**Faculty Mentor:** *Hua Geng, PhD*

**General Information:**

 Colorectal cancer (CRC) is a complex disease that arises from the accumulation of genetic and epigenetic alterations in the colon and rectum. The chronic inflammation, continuous tissue destruction and renewal, carcinogen exposure play an important role in triggering mutagenic processes that serve as cancer-initiating events. Imprinting is an epigenetic phenomenon that involves the silencing of one copy of a gene depending on its parental origin, and loss of imprinting (LOI) is an important CRC-associated molecular event. However, we still do not fully understand how these factors contribute to the development of colon cancer. In this proposed study, we aim to investigate the effects of the imprinted gene, namely, long non-coding RNA *H19* (*H19*, a tumor associated molecule), elucidate how *H19* involved in the development of CRC, and further evaluate the clinical early detection and prognostic potential using elevated *H19* biallelic expression as a biomarker for CRC.

**Key Roles:**

* *Run assays for detection H19 expression in CRC patient samples.*
* *Analyze data.*

**Key Qualifications/ Experience Required:**

* *Basic knowledge in bioscience/biomedical studies.*
* *Experience with basic lab techniques.*

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

Hua Geng, PhD

Research Associate Professor

hgeng5@uic.edu

**Sickle Cell Educational Modules – prototyping and improving**

**Faculty Mentor:** *Lewis Hsu, MD, PhD, Pediatric Hematology-Oncology*

**General Information:** *Sickle cell disease(SCD) is an inherited disease of red blood cells that causes unpredictable episodes of severe pain, chronic organ damage, and shortened lifespan. SCD disproportionately affects black and brown populations (although not a “black disease”) and has been characterized by minority health disparities for decades. Recent rapid progress in treatment and potential cures has been very gratifying, and UIC Comprehensive Sickle Cell Center is at the forefront of this progress. We are trying to inform the sickle cell community fully about new treatment options and about complications of sickle cell disease. Individuals with sickle cell disease, family caregivers, community health workers, and healthcare professionals all could benefit from better education on sickle cell disease.*

**Project:** *We are developing an educational repository with multiple formats and distribution channels for different segments of the SCD population. The student will learn to apply the tools of Human-Centered Design, Dissemination and Implementation Science, and story-telling for Science Communication. The student will share in developing prototype educational modules on one or two topics, collecting feedback from patients and families, and using the feedback to improve the prototype in iterative cycles. Students can choose to develop modules for use in Chicago, or for international sites where we have collaboration (Nigeria, Brazil, Uganda).*

*This activity already has approval by the UIC IRB. The student should complete CITIprogram.org human subjects research training before starting. The student will have directed reading and regular meetings. This can be a part-time and remote-work activity.*

**Key Roles:**

*Develop a prototype of low-literacy, highly visual educational material suitable for electronic dissemination (infographic, comic strip, or video story)*

*Collect feedback from patients and families (in person or online asynchronous)*

*Use the feedback to improve the prototype in iterative cycles.*

*Assist with writing of poster presentation or manuscript*

**Key Qualifications/ Experience Required:**

* *Medical student, graduate student, or upper-level college student*
* *Experience in education, visual arts, or global health will be a plus*
* *Language skills relevant to a population with SCD*

**How to Apply:** Students can apply by emailing their CV and Statement of Interest to Dr. Lewis Hsu, LewHsu@uic.edu

**Development of nonopioid pain targeted therapy**

**Faculty Mentor:***Jagadeesh Ramasamy, PhD,*

*Hematology-Oncology and Translational Research*

*Pediatrics, College of Medicine UIC*

**General Information:**Sickle cell disease (SCD is the world's most lethal genetic blood disorder caused by a single-point mutation of the Beta-globin gene. The effect of this simple change is catastrophic for those with the disease, many of whom face lifelong debilitating pain and multiple organ damage. Frequent episodes of acute pain due to Vaso-occlusive crises (VOC) is a unique feature of SCD. Deoxygenated hemoglobin-S (HbS) polymerization is an initial triggering factor for sickling. However, excessive reactive oxygen species (ROS) in SCD RBCs can activate oxidative reactions, including altering membrane lipids. Opioids are the current treatment of choice for pain management in SCD; however, continued use renders several adverse effects, including addiction. Although hematopoietic stem cell transplant (HSCT) is a curative therapy for SCD patients, many of them continue to experience pain and require opioid treatment. A novel strategy would open the possibilities of preventive treatment approaches for both acute and chronic pain to avoid opioid drugs, improving the quality of life of millions of people affected by SCD worldwide.

**Project:**We discovered the presence of abnormally retained mitochondria in erythrocytesand their link to elevated levels of reactive oxygen species (ROS) and hemolysis in SCD patients.

Mitochondrial retention in RBCs is now emerging as an upstream source for non-infectious inflammatory reactions in SCD and other vascular inflammatory diseases. Our lab *focuses on developing nonopioid pain targets for SCD and other pain conditions using in vitro and exvivo culture models, SCD mouse models, and SCD patient recruitment to collect blood samples to identify molecular targets.*

**Key Roles:**

Participate in ongoing Basic, translation and preclinical and clinical research lab projects, research assistance and development of new advanced technical research applications.

**Key Qualifications/ Experience Required:**

* *High school student, Medical student, Graduate student*
* *Experience in basic lab techniques will be a plus*

**How to Apply:**

Students can send a CV and Statement of Interest to Dr. Jagadeesh Ramasamy.

Email: jagadees@uic.edu

**Chicagoland CEAL Program**

**Faculty Mentor:** Molly Martin, MD

**General Information:** National Institutes of Health (NIH) Community Engagement Research Alliance (CEAL) research teams are currently working in 21 states to support active community engagement and outreach in research. The Chicagoland CEAL program is a partnership of academic and community health disparities experts working together to address health inequities in low-income Black and Latinx communities in the Chicago area. More info about our program is available at https://chiceal.ihrp.uic.edu/.

**Key Roles:**

The roles for this upcoming summer are unclear at this time. We anticipate a need for students to work on qualitative and quantitative analysis, manuscript preparation, and possibly community data collection and data dissemination.

**Key Qualifications/ Experience Required:**

* Strong writing skills
* Preferred experience with graphic design
* 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 a Statement of Interest to Anna Sandoval, MPH, at asando1@uic.edu.

**COordinated Oral Health Promotion (CO-OP) Chicago**

**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:**

* Support data cleaning, data analysis, and report and manuscript preparation
* Creating and updating results dissemination materials

**Key Qualifications/ Experience Required:**

* Preferred experience with community research
* Preferred experience with academic manuscript writing
* Preferred graphic design skills

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

**Faculty Mentor:** *Dr. SARAVANAN SUBRAMANIAN, Ph.D.*

**General Information:** Necrotizing enterocolitis (NEC) is the most common and life-threatening gastrointestinal disease among premature infants. The pathological features of NEC are well characterized by segmental coagulative bowel necrosis, bacterial overgrowth, pneumatosis intestinalis, and inflammatory cell infiltration in the intestines, leading to overwhelming sepsis and death. The molecular mechanisms driving the pathophysiology and pathogenesis of this critical disorder largely remain elusive. Using the neonatal mouse model, we will elucidate how microbial colonization influences intestinal inflammation and epithelial injury during NEC development.

**Key Roles:**

Animal Handling

Molecular studies (DNA and RNA extraction, RT-qPCR)

Immune cells profile (Flow cytometry)

Literature review

Manuscript writing

**Key Qualifications/ Experience Required:**

• *Bachelor’s*

• Experience with basic lab techniques

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

*SARAVANAN SUBRAMANIAN*

*ssubra53@uic.edu*

**Faculty Mentor:** *Heng-Fu (Henry) Bu, DVM & PhD, Research Associate Professor*

**General Information:** *3-4 SENTENCES ON WHAT THE RESEARCH STUDY IS ABOUT*

* *We aim 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 developing new therapies for patients with liver injury in the future.*

**Key Roles:**

* *In the summer program, the student will focus on researching the growth of progenitor cells in liver tissues. They will examine how these cells change during normal physiological processes and in the progression of diseases, comparing these processes in normal adult mice and those with genetic mutations. The study will involve a thorough review of existing literature and the execution of various protein and molecular assays.*

**Key Qualifications/ Experience Required:**

*• Medical student, junior or senior undergraduate majored in 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 Henry Bu at hbu2@uic.edu*

**Faculty Mentor:** *Reshma Shah, MD, MPH*

**General Information:** Less than 25% of preschool-aged children with developmental delays and disabilities (DD) currently receive recommended therapies (e.g., speech therapy). Because therapeutic services are associated with improved school readiness and subsequent educational and health outcomes, a lack of therapies during this period can be responsible for substantial morbidity among children and their caregivers.

This study aims to test whether an educational-medical linkage model (a proposed community-clinical linkage (CCL)), improves access to school-based services and subsequent child, parent, family and health service outcomes and offers a promising strategy to address longstanding racial, ethnic and income health care disparities among families with preschool children with developmental delays and disabilities.

**Key Roles:**

* Provide patient navigation to assist families obtain school-based services (this will be virtually done)
* Meet weekly with team to discuss progress and address barriers
* Conduct surveys to assess impact of the intervention
* Data entry
* Assist with manuscript preparation
* Assist with development of a website to support families access school-based services

**Key Qualifications/ Experience Required:**

* Ability to work as a member of team
* Ability to communicate in Spanish preferred but not required
* Ability and willingness to communicate with families

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

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

**General Information:** Sepsis, a life-threatening condition that can lead to multi-organ failure, is influenced by the behavior of immune cells such as macrophages. The precise mechanisms of macrophage regulation in sepsis are not fully understood. Our study focuses on identifying key molecules and signaling pathways in sepsis, with the aim of highlighting new therapeutic targets.

**Key Roles:**

• Perform basic bench experiments.

• Handle animals.

**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 Dr. **Xiao Wang** at xwang329@uic.edu

**Research Internship – Empath Lab, UIC College of Medicine, Department of Pediatrics**

The Empath Lab, housed within the Department of Pediatrics, is seeking students to support the PATH 2 Purpose and PATHway projects in the Department of Pediatrics, both of which focus on adolescent mental health. Students must be able to commit to at least 20 hours of work per week, and be able to be on-site at our 840 S. Wood St. office. This position would provide a wide array of academic and professional development opportunities, including experience in clinical mental health research, support with academic projects, and multi-disciplinary mentorship. No prior research experience required.

You can learn more about the PATH 2 Purpose and PATHway studies here:
PATH 2 Purpose: <https://www.path2purpose.info/>

PATHway: <https://www.pathwaystudy.info/>

Core requirements:

* Commitment to 20 hours per week of recorded work, minimum to working on the study.
* Conducting clinic or calling recruitment for at least two, 4-hour shift per week.
* Attendance at weekly meetings.
* Participation in research meetings.
* Regular communication with study staff.

Summer Scholars duties include:

* Recruitment of adolescent patients ages 13-19 via phone and in various clinics including UIC pediatric and adolescent medicine clinics, Maxwell Family Clinics, and Mile Square Health Centers.
* Enrollment of participants according to established research protocols.
* Maintaining detailed records of communication with research participants in our data management system.
* Participating in IRB human subjects training (CITI Training) and maintaining appropriate professional competencies and compliance with human subjects training requirements
* Attending Summer Scholars lectures and workshops

Benefits

* Gain experience about clinical mental health research with an emphasis on recruitment.
* Multi-disciplinary mentorship from university faculty and staff.
* Opportunities to prepare and present posters at both UIC College of Medicine research forums and conferences
* Career planning guidance and mentoring.
* Opportunities for long term grown and work with the study.

Interested applicants can submit a resume and cover letter to Calvin Rusiewski, crusiew2@uic.edu