Cancer Center
Stritch School of Medicine, Loyola University Chicago

Summary of Research Activities: My research centers around clinical trial research, primarily through cooperative groups and investigator initiated studies involving breast cancer, gastrointestinal cancers, and gynecological cancers. Specific treatment modalities studied include the use of traditional radiotherapy, chemotherapy, Intraoperative Radiation Therapy (IORT), MRI-guided radiotherapy, and brachytherapy. I have also done bench and translational research in therapies to reduce radiation toxicity.

Non-Technical Summary: The ultimate goal of my research is to improve the lives of cancer patients by determining optimal treatment regimens, studying efficacy and toxicity, studying new concepts and technology, etc.

Training Opportunities in Dr. Small's Lab: Students, fellows or residents who participate in Dr. Small's research can expect to develop a deeper understanding of the field of radiation oncology and its use in treating various types of cancer. Research projects are conducted with input and mentoring by seasoned faculty members.

Keywords: Breast, Gynecological, Gastrointestinal, Translational, Toxicity



Monsheel Sodhi B. Pharm. M.Sc. Ph.D.
Assistant Professor
Molecular Pharmacology and Neuroscience
Stritch School of Medicine
Loyola University Chicago
http://sodhilaboratory.strikingly.com
msodhi@luc.edu

Summary of Research: Our goal is to understand the molecular basis of psychiatric disorders that predispose individuals to suicide. We investigate gene expression in postmortem brain from cohorts of individuals with schizophrenia, bipolar disorder and major depression, including cases of suicide. Our recent work revealed that an *epitranscriptomic* process known as RNA editing, is elevated in the dorsolateral prefrontal cortex (DLPFC) of depressed suicides. In addition to studies of human brain, we are testing the *effects of stress on mouse behavior and neurochemistry*. RNA editing regulates brain development and synaptic plasticity, which are impaired in psychiatric disorders, including schizophrenia and depression. Our results suggest that prenatal stress triggers abnormalities in the glutamate system and in RNA editing, which may be precursors for psychiatric illness. The objective of this research is to identify new targets for improved *therapeutic interventions* and to *discover biomarkers* with which we can predict suicidal behavior, to facilitate the development of improved treatments.

Non-Technical Summary: We aim to understand how brain chemistry is disrupted by genes and the environment, leading to mental illnesses such as depression or schizophrenia. These disorders increase the risk of death by suicide. We test these questions in human brain tissue, and in mice exposed to stress during brain development. Understanding which genes are disrupted in these disorders will accelerate the development of safer and more effective treatments for mental illness and prevention of suicide. In addition, we will discover biochemical predictors of suicide risk that could be developed for the assessment of suicide risk, so that timely intervention is possible.

Training Opportunities in the Sodhi Lab: Students, fellows or residents who join Dr. Sodhi's lab can expect to receive training in molecular genetics, gene expression studies of human tissue, behavioral pharmacology, mammalian cell culture, in addition to gaining expertize in the broader area of the neuropharmacology of schizophrenia, mood disorders and suicide. Students learn how to form and prioritize hypotheses, design rigorous studies to test those hypotheses, conduct experiments, record and analyze the data generated. Trainees are also trained to present their data at professional meetings and in scientific journals. Lab alumni have built careers in the pharmaceutical or biotechnology industries and academia.

Keywords: Schizophrenia, suicide, depression, genetics, gene expression, drug discovery

Evan B. Stubbs, Jr., PhD
Research Health Scientist Edward Hines Jr. VA Hospital
Professor, Department of Ophthalmology
Loyola University Chicago Health Sciences Division

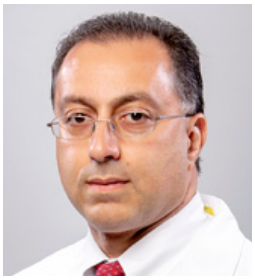
Summary of Research Activities: Generous support from various funding agencies including the Department of Veterans Affairs, National Institutes of Health, and several private foundations have allowed the Stubbs lab to pursue our primary research interests focused on developing novel therapeutic strategies for the clinical management of neuropathies. One such strategy being developed in the Stubbs lab utilizes a novel nanoparticle-based local drug delivery platform for the treatment of Guillain-Barré Syndrome (GBS), a prominent and debilitating acute inflammatory demyelinating disorder of the peripheral nervous system (AIDP). Our recently published experimental studies demonstrate that peri-neural administration of lovastatin-encapsulating PLGA nanoparticles significantly attenuate the clinical severity of EAN, an established animal model of AIDP/GBS. Statin-associated neuroprotection was found to significantly limit transendothelial trafficking of autoreactive leukocytes into peripheral nerve by disrupting isoprenylation of Rho GTPases. Statins similarly were found to alter Rho GTPase signaling in primary human trabecular meshwork (TM) cells. Human TM cells play a key role in regulating aqueous humor (AH) outflow / intraocular pressure. For reasons that remain unclear, AH outflow through the trabecular meshwork is impaired in patients with primary open angle glaucoma (POAG) leading to elevated intraocular pressure and ultimately glaucomatous neuropathy. Using our nanoparticles as a platform, we are able to deliver deep within the TM various encapsulated therapeutic agents, including novel mitochondrial-targeted antioxidants. It is here where these agents may have the greatest therapeutic impact for the management of POAG by minimizing or preventing oxidative-injury associated increases in outflow resistance. A third neuropathic disorder that the Stubbs lab studies in association with clinical colleagues is diabetic neuropathy, a very common metabolic neuropathy that significantly alters the quality of life for millions of people worldwide. Bringing together specialists in neurology and exercise physiology, we successfully conducted a VA-funded single site randomized clinical trial looking at the impact that moderate-intensity aerobic or strength-training exercise elicits on the progression of polyneuropathy among glycemic-controlled type 2 diabetic Veterans. Qualitative findings from this study suggest that a short-term (12-week) course of aerobic physical exercise may very well improve sensory, but not motor, nerve fiber function independent of glycemic control. Although the mechanism for this remains speculative, our experimental studies show that aerobic exercise can significantly delay the onset of neuropathic pain, in part, by attenuating calcium channel function within small diameter DRG neurons by altering opioidergic tone.

Non-Technical Summary of Research Activities: The Stubbs lab is actively engaged in the development of novel therapeutic strategies for the treatment of various types of diseases that selectively affect the bodies peripheral nerves as well as those that are responsible for helping us perceive our visual world. Using nanotechnology, the lab capitalizes on biomedical engineering advancements to produce microscopic sized particles that are then used to deliver novel therapeutic agents directly to the site of nerve injury thereby minimizing undesirable side-effects often observed with systemic delivery of the same agents. Patients with metabolic disorders such as diabetes often develop serious complications that impair nerve function more uniformly throughout the body. To help these individuals, a different therapeutic approach is needed that has a more wide-spread effect. Physical exercise is well known as an effective adjunctive strategy by which to manage blood glucose levels among diabetic patients. As an already established and proven therapeutic strategy, we are advancing this approach clinically to determine whether a non-invasive program of physical exercise type will prove just as effective at slowing or halting the progression of nerve injury among patients affected by this common metabolic-associated

nerve disorder.

Training Opportunities in the Stubbs Lab: Motivated graduate students seeking advanced Master or Doctorate level degrees in biochemistry, neurochemistry, cellular or molecular biology who join the Stubbs lab can expect to receive hands-on one- on-one training in the neurosciences using state of the cellular and molecular quantitative approaches. Students in training will be develop and master critical skills in experimental design, assay development, data analysis and data interpretation using appropriate parametric or non-parametric statistical measures. Students will learn how and when to evaluate programmatic progress and develop critical skills in implementing alternative design strategies while recognizing progress-delaying pitfalls. While in the Stubbs lab, students will develop and master vital interpersonal communication skills including how to best market and present original research findings at local, national, and international scientific meetings. Students of the Stubbs lab can expect to complete their training by learning first-hand how to prepare and disseminate original research findings not only through the production of a high-quality faculty reviewed and approved thesis/dissertation but also publishing their findings in high-impact peer-reviewed scientific journals. The student can be assured that masterful completion of these and other skill within the Stubbs lab will lead to professional advancement opportunities at and beyond the postgraduate level in the biomedical sciences.

Keywords: Experimental Autoimmune Neuritis, Guillain-Barre Syndrome, Glaucomatous Neuropathy, Diabetic Neuropathy, Statins



Rodney Tehrani MD
Professor of Medicine
Division of Rheumatology, Allergy and Immunology

Summary of Research Activities: The Division of Rheumatology is active in clinical research that is focused on rheumatologic diseases and their effects on the patient's functional activity in relation to their day to day living. This is studied in relation to the mechanisms of disease, clinical manifestations, and patient treatment options. Research predominately involves retrospective studies and case reports, but may also include clinical trials. The Division also works in collaboration with basic science researchers on projects that span from benchtop to clinical care. Presently, this includes a collaborative study focused on understanding the role of complement in Sjogren's syndrome. Rheumatology is also active in patient centered research as noted by a collaborative PCORI study with University of Alabama to determine if the dissemination of SLE educational materials to patients at clinical visit to improves the overall care of SLE patients.

Non-Technical Summary: The Division of Rheumatology is active in clinical research. The Division is active in retrospective studies involving general rheumatologic diseases in addition to collaborative works with other Divisions with an overlap of diseases. In addition, the Division also has a focus of patient centered research. The goal of the research in Rheumatology is to advance the treatment of rheumatologic care for our patients to improve their lives, health and well-being.

Training Opportunities: Students, residents and fellows who participate in research in the Division of Rheumatology will expect to receive training in clinical research focused on retrospective and patient centered studies.

Keywords: Rheumatologic Diseases, Autoimmune Disorders

Andrew T. Ulijasz, PhD
Assistant Professor
Microbiology and Immunology
Loyola University Chicago

Summary of Research Activities: Our research centers around how bacteria sense their host environment to enable their survival. Our lab works with two major pathogens, the Gram-positive Streptococcus pneumoniae, a major causative agent of lung and many other infections, and Pseudomonas aeruginosa, a Gram-negative, which is problematic in burn victims and the major cause of death in individuals with cystic fibrosis.

In S. pneumoniae, we identified a novel, multi-component signaling system which we hypothesize senses cellular metabolite changes during stress and changing host environments, ultimately enabling serious downstream infections. We research the genes this system ultimately regulates, and how it works at a mechanistic level. Importantly, the signaling system is conserved in all Gram-positives, and components of it are conserved in all life, indicating potential for novel and broad-spectrum therapeutic development.

P. aeruginosa and most pathogens require heme and iron to thrive in the host environment. However, many of the genes required for regulation of heme synthesis and uptake remain enigmatic. To help resolve this problem, we invented MetSeq (for Metabolite tn-Sequencing), a new, high-throughput method to identify all genes required for maintenance of a cellular metabolite of interest in any organism, MetSeq was used to identify many novel genes involved in heme metabolism, which have yielded surprising results that paint a picture of how P. aeruginosa and other pathogens might survive in the host when iron/heme are scarce. We are pursuing many exciting projects from these data.

Non-Technical Summary: Like humans, bacteria also must sense their surroundings to survive. This is especially important for bacterial pathogens when they enter the human host, where food becomes scarce and they need to avoid elimination by the immune system. Our lab seeks to learn how the important bacterial pathogens, Streptococcus pneumoniae and Pseudomonas aeruginosa, use their sensory systems to cause serious disease. To this end, our lab identified several avenues by which this occurs, and can ultimately illuminate novel vulnerabilities that may be exploited for therapeutic development.

Training Opportunities in the Ulijasz Lab: Students, fellows or residents who join Dr. Ulijasz's lab will receive training in microbiology, molecular biology, genetics, animal infection models, biochemistry, and structural biology. Combined, trainees learn a wide range of skills in microbiology as it relates to host infection, and importantly. Trainees will become excellent experimentalists (i.e. how to conceive, design, implement, and interpret experiments and scientific data).

Keywords: molecular mechanisms of bacterial pathogenesis, focusing on the human pathogen Streptococcus pneumoniae, and are also developing novel tools for molecular near-infra red (NIR) imaging of disease.

Roshni A. Vasaiwala, MD
Assistant Professor of Ophthalmology
Director of Cornea Service Line
Loyola University Medical Center and Stritch School of Medicine

Summary of Research Activities: Graft versus host disease, a complication after hematopoietic stem cell transplantation, occurs when T cells and other immune cells from the donor bone marrow attack the recipient's cells. Manifestations of this disease include ocular GVHD, which presents as severe ocular surface disease. Dr. Vasaiwala's research investigates the structural and functional changes in the Meibomian glands due to ocular GVHD using meibography and how this affects the ocular surface staining, tear breakup time, tear production, and patient symptoms. We look at the safety and efficacy of a new treatment modality known as Lipiflow Thermal Pulsation System, specifically in this patient population, as an early treatment option for ocular surface disease.

Non-Technical Summary: Dr. Vasaiwala researches dry eye and ocular surface disease in individuals who have received bone marrow transplants and suffer from graft versus host disease. We look at the structural and functional changes of the Meibomian oil glands on the eyelids in these patients and how these contribute to their dry eye symptoms. We investigate the effectiveness of a new dry eye treatment called Lipiflow Thermal Pulsation System in this patient population, as an early treatment to prevent the late stages of their ocular surface disease.

Training Opportunities with Dr. Vasaiwala: Students interested in ophthalmology or who want to gain exposure to ophthalmology, are invited to contact Dr. Vasaiwala to discuss opportunities for joining these research projects or starting a related project.

Kavitha Vellanki, MD
Associate Professor of Medicine
Program Director, Nephrology Fellowship Program
Department of Medicine, Stritch School of Medicine
Loyola University Chicago

Summary of Potential Research Activities/Specialty: Primary focus is on mentoring students/residents/fellows in conducting clinical research on kidney related outcomes in AKI/CKD/Pregnancy.

Non-Technical/Lay-language Summary: To help trainees in coming up with projects in their related areas of interest specific to kidney health or disease.

Training Opportunities available: Students, fellows or residents who work with Dr.Vellanki can expect to receive guidance on writing research proposals, obtaining necessary clinical data and presenting their findings at national/local conferences.

Keywords: Acute Kidney Injury, Chronic Kidney Disease, Pregnancy and kidney disease, Women's health in kidney disease, End Stage Kidney Disease

Karen L. Visick, PhD
Professor and Graduate Program Director
Department of Microbiology and Immunology
Loyola University Chicago

Summary of Research Activities: Bacteria can form multi- cellular communities, or biofilms, in which individual cells are protected from environmental insults such as antibiotics by virtue of being encased in a protective matrix comprised of polysaccharides and other macromolecules and physiologically distinct from free-living, planktonic cells. Biofilm formation enhances the ability of bacteria to colonize surfaces, including host tissues and abiotic surfaces such as medical implants, making them problematic in various settings. We use the Vibrio fischeri - squid (Euprymna scolopes) symbiosis to study biofilms that form in the context of an animal. Our work shows that genes required for biofilm formation in laboratory culture are similarly required for symbiotic aggregation and colonization. Genetic conditions that enhance biofilm formation in laboratory culture also strikingly enhance symbiotic biofilm formation and colonization. This strong correlation provides an exceptional opportunity to develop and test hypotheses about the mechanisms of biofilm formation and dispersal in bacterial colonization of a eukaryotic host. In addition to studying this benign microorganism, we apply our knowledge to the understanding of pathogens.

Non-Technical Summary: Bacteria can exist in a type of multi-cellular community known as a biofilm. In this community, individual cells produce molecules such as polysaccharides, that protect them from antibiotics as well as from normal immune defenses. Because biofilms can be problematic when they form in the human body and in nature, it is important to understand how biofilms form, and how they can be induced to disassemble or disperse from the biofilm. Our work studies biofilms that form in the context of an animal using a simple animal model, the symbiosis between the invertebrate squid Euprymna scolopes and the bacterium Vibrio fischeri. In this symbiosis, the bacteria generate a transient biofilm that promotes the subsequent colonization by the bacteria. We investigate how the bacteria control biofilm formation and dispersal in laboratory culture and ask if the same processes are important during interactions with the animal host.

Training Opportunities in the Visick Lab: Students, fellows or residents who join Dr. Visick's lab will receive training in bacterial genetics, gene regulation, microbe-host interactions, and bacterial biofilm formation.

Keywords: Biofilm, microbe-host interactions, signaling, colonization

Anuradha Wadhwa MD FASN
Associate Professor
Division of Nephrology
Department of Medicine
Stritch School of Medicine, Loyola University Chicago

Summary of Potential Research Activities/Specialty: My research is primarily focused on kidney disease education, home dialysis, reducing frailty and improving patient quality of life.

Non-Technical/Lay-language Summary: We study measures to improve outcomes for patients with kidney disease.

Training Opportunities available: Students, fellows or residents who join Dr. Wadhwa's research projects can expect to learn about kidney disease and be involved in clinical research on improving outcomes of patients with kidney disease.

Keywords: kidney disease education, home dialysis, frailty, dialysis, transplantation

Alan, J Wolfe, PhD
Professor, Dept. of Microbiology and Immunology
Co-Director, Loyola Urinary Education and Research Collaborative
Loyola University Chicago

Summary of Research Activities: My laboratory is comprised of a translational and a basic science group. The translational team debunked the dogma that the urinary bladder is sterile. It is now clear that microbes inhabit the bladders of children and adults with and without lower urinary tract symptoms. Our overarching goal is to understand how these microbes influence bladder health and disease. We study children to determine when the bladder becomes colonized and to reduce voiding disorders, pregnant women to reduce pre-term birth, and older adult men and women to reduce lower urinary tract disorders, including overactive bladder, urinary tract infections, and kidney stones. We also study the microbes and their genomes, to understand how they interact with each other and with the host. The other group studies acetylation, a post-translational modification long thought to be limited in bacteria. By altering protein structure and thus protein function, acetylation can regulate bacterial function and behavior. We report that acetylation regulates carbon flux through central metabolism. We focus on the bacterial ribosome and acetylation's influence on translation.

Non-Technical Summary:My laboratory is composed of two groups. One group recently debunked the century and a half old dogma that the urinary bladder is sterile. Now that we know that microbes inhabit the bladder, we are learning how and when these microbes influence bladder health and disease. We study children to determine when the bladder becomes colonized, pregnant women to reduce pre-term birth, and adults to reduce lower urinary tract disorders, such as overactive bladder, urinary tract infections, and kidney stones. The other group studies acetylation, a mechanism bacteria use to alter protein function and thus their behavior. Our efforts to understand acetylation are expected to increase yields of biofuels and other secondary metabolites, and enhance development of novel anti-microbial therapies.

Training Opportunities in the Wolfe Lab: Students and post-doctoral fellows, as well as clinical residents and clinical fellows who join Dr. Wolfe's lab will receive transdisciplinary training across diverse fields, including microbiome science, bioinformatics, comparative genomics, bacterial genetics, basic and clinical microbiology, and molecular biology. Basic science and clinical trainees interact daily. The intent is to train individuals who bridge the scientific and medical worlds.

Keywords: Microbiome, metabolism, urology, acetylation, genome

Yee Ling Wu, PhD
Assistant Professor
Department of Microbiology and Immunology
Loyola University Chicago

Summary of Research Activities: Inflammation is normally a protective host response to ensure timely elimination of pathogens and toxins. However, uncontrolled or chronic inflammation causes tissue injuries and diseases. Using in vitro assays, animal models, and patient samples, our research team studies mediators of inflammation including antibodies and complement in diseases. Specifically, we focus on two areas. We study the molecular mechanisms that regulate the generation of IgE, the major antibody mediator in asthma and allergies. We investigate the formation of different B cell subsets (i.e. memory B cells and plasma cells) and aim to determine the processes and factors that render them producing allergen-specific IgE. We investigate the genetic diversities and protein polymorphisms of human complement C4 in the pathogenesis of autoimmune diseases such as systemic lupus erythematosus, antiphospholipid syndrome and Sjögren's Syndrome. We elucidate how activated complement proteins crosstalk with platelets, endothelial, and immune effector cells to mediate different clinical manifestations in these diseases. Our goals: understand fundamental biology and uncover new targets for therapeutic interventions in these diseases.

Non-Technical Summary: Our research team studies the molecules and processes that lead to uncontrolled inflammation in diseases. Specifically, we study the molecular and cellular events that regulate the production of allergen-specific IgE antibodies in asthma and allergies. We also investigate the new roles of complement proteins (classically known for their functions in host defense) on mediating the clinical manifestations in autoimmune diseases such as lupus, antiphospholipid syndrome and Sjögren's Syndrome. We seek to generate new knowledge on fundamental biology and identify novel therapeutic targets.

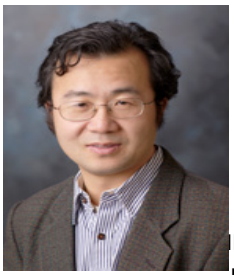
Training Opportunities in the Wu Lab: Students, fellows or residents who join our research team will receive training in molecular biology, immunology and genetics, and develop expertise in researching the pathogenesis of antibody- or complement-mediated diseases.

Nancy J. Zeleznik-Le, PhD
Professor and Chair
Department of Cancer Biology Professor
Department of Medicine
Loyola University Chicago

Summary of Research Activities: My laboratory seeks to understanding how oncogenic MLL fusion proteins cause aggressive MLL leukemias and how this information could inform novel therapeutic approaches for this devastating cancer. Our focus is on structure-informed functional studies of the chromatin regulators MLL and the MLL fusion partners such as AF9 (MLLT3) and ENL (MLLT1), to understand their gene regulatory mechanisms. The wildtype MLL, AF9 and ENL proteins normally function as master regulators of critical gene expression pathways via chromatin epigenetic reader and writer mechanisms. In contrast, the oncogenic MLL fusion proteins cause misregulated expression of these same MLL target genes. We use a variety of complementary approaches including in vitro and in vitro leukemia models, normal hematopoietic stem and progenitor cell analyses, and advanced molecular and cellular techniques. Our research has implications for improving normal hematopoietic stem cell function and determining mechanisms that might be amenable to therapeutic targeting of MLL leukemia.

Non-Technical Summary: Our laboratory seeks to understand how gene changes that create a specific type of oncogene cause MLL Leukemia, a particularly aggressive type of leukemia. We study how each part of this oncogene contributes to the development of this cancer and try to determine new ways to interfere with these functions. We study how the normal versions of these genes usually work to maintain normal blood cell development. Both the cancer-causing and the normal blood development mechanisms involve regulating the expression of critical genes through processes that depend on chromatin (specific packaging of DNA and proteins). We use a variety of methods that include several different models of leukemia, along with advanced molecular and cellular assays, for our research.

Training Opportunities in the Zeleznik-Le Lab:Students, fellows or residents who join Dr. Zeleznik-Le's lab will receive training with in vitro and *in vivo* models of leukemia and hematopoiesis, molecular biochemical and functional assays for epigenetics, transcription, gene regulation, and protein function. They also will gain a broad knowledge of chromatin-mediated gene regulation, normal hematopoiesis, and leukemia.



Jiwang Zhang, MD., PhD
Professor, Departments of Pathology
Cancer Biology Director, Cancer Signaling Program
Loyola University Chicago

Summary of Research Activities: Our laboratory is committed to understanding how the molecular signals that emerge from the bone marrow (BM) micro-environmental niche regulate normal hematopoiesis and how deregulation of such signaling is involved in the pathogenesis of hematopoietic disorders. Specifically, we have identified: 1) factors from the normal BM niche which regulate self-renewal of hematopoietic stem cells (HSCs). We want to use such factors to stimulate the expansion of HSCs in in vitro culture for to improve the success of transplantation therapy and to induce hematopoietic regeneration in conditions of BM failure; 2) factors and related signals from diseased BM which are causally involved in disease initiation, progression and/or drug- resistance. We intend to use such his information to develop novel medications for the purpose of preventing the progression of pre-leukemia to leukemia, and to develop targeted therapies to combat drug-resistant cases of leukemia. We use unbiased systematic techniques such as RNA sequencing (from RT-PCR) and shRNA/Crispr screening assays in our factor identification process. We then use both in vitro culture assays and *in vivo* animal models to functionally verify these factors. Finally, we always seek the goal of translating our discoveries by further evaluating our findings in primary patient samples and xenograft models.

Non-Technical Summary: Our laboratory is interested in understanding how blood stem cells (BSCs) are regulated in both normal and diseased bone marrow (BM) environments. BSCs are the fundamental cells that give rise to all of the many types of cells in our blood.
We identified biochemical factors from the normal BM environment that can stimulate the expansion of healthy BSCs. We want to use such factors to treat individuals who suffer from reduced blood cell production. We also intend to use such factors to culture BSCs outside of the body to grow sufficient numbers of BSCs to improve the success of transplantation therapy. 2) We study molecular signaling changes in the BM environment as pre-leukemic blood conditions progress to leukemia; we also want to understand how the BM environment changes before and after treatment. We want to identify molecular targets to help in the development of drugs for preventing the development/progression of leukemia, as well as disease relapse, by targeting leukemic BSCs with medications. We use in vitro cell culture techniques and *in vivo* animal modeling of leukemia to identify chemical factors and signals that cause and promote the as well as other blood malignancies. We evaluate our discoveries in human samples and xenograft animal models and expect to apply our research findings to improve the success of clinical treatment of pre- leukemia and leukemia by collaborating with Loyola clinical specialists.

Training Opportunities in the Zhang Lab: Students, fellows or residents who join Dr. Zhang's lab will receive training in experimental methods for the analysis, isolation, in vitro culture, and *in vivo* transplantation of BSCs as well as in Crispr-Cas9 and shRNA assays for the unbiased screening of molecular targets. They also will learn how to develop pre-leukemia and leukemia animal models for the pre-clinical study and evaluation of hematologic disease pathogenesis and treatment.

Keywords: Bone Marrow; Gene Regulation; Leukemia; Oncology; Signal Transduction; Stem Cell

Aleksey V. Zima, PhD
Associate Professor
Dept. of Cell and Molecular Physiology,
Stritch School of Medicine
Loyola University Chicago

Summary of Research Activities: The long-term goal of our research is to define the cellular and molecular mechanisms that control cardiac calcium homeostasis in the normal and disease states, with particular focus on the ryanodine receptor calcium release channel. The laboratory focuses on the molecular mechanisms that cause ryanodine receptor dysfunction during oxidative stress and how this may contribute to abnormal cardiac function during pathologies (such as myocardial infarction and heart failure). In addition, our research aims to define the molecular mechanisms that regulate active calcium transport in the sarcoplasmic reticulum. In our laboratory, we use advanced molecular biological techniques, *in vivo* gene delivery and high resolution calcium imaging.

Non-Technical Summary: Heart function vitally relies on precisely controlled intracellular calcium regulation. In cardiomyocytes, the majority of calcium is released from the sarcoplasmic reticulum as a result of activation of a special calcium release channel: the ryanodine receptor. Mechanisms controlling the ryanodine receptor function represent critical sites at which contractility and intracellular calcium homeostasis can be regulated. Defects in the ryanodine receptor regulation cause contractile dysfunction in a variety of cardiac diseases. Since the most common cardiac pathologies (such as infarction and heart failure) are associated with oxidative stress, the main goal of our research is to define the molecular mechanisms of the ryanodine receptor dysfunction during oxidative stress.

Training Opportunities in the Zima's Lab: Students, fellows or residents who join Dr. Zima's lab will receive training in different experimental methods, including confocal microscopy, electrophysiology and molecular biological techniques.

Keywords: calcium homeostasis, ion channels, ion pumps, heart

Marcella Niehoff School of Nursing (MNSON)
Press Book

Patricia (Patti) A. Bachmeier, RN, MSN, SCRN, CMSRN
Instructor, Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: My overall interests are investigating the use of simulation and serious gaming in the classroom to enhance student engagement and learning. Using a standardized patient, the goal was for the students to implement content from theory to a patient who was being seen at the healthcare providers office with ailments recently discussed in the classroom. As an alternative to the simulation, serious gaming was investigated as a tool to engage students in the classroom setting. In addition, I have also participated in the investigation of the pre-licensure nursing students ability to apply concepts of nursing presence, taught in theory, to the patient care setting of their clinical courses.

Moving forward, I will be working on incorporating technology into the classroom to meet the needs of different types of learners in the classroom. With the upcoming Next Generation NCLEX, it will be essential to incorporate a multitude of teaching strategies to assist students in application, clinical judgment and reasoning.

Lisa Burkhart, PhD, RN, ANEF (she/her)
Professor
Department of Health System, Leadership, & Policy
Marcella Niehoff School of Nursing
Loyola University Chicago

Technical Summary of Research Activities: As both Professor at Loyola University Chicago and Research Health Scientist at Edward Hines, Jr. VA Hospital, Dr. Burkhart has conducted research and led education initiatives at both sites. She is a health services researcher using mixed methods focusing on preventive care in ambulatory and community settings among adults with chronic conditions. Her current research, funded by the VA Office of Health Services Research & Development, is to create, validate, and pilot an automated decision support tool to prevent community-acquired pressure injuries among Veterans living with spinal cord injury (SCI) for use in the SCI Clinic (IIR 16-267, PI Burkhart). She is also PI on a study to compare wearable device platforms to monitor Veterans with SCI in the community to detection of complications (SPRT-OCCSA162). She is also collaborating with Dr. Solari-Twadell on a HRSA-funded grant to develop educational curricula that integrates social determinants of health in nursing acute care practice (US6HP47322, PI Solari-Twadell). Publication citations are available at: https://www.ncbi.nlm.nih.gov/myncbi/1BO2sSlKwk8EKI/bibliography/public/

Non-Technical/Lay-language Summary: Health services research explores quality, safety, and value in health systems. This includes mixed methods research (i.e., integration of qualitative and quantitative methods) to identify health process issues, identify solutions, and test the effectiveness of those solutions. Dr. Burkhart's research has focused on using technology to prevent complications among adults with chronic conditions, particularly Veterans living with spinal cord injury. Translating innovations into practice require innovations in curricula. Program initiatives have focused on primary and community care, social determinants of health, and interprofessional collaborative practice.

Training Opportunities available: Students, fellows, or residents who join Dr. Burkhart's research team can expect to receive training in health services research to promote preventive care.

Keywords: primary care, health services research, Veteran, spirituality, spinal cord injury, nurse

Regina Conway-Phillips, PhD, RN
Associate Professor
Department Chair
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: Dr. Conway-Phillips research interests are in the areas of breast cancer screening behavior in African American women, cancer disparities, health disparities and spirituality. She specializes in Qualitative Research Methodologies. Their most recent qualitative study utilized the grounded theory approach to study African American women who have never or rarely participated in breast cancer screening to explore the reasons these individuals have not adopted breast cancer screening behaviors.

She has served as the qualitative analysis expert for the Readiness Evaluation and Discharge Interventions (READI) study and the American Academy of Ambulatory Care Nursing Invitational Summit focus group. She has also served as the co-principle investigator on the Blue Cross Blue Shield Foundation Grant: RiSE (Resilience, Stress, and Ethnicity) to Prevent Cardiovascular Disease in African American Women and the Health EQ Grant: Race-Based Stress Reduction and Resilience Program for African American Women at Risk for Cardiovascular Disease. More recently, she has served as a content expert in Primary Care on the Loyola University School of Nursing HRSA N-PATH (Community-Promoting Access to Healthcare) grant and a qualitative collaborator on the Health EQ funded study Exploring Quality of Life, Symptom Burden and the Feasibility of a Lifestyle Intervention in Patients with Multiple Myeloma – a focus on African American Survivors.

She teaches in the undergraduate and graduate nursing programs at the Marcella Niehoff School of Nursing and in the undergraduate healthcare administration program.

Non-Technical Summary: Same as above

Training Opportunities: Dr. Conway-Phillips serves as PhD Dissertation Committee member, DNP Project Director and MSN Capstone Director for students focused on issues regarding health disparities, spirituality and qualitative research.

Keywords: Nursing, US Healthcare, Cancer Disparities, Health Disparities, African American (Black) Health Behavior, Spirituality and Qualitative research

Patricia Friend PhD, APRN-CNS, AOCNS, AGN-BC
Associate Professor and Program Director
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: Dr. Friend has advanced certification in oncology nursing, is board- certified in advanced genetics nursing, and is licensed as an APRN-CNS (Clinical NurseSpecialist). Her areas of expertise are in oncology and genomics, educational preparation of advanced practice nurses, online education, and interprofessional education and practice. Her doctoral dissertation work was supported by the American Cancer Society (doctoral scholarship) and a pre-doctoral fellowship (F31) from the National Cancer Institute. Her doctoral research, examining the interactions between stress and immune responses in women undergoing diagnostic breast biopsy, was funded by the National Cancer Institute, the Oncology Nursing Foundation, and the Chicago Chapter of the Oncology Nursing Society. She has experience with educational training grants as well, and currently leads a team of faculty supported by the NCI-sponsored Interprofessional Education Exchange (iPEX) Project, that is developing interprofessional education in palliative care.

Non-Technical Summary: Dr. Friend's main area of clinical scholarship and research interest is in the area of genetics/genomics. The implications of genomic discoveries for individuals and families will continue to expand rapidly. Health care providers and scientists/practitioners in all relevant fields will need to become proficient and expert not only in the scientific knowledge base in order to translate and apply genomic discoveries to improve health, but also in the skill of communicating and discussing genetic/genomic results as well as the impact of such result on families and familial relationships. She serves on the Genomics Advisory Board for the Oncology Nursing Society and is interested in improving genomic literacy of health care educators, students and clinicians.

Keywords: oncology, nursing, genomics, advanced practice nursing education

Lindsey Garfield, PhD, WHNP, RN
Assistant Professor
Marcella Niehoff School of Nursing
Institution: Loyola University Chicago

Summary of Research Activities:
Dr. Lindsey Garfield's research focuses on the associations of perinatal psycho-behavioral well-being (stress, depressive symptoms, anxiety, posttraumatic stress, sleep and fatigue) with biological markers (i.e., oxytocin, epigenetics, pro-inflammatory cytokines) and increase risk for adverse birth outcomes (preterm birth, low birth weight infants) among at-risk minority women. Dr. Garfield's research has expanded to include pro-inflammatory cytokines and DNA methylation as potential pathways by which perinatal stress and depressive symptoms increase risk for adverse birth outcomes among pregnant minority women. Dr. Garfield aims at identification of women at greatest risk for alterations in psycho-behavioral well-being through the use of objective biomarkers. Additionally, Dr. Garfield's research includes development of culturally relevant interventions to improve the psycho-behavioral well-being of perinatal, low income, minority women.

Non-Technical Summary: Dr. Garfield is interested in identifying biomarkers to identify perinatal women at risk for mental health disorders specifically perinatal depression and perinatal posttraumatic stress disorder. Dr. Garfield's research concentrates on low income minority women with an infant cared for in the neonatal intensive care unit. These women and their infants are at elevated risk for perinatal health disparities including maternal depression and poor infant development and growth. Dr. Garfield's research aims at identifying women in this at risk population who may benefit for further interventions to improve transgenerational health.

Training Opportunities in the Garfield Lab: Students, fellows or residents who join Dr. Garfield's research lab can expect to receive training in perinatal mental health, biomarker laboratory procedures, and participation in culturally relevant interventions.
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Thao Griffith, PhD, RN
Assistant Professor
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: Our team is committed to a patient-oriented research focusing on preterm infants. Robust evidence demonstrates that oral feeding skills require integrity of neurobehavior. Cumulative stress exposure during pre- and early postnatal periods may impair neurobehavior critical for oral feeding skills. Yet the extent to which cumulative stress exposure impairs development of oral feeding skills and the mechanism whereby this occurs is not known. We will incorporate epigenetic methodology with the established Early Feeding Skills Assessment, Neurobehavioral Assessment of the Preterm Infants, and NICU Network Neurobehavioral Scale to elucidate DNA methylation of glucocorticoid-related genes as predictors of oral feeding skills. The short-term goal is to understand the contribution of stress-related epigenetic alterations in the development of preterm infant oral feeding skills. The long-term goal is to leverage findings from the science of preterm behavioral epigenetics to develop innovative approaches that reduce the impact of early life stress exposure on preterm infant development.

Non-Technical Summary: Preterm infants are often challenged to feed orally, leading to growth and developmental delay, prolonged hospitalization, and increased health care cost. The ability to feed orally is dependent on neurobehavior, which can be impaired through epigenetic alterations due to early life stress exposure. Understanding the role of stress-related epigenetic alterations in the development of preterm infant oral feeding can guide future development of strategies to promote successful oral feeding and decrease health care cost.

Training Opportunities in the Griffith Lab: Students who join Dr. Griffith's team can expect to receive training in conducting literature review, descriptive and experimental design, in addition to developing knowledge/expertise within the broader area of preterm infant neurobehavior, oral feeding skills, feeding behavioral and physiological measures, multisensory massage intervention, the Early Feeding Skills Assessment, Neurobehavioral Assessment of the Preterm Infants, and NICU Network Neurobehavioral Scale.

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Audrey L. Klopp, PhD, RN, NHA
Clinical Assistant Professor
Director of Doctor of Nursing Practice (DNP)
Post-Master's Track
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: Dr. Klopp is an Assistant Professor in the Department of Health Management and Risk Reduction at Loyola University Chicago, Marcella Niehoff School of Nursing. She has taught students at the BSN, ABSN, MSN, and DNP levels. She has served as the Program Director for the DNP Program since 2013, and has been actively engaged in the development of the BSN-DNP programs. Dr. Klopp frequently serves a Director for MSN students' Comprehensive Examinations and DNP students' Scholarly Projects.

Non-Technical Summary: Dr. Klopp's professional background includes Advanced Practice Nursing as a Clinical Nurse Specialist, and executive leadership in senior living where she conceptualized, and helped design and operationalize humane and person-centered care for older adults living with dementia. She has published in the areas of body image, leadership, and dementia care. Dr. Klopp is an active member of the Suburban Cook County Area on Aging Advisory Council and supports initiatives on successful aging.

Carol T. Kostovich, PhD, RN, CHSE
Associate Professor
Assistant Dean of Innovative Educational Strategies and Simulation
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: Dr. Kostovich is interested in developing, implementing and evaluating innovative approaches to teaching that can be used in the classroom, online or in a simulation lab. The goal is to establish varied evidence-based teaching strategies that can be used by faculty teaching in both undergraduate and graduate programs. Strategies that engage the auditory, visual and kinesthetic learner are developed, tested and evaluated for their ability to assist students in achieving course outcomes. Dr. Kostovich also studies the phenomenon of nursing presence as an intervention to provide patient-centered nursing care. She developed the Presence of Nursing Scale (PONS) and the Presence of Nursing Scale- RN Version (PONS-RN) to measure elements of the nurse-patient relationship. Dr. Kostovich is interested in further evaluating the psychometric properties of the PONS and PONS-RN when used in varied populations, along with exploring the relationship between nursing presence and nurse sensitive patient outcomes.

Non-Technical Summary: Dr. Kostovich is interested in developing, implementing and evaluating innovative approaches to teaching that can be used in the classroom, online, or in the simulation lab. The goal is to establish varied teaching strategies that can be used effectively to engage students with all types of learning preferences.
Dr. Kostovich also studies patient-centered care and the therapeutic nurse-patient relationship, referred to as nursing presence. She has developed survey instruments to measure nursing presence and is exploring its relationship to patient care outcomes.

Training Opportunities: Students working with Dr. Kostovich will have the opportunity to gain experience in the development, implementation and evaluation of teaching-learning strategies, including simulation. Other opportunities include furthering the study of the phenomenon of nursing presence as an intervention to provide patient-centered nursing care.

Keywords: Teaching-Learning Strategies, Simulation, Teaching Innovation, Nursing Presence, Patient-Centered Care

Leah A. McClellan, BA, MSN
Instructor, Health Systems, Leadership and Policy
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: As a previous Assistant Project Director for the Chicago consortium of the Women's Interagency HIV Study, a multi-center, prospective cohort study, we investigated the progression of HIV in women. The main areas of focus include epidemiology of HIV, disease progression, treatment use and outcomes, and co-morbidities among HIV-infected women. National and local studies explore topics such as HIV therapy use and treatment, co-infection with HVC, metabolic abnormalities, HIV and aging, assessment of neurocognitive function, cardiovascular disease outcomes, women's reproductive health, socioeconomic determinants of health, and psychoneuroimmunology (PNI) in relation to HIV. As a research coordinator of a PNI study, I worked with the principal investigator to conduct research utilizing salivary cortisol, urinary melatonin and catecholamines, various biomarkers, and heart rate variability data.

In addition, as the coordinator for the International Humanitarian Surgical Team, through collaboration with local health care providers, we performed maxillofacial and general surgeries and created educational opportunities for nurses and doctors in Guatemala.

Non-Technical Summary: As a previous Assistant Project Director for the Chicago site of a large, national study, we investigated the progression of HIV in women. National and local studies conducted by principle investigators explore topics related to HIV therapy, disease outcomes, and disease progression. As a research coordinator of a PNI study, I worked with the principal investigator to collect data in order to study the interactions between the nervous and immune systems.

Training Opportunities in the McClellan's Lab: None at this time.

Alexandra Nowak, PhD, JD, RN
Assistant Professor
Marcella Niehoff School of Nursing
Loyola University Chicago

Technical Summary of Research Activities:
Dr. Nowak's research focuses on biopsychosocial determinants of preterm birth in Black American women. She has conducted research examining the relationships among the neighborhood environment, psychological stress, DNA methylation of glucocorticoid pathway genes, and gestational age at birth. Her current research is focusing on a multiomic approach integrating DNA methylation and single nucleotide polymorphism (SNP) data with perceived and objective (GIS) measures of neighborhood data and gestational age at birth in Black American women. Understanding the contribution of neighborhood disorder to subsequent biological changes may help pinpoint biological markers that identify those at risk and inform precision interventions for PTB prevention. The results of this research will also lend itself to support policy change targeting poor neighborhood conditions and other structural barriers to decrease the long-standing disparity in PTB rates for Black Americans.

Non-Technical/Lay-language Summary:
In the United States, Black women experience preterm birth at 1.5 times the rate of White women. Prior research has shown that neighborhood conditions (e.g., vacant housing, crime) resulting from historical structural racism is associated with preterm birth, and psychological stress has mediated that association. However, research on the biological underpinnings of these associations is lacking. Dr. Nowak's research seeks to understand the associations among neighborhood structural barriers and the subsequent biological pathways leading to preterm birth in Black women and reduce the disproportionate impact of preterm birth on the Black community.

Training Opportunities available:
Students who work under the guidance of Dr. Nowak can expect to receive training in quantitative research methods, perinatal health disparities, structural racism, data collection and analysis, literature review preparation, and small grant writing.

Keywords:
Preterm birth, multiomics, Black or African American, DNA methylation, single nucleotide polymorphisms, neighborhood, psychological stress

Cynthia P. Paidipati, PhD, APRN, PMH-NP/CNS-BC
Clinical Assistant Professor
Director, Psychiatric Mental Health Nurse Practitioner Program
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: Dr. Paidipati's research focuses on understanding the relationship between moral distress, depression, and suicide risk among undergraduate nursing students. As the 2nd leading cause of death for 15 to 24 year olds, suicide remains a significant public health concern and warrants considerable attention and further inquiry within research, practice, and policy. Increasing evidence suggests professionals working in nursing, medicine, or other allied health fields are at greater risk for depression, suicide, and other emotional and mental health problems. Less is known, however, about college-aged students enrolled in health-related programs, including nursing students. Dr. Paidipati's current study examines the relationships between stressors in nursing education and clinical practice and the impact on mental health and well-being within a national sample of undergraduate nursing students. In addition, this research explores the ethical phenomena of moral distress within nursing students. Findings from this study will lead to the development of interventions aimed to improve mental health and well-being of nursing students and increase suicide prevention efforts. Future research will emphasize ethics education and preparedness within undergraduate nursing programs and aim to enhance moral resilience and courage for nursing students.

Non-Technical Summary: Suicide is the 2nd leading cause of death for youth 15 to 24 years in the United States and remains a significant public health concern. In her research, Dr. Paidipati is interested in understanding how depression and suicide risk impact undergraduate nursing students. This is an important topic within mental health, college health, and the nursing community. Dr. Paidipati's current study looks at the relationships between stressors within nursing education and nursing practice and mental health outcomes for students. The research also looks at ethical issues and experiences of nursing students in their educational programs. The knowledge gained from this study will help us better understand mental health risk among nursing students and develop interventions that improve mental and emotional health and well-being for nursing students. We also hope to increase ethics education and preparedness within undergraduate programs, so that nursing students become morally resilient and courageous nurses in the future.

Training Opportunities for Research: Students who join Dr. Paidipati's research can expect to receive training in mixed methods research with an emphasis on suicide risk and suicide prevention in adolescent and young adult populations. Students will also have exposure to theoretical, empirical, and applied ethics in nursing education and practice, in addition to developing heightened knowledge and expertise within the broader area of psychiatric mental health nursing.

Keywords: Mental Health, Depression, Suicide Risk, Moral Distress, Nursing, Ethics

Nancy L. Raschke-Deichstetter RN, MS, CEN
Simulation Faculty
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: Simulation is a bridge between classroom theory and clinical practice. Research activities focus on the use of simulation as a strategy to enhance critical thinking and nursing practice in a psychologically safe learning environment. Evaluation of student confidence, skill attainment, and knowledge acquisition provide insight for future simulation development. Simulations take place in the Walgreens Family Virtual Hospital at the Health Science Campus and in the Clinical Simulation Learning Lab at the Lakeshore Campus.

Clinical simulation activities are also evaluated outside of the Learning Lab. In-class simulation activities provide opportunity for a large number of students to immediately apply knowledge and reflect on content discussed in a lecture format. Virtual simulation encourages participation in a learning activity at a time and place convenient for students allowing time for deliberate practice and immediate feedback.

Non-Technical Summary: Simulation based experiences are purposefully planned to mirror real-life clinical scenarios. Students are given the opportunity to collect information, plan nursing care, and reflect on professional practice. Simulation as a teaching and learning strategy is evaluated based on student skill, knowledge, and attitude development. Simulations take place in the Walgreens Family Virtual Hospital at the Health Science Campus and in the Clinical Simulation Learning Lab at the Lakeshore Campus as well as the classroom.

Training Opportunities: Students would be introduced to a wide range of simulation strategies including task trainers, computer assisted activities, high fidelity mannequins, and standardized patients. Additional forums for simulated learning include virtual and video formats. Planned facilitator and debriefing sessions promote understanding and supports the transfer of knowledge, skills, and attitudes in a safe learning environment.

Keywords: Simulation, teaching-learning strategy, nursing education

Monique M. Ridosh, PhD, RN
Associate Professor
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: As a nurse researcher, I am developing strategies to improve health and family quality of life. I started as Assistant Professor on a tenure-track in 2015 at Loyola University Chicago with the goal of developing a program of research in families living with chronic conditions. Funding support through a K01 has provided the opportunity to identify predictors of self-management in youth over time. I am also a co-investigator on a study at Loyola University Chicago, I am currently a co-investigator on a study at Loyola University Chicago, *Self-Management in Adolescents and Young Adults with Spina Bifida*. Building upon my prior work of studying the transition from adolescence to young adulthood in the context of spina bifida, I am interested in developing interventions for this population and their families, targeting factors that predict successful self-management to decrease health complications of their condition. I have recently completed a Research Supplement to Promote Diversity in Health-Related Research examining the impact of family functioning on self-management and quality of life in women with type 2 diabetes who were participating in a clinical trial for the treatment of depression. As a result of the Diversity Supplement Award, a collaboration was initiated with the Hispanic Community Health Study/Study of Latinos which has led to a study of family factors, diabetes, and quality of life in a US population-based sample of 16,000.

Non-Technical Summary: Self-management strategies are necessary to address the secondary conditions of spina bifida, a congenital chronic health condition, for better health and well-being of adolescents and young adults. I examine family functioning and self-management across chronic conditions and in adults to learn what is helpful to or hinders self-management. Adults with spina bifida are at increased risk for early mortality due to health complications, which may be preventable when youth engage in successful self-management and achieve independence. I am interested in studying predictors of successful self-management, improved health status, and quality of life in youth with spina bifida to facilitate the development of precision health strategies that engage youth and their families in preventive health behaviors.

Training Opportunities in the Ridosh Lab: Students and fellow researchers who join Dr. Ridosh's lab can expect to receive training in both qualitative and quantitative approaches for research in families with a member with a chronic condition. Training and collaboration opportunities are available for those interested in methods for family health research in transition, self-management, and quality of life.

Keywords: Self-management, transition, family functioning, family quality of life, depression

Karen L. Saban, PhD, RN, CNRN, FAHA, FAAN
Professor and Associate Dean for Research and Scholarly Innovation- Marcella Niehoff School of Nursing
Loyola University Chicago
Health Science Researcher
Center for Innovation in Complex Care Management
Edward Hines Jr. VA

Summary of Research Activities: Dr. Saban's research seeks to integrate social context and inflammation with epigenetic signature to explain disparities in cardiovascular disease/stroke in disadvantaged women and to examine interventions that may ameliorate stress-related inflammation in vulnerable populations. The findings of her research have the potential to significantly improve the health of women at risk for stroke and to reduce cardiovascular health disparities.

Dr. Saban recently completed a study examining the feasibility and acceptability of an 8-week, group- based stress reduction program designed to help African American women reduce stress and improve cardiovascular risk. The intervention, called "*Resilience, Stress, and Ethnicity* (RiSE) integrates cognitive-behavioral strategies focused on the biopsychosocial impact of racism, racial identity development, and resilience/empowerment.

Previous research has examined the efficacy of an 8-week mindfulness based stress reduction (MBSR) in improving psychological well-being, reducing inflammatory burden, improving resilience, and decreasing cardiovascular risk in women veterans. In addition, Dr. Saban has examined the extent to which prior life adversity contributes to cardiovascular disease risk and the pro-inflammatory response to acute stress in African American women as well as determining the degree to which prior life adversity predicts global DNA methylation status in women at risk for cardiovascular disease (NINR K01).

Non-Technical Summary: Chronic stress, particularly stress related to social determinants such as social status, environment, and discrimination, can lead to inflammation that heightens the risk for developing cardiovascular disease. Behavioral interventions that address chronic stress in vulnerable populations may decrease the impact that chronic stress has on health.

Training Opportunities in the Dr. Saban: Students who work with Dr. Saban can expect to receive training in research design, recruitment and retention strategies, and conducting randomized clinical trials. In addition, training in developing expertise in stress reduction interventions for minority/vulnerable populations at risk for cardiovascular disease is available.

Keywords: Cardiovascular disease, stress, inflammation, epigenetics, discrimination, racism

Ginger Schroers, PhD, RNC, CNE
Assistant Professor
Department of Family and Community Health Nursing
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: Dr. Schroers's research focuses on contributing evidence that can be used to improve patient safety and healthcare quality, particularly around medication administration. In healthcare settings, medication administration is frequently interrupted, threatening the safety of this critical task. Interruptions during medication administration increase the risk for medication errors, delayed medication administration, and omitted medication administration. Guided by a cognitive science theory, Dr. Schroers is leading a study that investigates an interruption management strategy that aims to mitigate errors and improve task efficiency. The interruption management strategy utilizes associative cueing that enable operators to resume the interrupted primary task at the correct step, without skipping or repeating steps. Dr. Schroers uses a simulated context of medication administration to teach and provide opportunities for practice of associative cueing during interrupted medication administration. The interruption management strategy is cost-effective and can be applied in multiple contexts among various disciplines.

Non-Technical Summary: Interruptions are prevalent in hospitals and other healthcare settings and threaten patient safety. Currently, there is a lack of evidence on best practices to manage, or handle, interruptions when they occur within healthcare environments. Thus, Dr. Schroers is investigating a strategy that uses cues to return to the proper step a person was in during an interrupted task. Using cues during interrupted tasks have been shown to decrease errors and improve task efficiency in environments outside of healthcare - it is the hope that the same will be seen in healthcare settings.

Training Opportunities with Dr. Schroers: Students and fellow researchers can expect to receive training in interruption, healthcare systems issues, and/or medication safety research. Collaboration opportunities are available for those interested in investigating safe practices surrounding medication administration and/or interruption management strategies.

Keywords: Medication Safety, Interruptions, Systems Issues

Darlie Simerson, DNP, APRN, FNP-BC
Clinical Assistant Professor
Director, Family Nurse Practitioner Program
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities:
Dr. Simerson is an Assistant Professor and Director of the Family Nurse Practitioner Program at Loyola University Chicago, Marcella Niehoff School of Nursing. She has published on topics related to emergency medicine practice, tobacco cessation, electronic cigarette use by youth, and disaster management. For her Doctor of Nursing Practice scholarly project, she implemented a brief tobacco cessation intervention in the emergency department. She is currently co-investigator with an internal grant funded group looking at developing a student run health clinic.

Non-Technical Summary: Dr. Simerson teaches students at the master's and doctoral levels. She has served as the Director of the Family Nurse Practitioner program for 1 year and was previously Director of the Adult Gerontology Primary Care NP and FNP with Emergency Specialty programs 2016-2018. Dr. Simerson is actively engaged in mentoring faculty and students, including helping to guide master's and doctoral level students towards publication of their scholarly work.

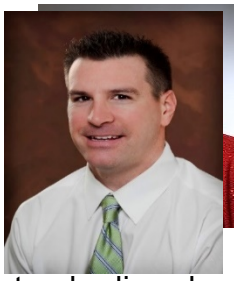
Other interests and expertise: Dr. Simerson has practiced as an FNP in emergency settings for 15 years. She currently provides care to patients across the lifespan in an immediate care setting.

Lisa Skemp PhD, RN, FGSA, FAAN Professor
Department Chair, Health Systems, Leadership, and Policy
Marcella Niehoff School of Nursing
Loyola University Chicago

Summary of Research Activities: The purpose of the research is to promote health and quality of life for community-dwelling elders focused on building community capacity for healthy aging. This cross-cultural and international program of research is in two general areas: 1) using ethnographic, epidemiological, nursing partnership and egonet research methods to understand how elders acquire the things they need to live in the community and 2) using information communications technology (ICT) in the translation of evidence-based practice (EBP) and best practices (BP) into culturally informed local care. The first area of research provides a foundation for understanding the community context and the natural systems of elder personal care support networks. These data are then used to inform the development and testing of culturally informed interventions in areas of global public health need: healthy aging and program development focused on Diabetes, Family Involvement in Care of Persons with Dementia and Prevention of Loneliness and Suicide among older adults and college age students. The culturally informed healthy aging (CIHA) process model guides the education, research, and practice initiatives while ICTs are used to facilitate the translation of EBP and BP to local culturally informed care.

Non-Technical Summary: Grounded in interdisciplinary and community-engaged research and educational programming conducted in the Midwest, deep South, Caribbean, and South India, we are working with local community members to learn about healthy aging and quality of life for older adults living in the urban Chicago area. This includes exploring mechanisms to promote intergenerational relationships to address stigma, ageism and loneliness in both college age students and older adults. Information technology is used to facilitate intergenerational and community communication and culturally informed community programming.

Training Opportunities in Lisa Skemp's research: Opportunities may include participation in community-engaged research in a local urban population after completing training in ethnographic, epidemiologic and/or nursing research methods. Training may also inductive data analysis, triangulation of different data sources and translation of programming to a local community.



Eric S. Zack DNP, RN, ACNP-BC, AOCN, BMTCN
Clinical Assistant Professor
Marcella Niehoff School of Nursing
Department of Health Promotion
Loyola University Chicago

Summary of Research Activities: Dr. Zack's focus has been to standardize chemotherapy and other hazardous drug administration policies and nursing practices traditionally reserved for treating people with oncology diseases to expanding these uses for other people with non-oncologic conditions such as for autoimmune and anti-rejection purposes to improve patient and staff safety through several steps: 1) a thorough review of the medical, nursing, and pharmacy literature, 2) revising and updating all related hospital and nursing policies and resources that address the above concerns, 3) developing appropriate hazardous drug online educational in-services with minimum competency guidelines and annual competency measures required for all staff who administer these agents for either oncology or non-oncology purposes, 4) partnering with other interprofessional team members to ensure training and compliance with other affected individuals and/or groups, 5) evaluating the effectiveness of interventions, and finally 6) in publishing and sharing these successful strategies and results through professional organizations and typical professional avenues such as journals, posters, podiums, and conferences.

Non-Technical Summary: Dr. Zack's research focus has been standardizing chemotherapy and other hazardous drug administration practices traditionally reserved for treating people with oncology diseases to expanding these uses for other people with non-oncologic conditions such as for autoimmune and anti-rejection purposes. The challenge today remains in that oncology nursing practices are guided by several professional organizations such as the Oncology Nurses Society (ONS), the National Institute of Occupational Safety and Health (NIOSH), and the American Society of Health System Pharmacists (ASHP). However, there is no other current autoimmune or anti-rejection parallel organization(s) nor consensus that guides nursing practice, education, credentialing, certification, or competency regarding administration of these chemotherapy and/or other hazardous drugs for these patient populations through system protections that are designed to ensure patient, nurse, and other staff safety.

Keywords: Medical/Surgical Nursing, Advanced Medical/Surgical Nursing, Pharmacology, Oncogenesis and Cancer Disease Management, Oncology, Nurse and Patient Safety

School of Health Sciences and Public Health
Press Book

Holly Mattix-Kramer, MD, PhD
Professor, Department of Public Health Science and Medicine
Division of Nephrology and Hypertension
Parkinson School of Health Sciences and Public Health
Stritch School of Medicine, Loyola University Chicago

Summary of Potential Research Activities/Specialty: Chronic disease management, patient education, patient reported outcomes including urinary symptoms. Also, do research on clinical hypertension, implementation research on hypertension treatment, treatment inertia. Epidemiologic research on obesity and nutrition as it relates to chronic kidney disease and its progression.

Non-Technical/Lay-language Summary: Dr. Mattix-Kramer's research group focuses on management of chronic conditions including hypertension and kidney disease.

Training Opportunities: None at this time.

Keywords: chronic conditions, disease management, hypertension, kidney disease, nutrition

Jennifer O'Rourke, PhD, APN
Associate Professor
Parkinson School of Health Sciences & Public Health
Loyola University Chicago

Summary Research Activities: Dr. O'Rourke's research centers on simulation pedagogy in nursing and interprofessional practice. This area of scholarship includes examining how simulation can strength a nurse-nurse handoff off communication curriculum as well as exploring the concept of psychological safety in simulation from both the learner and faculty perspective. Additionally, Dr. O'Rourke is part of a writing group collaborative focused on disseminating simulation evidence through scoping and integrative reviews.

Non-Technical Summary: Dr. O'Rourke currently serves as the principal investigator on a 2.8 million dollar Health Resources and Services Administration grant (2019-2023). The purpose of the grant is to engage nurse practitioner students in working with underserved primary care populations and to integrate knowledge on the care of mental health and substance use issues in primary care. The grant provides scholarship opportunities for students as well as continuing education for preceptors and faculty.

Training Opportunities: Dr. O'Rourke provides students opportunities to engage in educational research, in particular simulation. There are a variety of ongoing projects that include data collection and analysis, literature reviews and small grant writing.

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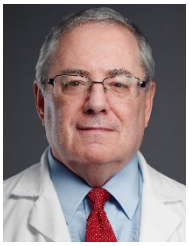


Jorge P. Parada, MD, MPH
Professor, Department of Medicine
Professor, Parkinson School of Health Sciences & Public Health, Loyola University Chicago
Stritch School of Medicine

Summary of Research Activities: The focus of Dr. Parada's research is clinical effectiveness, outcomes, and resource utilization in infectious diseases – with a focus on infection control and the prevention of healthcare associated infections – including promoting antibiotic stewardship (former chair of the antibiotic stewardship committee) and vaccine use, and preventing Clostridioides difficile and Methicillin Resistant Staphylococcus aureus (MRSA), as well as important devise-related infections, such as central line associated blood stream infections (CLABSIs), catheter associated urinary tract infections (CAUTIs), ventilator-associated pneumonia (VAPs) and Surgical site infections (SSIs), and improving hand hygiene practices. Their other interests include vector-borne infections and travel medicine and dates back to my training at the Lisbon Institute of Tropical Medicine and Hygiene and my experience working in Angola. Their interest in emergency preparedness is highlighted by my role as course director for the Chicago Medical Society's lecture series on bioterrorism, pandemic influenza, SARS and includes studies modeling response strategies to anthrax attacks.

Non-Technical Summary: The focus of Dr. Parada's research is clinical effectiveness, outcomes, and resource utilization in infectious diseases – with a focus on infection control and the prevention of healthcare associated infections – including promoting antibiotic stewardship (former chair of the antibiotic stewardship committee) and vaccine use, and preventing Clostridioides difficile and Methicillin Resistant Staphylococcus aureus (MRSA), as well as important devise-related infections, such as central line associated blood stream infections (CLABSIs), catheter associated urinary tract infections (CAUTIs), ventilator-associated pneumonia (VAPs) and Surgical site infections (SSIs), and improving hand hygiene practices. My other interests include vector-borne infections and travel medicine and dates back to my training at the Lisbon Institute of Tropical Medicine and Hygiene and my experience working in Angola. My interest in emergencypreparedness is highlighted by my role as course director for the Chicago Medical Society's lecture series on bioterrorism, pandemic influenza, SARS and includes studies modeling response strategies to anthrax attacks.

Training Opportunities: Students, fellows or residents who join Dr. Parada's research projects can expect to learn about the fundamentals infection prevention and control of healthcare associated infections. Trainees can join Dr. Parada and his team to work on projects aimed at improving quality of care or describing infectious exposures and outbreak investigations.

Keywords : Healthcare associated infections, patient safety, quality improvement

Steven M. Shea, PhD
Assistant Professor, MR Physicist
Department of Radiology
Parkinson School of Health Sciences and Public Health
Stritch School of Medicine
Loyola University Chicago

Summary of Research Activities: Dr. Shea research focus is on creating technical innovations in Magnetic Resonance (MR) image acquisition, reconstruction, and quantitation to better diagnose disease and guide treatment. They have experience in MR pulse sequence programming, physics simulations, motion correction/compensation techniques, and software development. Their primary areas of research are improving MRI for prostate cancer diagnosis and biopsy guidance; and transitioning MR methods to meet the needs of Radiation Oncology for Radiation Therapy treatment planning. This includes the following activities:

- Developing true 3D image acquisitions to outperform multi-slice 2D acquisitions for prostate cancer detection
- Building image & clinical databases to be used in machine learning to automatically detect cancer in MR images; then validating machine learning algorithms to assess performance in real-world clinical situations
- 3D printing of molds to allow accurate ex-vivo harvest of live tissue and/or improve registration of pathology with in-vivo imaging for validation of image quantitation
- Optimization of MR pulse sequence parameters to reduce metal artifact in HDR brachytherapy patients

Non-Technical Summary: Dr. Shea's goal is to use their engineering and physics knowledge to improve Magnetic Resonance Imaging (MRI) in order to better diagnose disease and guide treatment. They are currently focused on exploring new MR image acquisitions and developing artificial intelligence techniques to better diagnose prostate cancer. In addition, they have been improving MRI quality and reducing workflow barriers so that MR images can be better used in radiation therapy planning to improve patient outcomes.

Training Opportunities: Students are needed to quantitate image results, design and populate databases, interepret radiology & pathology reports, and perform literature searches, all in the area of cancer imaging research.

Keywords: MRI, prostate cancer, MRI radiotherapy planning, motion correction, machine learning in imaging

LOYOLA
UNIVERSITY CHICAGO

Preparing people to lead extraordinary lives

Lakeside Campus
Press Book

Rasha Abbasi, PhD
Assistant Professor
Physics Department
Loyola University Chicago

Summary of Research/Scholarly Activities: Terrestrial Gamma-ray Flashes (TGFs) are bursts of high energy photons of sub millisecond duration that are produced by lightning. The study of TGFs, both their initiation and propagation, is of major interest to lightning researchers. The Telescope Array Surface Detector (TASD), a 700 km^2 cosmic ray detector located in the western desert of Utah, U.S.A. is currently the world's leading detector in the study of downward-directed TGFs. The recently obtained NSF award will allow further investigation of the initiation phase of downward TGFs observed by the TASD. The results of this project will improve our understanding of lightning and lead to a better understanding of it's meteorological origins, which in turn will improve the ability to mitigate the negative effects of lightning and associated radiation hazards. The outreach component of this work will allow scientists to describe the microphysics of lightning to the public at a powerful and impactful level through various communication venues.

While it is known that TGFs are produced inside thunderstorms and in correlation with lightning, both the mechanism responsible for producing TGFs and the relation of intra-cloud discharges to TGFs are still unknown. There are several leading possible mechanisms that are believed to produce TGFs. Multiple studies conclude that each mechanism's optical signature is distinctly different. The intensities at which the optical emission at different wavelengths is detected would provide key information about the lightning development sequence. The research in Dr. Abbasi's lab allows the observation of the relationship between downward-directed TGFs and their optical emissions using a high-speed video camera and a photometer in conjunction with Lightning Mapping Array (LMA) stations, electric field-change detectors, and a high-speed broadband VHF interferometer. Results from these observations will be directly compared to the optical emissions observed simultaneously with the ASIM satellite's upward-directed TGFs. Most importantly, it will provide answers to critical questions about TGFs and even lightning initiation processes, and will further the understanding regarding one of the top ten questions in lightning research: What are the mechanisms responsible for producing and propagating gamma-ray events in our atmosphere?

Non-Technical Summary: Dr. Abbasi is an astroparticle physicist who uses experimental and computational methods to study cosmic rays and atmospheric electricity. They are a member of the Telescope Array and the IceCube neutrino observatory. Their work on the Telescope Array observatory seeks to understand several important questions including the long sought out question of what could be the origin of terrestrial gamma ray flashes and how is lightning initiated. They are also conducting cosmic ray anisotropy study using data collected by the Telescope Array, IceCube and IceTop detectors. Such anisotropy would allow them to understand the origin and propagation of cosmic rays in our galactic neighborhood.

Training Opportunities: Dr. Abbasi's lab offers students opportunities in these research areas and on projects that include detector development, programming, and data analysis.

Keywords: Cosmic rays, Terrestrial Gamma ray Flashes, Atmospheric Electricity, Anisotropy

Brook Abegaz, PhD
Assistant Professor of Computer Engineering
Engineering
Loyola University Chicago

Summary of Research/Scholarly Activities: Dr. Abegaz focuses on designing adaptive and robust control systems and methods for efficiency improvement of smart power grids and autonomous vehicles. The smart grid systems research includes models of real-world power grid models such as the 39 bus New England power system, various IEEE test cases and power electronic models of voltage regulators and buck and boost power converters. On these smart grid models, novel control methods are designed and implemented through complex networks based and machine learning based clustering algorithms. The results are compared against model predictive control (MPC), Gaussian Matrix Model (GMM) and self-organizing mapping (SOM) based control mechanisms. The autonomous vehicle systems research is performed by modeling self-driving vehicles and using ten different types of sensors for activity monitoring. Smart control algorithms are developed for self-driving vehicles, aiming to address safety and security issues related to cruise control, lane keeping, and obstacle avoidance features to identify and react to malfunctions, perturbations and errors during operation for these autonomous vehicles.

Non-Technical Summary: Dr. Abegaz is interested in designing efficient, computer-based controllers for power grids and self-driving vehicles. Smart power grids are required to enable bi-directional power flow amongst power prosumers (producer-consumers), which could also enhance the grid integration of renewable energy. For that goal, the research aims to develop power controllers that manage the flow of power at the level of power converters and voltage regulators. Related to self-driving cars, the level of autonomy that most cars operate at today is level 2 (based on a scale of 0 – no autonomy, to 5 – full autonomy where the car can operate on its own at any environmental condition). Their research aims to develop computer-based controllers which rely on sensors to guide the car to fully self-drive: to pass obstacles, to recognize errors and to avoid them on its own.

Training Opportunities: Students and postdoctoral fellows can expect to receive training on systems, methods and algorithms for computer software and hardware that are used to design real-time control systems. They can also get expertise in the broader areas of software-hardware co-design and programmable logic controllers.

Keywords: Smart grids, power converters, voltage regulators, self-driving cars, sensors, safety, security, efficiency, control systems, model predictive control, Gaussian matrix model, self-organizing mapping, clustering, algorithms, software-hardware co-design

Liridona Veliu Ashiku, PhD
Politics and International Relations, M.A., Peace Studies and Conflict Resolution, B.A., Political Science and Government
Adjunct Faculty
Department of Political Science
Loyola University Chicago

Technical Summary of Research/Scholarly Activities:
Dr. Veliu Ashiku is a member of the Association for the Study of Nationalities (ASN), the British International Studies Association (BISA), and the European Consortium for Pollical Research (ECPR). Dr. Veliu Ashiku's research focuses on socio-spatial segregation, democratic processes in post-socialist societies, 'balkanization' and othering in foreign politics, and political research regarding politics in Southeast Europe and its borderlands. Dr. Veliu Ashiku's work addresses marginalization and inequalities in domestic politics as well as international relations.

Non-Technical/Lay-language Summary:
Dr. Veliu Ashiku is a native Albanian from North Macedonia. She is fluent in Macedonian as well as fully proficient in English. She has elementary speaking experience in German and Spanish. In addition to her Adjunct responsibilities at Loyola University Chicago as well as DePaul University, she serves as a Research Assistant for the Institute for International Conflict Resolution and Reconstruction (IICRR) at Dublin City University (DCU) and the Kroc Institute at the University of Notre Dame. She adopts a critical and interceptional methodological lens investigating political inequality across multiple cities, countries, and global semi spheres. Her expertise is in Political Theory, International Relations, and Balkan area studies.

Training Opportunities available:
Students, (postdoctoral) fellows or residents who work under the guidance of Dr. Veliu Ashiku can expect to receive training in public policy, peace and conflict studies, conflict resolution studies, political theory/ideologies, and intersectionality.

Classes taught at Loyola:
PLSC 100 – Political Theory
PLSC 339 – Political Ideologies
PLSC 306 – Modern Political Thought

Michael B. Burns, PhD
Associate Professor
Department of Biology, College of Arts and Sciences
Loyola University Chicago

Technical Summary of Research/Scholarly: The Burns lab is interested in understanding the changes in microbial communities associated with human cancers. They are currently working on projects related to Cutaneous T-Cell Lymphomas (CTCL), breast cancer, and Acute Lymphoblastic Leukemia (ALL). Beyond just identifying patterns in the microbiome associated with diseases, the lab is also focused on understanding how to shift the microbiome back to its normal state. They are testing various dietary compounds, pharmaceuticals, and environmental agents to see their effect on the human gut microbiome. The Burns lab also engages in interdisciplinary work related to science communication and outreach, specifically at the intersection of science, religion, and technology. This has led to several successful projects related to Artificial Intelligence, pedagogy, and science and religion outreach with community partners outside of Loyola.

Non-Technical/Lay-language Summary: The Burns Lab delves into the intricate relationship between the human microbiome and cancers. They explore microbial community changes linked to skin, breast, and other cancers and investigate methods to restore the microbiome's balance using dietary compounds and pharmaceuticals. Additionally, emphasizing the significance of science communication, the lab undertakes interdisciplinary projects to address global challenges including generative AI, pandemics, and climate change. These outreach efforts are typically targeted at faith communities outside of Loyola, to have meaningful conversations that might not otherwise take place.

Training Opportunities: Students, (postdoctoral) fellows or residents who work under the guidance of Dr. Burns can expect to receive training in molecular biology, computational biology, philosophy of science, science communication, STEM pedagogy, and science and religion dialogue.

Keywords: Cancer Metagenomics, Bioinformatics, Science Communication, STEM-Humanities Interdisciplinarity, Science and Religion, Pedagogy

Vincent C-F Chen, PhD
Assistant Professor of Biomedical Engineering
Engineering
Loyola University Chicago

Summary of Research/Scholarly Activities: Current research activities in Dr. Chen's lab involve the use of electrical stimulation to assist, support and/or improve sensory or motor functions, with the goal of developing biomedical devices to enhance the results of therapeutic exercises performed during physical rehabilitation sessions. By conducting preclinical research on how electrical stimulation can be used to induce neuroplasticity, they seek to identify the means by which we can effectively develop real-life applications to modulate the neuromuscular system in order to improve neurorehabilitation outcomes. They focus on the research of electrical stimulation with projects designed to improve muscle strength and delay muscle atrophy, by attempting to induce neuroplasticity via a combination of brain and peripheral nerve stimulation. By conducting both animal and human experiments, they hope to facilitate the advancement of biomedical engineering and neuroscience with our contributions.

Non-Technical Summary: Dr. Chen's lab focuses on using electrical stimulation to facilitate sensory or motor functions. Their ultimate objective is to develop biomedical devices to achieve improved results from the therapeutic exercises performed during the patients' physical rehabilitation sessions. Starting by studying how electrical stimulation can be used to induce the ability of the brain to form and reorganize synaptic connections, especially in response to learning or experience following injury, they seek to identify how to develop real-life applications to achieve our objective. Their research, which involves both animal and human experiments, focuses on the use of electrical stimulation on the brain and peripheral nerves to improve the recovery of sensory and motor functions.

Training Opportunities: Students or postdoctoral fellows who join Dr. Chen's lab can expect to gain experience in acquiring and processing electroencephalography data, building customized experimental apparatuses, and designing stimulation and data acquisition circuitries.

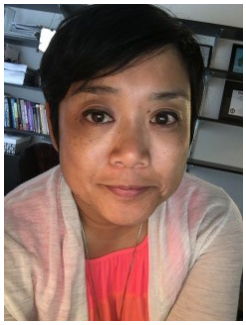
Colby Dickinson, PhD
Associate Professor of Theology
Theology Department/College of Arts and Sciences
Loyola University Chicago

Summary of Research/Scholarly Activities: Working within the systematic theology unit of the Theology Department, Dr. Dickinson's research explores intersections between contemporary continental philosophy and theology, especially through modern varieties of political theology and the philosophy of religion. A wide variety of topics covered include, but are not limited to, 'weak' or kenotic philosophies and theologies, philosophical takes on secularism and atheism, nihilism as the legacy of mysticism in the modern period, theories of fetishism and of the embodiment of the transcendent in modernity, poetry and theo-poetics in continental-philosophical discourses and the role of autobiography in philosophical and theological writings. Methodologically, attention is paid to genealogical, archaeological and hermeneutical methods in theology and philosophy, as well as the economic and ideological analyses of critical theory. Specific philosophers studied include, again but are not limited to, Giorgio Agamben, Jacques Derrida, Walter Benjamin, Theodor Adorno, Martin Heidegger, Jean-Luc Nancy, René Girard, Gianni Vattimo, Luce Irigaray, Bruno Latour, Paul Ricoeur, Michel Foucault, Emmanuel Levinas, Slavoj Žižek and Judith Butler.

Non-Technical Summary: Dr. Dickinson's research explores intersections between contemporary European philosophy and theology, especially as this connection illuminates the fields of politics, religion and the philosophy of religion, broadly speaking. A variety of topics covered include 'weak' or kenotic philosophies and theologies, philosophical takes on secularism and atheism, nihilism as the legacy of mysticism in the modern period, theories of fetishism and of the embodiment of the transcendent in modernity, poetry and theo-poetics in continental-philosophical discourses and the role of autobiography in philosophical and theological writings.

Training Opportunities: Students, graduate and undergraduate, as well as postdoctoral researchers who work under the guidance of Dr. Dickinson can expect to receive training in continental philosophy, political theology and the philosophy of religion.

Keywords: continental philosophy, political theology, philosophy of religion



Eilene A. Edejer, PhD
Research Methodology, M.Ed.
School/Community Counseling, B.A., Communication
Clinical Associate Professor
School of Education
Institutional Senior Research Associate
Office of Institutional Effectiveness
Loyola University Chicago

Technical Summary of Research/Scholarly Activities:
Collaboratively administer the institutional surveys, analyze the data, and prepare reports for multiple constituent's decision-making purposes for the Office of Institutional Effectiveness. Serves as faculty member in Research Methodology and Psychology in the Schools. Teaches Research Methodology courses (RMTD 400: Introduction to Research Methodology; RMTD 404: Introduction to Educational Statistics; RMTD 421: Building a Body of Evidence Using Quantitative Methods; ELPS 620: Capstone/Dissertation Research). Serves as chair or member on numerous dissertation committees and as a resource for students during course and post course for various research methodology issues.
Recent publications covering topics investigating the design and implementation of teacher education, augmentative and alternative communication and emergent literacy, and evaluation of methods in teaching in Boston Public Schools.

Non-Technical/Lay-language Summary:
Dr. Eilene Edejer has over 30 years of applied research experience in different educational and community settings. She earned both her M. Ed. in Community & School Counseling and Ph. D. in Research Methodology from Loyola University Chicago, where she is currently a clinical assistant professor in the School of Education. Her current research interests include equity in student assessment and Culturally Responsive Teaching during the pandemic.

Training Opportunities available:
Students, (postdoctoral) fellows or residents who work under the guidance of Dr. Edejer can expect to receive training in research methodology, assessment and accreditation, and program evaluation.

Classes taught:
CIEP 498 – Independent Study
CIEP 499 – Directed Research
CIEP 600 – Dissertation Supervision
ELPS 620 – Capstone/Dissertation Research
RMTD 400 – Introduction to Research Methodology
RTMD 404 – Introduction to Educational Statistics

Ken A. Fujimoto, PhD.,
Philosophy, M.A. Creative Writing-Fiction, B.A. Psychology
Assistant Professor- Research Methodology Program
School of Education

Technical Summary of Research/Scholarly Activities:
Dr. Fujimoto has served as a member of the curriculum committee for the School of Education since 2018. He is a member of the Research Methodology Admissions Committee. He has provided statistical consultation to a team of psychiatrists at the Long Beach Veterans Affairs Healthcare System, Department of Psychiatry. As well as statistical consultation to researchers who engaged in improving child day cares and caregiver interactions at the University of Illinois at Chicago/Institute of Government and Public Affairs. He additionally provided statistical consultation to a Minority Mental Health Research Lab, at Claremont McKenna College. Dr. Fujimoto has experience in statistical methods/models including Infinite- and finite-mixture Modeling, Bayesian nonparametric, multilevel modeling (hierarchical linear modeling), latent variable modeling, structural equation modeling, categorical data analysis, regression, and ANOVA. Dr. Fujimoto's experience with measurement theories/models includes Parametric and nonparametric item response theory, generalizability theory, and classical test theory. Dr. Fujimoto has experience with programing languages and statistical software including C++, MATLAB, R, SAS, SPSS, IRTPro, flexMIRT, Conquest, Parscale, Bilog, Winsteps, and Facets.

Non-Technical/Lay-language Summary:
Dr. Fujimoto is a native English speaker and fluent in speaking Japanese. He is a member of the Psychometric Society, the National Council on Measurement in Education, and the American Educational Research Association. Dr. Fujimoto's specialty area is measurement and statistics. Dr. Fujimoto has over 22 journal publications with topics ranging from a variety of different multilevel response theories, to how environment impacts mental health and learning ability. Dr. Fujimoto has presented at 30 conferences showcasing knowledge and expertise on research models, mental health approaches, response theories, and youth development.

Training Opportunities available:
Students, (postdoctoral) fellows or residents who work under the guidance of Dr. Fujimoto can expect to receive training in statistical methods/models, measurement theories/models, and programming languages and statistical software.

Classes taught:
CIEP498: Independent Study
CIEP 499: Directed Research
CIEP 600: Dissertation Supervision
CIEP 610: Doctoral Study
RMTD 432: Item Response Theory
RMTD 430: Psychological Measurement
RMTD 482: Introduction to Linear Modeling
RMTD 404: Introduction to Educational Statistics
RMTD 400: Introduction of Research Methodology

James T. Gathii, S.J.D
Harvard Law School, Diploma in the Practice of Law, LL.B.
University of Nairobi, Faculty of Law
Wing-Tat Lee Chair of International Law and Professor of Law
School of Law- Loyola University of Chicago

Technical Summary of Research/Scholarly Activities:

James T. Gathii is a Professor of Law and the Wing-Tat Lee Chair in International Law at Loyola University Chicago School of Law since July 2012. He is a graduate of the University of Nairobi, Kenya, and Harvard Law School. He sits on the board of editors of the American Journal of International Law, the Journal of African Law and the Journal of International Trade Law and Policy, and on the Advisory Board of the International Journal of Constitutional Law, among others. He is a founding Editor of Afronomicslaw.org, a blog on international law issues as they relate to Africa and the Global South. He is the founding editor in chief of the *African Journal of International Economic Law*. He is an experienced arbitrator in International Commercial Arbitrations and Investor State Disputes. In 2016, he was elected to be on the Indicative List of Panelists of the World Trade Organization. He has authored several books with topics including how law is utilized in Kenya as well as the impact of trade and international courts in Africa. Additionally, he has written over 80 articles and book chapters.

Non-Technical/Lay-language Summary:

Dr. Gathii's research and teaching interests are in Public International Law, International Trade Law, Third World Approaches to International Law, (TWAIL), African Constitutionalism and Human Rights. Professor Gathii is an Independent Expert of the Working Group on Extractive Industries, Environment, and Human Rights Violations in Africa formed by the African Commission on Human and Peoples' Rights. He is also an expert member of the Working Group on Agricultural Land Investment Contracts of the International Institute for the Unification of Private Law (UNIDRIOT). He has sat as an arbitrator in two international commercial arbitrations hosted by the Permanent Court of Arbitration in the Hague. He is a founding member of the Third World Approaches to International Law, (TWAIL), network. He is an elected member of the International Academy of International Law. He has consulted for the Office of the United Nations High Commissioner for Human Rights, (OHCHR), and the Economic Commission for Africa, (ECA), among others.

Training Opportunities available:

Students, (postdoctoral) fellows or residents who work under the guidance of Dr. Gathii can expect to receive training in international law, international trade law, international organizations, and international business transactions.

Classes taught at Loyola:
LAW 265 – Black Traditions in International Law
LAW 372 – International Law and Practice
LAW 884 – Doctoral Dissertation Research and S.J.D. Colloquium I
LAW 885 - Doctoral Dissertation Research and S.J.D. Colloquium II
LAW 886 - Doctoral Dissertation Supervision
LAW 887 - Doctoral Dissertation Supervision and Completion

Catherine A. Haden, PhD
Professor
Department of Psychology
Loyola University Chicago

Summary of Research/Scholarly Activities: Dr. Haden's research focuses on children's learning and remembering. They use observational and experimental methods, and qualitative and quantitative analyses to understand the ways that parent-child conversational interactions can impact the development of skilled remembering, and learning about science, technology, engineering, and mathematics (STEM). Much of the research in our lab is use-inspired. They partner with museums and libraries to understand whether and how educational practices foster family interactions that advance children's STEM learning. They further ask how conversations that children have with adults as events are unfolding and after they have occurred can play a crucial role in children encoding, consolidation, and subsequent retrieval of information, leading to lasting learning and remembering. Our work is yielding empirically-tested practices that parents and other educators can use to support children's learning and cognitive development.

Non-Technical Summary: Dr. Haden's research team studies children's learning and remembering. Using observational and experimental methods, their work focuses on the ways parent-child conversational interactions can benefit children's developing cognitive skills, and understanding of science, technology, engineering, and mathematics (STEM). In some of our work, we partner with museums and libraries to examine specifically how the design of programs and exhibits can foster family interactions that advance children's STEM learning.They also address how talking about learning experiences can benefit children's memory. Their work is contributing to educational practices that promote real-world STEM learning opportunities for children and families.

Training Opportunities: Students, and postdoctoral fellows who work with Dr. Haden engage in research at the intersection of developmental psychology and STEM education, gaining multi-disciplinary research training, and valuable experiences communicating about research to academic and non-academic audiences.

Keywords: Parent-child conversations, memory, informal STEM education (in museums, libraries)

Malik S. Henfield, PhD
Counselor Education, EdS,
School Counseling (K-12), MEd,
School Counseling (K-12), BS Biology
Dean and Full Professor
The Institute for Racial Justice
Loyola University of Chicago

Technical Summary of Research/Scholarly Activities:

Dr. Henfield is the founding dean for the Institute for Racial Justice at Loyola University Chicago. Dr. Henfield's scholarship situates Black students' lived experiences in a broader ecological milieu to critically explore how their personal, social, academic, and career success is impeded and enhanced by school, family, and community contexts. His work to date has focused heavily on the experiences of Black students formally identified as gifted/high achieving, while his latest projects focus more exclusively on developing, implementing, and evaluating in and out of school interventions associated with preparing Black students for success in college and careers.

Non-Technical/Lay-language Summary:

Dr. Henfield currently serves as the founding dean of the Institute for Racial Justice at Loyola University Chicago. Before this, he served as the dean of Education at LUC (Loyola University Chicago). His research is centered on equitable education approaches by investigating inequalities and shortcomings of the education system. Dr. Henfield currently serves as the senior advisor to the President and CEO (Chief Executive Officer) of the Chicago Urban League. He sits on the advisory boards for Black Achievement Success and Engagement at the University of San Fransico, as well as the Center for Postsecondary Readiness and Success at American University in Washinton D.C. At the American Education Research Association (AERA), he is the chair of both conference programming and the Critical Examination of Race, Ethnicity, Class, and Gender Education. Dr. Henfield serves as a committee member and secretary for division E – Counseling and Human Development at AERA. Dr. Henfield is currently a member of 12 professional organizations that address educational solutions, impact, teacher training, and how accessibility and impact are different across gender, racial, ethnic, and class identities.

Training Opportunities available:

Students, (postdoctoral) fellows or residents who work under the guidance of Dr. Henfield can expect to receive training in Black experiences of education, minority experiences in education, gifted programs in schools, school counseling, and education of councilors.

Chad P. Johnston, PhD
Assistant Professor of Environmental Engineering
Engineering
Loyola University Chicago

Summary of Research/Scholarly Activities: Dr. Johnston's work is primarily concerned with the environmental geochemistry of contaminants and the mineral substrates that affect their fate and mobility. Many of their research questions focus on understanding key processes occurring at the solid-liquid interface. Generally speaking, the purpose of their work is to elucidate the molecular-scale nature of processes such as adsorption, and to characterize the structure and dynamics of water at the surfaces of important oxide minerals and nanoparticles. Ultimately, they wish to contribute to the development of more robust environmental models that link field-scale behavior to the underlying microscopic phenomena. They primarily employ molecular spectroscopy (e.g., infrared and X-ray absorption) and molecular modeling methods (e.g., molecular dynamics simulations and quantum mechanical calculations) to carry out these investigations.

Non-Technical Summary: Water contamination is among the key factors affecting the overstressed supply of global freshwater. Effective fate-and-transport modeling of contaminants in both natural and engineered systems is needed to design successful remediation strategies, modernize water treatment processes, and to guide water resource policy and management. Their research seeks to contribute the fundamental molecular-scale information required to calibrate and improve predictive water contamination models. Much of this work involves investigations of processes occurring at the interface of natural waters with naturally occurring solids. They employ a variety of spectroscopic and molecular modeling techniques.

Training Opportunities: Students working with Dr. Johnston can expect training in areas related to a variety of computational chemistry techniques, molecular dynamics simulations, and molecular spectroscopy.

Keywords: Environmental geochemistry, nanoparticles, molecular dynamics, surface complexation, adsorption, emerging contaminants.

tavis d. jules, EdD
International Educational Development
Full Professor, Cultural and Educational Policy Studies
International Higher Education
School of Education

Technical Summary of Research/Scholarly Activities:

tavis d. jules (written in lower case) is a Full Professor of Cultural and Educational Policy Studies and Higher Education at Loyola University Chicago; his focus and expertise lie in comparative and international education, specifically on issues of race, terrorism, regionalism, and dictatorial transition. He is the immediate past President of the Caribbean Studies Association, Book and Media Reviews Editor for the Comparative Education Review, an International Institute of Islamic Thought Fellow, and a Senior Fellow at NORRAG. He is the author of over 50 refereed articles, and his most recent books include: The Bloomsbury Handbook of Theory in Comparative and International Education (with Robin Shields and Matthew A. M. Thomas, Bloomsbury 2021), The Educational Intelligent Economy: Big Data, Artificial Intelligence, Machine Learning and the Internet of Things in Education (with Florin D. Salajan, Emerald 2019); Educational Transitions in Post Revolutionary Spaces: Islam, Security and Social Movements in Tunisia (with Teresa Barton, Bloomsbury 2018); Re-Reading Education Policy and Practice in Small States: Issues of Size and Scale in the Emerging Intelligent Society and Economy (with Patrick Ressler, Peter Lang 2017); and The New Global Educational Policy Environment in the Fourth Industrial Revolution: Gated, Regulated and Governed (Emerald 2016).

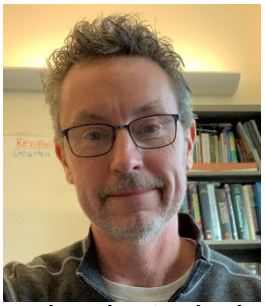
Non-Technical/Lay-language Summary:

Dr. jules' research interests include, but not limited to, comparative and international education, regional integration and educational Development, Education in Conflict Settings, Globalization Studies and Educational Policy formation and development – particularly, but not exclusively, within the Caribbean. More recently, his research has focused on analyzing the impact of regionalization upon small (and micro) states.

Training Opportunities available:

Students, (postdoctoral) fellows or residents who work under the guidance of Dr. jules can expect to receive training in regionalism and governance, international cooperation and education, leadership, ethics, and sustainability, gender education and development, comparative and international education policy studies, economic integration and education, and policy challenges in small island developing states.

Classes taught:
HNOR203b – The US Experience
ELPS 405 – Introduction to Educational Policy Analysis
ELPS 455 – Comparative and International Education
ELPS 465 – Data Analysis
ELPS 600 – Dissertation Supervision
ELPS 610 – Doctoral Study



John J. Kelly, PhD
Professor and Chairperson
Department of Biology
Loyola University Chicago

Technical Summary of Research/Scholarly Activities:
Research in Dr. John Kelly's lab at Loyola University Chicago focuses on the microbial ecology of freshwater ecosystems. The lab uses molecular tools, including high-throughput amplicon sequencing, quantitative PCR, and metagenomics, to profile the composition of complex microbial communities in rivers and streams and link community composition to function. The lab is especially interested in the effects of a variety of contaminants of emerging concern (CECs), including pharmaceuticals and personal care products (PPCPs) and microplastics, on the structure and function of microbial communities in streams.

Non-Technical/Lay-language Summary: Research in Dr. John Kelly's lab at Loyola University Chicago studies microbial communities in the environment. Microbial communities, which can include bacteria, algae, and fungi, are present in every ecosystem on earth, and they play important roles in the functioning of many of these ecosystems. Many current environmental problems as well as many of their potential solutions are closely linked to microbial communities and their activities, yet remarkably little is known about the diversity and function of microbial communities in the environment. Dr. Kelly’s research uses state-of-the-art methods to analyze the composition and function of microbial communities in rivers and streams, with a special focus on the effects of human pollutants.

Training Opportunities available:
Students and postdoctoral fellows who work under the guidance of Dr. Kelly can expect to receive training in microbial ecology, molecular methods, stream ecology, and bioinformatics.

Keywords:
Microbial Ecology; Stream Ecology; Contaminants of Emerging Concern; Pharmaceuticals and Personal Care Products

John (Jack) D. Kerkering, PhD
Associate Professor, Department of English
College of Arts and Sciences
Loyola University Chicago

Summary of Research/Scholarly Activities: Dr. Kerkering's research focuses on the history of literary form, especially poetic form. Of particular interest to me is how accounts of literary form have helped innovate our understanding of personhood. Thus in their first book, *The Poetics of National and Racial Identity in Nineteenth-Century American Literature* (Cambridge University Press, 2003) I address writers and critics of poetry who, for various reasons, sought to understand particular literary forms as extensions of—and indeed as outright embodiments of—specific nations and races: Scots, Southern Confederates, Anglo Saxons, and "Negroes." Their second book, *Racial Rhapsody: The Aesthetics of Contemporary U.S. Identity* (Routledge, 2019), examines how more recent efforts to think about literary form in racial terms have contributed to the ongoing project of conceptualizing racial identities in persons.

Non-Technical Summary: In their 1990 work "Summa Lyrica: A Primer of the Commonplaces in Speculative Poetics," poet and literary critic Allen Grossman writes that "Discourse about poetry is displaced discourse abut persons" (235). Here Grossman astutely captures the close conceptual relationship that has existed historically between efforts to characterize the nature of poems as objects and efforts to characterize the nature of persons as subjects. As their research shows, poetic theorizing, or poetics, has often served as a conceptual laboratory in which innovative accounts of personhood took their preliminary form prior to being used to describe persons. Dr. Kerkering's work examines this initial poetic exploration of concepts like racial identity, which was attributed to poems before being attributed to persons, in order to trace the origins of such historically contingent ideas about selfhood. They thereby seek to improve our historical understanding of how problematic ideas like racial identity have become broadly available and accepted.

Training Opportunities: Students who work under the guidance of Dr. Kerkering can expect to receive training in literary criticism, literary theory, the history of poetry and poetics, and the history of theories of identity, with a special emphasis on the literature and culture of the United States prior to World War II.

Keywords: Poetry, racial identity, American Literature

Twyla Blackmond Larnell, PhD
Associate Professor
Department of Political Science
College of Arts & Sciences

Technical Summary of Research/Scholarly Activities:
Dr. Larnell conducts research that answers practical questions regarding the social, economic, and political problems facing racialized groups and low-income neighborhoods. Her research centers on understanding how local politics and policies influence the distribution of power and resources throughout cities that contribute to 1) disparities in the representation of racialized groups and women in local government, particularly mayors, and 2) spatial inequalities that trouble those communities with predominantly racialized and low-income populations. Due to the complexity of these issues, she draws on an interdisciplinary literature (political science, public policy, public administration, sociology, and geography) and relies on a broad set of research methods, including spatial regression analysis. She considers herself to be a scholar of racial politics, rather than a scholar of a specific racialized group. As such, she makes a great effort to review the literature and collect the data necessary to adequately examine differences across racialized groups, primarily Black, Latinx, and Asians in American cities. At present, she sits on the City of Chicago's Zoning Advisory Panel, which is an important opportunity to help the city address the spatial inequalities contributing to concentrated poverty in predominantly minority communities.

Non-Technical/Lay-language Summary:
Dr. Twyla Blackmond Larnell is an Assistant Professor of Political Science at Loyola University Chicago. Her research and teaching interests center on American urban/local politics and public policy with a specific interest in racial, gender, and class politics in the areas of local governmental representation, particularly mayors, and local economic development. Dr. Larnell believes that she has a civic responsibility to use her knowledge, research, and training to inform the public, particularly the groups and communities that she studies, to promote political knowledge, engagement, and participation, as well as provide community leaders with potential policy solutions. Few people outside of academia and research draw on scholarly journals for information and instead rely on the news media. For this reason, she has appeared as a panelist on WYCC PBS Chicago's "In the Loop," WTTW Chicago PBS "Chicago Tonight" and ABC Chicago's News Views (2018 and 2020). She was quoted in Crain's Chicago Business Magazine, Chicago Sun-Times, The Root and The Southside Weekly. She can also be seen in two documentaries ("The Secret Life of Local Government" and "Black Feminism").

Training Opportunities available:
Students, (postdoctoral) fellows or residents who work under the guidance of Dr. Larnell can expect to receive training in social, economic, and political problems that racialized groups and peoples from low-income communities' face.

Classes taught at Loyola:
PLSC 101: American Politics
PLSC 218: Black Politics
PLSC 300A: Contemporary Issues in American (Minority) Politics
PLSC 334: Urban Policies and Problems

PLSC 390: Urban Politics
HONR 203B: United States Experience

Olivia C. Stewart Lester, PhD
Assistant Professor of New Testament and Early Christianity
Department of Theology, College of Arts and Sciences
Loyola University Chicago

Summary of Research/Scholarly Activities: Dr. Stewart Lester's research focuses on prophecy in Hellenistic Judaism, early Christianity, and the larger ancient Mediterranean. Their first book, *Prophetic Rivalry, Gender, and Economics: A Study in Revelation and Sibylline Oracles 4–5* (Mohr Siebeck, 2018), adds to a growing body of scholarship challenging prophecy's decline in the early Roman imperial period and examines constructions of true and false prophecy at the intersections of interpretation, gender, and economics. Their current project is a study of the Jewish-Christian Sibylline Oracles. These prophecies illuminate our understanding of the so-called "parting of the ways" between Judaism and Christianity, presenting within one textual collection a wide variety of literary interactions between Jews and Christians over centuries, all written in the pseudepigraphic voice of a woman. Moving outside the collection, early modern engagement with the Sibylline Oracles presages the scholarly interest in distinguishing authentic texts from fakes that comes to define biblical studies as a discipline and remains a task of the expert humanities scholar today. Related to this project, recent publications examine the relationship between the Sibylline Oracles and apocalyptic historiography, Jewish and Christian iconography, and ancient and modern anti-Judaism.

Non-Technical Summary: An ancient historian, Dr. Lester research prophecy as a cultural phenomenon in the ancient Mediterranean. Their work is interdisciplinary, examining prophecy cross-culturally—in ancient Greek and Roman religions, ancient Judaism, and ancient Christianity. It is also integrated in its approach, uniting philological analysis with gender theory, economics, temporal studies, literary criticism, and material culture. Their first book is entitled *Prophetic Rivalry, Gender, and Economics: A Study in Revelation and Sibylline Oracles 4–5* (Mohr Siebeck, 2018). The book examines constructions of true and false prophecy at the intersections of interpretation, gender, and economics. They are currently working on a monograph on the Jewish-Christian Sibylline Oracles, a rare ancient example of collected prophecies written in the voice of a woman.

Training Opportunities: Students who work under the guidance of Dr. Stewart Lester can expect to receive training in theories and methods in the study of religion, generally, and biblical studies, specifically, with a special focus on integrating gender theory, historiography, literary criticism, and New Testament Greek.

Pengfei Li, PhD
Assistant Professor
Department of Chemistry and Biochemistry
College of Arts and Sciences
Loyola University Chicago

Summary of Research/Scholarly Activities: Dr. Li's lab performs theoretical and computational studies at the interface of biological chemistry and inorganic chemistry, in order to gain fundamental mechanistic insights on metalloproteins and apply our understanding to molecular design for biomedical purposes. More specifically, they aim to develop an artificial intelligence assisted polarizable model for predicting the energetic properties of metal ion containing systems with high accuracy, cheap computational cost, and improved transferability. Moreover, they aim to use molecular dynamics simulations to understand how the protein scaffold and target-binding influence metal binding in the Ca^{2+} binding proteins. In addition, they will investigate the ligand binding mechanism of the S100B protein, a Ca^{2+} binding protein which is a biomarker and potential therapeutic target for malignant melanoma, and optimize the ligand affinity and specificity towards this protein.

Non-Technical Summary: Dr. Li's lab is interested in studying how metalloproteins perform their functions and applying the obtained knowledge to design molecules for relevant biomedical purposes. Their lab is a computational lab which will use computational modeling to study these processes. In order to better simulate the metal ion containing systems, they need to have reliable and fast models. Developing such models is one of the focuses of our lab. Moreover, they are specifically interested in the Ca^{2+} binding proteins, which play significant roles in various transduction pathways in metabolism. They aim to elucidate the mechanisms of Ca^{2+} binding proteins and perform relevant ligand design through using molecular modeling techniques.

Training Opportunities: Students or fellows who join Dr. Li's lab can expect to receive training in theoretical and computational modeling techniques such as quantum chemistry calculations and molecular dynamics simulations.

Keywords:
Molecular modeling, molecular dynamics, metalloproteins, force fields

Joseph Ross Milanovich, PhD
Associate Professor
Department of Biology
Loyola University Chicago

Technical Summary of Research/Scholarly Activities: The Milanovich Lab at Loyola University Chicago focuses on understanding the influence of land-use and climate change on amphibian and reptile communities, primarily in the Midwestern United States. We use a variety of methods to explore the effects of global change on, and the ecological function, health, and populations of herpetofauna. Amphibians and reptiles are represented by a variety of taxa, and are some of the most abundant organisms on the planet. Understanding their ecological role is essential to project the true impact of anthropogenic change on biota.

Non-Technical/Lay-language Summary: The Milanovich Lab at Loyola University Chicago studies how environmental change influences how amphibians and reptiles react to change – especially their populations, what habitat they use, how healthy they are, and how we can best conserve these organisms. We also study how these animals benefit the environment and why they are important to focus conservation efforts. The primary goal is to provide data and support for the conservation of these species in the context of global change.

Training Opportunities available: Students, (postdoctoral) fellows or residents who work under the guidance of Dr. Milanovich can expect to receive training in ecology, global change biology, herpetology, landscape ecology, quantitative ecology, experimental ecology and life/natural history.

Keywords: Herpetology, ecology, physiology

Catherine DeCarlo Santiago, PhD
Associate Professor
Department of Psychology
Loyola University Chicago

Summary of Research/Scholarly Activities: Dr. Santiago research Program focuses on how children and families respond to stress and trauma as well as how community interventions can improve functioning and promote resilience. In partnership with school and community leaders, administrators, clinicians, and parents, they conduct school- and community-based intervention research. Our work examines effectiveness, implementation, and sustainability of these interventions among underserved populations. At a basic level, they are interested in individual and family adaptation to the accumulation of stress and trauma. In addition, they are focused on cultural and family factors in relation to psychopathology and mental health intervention. In particular, they are interested in how family and cultural factors might enhance or ameliorate the relationship between stress and child psychopathology, especially among minoritized families. Their lab will continue both basic and intervention research that explores adaptation to stress and adversity among children and families.

Non-Technical Summary: Dr. Santiago research program is focused on improving understanding of trauma, stress, and resilience. This learning can then be applied to intervention efforts. They also evaluate school and community interventions to support increased access to supports and services in school and community settings. Another goal is to apply our research to policy and advocacy efforts.

Training Opportunities: Students and fellows who work under the guidance of Dr. Santiago can expect to receive training in community research, intervention research, and mixed methods research (quantitative, qualitative).

Key words: Trauma, stress, family, children, intervention

Megan A. Sholar, PhD
Advanced Lecturer
Interdisciplinary Honors Program
Loyola University Chicago

Summary of Research/Scholarly Activities: Dr. Sholar research centers on women, politics, and public policy, with a focus on family and parental leave policies. Their current co-authored book project examines the ways in which women continue to chase equality in a range of public policy arenas in the United States. In particular, they explore the reasons that women have been unable to close the gender gap and eradicate discrimination in employment, education, and family and reproductive rights. They are also working on a co-authored project to explain the variation in paid family leave policies across the country. The United States is the only industrialized country in the world without national-level paid family leave, yet many state governments have stepped in to fill the void. To determine why some states have introduced and/or adopted paid leave policies and others have not, they are measuring the effects of variables such as legislative party control, state ideology and religiosity, union density, and representation of women in office. They are bolstering their quantitative results with a number of interviews with activists and politicians who have been involved in the passage of paid leave policies.

Non-Technical Summary: Through their research, Dr. Sholar hopes to advance our understanding of the reasons that women continue to face political, economic, and social discrimination and underrepresentation in the United States. For example, women hold only about one-quarter of political seats and are less than 10 percent of the CEOs of Fortune 500 companies. One of the main reasons for this discrepancy is that women continue to be responsible for the majority of (unpaid) care work of children and other family members. Compounding this problem is the fact that the United States remains the only industrialized country in the world without paid family leave. Their research examines the reasons for this lack of paid leave, the prospects for passing paid leave in the future, and the ways in which state and local governments, as well as businesses, have begun to address this problem in the absence of national-level policy action.

Training Opportunities: Students who work under the guidance of Dr. Sholar can expect to receive training in qualitative research methods, in addition to developing a better understanding of the role that women play in politics as activists, voters, and politicians. They will also gain insight into the reasons that women continue to suffer from discrimination and underrepresentation in the political realm.

Keywords: women and politics, family leave, parental leave, women and elections

Christopher W. Skinner, PhD
Associate Professor of New Testament & Early Christianity
Department of Theology / College of Arts and Sciences
Loyola University Chicago

Summary of Research Scholarly/Activities: Dr. Skinner is a scholar of New Testament and Christian origins working at the intersection of narratology and historical criticism. Specifically, their research explores literary and historical questions in the narratives about Jesus both within and outside the New Testament. They have written extensively about narrative-critical issues as well as characterization in the Gospels of John and Mark. They have also written about the scholarly reception of the Gospel of Thomas, particularly those areas of research that have resisted consensus. They have additional interests in the reception of Jesus within popular culture and the leveraging of ideas about and images of Jesus and the Bible within contemporary political and religious discourse. They are currently working on two projects: the first is a study of Mark's Christology against the Jewish, Roman, and Hellenistic worlds. The second is a project that re-envisions scholarly questions surrounding the Johannine community.

Non-Technical Summary: Dr. Skinner is interested in how critical questions about literature and history can inform our understanding of early Christian traditions, particularly the earliest presentations of Jesus within and outside the New Testament. Their research focuses on the Gospels of Mark and John—both found within the New Testament—and the enigmatic Gospel of Thomas, an ancient text that was rediscovered in the middle of the 20th century. They have are particularly interested in the ways these traditions differ from one another. They also study how ideas about Jesus and the Bible are used within contemporary culture, political rhetoric, and religious discourse.

Training Opportunities: Graduate students who pursue research with Dr. Skinner can expect to develop; (1) strong philological skills, especially in the study of Greek and Coptic texts; 2) the ability to read ancient texts closely and carefully within their social, religious, and historical contexts; (3) a robust understanding of history and historical method, and (4) a broad awareness of texts and traditions within Second Temple Judaism and Early Christianity.

Keywords: Christology, gospels, historical Jesus, New Testament, narrative criticism

Timothy M. Stoelinga, PhD
Curriculum Studies, M.Ed.
Curriculum and Instruction, B.S.
General Engineering Director
Center for Science and Math Education
Loyola University Chicago

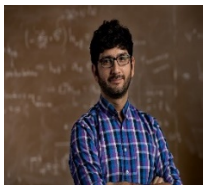
Technical Summary of Research/Scholarly Activities:
Timothy Stoelinga has funded Programs and Research in training new generations of leaders in STEM, support for NGSS teacher leaders, and programs supporting excellence in Mathematics Education.

Timothy Stoelinga's publications include topics covering; learning-trajectory-based formative assessment in mathematics, intensification approaches to algebra, how large urban schools implement mathematics, research into innovative approaches to teacher preparation and professional development in K-12 STEM education PK-16, studying teaching practices that promote equitable learning in mathematics and science classrooms, understanding students' perspectives on the impact of status and positing in mathematics classrooms, particularly for marginalized groups of students in STEM education, and teaching post STEM gateway courses and K-12 teacher preparation courses.

Non-Technical/Lay-language Summary:
Stoelinga's work in STEM education has focused on the design and study of innovative programs that enhance STEM learning from early childhood to adulthood. In particular, he studies how curricular support and programs of teacher inquiry can enhance teaching and learning in mathematics and science. Stoelinga is also interested in studying children's development of positive identities as learners, focusing on issues related to socialization, participation, and identity, particularly for students in underrepresented groups in STEM. Stoelinga designed and studied research-based curriculum projects in elementary and secondary level mathematics.

Training Opportunities available:
Students, (postdoctoral) fellows or residents who work under the guidance of Dr. Stoelinga can expect to receive training in equity, identity, and participation in STEM education, design-based research, and mathematics curriculum development.

Classes taught at Loyola University Chicago:
MATH 117: Precalculus I
MATH 118: Precalculus II
TLSC 450: Teaching & Learning in an Area of Specialization – Secondary Mathematics
TLSC 451: Teaching & Learning with a Global Framework



Walter Tangarife, PhD
Assistant Professor
Department of Physics, College of Arts and Sciences
Loyola University Chicago

Summary of Research/Scholarly Activities: Dr. Tangarife research focuses on two main areas of particle theory. The first one concerns the phenomenology of physics beyond the Standard Model, including dark matter, neutrino physics, and particle cosmology. They are interested in models where neutrino physics and the dark matter problem are intertwined, either because neutrinos provide a mechanism to create and detect dark matter, or because the dark fields participate in the mechanism that generates masses for neutrinos. In the second area, they study applications of the AdS/CFT correspondence to the black hole information paradox and thermalization of strongly coupled systems.

Non-Technical/Lay-language Summary: In their research, Dr. Tangarife focuses on fundamental questions about the nature of dark matter, which makes up 26% of the universe. They are interested in models that explain how this type of matter has evolved during the early age of the universe. An additional question is how dark matter is related to the physics of neutrinos, which are very tiny particles that interact feebly with the rest of particles in the universe. In a complementary area, they study the physics of what happens when you try to use the rules of quantum mechanics near the horizon of a black hole. This line of investigation aims to understand the quantum nature of gravity.

Training Opportunities: In Dr. Tangarife's research group, undergraduate students are trained in the basics of high energy physics such as quantum field theory, fundamentals of cosmology, and the physics of black holes. They have opportunities to present their work at scientific symposia and several students have received some of the Provost Fellowships available to LUC students.

Keywords: Particle Physics, Dark Matter, Neutrinos, Black holes, Information paradox.

Elizabeth Webster, MFA, PhD
Assistant Professor
Criminal Justice and Criminology
Loyola University Chicago

Summary of Research/Scholarly Activities: Dr. Webster's work focuses on criminal justice system errors and the processes, policies, and perceptions that contribute to, and remedy, these errors. Research projects include: exonerated defendants' perceptions of the legitimacy of the courts (in progress); prosecutorial discretion in postconviction innocence review (Webster 2020, Webster 2019); the proliferation and inaccuracies of state criminal history records disclosed on the internet (Lageson, Webster and Sandoval, forthcoming); and how gender and racial bias contribute to tunnel vision in wrongful conviction cases (Webster and Miller 2014). Ultimately, they aim to contribute to efforts that enhance the accuracy and the legitimacy of the criminal justice system, particularly in the administration of post conviction justice.

Non-Technical Summary: Dr. Webster's work focuses on criminal justice system errors and the processes, policies, and perceptions that contribute to, and remedy, these errors. Their current research examines exonerated defendants' perceptions of the legitimacy of the courts, specifically, whether procedurally just exoneration experiences enhance exonerees' trust in the courts and their recovery after wrongful incarceration. In a previous study, funded by the National Institute of Justice, they explored when and why prosecutors choose to assist a wrongfully convicted person in achieving their exoneration. They found that prosecutors are more likely to assist when the underlying wrongful conviction does not involve official misconduct. Ultimately, they aim to contribute to efforts that enhance the accuracy and the legitimacy of the criminal justice system, particularly in the administration of post-conviction justice.

Training Opportunities: Students, fellows, or residents who work under the guidance of Dr. Webster can expect to receive training in qualitative sociological research methods, feminist criminology, and increased knowledge and expertise in the postconviction legal system and prosecutorial discretion.

Keywords: Wrongful convictions, courts, prosecutors, criminal appeals