

2023 UIC Department of Pediatrics Summer Scholars Program Research Opportunities

This is not an exhaustive list; please contact any Department researcher to discuss other ideas. If you are interested in any of these opportunities, email the contact person to discuss more with the researcher.

Faculty Mentor: Dr. Sekhar P. Reddy

General Information: Oxidant and environmental stress associated with premature birth are linked to the development of bronchopulmonary dysplasia (BPD), a chronic disease with poor health outcomes. While current treatments primarily improve the survival of preterm babies, the incidence of BPD and associated poor health outcomes remain significant problems. Studies with clinical models of acute and chronic lung injury and human samples showed the central role of heightened or unresolved inflammation coupled with defective remodeling as leading pathogenic disease features. Our lab search uses tissue-specific gene-targeted mouse and preclinical models of BPD to elucidate the exact mechanisms underlying abnormal lung inflammation and alveolar remodeling in the neonatal lung exposed to oxidant stress. We specifically focus on proximate AP-1/Nrf2 proto-oncogene signaling in regulating lung inflammation and alveolar remodeling in the developing lung after oxidant injury.

Key Roles:

- RUN ASSAYS,
- ANALYZE DATA, and
- ASSIST WITH MANUSCRIPT preparation

Key Qualifications/ Experience Required:

- Junior/Senior High School Students, Undergraduates/Medical Students
- EXPERIENCE WITH BASIC LAB TECHNIQUES and Microsoft office.

How to Apply: Students can apply by emailing their CV and Statement of Interest to Sekhar P. Reddy, PhD
Professor of Pediatrics
312-413-3606
Sreddy03@uic.edu

Faculty Mentor: Tianji Chen, PhD

General Information: We recently identified a gene named Prrx2 that plays a critical role in the pathogenesis of pulmonary hypertension (PH). We will study the potential downstream signaling that are regulated by Prrx2 in pulmonary vascular cells and investigate the downstream mechanisms by which Prrx2 plays the role.

Key Roles:

Students will need to read literatures and collect data by involving in performing assays for the project. Assays include RNA isolation and qPCRs, Western blot analysis and/or immunostaining.

Key Qualifications/ Experience Required:

- Basic knowledge in bioscience/biomedical studies.
- Previous laboratory (wet lab) experiences are preferred.

How to Apply: Students can apply by emailing their CV and Statement of Interest to Tianji Chen, PhD,
tianjic@uic.edu.

Faculty Mentor: Andrea A. Pappalardo, MD

General Information: Asthma affects 11% of children in Illinois, over half of which have uncontrolled symptoms. Health disparities in pediatric asthma have been persistent for decades, and researchers are looking to how we can leverage public policy to improve asthma outcomes for children. One example for this is Asthma Stock Inhaler Programs for schools, which was passed in Illinois at Public Act 100-0726. Stocking undesignated rescue inhalers in schools can provide critical access to life-saving medications in the school, whenever a student or staff member may need one.. We are looking for two remote interns to help us with thematic qualitative data analysis of interviews with school staff, parents, and students.

Key Roles:

- Perform thematic analysis and qualitative coding of interviews (Qualitative Data Analysis)
- Participates in meetings and workgroups related to the project
- May conduct literature searches
- May write abstracts and/or manuscripts based on findings
- Help develop stock inhaler toolkit for ALA partnership
- Engage with multiple stakeholders to create toolkit that would be endorsed by many critical organizations
- Propose and create and additional project based on student interests

Key Qualifications/ Experience Required:

- Bachelor's degree in Public Health, Social Science or related field required.
- MD/MPH/PHD students preferred
- Knowledge of fundamental research concepts, practices and procedures required
- Must exhibit careful attention to detail
- Excellent written and oral communication skills required
- Must show strong interpersonal skills and exceptional professionalism
- Experience with MS Excel, MS Word, MS PowerPoint, SAS, and/or Nvivo preferred

**NOTE: Dr. Pappalardo is looking for two students. One in the Chicago area, and one at the Rockford or Peoria campus.*

Lab Website: <https://chicago.medicine.uic.edu/departments/academic-departments/medicine/pulmonary-critical-care-sleep-allergy/research/pappalardo-lab/>

How to Apply: Students can apply by emailing their CV and Statement of Interest to Andrea Pappalardo at apappa2@uic.edu

Faculty Mentor: Reshma Shah, MD, MPH

General Information: Dr. Shah is conducting research on how the primary care setting can better help children with developmental delays and disabilities access therapeutic services and reduce inequities to evidence-based care.

Key Roles:

- To develop visual media to assist with obtaining school-based therapies
- To input data
- To complete a chart review
- To provide families with assistance in obtaining school-based services

Key Qualifications/ Experience Required:

- Excellent communication skills
- Ability to speak in Spanish is preferred, but not required
- Ability to access Epic is preferred
- Experience in creating visual media preferred
- Experience with website design preferred

How to Apply: Students can apply by emailing their CV and Statement of Interest to Reshma Shah at reshmamd@uic.edu

Faculty Mentor: Molly Martin, MD

General Information: National Institutes of Health (NIH) Community Engagement Research Alliance Against COVID-19 Disparities (CEAL) research teams are currently working in 21 states to provide trustworthy information through active community engagement and outreach to the people hardest-hit by the COVID-19 pandemic. The Chicagoland COVID Collaborative is a partnership of academic and community health disparities experts working together to improve COVID-19 vaccination and engagement in quality therapeutic care and trials for low-income Black and Latinx communities in the Chicago area. More info about our program is available at <https://chicovid.ihrp.uic.edu/>.

Key Roles:

Because the COVID landscape is changing so rapidly, the roles for this upcoming summer are unclear and rapidly changing. We anticipate a need for students to work on qualitative and quantitative analysis, manuscript preparation, and possibly community data collection.

Key Qualifications/ Experience Required:

- Preferred experience with community research
- Preferred experience with qualitative data analysis
- Preferred Spanish-language skills

How to Apply: Students can apply by emailing their CV and Statement of Interest to Anna Sandoval, MPH, at asando1@uic.edu.

Faculty Mentor: Molly Martin, MD

General Information: COordinated Oral Health Promotion (CO-OP) Chicago is an NIH-funded research study that addresses oral health disparities in young children. The CO-OP Chicago trial finished in 2020. A subsequent data collection was conducted to better understand the impact of COVID-19 on oral health and social factors. Now the study is collecting data from families again to study oral health social determinants over time. More information is available at: <https://co-opchicago.ihrp.uic.edu/>.

Key Roles:

- Assist with data collection
- Support data analysis, and report and manuscript preparation

Key Qualifications/ Experience Required:

- Preferred experience with community research
- Preferred experience with academic manuscript writing

How to Apply: Students can apply by emailing their CV and Statement of Interest to Anna Sandoval, MPH, at asando1@uic.edu.

Faculty Mentor: Heng-Fu (Henry) Bu

General Information:

We aim to (1) To study whether and how the interaction between IFN γ signaling pathway impacts activities of intestinal stem cells/progenitor cells and intestinal regeneration during severe inflammation. (2) To study whether and how MFG-E8 promotes liver wound healing, to elucidate how liver pathological events influence levels of this protein. Our study will ultimately lead to develop new therapies for patients with intestine disorders and liver disease in the future.

Key Roles:

The student may study the progenitor cell proliferation in the intestine or liver tissues and explore the cell alterations during the physiology and the pathogenesis within the normal adult and gene mutation mice. They will do some literature review and run some protein and molecular assays during the summer program.

Key Qualifications/ Experience Required:

- Medical student, junior or senior undergraduate majored with Biology, Pre-med and /or similar science study.
- Fluency in English and experienced with basic concept of Bio-lab Techniques such as in vitro cell culture, ELISA, PCR and RT-PCR, Western Blotting, and hybridization et al.; some practice experience on mouse is preferred.

How to Apply:

Students can apply by emailing their CV and Statement of Interest to Dr. Hengfu Bu at hbu2@uic.edu

Faculty Mentor: Hua Geng, PhD, Research Associate Professor

General Information:

Rapid progress of next generation sequencing (NGS) technologies at single cell resolution has provided many valuable insights into complex biological process, discovery of rare cell population and track the trajectories of distinct cell lineages. Intestinal regeneration after injury frequently occurs during inflammation (IBD and sepsis) and response to the genotoxic agents (chemotherapy and radiation). This process involves evoking injury-resistant stem cells or activation of cellular plasticity and dedifferentiation of remaining cells to progenitors and stem cells. The proposed study will collect data from the public available RNA-seq datasets (scRNA-seq and bulk RNA-seq) related to intestinal regeneration (from human study and experimental mouse model), followed by integrative bioinformatic analysis of pooling datasets, and aim to discover a holistic representation of the cell state and key signaling that plays a critical role in intestinal regeneration.

Key Roles:

- Literature review and collection of datasets information from publications.
- Obtain single-cell RNA sequencing and bulk RNA-seq dataset from NCBI SRA, scRNASeqDB, Single Cell Portal etc.
- Perform RNA-sequencing data analysis pipeline.
- Recording findings by taking written notes and using appropriate software

Key Qualifications/ Experience Required:

- Knowledge of research concepts, data management, and statistics.
- Solid writing skills for manuscript preparation.

How to Apply: Students can apply by emailing their CV and Statement of Interest to Dr. Hua Geng at hgeng5@uic.edu

Faculty Mentor: SARAVANAN SUBRAMANIAN, Ph.D., Research Assistant Professor

General Information: Necrotizing enterocolitis (NEC) is a devastating and life-threatening inflammatory gastrointestinal disease in 2-5% of all premature infants. Intestinal epithelial cell (IEC) apoptosis is considered as one of the prominent pathological features in NEC. During the chronic inflammatory state of NEC, IECs undergo necroptosis that induce more pathological feature than apoptosis. We establish the mechanism of scattered crypt IEC apoptosis to diffuse villus IEC necrosis in a novel model of NEC induced by IEC apoptosis. Here, we will elucidate how intestinal crypt epithelial apoptotic injury progresses to NEC in mouse pups.

Key Roles:

Animal Handling, Molecular studies, immune cells profile, Literature review, Manuscript writing

Key Qualifications/ Experience Required:

- College students with high school diploma
- Experience with basic lab techniques

How to Apply: Students can apply by emailing their CV and Statement of Interest to Dr. SARAVANAN SUBRAMANIAN at ssubra53@uic.edu

Faculty Mentor: Xiao Wang, MD, PhD, Assistant Professor

General Information: Our study focuses on sepsis pathogenesis, which aims to clarify the underlying mechanism of innate immune cell differentiation in sepsis. In this project, we will employ basic cellular and molecular biology technologies, such as primary cell culture, PCR, western blot, etc., to get information about genetically modified animals in a disease model. Further, we will use RNA-seq, ChIP-seq, and metabolic profiling to explore the role of innate immune cells' metabolic-epigenetic axis in the host response to septic stress.

Key Roles:

- Collecting data for manuscript preparation.
- Involved in experimental design and preliminary data interpretation in grant submission.

Key Qualifications/ Experience Required:

- College students with high school diploma
- PCR and Western blot skills are preferred.

How to Apply: Students can apply by emailing their CV and Statement of Interest to Dr. Xiao Wang at xwang329@uic.edu

Faculty Mentor: Kristen Kenan, MD, MPH

General Information: The PATH 2 Purpose study is a two-arm comparative effectiveness research trial that will evaluate the ability of the interventions, Teens Achieving Mastery over Stress (TEAMS) and Competent Adulthood Transition with Cognitive-behavioral and Interpersonal Training (CATCH-IT), to intervene early to prevent depressive illness in adolescents ages 13-18 from diverse communities. The study will enroll 564 teens at-risk for depression into the two different online prevention programs, TEAMS and CATCH-IT, and compare their effectiveness, accessibility, time commitment, cultural acceptability, and implementation costs. Our challenge is to:

- Widely implement effective, evidenced-based mental health interventions in primary care clinics and schools;
- Successfully adapt the interventions for use in diverse communities; and
- Create a sustainable system for the interventions to be used in a population-health model.
- For more info: <https://path2purpose.info>
- Like us on https://www.instagram.com/path2purpose_study/
- Like us on <https://www.facebook.com/path2purpose2021/>

Key Roles:

Remote and in-person screening, Recruitment, and enrollment of adolescent patients age 13-18 in UIC pediatric and adolescent medicine clinics and Mile Square Health Centers.

Key Qualifications/ Experience Required:

We are seeking undergraduate and graduate students interest who have interpersonal skills, can work independently, and have previous work/volunteer experience with adolescents ages 13-18. Since the recruitment training process is complex, particularly due to COVID, students who are willing to volunteer longer than the 6-week Summer Scholars program are preferred.

How to Apply: Students can apply by emailing their CV and Statement of Interest to Matthew Lowther at lowtherm@uic.edu

Note: The position is contingent upon successful completion of training requirements for delivering the intervention.

Faculty Mentor: Dr. Jagadeesh Ramasamy PhD

General Information: Dr. Ramasamy and his lab research fellows are currently developing non-opioid novel molecular targets to reduce the pain suffering attributed to 1) Sickle Cell Disease (SCD), 2) Alzheimer's Disease (AD), and 3) Endometriosis by identifying upstream messengers/target molecules of acute and chronic pain signaling. Mitochondrial retention in SCD red blood cells is discovered in the lab first time and is now well recognized as a significant contribution to SCD as well as SLE pathophysiology. However, the molecular mechanisms linked to pain and mitochondrial retention are not clear. Our recent findings suggested that dysregulated autophagy byproducts released during the lysis of RBCs have the potential to trigger pain episodes in SCD patients. Our lab uses:

1. Transgenic SCD mouse models.
2. The exvivo hematopoietic stem cell culture/erythropoiesis model.
3. SCD patients' samples to elucidate the pain mechanisms and novel targeted therapy.

Key Roles:

Literature review, run protein and molecular assays, data analysis, and manuscript writing.

Key Qualifications/ Experience Required:

Undergraduates/Medical Students

Basic research lab techniques such as cell culture, ELISA, QPCR, Western Blotting, Flow cytometry and experience in microscope and mice are preferred.

How to Apply: Students can apply by emailing their CV and Statement of Interest to

Jagadeesh Ramasamy, PhD
Research Assistant Professor

jagadees@uic.edu