Mentor: **Dr. Tarek Alhamad**  
**Type of student:** Graduate, Medical  
**Required Skills:** Data analysis experience (SAS is preferred)

**Project 1:** *Pediatric En Bloc Kidney Transplant, Clinical Implications and Outcomes.*  
**Project description:** United network organ sharing is the national database for kidney transplant recipients from 1987 till now. Utilizing this clean data, we will be examining risk factors associated with deceased donor kidney transplant outcomes as the impact of pediatric en-bloc kidneys. This requires basic knowledge of SAS. Supervision and support will be provided for the data analysis.  
**Location:** St. Louis  
**Learning Experience:** Complete data analysis including KM and MV cox regression models; Writing methods and results section; Participate as an author

Mentor: **Dr. Megan Baldridge**  
**Type of student:** Undergraduate, Graduate, Medical  
**Required Skills:** Basic lab skills (pipetting, PCR, etc)

**Project 1:** *Effects of Malnutrition on the Microbiome and Viral Infection*  
**Project description:** Malnutrition is a risk factor in children for more severe intestinal virus infection, and we have observed that a low protein diet in mice is also associated with more severe infection with norovirus, a common intestinal pathogen. Malnutrition also alters the microbiome, and we are interested in exploring whether changes in the microbiome alter immune responses to viral infection or directly affect viral infection itself.  
**Location:** St. Louis  
**Learning Experience:** Working with mouse models, manipulation of diet and microbiome, analysis of immune cells and pathways, viral infection models

Mentor: **Dr. Yehuda Ben-Shahar**  
**Type of student:** Undergraduate, Graduate, Medical  
**Required Skills:** N/A

**Project 1:** *Manganese, Brain Functions, and Decision Making Behaviors*  
**Project description:** Exposure to environmental manganese can lead to broad neurological and behavioral pathologies, including Parkinson’s-like syndrome and abnormal decision making. We use genetic and behavioral approaches to study the molecular and physiological mechanisms that mediate the impact of manganese on neural functions, which is currently poorly understood.  
**Location:** St. Louis  
**Learning Experience:** The student will learn how basic, hypothesis driven research is conducted, which will include principles of experimental design, classic and molecular genetics, and data analyses and interpretation.
Mentor: **Dr. Jacco Boon**  
Type of student: Undergraduate, graduate and medical  
Required skills: Lab experience is preferred but not required.

**Project 1: Influenza virus and the role of host genetic variation in severity of disease**  
**Project description:** Severe influenza virus infections are most common in children under the age of 5 years. World-wide it is estimated that nearly 1-2 million cases of severe influenza-associated acute lower respiratory tract infections occur annually. The goal of our research is to develop new treatment options to prevent influenza virus infections and reduce the burden of disease. Specifically, we are interested in (i) characterizing the effects of human genetic variation on virus infection and disease and (ii) identifying host proteins that restrict influenza infection and replication. These efforts will help us understand the molecular basis of severe influenza infections and provide opportunities to develop novel antiviral drugs.  
**Location:** St. Louis  
**Learning experience:** At the end of the summer, the student will understand the differences between avian, human and swine influenza virus and know how influenza pandemics occur. We will also train the student to perform state-of-the-art genome editing to test the effects of genetic variation or a host gene function on virus replication or host responses. Finally, at the end of the summer, the student will have a basic understanding of the scientific process that lead to the discovery of novel concepts, ideas, and ultimately new therapies to treat life-threatening diseases.

Mentor: **Dr. Stan Braude**  
Type of student: Graduate, Medical  
Required Skills: Data mining, large data sets, statistical analysis.

**Project 1: Oncoprotective Hypothesis for Fever.**  
**Project description:** A variety of cancerous growths are susceptible to heat and pyrogenic therapy is being evaluated at clinics in the US and Mexico. We propose that the fevers generated during normal response to infection can have a cumulative oncoprotective effect during the course a lifetime. To test this hypothesis we will compare epidemiological data on various cancers with rates of malaria and sales of antipyretic agents.  
**Location:** St. Louis  
**Learning Experience:** Data analysis and manuscript preparation.

Mentor: **Dr. Ross Brownson**  
Type of student: Undergraduate, Graduate, Medical  
Required Skills: English proficiency preferred, telephone interview skills, time management, note-taking, online survey experience

**Project 1: Dissemination & Implementation Training and Research for Cancer Control**  
**Project description:** Student will be helping with two projects focused on Dissemination and Implementation in Cancer Control. First project will be assisting a training program for researchers including a multi-day summer institute and data collection from trainees where tasks will include: note taking, course evaluation/ development, and coordinating with researchers at the institute. Second project will be a study on the implementation of cancer control programs in state health departments. Students tasks will include assisting with data collection from national survey and validating measures.  
**Location:** St. Louis  
**Learning Experience:** Will be exposed to top researchers & topics in the field of Dissemination & Implementation. Will gain experience in data collection, management & analysis as well as measures development & validation.

**For Projects 2 & 3**  
**Type of student:** Graduate, Medical  
**Required Skills:** Quantitative data collection, data analysis, data visualization, development of summary reports, interpersonal skills, time management
Project 2: Multilevel Approaches for Promoting Physical Activity in Rural Communities

Project description: The goal of the project is to use a multilevel ecological framework in order to increase physical activity in rural populations. We will accomplish the aforementioned goal by the use of text messaging, walking groups, and events at local walking trails.

Location: St. Louis mostly, with intermittent travel to Southeast Missouri

Learning Experience: The student will learn to collect and analyze data in the construction of the multilevel intervention. Further, the student will learn public health principles in order to acquire buy in from the community to partake in the intervention.

Project 3: Adoption and Implementation of Evidence to Mobilize Local Health (AIM-Local Health)

Project description: AIM-Local Health is a multi-year project to determine the best ways to promote and support the use of public health knowledge for evidence-based diabetes and chronic disease control among local health departments (LHDs). Phase 2 of the project will be underway, and involves conducting a stepped-wedge cluster randomized trial to assess effectiveness of dissemination strategies with local-level practitioners at LHDs to enhance capacity and organizational support for evidence-based diabetes prevention and control.

Location: St. Louis

Learning Experience: The student will learn about local-level public health practice. S/he will assist in writing reports and papers, develop user-friendly summaries for public health practitioners, conduct literature reviews and analyze survey data.

Mentor: Dr. Kathleen Bucholz

Type of student: Undergraduate, Graduate, Medical

Required Skills: data analysis experience, basic statistics or some training in quantitative analysis if not a formal stats background, good computer skills, some background in abnormal psych or equivalent would be helpful but not essential, basic appreciation for family-based research

Project 1: Pathways to Substance Misuse and Problems in Ethnically Diverse Youth from High Risk Families

Project description: The student will analyze data from adolescents and young adults from families enriched for alcohol use disorder in one or both parents. The assessments obtained at 2 year intervals cover a wide range of risky behaviors, including substance use, problems and disorder, other psychiatric problems, suicidality and traumatic exposures, as well as typical developmental achievements such as school graduation, marriage. Data support investigation of factors linked to vulnerability to adverse outcomes as well as to resistance to adversity, and comparisons across race/ethnic groups.

Location: St. Louis

Learning Experience: The student will delve into the literature on adolescent problem behaviors to formulate a research question, learn SAS to analyze the data, apply statistical tests, interpret the results, and prepare a summary presentation for a general audience. Principles of analysis and scientific practices will be stressed throughout.

Mentor: Dr. Philip Budge

Type of student: Undergraduate, Graduate, Medical

Required Skills: data analysis or lab experience would be helpful, but not required

Project 1: Assessment of Day-To-Day and Activity-Related Variability in Filarial Lymphedema Using a Novel 3D Infrared Scanner

Project description: In order to test potential therapies for treating lymphedema (leg swelling) due to lymphatic filariasis, one needs practical and accurate methods of measuring the affected limbs. We recently showed that a portable infrared 3D scanner provides quick and accurate limb measurements for patients with filarial leg lymphedema. We will use this scanner in an upcoming clinical trial testing whether the antibiotic doxycycline can help treat lymphedema. In order to interpret the results of that study, it will be important to know how much day to day variability patients experience in their leg swelling. To determine the natural variability in limb measures we plan to use
the 3D scanner to collect morning and evening scans among several lymphedema patients who receive care at the Filariasis Research Training and Services Unit (FRTSU), University of Ruhuna Medical Faculty in Galle, Sri Lanka. This project would provide the student with the opportunity to interact closely with medical school faculty and staff at FRTSU, as well as to learn about lymphatic filariasis and the burden its effects have on affected patients. Some of the study patients will be visited in their homes, which will allow that student to observe living conditions in Galle and the surrounding villages, and to see how filariasis affects home life of those it disfigures. It will contribute to the larger clinical trial and hopefully will lead to a brief publication.

**Location:** St. Louis and possibly Galle, Sri Lanka

**Learning Experience:** Depending on the student’s interest, they will learn about lymphatic filariasis and management of limb lymphedema. If the student prefers a lab project rather than a field study, they will learn basic lab techniques.

---

**Project 1: Epidemiology and Laboratory Identification of Mycobacterium Chimaera**

**Project description:** Mycobacterium chimaera has recently emerged as an important cause of human infection as a result of contaminated heater-cooler units used in cardiac bypass surgery. However, the true incidence of this infection is unknown because traditional laboratory methods cannot differentiate this organism from other members of the Mycobacterium avium complex. We will evaluate the analytical performance characteristics of a new MALDI-TOF MS method for identification of M. chimaera and describe the clinical characteristics associated with infection with this organism.

**Location:** St. Louis

**Learning Experience:** Bacterial identification methods, use of MALDI-TOF MS for bacterial identification, data abstraction from medical records

**Mentor:** Dr. Carey-Ann Burnham

**Type of student:** Undergraduate, Graduate, Medical

**Required Skills:** Some prior lab experience would be very helpful. Experience with sterile technique and bacterial culture would be helpful.

---

**Project 2: Frequency of Instrument, Environment, and Laboratory Technologist Contamination During Routine Diagnostic Testing Of Infectious Specimens on Automated Laboratory Equipment**

**Project description:** Our objective is to measure laboratory contamination during routine analysis of patient specimens on automated laboratory testing equipment, including Kiestra Lab Automation and Core Lab Chemistry and Hematology automation. Specimens will be spiked with the nonpathogenic MS2 bacteriophage and with fluorescent markers to evaluate instrument, environment, and laboratory technologist contamination during this testing. These data could inform future lab practice guidelines to reduce the risk of pathogen transmission to laboratory workers.

**Location:** St. Louis

**Learning Experience:** The student will learn about routine laboratory testing, PCR, and data analysis during this training experience.

**Mentor:** Dr. Anne Butler

**Type of student:** Graduate

**Required Skills:** Prior lab experience, including pipetting, sterile technique, and PCR, would be helpful but not essential.

---

**Project 1: Comparative Effectiveness and Safety of Antibiotics to Treat Outpatient UTI**

**Project description:** Project Summary: Given the high incidence of uncomplicated UTI, evidence is urgently needed to guide optimal prescribing of antibiotics. The proposed study will use existing data on more than one million women with uncomplicated UTI to identify the risk-benefit tradeoff and then assess the cost-effectiveness of various antibiotic regimens. Aim 1: To compare the effectiveness and safety of guideline-recommended antibiotic regimens for the
treatment of outpatient uncomplicated UTI among premenopausal women. To examine whether the short-term risk of subsequent UTI-related antibiotic prescriptions, UTI-related urine tests, pyelonephritis, pyelonephritis-related bloodstream infections, and antibiotic-related adverse events vary by drug and duration, as well as age, geographic region, and year. Hypotheses. 1a) Nitrofurantoin will be associated with the highest effectiveness and lowest risk of adverse events. 1b) Compared to antibiotic regimens with guideline-recommended duration, regimens with longer duration will be associated with similar effectiveness but higher risk of adverse events.

Location: St. Louis

Learning Experience: The student will engage in an infectious diseases epidemiologic research project using a large administrative database. Depending on the student's skillset, he/she will engage in statistical analyses, data visualization, literature review, and dissemination of results through posters or powerpoint slides. The student will have the opportunity to learn about the antibiotic treatment of common infections.

Project 2: Comparative Effectiveness and Safety of the High-dose Influenza Vaccine in the Dialysis Population

Project description: Evidence suggests that standard influenza vaccines do not prevent influenza-related outcomes in the dialysis population, yet the comparative effectiveness and safety of various influenza immunization strategies have not been established in this population. Using existing healthcare data from half a million dialysis patients in the United States, we will examine the risks and benefits of influenza immunization with a) high-dose vs. standard dose vaccines; and b) a repeat standard dose vs. a single standard dose during the same influenza season. The results of our research will inform potential quality improvement initiatives and will provide clinicians, payors, regulators, and policy makers with timely information on the relative benefits and harms of various influenza immunization strategies in the dialysis population.

Location: St. Louis

Learning Experience: The student will engage in an infectious diseases epidemiologic research project using a large administrative database. Depending on the student's skillset, he/she will engage in statistical analyses, data visualization, literature review, and dissemination.

Mentor: Dr. Heather Cameron
Type of student: Graduate
Gender Preference: female
Required Skills: Excellent writing, Info graphics, communication, desk research and qualitative interviews

Project 1: Community Health Impact Accelerator and Building out Impact tools

Project description: Help to build out a new community health Impact Accelerator in STL. Goal is to help existing projects working in community health build out revenue creating projects and better communicate the impact of current projects. Meet with health organizations for a needs assessment, design and deliver products.

Location: St. Louis, Berlin, Germany

Learning Experience: How to do assessments, how to create compelling communications, research comparable solutions in various community health priorities

Mentor: Dr. Yin Cao
Type of student: Graduate, Medical
Required Skills: Background in epidemiology, strong writing skills, some experience in data analysis

Project 1: Epidemiology of Young-Onset Colorectal Cancer

Project description: Colorectal cancer (CRC) is the third most common cancer and second leading cause of cancer death in the United States. About 11% of colon cancers and 18% of rectal cancers occur in adults younger than 50 years. In contrast to the recent population decline in CRC incidence in adults aged 50 and above, CRC incidence has increased in all 5-year age groups between 20 and 49 years. The majority of young-onset CRCs are sporadic with potential unique etiology. The students will have the opportunity to work on the following projects centered around this theme: 1) investigate the epidemiology (e.g. lifestyle factors) and racial disparity of young-onset CRC through analyzing large prospective data 2) help build a young-onset CRC tissue repository using clinical data.
Location: St. Louis
Learning Experience: Besides traditional methodology in epidemiology (study design, data analyses, and manuscript writing), the student will also learn how to conduct clinical research in real-world settings using tissue data.

Project 2: **Lifestyle Factors and Microbiome**  
**Project description:** Examine the association between lifestyle factors and gut microbiome using data from large prospective studies.  
**Location:** St. Louis  
**Learning Experience:** This project requires strong quantitative skills (e.g. previous experience with Python) is necessary. The student will learn how to link, analyze and interpret metadata and metagenomic data.

Mentor: Dr. Patricia Cavazos-Rehg  
**Type of student:** Undergraduate, Graduate, Medical  
**Required Skills:** Ability to follow oral and written instructions; Good verbal and written communication skills in English; Excellent interpersonal skills; Detail oriented; Knowledge of social media platforms; Qualitative data experience; Experience developing and administering surveys; Assist in manuscript writing

Project 1: **Understanding Health Risk Behaviors on Social Media and Identifying Ways To Intervene**  
**Project description:** The student will be involved in cutting-edge research that examines mental health and substance use content across various social media platforms. Through this process, she/he will assist in assessing engagement, temporal trends and sentiment of this content. Additionally, the student will have the opportunity to assist with the identification and recruitment of individuals posting about mental health and substance use on social media into an online study.  
**Location:** St. Louis  
**Learning Experience:** This experience will introduce the student to how social media posts can be used for behavioral insights. They will assist with data collection and analysis as well as initial manuscript development.

Mentor: Dr. Su-Hsin Chang  
**Type of student:** Undergraduate, Graduate, Medical  
**Required Skills:** Some data analysis experience will be preferred but is not required.

Project 1: **Organ Transplant Outcomes**  
**Project description:** Organ transplant outcomes: We will focus on liver, pancreas, lung, and kidney transplants and build predictive models to predict post-transplant outcomes.

**Project 2: Economic Burden of Obesity-Related Diseases**  
**Project description:** Economic burden of obesity-related diseases: We will use national databases and mathematical modeling to predict lifetime healthcare costs associated with some obesity-related diseases, including hypertension, diabetes, coronary heart disease, and stroke.

**Project 3: Outcomes of Obesity Surgery**  
**Project description:** Outcomes of obesity surgery: We will abstract data from patient electronic medical records of bariatric patients who perform bariatric surgery in the Barnes-Jewish Hospitals and examine long-term outcomes of bariatric surgery, including weight loss, comorbidity improvement, complications, and mortality.  
**Location:** St. Louis  
**Learning Experience:** Students will learn data management and analysis. Interested students will have the opportunity to participate in manuscript writing and become an author on the manuscript.
Mentor: Dr. Li-Shiun Chen
Type of student: Graduate, Medical
Required Skills: Research may require interaction with human research participants. Some statistical knowledge and interest in manuscript writing is preferred. Previous research experience is not required. Applicants must have the ability to follow oral and written instructions.

Project 1: Genetically Informed Smoking Cessation Trial
Project description: Students will identify a research question, analyze the relevant data, and present their results. The collaborative environment at Washington University provides the opportunity to interact with researchers at a variety of training levels, providing diverse perspectives on addiction research.
Location: St. Louis
Learning Experience: Develop experience in data collection, analysis, interpretation, manuscript writing, and dissemination; gain experience in data collection methods (e.g., recruitment calls, data entry, and standardized interviews).

Mentor: Dr. Rebecca Chibnall
Type of student: Undergraduate, Graduate, Medical
Required Skills: None required

Project 1: Infant Diaper Life Cycle Analysis
Project description: We have begun initial work on a life cycle analysis of disposable infant diapers and modern reusable infant diapers. We have already collected some data on inputs into the production of these products as well as real-use of these products. Our project is in collaboration with the School of Engineering in the lab of Jay Turner, PhD as well as the School of Social Work with Angela Hobson, PhD, MPH.
Location: St. Louis
Learning Experience: Students will gain experience in data analysis as well as the performance of a life cycle analysis.

Project 2: Prevalence Of Vulvar Pruritus
Project description: I have been collecting data on vulvar pruritus and quality of life in my multi-disciplinary vulvovaginal disorders clinic with Dr. Holly Steiner from the Department of Obstetrics and Gynecology. I plan to perform a retrospective chart review to quantify how often vulvar pruritus is screened for and look at preliminary data from our current vulvovaginal disorders clinic database.
Location: St. Louis
Learning Experience: Navigating the IRB system, performance of a retrospective chart review, data analysis, further understanding of itch and specifically vulvar itch.

Project 3: Systematic Review of Infant Diapering Practices
Project description: We have already performed a literature review to include all papers published in the last 30 years on infant diapering. The student will then perform a systematic review of these articles to assess current knowledge on infant diapering. The student will need to have prior systematic review or meta-analysis experience.
Location: St. Louis
Learning Experience: Further understanding of systematic review and/or meta-analysis, knowledge on infant diapering practices.

Mentor: Dr. Gautam Dantas
Type of student: Undergraduate, Graduate, Medical
Required Skills: Culturing bacteria, organizing a lab notebook, researching protocols

Project 1: Competitive Inter-Species Interactions between Nosocomial Pathogens
Project description: Increasing prevalence of multidrug resistant infections caused by the bacterial pathogens Pseudomonas aeruginosa and Pseudomonas stutzeri is a threat to global health. These organisms can often persist for
extended periods of time on hospital surfaces. After conduction of a longitudinal analysis of multidrug resistant organisms in Pakistan, we have observed a statically significant spatial separation of these species. The student will be performing experiments to test if the P. aeruginosa from Pakistan are able to inhibit the growth of P. stutzeri in a contact dependent or independent manner.

**Location:** St. Louis  
**Learning Experience:** The student will learn numerous microbiology experiments (cross-streak assays, supernatant spot testing, etc.) to assess if inhibition abilities exist between the two species.

**Project 2: blaOXA-48 Carbapenemase Resistance Genes On Plasmids In The United States And Pakistan**  
**Project description:** Carbapenemases are the favored drug of last resort for treatment of multidrug resistant bacterial infections. Their efficacy in the United States is threatened due to global expansion of carbapenem inactivating enzymes (carbapenemases). The blaOXA-48 family of carbapenemases are increasing in the United States. We have assembled a cohort of pathogenic species with blaOXA-48 plasmids. The student will be performing work towards the isolation and sequencing of these plasmids. Following which, they will employ computational techniques to characterize the genetic context of the blaOXA-48 gene.  
**Location:** St. Louis  
**Learning Experience:** The student will learn how to isolate plasmid DNA, construct sequencing libraries, and computationally analyze plasmids.

---

**Mentor:** Dr. Allan Doctor  
**Type of student:** Undergraduate, Graduate, Medical  
**Required Skills:** Some experience with global health preferred, but not neccessary

**Project 1: Application of Community Based Group Model Building to Pediatric Critical Care Implementation in Resource Limited Settings**  
**Project description:** We are launching an interventional RCT for severe cerebral malaria in Blantyre, Malawi; the trial will involve use of a newly opened Pediatric ICU. To optimize clinical protocol effectiveness our team has been working with local and international groups to optimize staff training and equipment preparation. This project will involve development and refinement cross-cultural implementation tools to support delivery of basic Critical Care Medicine in this setting.  
**Location:** Blantyre, Malawi (in part) and St. Louis  
**Learning Experience:** The student will learn basic systems dynamics and implementation science methodologies that are pertinent to Pediatric ICU care.

---

**Mentor:** Dr. Ali Ellebedy  
**Type of student:** Graduate, Medical  
**Required Skills:** Wet lab experience

**Project 1: Analysis of Antibody Responses to Influenza Virus Vaccination**  
**Project description:** Influenza viruses continuously acquire mutations in exposed epitopes of the hemagglutinin (HA) and neuraminidase (NA) proteins through a process called antigenic drift. Influenza vaccine efficacy can be low when there is a mismatch between vaccine strains and circulating strains. Viral antigens included in influenza vaccines are routinely updated in an attempt to avoid antigenic mismatches. Current seasonal influenza vaccines possess antigens from an H1N1 strain, an H3N2 strain, and one or two influenza B strains. H3N2 viruses began circulating in humans in 1968 and have continuously acquired mutations in HA and NA. Most neutralizing antibodies (Abs) recognize antigenic sites on the globular head of HA (designated sites A-E), while rare Abs bind to the more conserved HA stalk or sialic acid binding domains. Most H3N2 vaccine mismatches from 1968-2013 have been attributed to mutations in antigenic site B. Interestingly, none of the site B mutations that emerged during this time period have led to new glycosylation sites on HA. This is surprising, given that the addition of glycans on HA can have dramatic effects on Ab binding. New glycosylation sites have emerged in other antigenically important regions of H3. Recently, H3N2 viruses have acquired a mutation that results in a new glycosylation site in antigenic site B of HA.
The H3N2 component of the 2016-2017 has been updated to include antigens from this new drifted H3N2 strain, however despite this, vaccine efficiency during the 2016-2017 was only 49%. We have found that the new drifted H3N2 strain rapidly acquires a mutation (T160K) during in vitro and in ovo growth. The T160K HA mutation abrogates the new HA site B glycosylation site of H3N2 viruses, and as a result, all H3 vaccine antigens propagated in eggs lack HA site B glycosylation. We hypothesize that this egg-adapted mismatch in antigenic site B contributed to moderate vaccine effectiveness during the 2016-2017 season.

Location: St. Louis

Learning Experience: Role of antibodies in providing protection against influenza viruses, how vaccination induce 'different' antibodies, How to assess Antigen-Antibody interactions, Molecular cloning

Mentor: Dr. Peter Fischer
Type of student: Undergraduate, Graduate, Medical
Required Skills: lab experience, experience in handling human samples, basic statistics

Project 1: Diagnosis And Control Of Helminth Infections
Project description: During the research serological and molecular diagnostic assays will be performed to detect worm infection in humans and vectors from various field sites in Africa or Asia before and after intervention. In addition meta data will be analyzed and compared to the outcome of the diagnostic assays. To understand the epidemiology of worm infection, background information on the complicated life cycles of helminths will be provided.
Location: St. Louis
Learning Experience: Insight into diagnostic and control strategies for helminth infection; Introduction into medical helminthology; Recognition of helminths as major global health pathogens; Data analysis of large laboratory and public health data sets.

Mentor: Dr. Ellen Fitzsimmons-Craft
Type of student: Undergraduate, Graduate, Medical
Required Skills: The ideal candidate would have a strong interest in eating disorders research and some experience in this area. General research experience, as well as experience in health education program development, program promotion via social media, and data analysis is preferred.

Project 1: The Healthy Body Image Program: An Online Platform for Eating Disorders Screening, Prevention, and Intervention on College Campuses
Project description: Our research team at Washington University in St. Louis and Stanford University has developed an online platform for screening and delivering tailored interventions to a population of individuals with varying eating disorder risk and symptom profiles via system-level implementation on college campuses. Specifically, the digital Healthy Body Image (HBI) Programs available by computer or smartphone uses an evidence-based online screening tool to identify individuals at low risk for, high risk for, or with a clinical/subclinical eating disorder, and offers tailored, evidence-based online/mobile interventions or referral to in-person care to address students’ risk/clinical status. In brief, students at low risk for an eating disorder are offered the StayingFit online, universal health education intervention, which has been shown to result in increased fruit and vegetable consumption, lower weight/shape concerns, weight stabilization in normal weight students, and weight loss in overweight students. Students at high risk for an eating disorder are offered the Student Bodies-Classic online, targeted eating disorder prevention intervention, which has been shown to reduce ED risk and symptom progression. Finally, students with a clinical/subclinical eating disorder other than anorexia nervosa (AN) are offered the Student Bodies-Eating Disorders (SB-ED) mobile, guided self-help intervention, which contains units covering the core components of CBT for eating disorders and has been shown to reduce eating disorder symptoms and symptom progression. The HBI Program is currently offered in nearly 40 US universities, as part of either a large-scale National Institute of Mental Health grant or in one of the Missouri public universities, as part of the contract with the Missouri Eating Disorders Council, a division of the Missouri Department of Mental Health.
Students participating in this summer research experience would likely be involved in one of the following projects focused on further expanding the HBI platform: updating and programming the SB-ED program for use on a new mobile
Project 1: Molecular Characterization of Vaccine Antigens for Enterotoxigenic E. Coli
Project description: Our laboratory works on the molecular pathogenesis and pre-clinical vaccinology of enterotoxigenic E. coli (ETEC), an important cause of diarrheal illness in developing countries. Projects in the laboratory range from fundamental projects to assess the molecular role of virulence factors and host pathogen-interactions to assessing the quality of immune responses to candidate vaccine antigens. Students are typically assigned a piece of a larger ongoing project in the laboratory.
Location: St. Louis
Learning Experience: Basic molecular biology techniques, immunology

Mentor: Dr. Randi Foraker
Type of student: Undergraduate, Graduate, Medical
Required Skills: Data management / data analysis

Project 1: Integrating Contextual (i.e., socioeconomic) Data with Clinical Data
Project description: The student will be working with myself and clinical colleagues to merge clinical data with contextual (i.e., socioeconomic) data that are not routinely collected in the process of care. The student will perform basic data analysis (i.e., calculate distributions of and associations between variables) for this project.
Location: St. Louis
Learning Experience: The student will learn data management skills and use statistical software to perform data analyses.

Mentor: Dr. Margaret Garb
Type of student: Undergraduate, Graduate
Required Skills: Some skill at archival research, digital mapping, analyzing texts and images

Project 1: Poor in America: A History of Work and Poverty from the Civil War to the Reagan Years
Project description: Research on work programs, alms houses, and household budget surveys conducted in Missouri from 1900 to 1950.
Location: St. Louis
Learning Experience: Skill in archival research and place-based research.

Mentor: Dr. Jeffrey Gordon
Type of student: Undergraduate, Graduate, Medical
Required Skills: N/A

Project 1: The Gut Microbiota and Childhood Undernutrition: Looking at Human Development from a Microbial Perspective
**Project description**: Human postnatal development is typically viewed from the perspective of our ‘human’ organs. As we come to appreciate how our microbial communities (microbiota) are assembled following birth, there is an opportunity to determine how this microbial facet of our developmental biology is related to healthy growth as well as to the risk for and manifestations of disorders that produce abnormal growth.

We are testing the hypothesis that perturbations in the normal development of the gut microbiota are causally related to childhood undernutrition, a devastating global health problem whose long-term sequelae, including stunting, neurodevelopmental abnormalities and immune dysfunction, remain largely refractory to current therapeutic interventions. The journey from testing this hypothesis in animal models and then proceeding to human studies illustrates the opportunities and challenges for developing new microbiota-directed therapeutics.

With support from the Bill & Melinda Gates Foundation, we are examining the mechanisms by which the gut microbiota influences nutritional status/growth. To do so, we use ‘gnotobiotic’ mice that have been colonized with human gut communities from healthy and undernourished children. The animal recipients of these communities are fed diets representative of those consumed by the microbiota donors, with and without supplementation with candidate microbiota-directed food ingredients. The results are being used to develop new food-based and microbial interventions for children with undernutrition; therapeutic leads been advanced to human studies that are being conducted in an urban slum in Dhaka, Bangladesh.

**Location**: St. Louis

**Learning Experience**: Exposure into this discovery pipeline and familiarity with applying methods in genome sciences to analyze samples from these studies

---

**Mentor**: Dr. Lori Holtz
**Type of student**: Medical
**Required Skills**: Data analysis, chart review

**Project 1: Pediatric Celiac Disease in St. Louis**

**Project description**: We are searching for a student to conduct a 10 year retrospective review on celiac disease here at St. Louis Children's Hospital. This would involve collecting clinical data from the medical chart, recording it in an electronic database, and correlating it with histological and outcome data.

**Location**: St. Louis

**Learning Experience**: How to conduct a chart review, how to create and maintain a database of clinical data, how to interpret histological slides, and basic biostatistical skills.

---

**Mentor**: Dr. Peter Hovmand
**Type of student**: Undergraduate, Graduate
**Required Skills**: Data analysis/programming

**Project 1: Relationship and Sexual Violence Assessment Initiative**

**Project description**: The Relationship and Sexual Violence Assessment Initiative (RSV-AI) focuses on developing innovative methods for the assessment and evaluation of relationship and sexual violence prevention and response on university campuses. RSV-AI students will work on one or more pilot projects to advance the methodology of relationship and sexual violence assessment and evaluation, ranging from basic social epidemiology to testing of formal evaluation research designs of prevention and response programs. Matching of students to projects will be based on the needs of RSV-AI and students' interests and skills.

**Location**: St. Louis

**Learning Experience**: Students will gain exposure to innovative methods for social epidemiology of dynamic populations; experience with public health approaches to gender based violence; and, a better understanding of how intersectionality, stigma, and systems of oppression impact access and utilization of social supports.

---

**Mentor**: Dr. Lora Iannotti
**Type of student**: Graduate, Medical
Required Skills: Student should have some experience working in a low-resource country. French language proficiency preferred. Experience and skills in one or more of the following also appreciated: epidemiology methods; proposal development; and communication for research collaboration and dissemination.

Project 1: Haiti: Public Health Nutrition Research
Project description: Student will support three research and program initiatives in Haiti: 1) anemia and air quality; and 2) maternal nutrition and fetal growth; and 3) public health higher education degree program. There will be a range of activities that include supporting data collection, proposal development, maintaining relationships with key partners, and organizing public health courses. Student will work closely with the PI, Dr. Lora Iannotti, as well as study coordinator in Haiti, Ms. Sherlie Jean-Louis, and other investigators from the Brown School, the Medical School, and School of Engineering.
Location: Cap Haitien, Haiti
Learning Experience: Student will acquire skills in study design, epidemiology methods, proposal development, and collaboration with partners in a low-resource setting.

Mentor: Dr. Josh Jackson
Type of student: Undergraduate, Graduate
Required Skills: Familiarity with R programming language and experience working with secondary data sets is preferred

Project 1: Personality, Health Behaviors, and Health Trajectories
Project description: The project involves testing the pathways by which personality influences longevity via health behaviors. Using existing longitudinal data to measure changes in health status we will look at personality; health behavior links such as smoking, diet, exercise, and doctor adherence as predictors of better health. Research students will help with literature review, data management, data analysis, and write up.
Location: St. Louis
Learning Experience: How to preform a literature review, data management, and data analysis techniques such as longitudinal modeling, structural equation path models, and hazard models.

Mentor: Dr. Sanjay Jain
Type of student: Undergraduate, Graduate, Medical
Required Skills: Lab experience

Project 1: Mechanisms Directing Fate of Kidney Progenitors in Health and Disease
Project description: Our lab is trying to understand how anatomically and physiologically complicated organ such as kidney is assembled. This knowledge is directly relevant to a number of developmental abnormalities in children and adult kidney and cardiovascular disease. Using different genetic and molecular model systems the projects will contribute to knowledge of developmental genetic programs along differentiation into mature lineages using mouse, human iPSCs and single cell technologies.
Location: St. Louis
Learning Experience: Human iPSC cell culture methods to make neural crest or kidney lineages, validation and analysis of gene expression patterns

Mentor: Dr. Senthil Jayarajan
Type of student: Medical
Required Skills: Data analysis experience preferred

Project 1: Vascular Surgery in Patients with Connective Tissue Disorders
Project description: The proposed study would examine outcomes in patients with connective tissue disorders who require cardiovascular surgery. The data sources used would include the National Inpatient Sample and National Readmissions Database. The incidence of vascular surgical procedures, types of pathologies and the outcomes will be
examined. These outcomes will include in-hospital complications, readmissions, and costs. They will be compared to outcomes in patients who do not have connective tissue disorders.

**Location:** St. Louis

**Learning Experience:** Usage of administrative datasets; data analysis including multivariate regression; abstract manuscript preparation

---

**Project 2: Predictors of High Arteriovenous Fistula Dialysis Centers**

**Project description:** The proposed study would examine characteristics of dialysis centers with high rates of arteriovenous fistulas compared to those with low rates of arteriovenous fistulas. The data sources used would include the United States Renal Data System and United States Census. Socioeconomic and medical factors will be examined. Longevity of the dialysis access will also be examined.

**Location:** St. Louis

**Learning Experience:** Usage of administrative databases, data analysis including multivariate and survival analysis; preparation of abstract and manuscript

---

**Mentor:** Dr. Sebla Kutluay

**Type of student:** Undergraduate, Graduate, Medical

**Required Skills:** Lab experience (pipetting, ability to do basic lab tasks) AND/OR data analysis and programming experience

---

**Project 1: Regulation of HIV-1 Replication by RNA-binding Proteins**

**Project description:** Research in our laboratory focuses on understanding the molecular details of how HIV-1 replication is regulated by these host and viral RNA-binding proteins, the identification of the RNA targets of these proteins, and the discovery of novel RNA-binding proteins that enhance or block HIV-1 replication. To this end, we employ conventional and novel next-generation sequencing-based approaches. The summer project will be tailored based on the student's interest and skill set to focus on either the experimental aspects or computational analyses of ongoing projects in the lab.

**Location:** St. Louis

**Learning Experience:** The student will get familiar with basic aspects of HIV-1 replication and virus-host interactions. On a more practical level, the student will gain unique bench and computational skill sets.

---

**Mentor:** Dr. Daisy Leung

**Type of student:** Undergraduate, Graduate, Medical

**Required Skills:** Previous experience with basic molecular biology and biochemistry techniques is preferred and interest in host-pathogen interactions is required.

---

**Project 1: Mechanisms of Viral Immune Evasion And Pathogenesis by Negative Sense RNA Viruses**

**Project description:** Research in the lab is focused on understanding the mechanisms regulating host-viral interactions that contribute to immune evasion and pathogenesis. Currently, we are interested in characterizing interactions between proteins from several negative sense RNA viruses, including Ebola virus and respiratory syncytial virus, and host proteins from the innate immune signaling pathways. Ongoing projects in the lab are investigating: 1) the roles of viral proteins in innate immune evasion, 2) viral replication and transcription mechanisms, and 3) structure-based approaches to develop antivirals. These projects utilize a range of biochemical, biophysical, and structural biology techniques, including NMR and X-ray crystallography. We are interested in working with highly motivated students with a keen interest in using biochemical and biophysical techniques to define signaling at the host-viral interface.

**Location:** St. Louis

**Learning Experience:** The student will learn basic scientific methods, how to design and execute experiments, and how to analyze and present results.
Mentor: **Dr. Stephen Liang**  
**Type of student:** Undergraduate  
**Required Skills:** Basic infectious disease knowledge, familiarity with medical terminology, experience reviewing clinical medical records, data analysis experience  

**Project 1: Emergency Department HIV Postexposure Prophylaxis Program For Sexual Assault At A Large, Urban, Teaching Hospital**  
**Project description:** The purpose of this study is to characterize the patient population that has received human immunodeficiency virus (HIV) post-exposure prophylaxis (PEP) following sexual assault in the Barnes-Jewish Hospital emergency department (ED). We will examine characteristics of the assault and clinical picture prompting initiation of HIV PEP and identify outcomes (e.g., adverse drug events, acquisition of HIV infection, acquisition of other sexually transmitted infection) and healthcare utilization (e.g., followup in infectious disease clinic, repeat ED visit).  
**Location:** St. Louis  
**Learning Experience:** The student will gain familiarity with study design, data collection, and analysis, along with a better understanding of the indications, challenges, and potential benefits of HIV post-exposure prophylaxis for sexual assault victims presenting to the BJH ED.

Mentor: **Dr. Erin Linnenbringer**  
**Type of student:** Undergraduate, Graduate, Medical  
**Required Skills:** Strong organizational and communication skills are required. Familiarity with quantitative (e.g., descriptive statistics, regression analysis) or qualitative (e.g., coding transcripts, identifying themes) analysis techniques are preferred, but not required.  

**Project 1: Mixed Methods Analysis of School Desegregation Program Participation & Student Health**  
**Project description:** In this pilot project, we will explore the association between school desegregation participation and behavioral, physical, and/or mental health outcomes among African American families in St. Louis.  
Option 1: Qualitative analysis of key informant interviews and parent focus groups transcripts and notes.  
After completing the provided background reading on school desegregation programs and social determinants of health, the student will work with study investigators to: review interview and focus groups transcripts; develop codes and identify key themes within the transcripts; review related literature; and generate a summary report, which could also take the form of a scientific poster and/or manuscript dependent upon student interest and skill set.  
Option 2: Quantitative analysis of a web-based survey  
After completing the provided background reading on school desegregation programs and social determinants of health, the student will work with study investigators to: clean and summarize the web-based survey data; generate descriptive statistics; complete additional hypothesis-testing analyses per investigator instruction and/or student research interests.  
Both project options will culminate with a written summary of the student’s work. This summary could serve as the basis of a scientific poster and/or manuscript, dependent upon student interest and skill set.  
**Location:** St. Louis  
**Learning Experience:** The student will gain a deeper understanding of social determinants of health; hands-on experience with qualitative or quantitative data analysis techniques and software; scientific writing experience.

Mentor: **Dr. Wade Martin**  
**Type of student:** Undergraduate, Graduate, Medical  
**Required Skills:** Data analysis  

**Project 1: Arm Exercise versus Pharmacologic Stress Testing for Clinical Outcome Prediction**  
**Project description:** This project is a clinical trial comparing arm exercise electrocardiographic (ECG) stress testing without and with coronary artery calcium scoring (+/- CAC) with treadmill ECG +/- CAC, pharmacologic (Lexiscan) myocardial perfusion imaging, and cardiac computed tomographic angiography (CTA) to predict clinical outcome (mortality, subsequent myocardial infarction or coronary artery revascularization. It would be of interest for student
who have an interest in medicine or exercise. The student(s) would be involved in screening patients for involvement in the study, stress testing, cardiac CTA evaluations, and data analysis.

**Location:** St. Louis

**Learning Experience:** The nuts and bolts of setting up and conducting a clinical trial, screening patients, obtaining informed consent, different methods of cardiac stress testing, and methods and techniques of data analysis.

---

**Mentor:** Dr. Amy McQueen

**Type of student:** Undergraduate, Graduate

**Required Skills:** We can accommodate different skill levels. Ideally, someone who has a clear phone voice could help administer surveys as well as code and analyze data for their project.

**Project 1: Testing Interventions to Address Unmet Basic Needs and Smoking Cessation Among Low Income Smokers**

**Project description:** Our ongoing R01 research grant will test a 2x2 factorial design where smokers are randomized to one of four conditions (Specialized vs. Standard Quitline program; Basic Needs Navigation vs. none). We will recruit participants from callers to United Way 2-1-1 in Missouri who report being daily smokers and are interested in quitting in the next 30 days. Callers receive referrals from 2-1-1 for social service and other community support for their unmet needs which often include assistance with paying for utilities, rent, food etc. Half of our participants will be able to interact with our Basic Needs Navigator for 3 months while they also participate in a specialized cessation program and we expect this group to be more abstinent from tobacco at 6 months than other study conditions. We worked with the commercial entity that delivers the MO Quitline to develop a specialized cessation program specific to our low income population.

The Summer Intern may help administer telephone surveys, code audio-recordings of intervention delivery for fidelity to study protocols, conduct literature reviews, and manage and analyze data.

**Location:** St. Louis

**Learning Experience:** Conducting behavioral intervention trials, administering telephone surveys, coding audio-recordings of participants and navigators and/or cessation coaches for fidelity to study protocols and the importance of inter-rater reliability and implications for study group comparisons, and experience working with a large research team. Gain experience with data management and analysis.

**Mentor:** Dr. Rob Mitra

**Type of student:** Undergraduate, Graduate, Medical

**Required Skills:** Lab experience and familiarity with molecular biology tools is a plus. Alternatively experience writing python code or multivariate analysis would be useful for computational projects.

**Project 1: Investigations of the Gene Regulatory Networks that Control Development.**

**Project description:** There is still a great deal to learn about the design principles that guide vertebrate development. Since all cells in an organism contain the same genes, transcribing different sets of genes is what confers a cell’s specialized role. Which genes get turned on or off to create a particular cell type at the right time, in the right place during the development of an organism? This is one of the pivotal questions in developmental biology. We have developed a technology, Transposon “Calling Cards,” to attack this question in a novel way, and we have shown that it works in yeast and mammalian cell culture. We will produce a record of gene activation at various stages of neural differentiation, watching as stem cells and their progeny specialize. These data will contribute to the field by providing a blueprint for the generation of many cell types, and could ultimately guide the reprogramming of embryonic or induced pluripotent stem cells to produce specific cell types.

**Location:** St. Louis

**Learning Experience:** Techniques in genomics, molecular and systems biology.
Mentor: Dr. Nancy Morrow-Howell  
Type of student: Undergraduate, Graduate  
Required Skills: No previous experience is required.

Project 1: Age-Friendly Universities  
Project description: The Friedman Center for Aging is exploring how WashU and partner institutions can better serve age-diverse stakeholders by facilitating a "University for Life" initiative that would support campus and civic engagement for people of all ages. This is based on an Age Friendly University movement started at Dublin City University. This summer we are conducting a survey of partner institutions of the McDonnell International Scholars Academy to assess their views on this concept, existing programs that are relevant, and other information that will help us prepare for a fall 2018 workshop. Note: This is just one summer project at the Friedman Center. We will work with you to identify which of our projects are a best fit for your interests.

Location: St. Louis  
Learning Experience: Survey development and implementation, report writing, data visualization. Potentially policy assessments if assigned other projects in the center.

Mentor: Dr. Jason Newland  
Type of student: Undergraduate, Graduate, Medical  
Required Skills: No experience required. We want an enthusiastic student who is willing to work hard in a team environment.

Project 1: Evaluation of a Tracheitis Treatment Protocol Implemented in the Pediatric Intensive Care Unit  
Project description: Ventilator-Associated Pneumonia (VAP) is a nosocomial infection in critical care that is associated with an increase in morbidity, mortality, duration of hospital length of stay and cost. A major risk factor for the development of VAP is ventilator-associated tracheitis (VAT). A pediatric study showed that short course treatment (5 days or less) for VAT was equally effective as prolonged therapy. Furthermore, new guidelines are being developed on the best way to determine if a child has a ventilator associated condition. Limited studies have been done evaluating these new guidelines in children. We propose to study the implementation of a standard protocol for treating tracheitis that limits the duration of therapy to 5 days. Additionally, we will evaluate the use of new proposed CDC definitions for determining ventilator associated conditions in children to determine if it correlates with what clinicians believe is a VAT or VAP. We will be including children; 21 years of age admitted to the PICU or CICU from October 1, 2016 through March 31, 2017 that have required at least 48 hours of invasive mechanical ventilation and are diagnosed with a ventilator associated condition including tracheitis and/or pneumonia. 1. We will determine if the percentage of patients being treated for VAT or VAP meet the new CDC definition regarding a ventilator associated condition. 2. We will determine the percentage of VAT that develop into VAP. We will divide this group into those treated with 5 days or less versus those treated for greater than 5 days. 3. We will evaluate those patients treated for pneumonia on whether they meet the new CDC criteria for probable VAP.

Location: St. Louis  
Learning Experience: The student will learn the steps required to complete a successful retrospective clinical research project that impacts patient care. This project will teach the student about the importance of accurate medical record documentation as well as the meticulous attention to detail that is required in performing a chart review. The student will also learn about the importance of working within a research team, performing succinct clear presentation and writing a scientific abstract and potentially a manuscript.

Mentor: Dr. Audrey Odom John  
Type of student: Undergraduate, Graduate, Medical  
Required Skills: Some experience in bench laboratory research is preferred

Project 1: The Smell of Malaria Parasites  
Project description: Plasmodium falciparum malaria remains an important global health problem. We have recently discovered that the malaria parasite produces volatile compounds that mosquitoes can smell. The proposed summer
research project will explore a possible mechanism by which the parasite makes these compounds. A main goal will be generating transgenic parasites that "smell differently" to mosquitoes, to determine whether these volatiles affect parasite development and transmission.  

**Location:** St. Louis  
**Learning Experience:** The student will learn advanced molecular biology techniques, tissue culture, and protein purification and enzymology.

---

**Mentor:** Dr. Mary McKay, Fred Ssewamala, Ozge Sensoy Bahar  
**Type of student:** Undergraduate, Graduate, Medical  
**Required Skills:** Some global experience (research, work, or volunteer), Strong writing, communication, and organizational skills, Some experience with data collection, entry, analysis, Familiarity conducting literature reviews

---

**Project 1: SMART (Strengthening Mental Health and Research Training) Africa**  
**Project description:** The aims of the study are:  
Aim 1. To apply a trans-disciplinary collaborative approach to adapting the multiple family group (MFG) intervention to align with policy, funding, resource capacity, cultural and contextual influences across three African country contexts. The program adaptation activities will be integrated into policy and research capacity building goals and involve study teams from Uganda, Ghana and Kenya. Country-specific teams will be supported by workshops/webinars related to child mental health services and implementation research methods, evidence-based practice (EBP) approaches to child disruptive behavior disorders (DBDs) and the MFG platform as part on an intensely collaborative, systematic program adaptation.  
Aim 2. Using an experimental effectiveness-implementation hybrid design, to examine the short- (8 & 16 weeks) and longitudinal-(6-month) outcomes associated with the MFG (disruptive child behavior, behavioral functioning). Thirty primary schools will be randomly assigned to 3 study conditions: 1) MFG-delivered by trained family peers; 2) MFG-delivered by community health workers; or 3) Comparison: Mental wellness materials. Three thousand youth (8 to 13 years) and their adult caregivers will be involved in the scale up-study.  
Aim 3. To examine the uptake, implementation, fidelity (i.e., facilitator competence; fidelity, attendance of children and adult caregivers) of two MFGs implementation approaches’ implemented by trained family peers and community outreach health workers.  
Aim 4. To identify multi-level factors (guided by the PRISM) that influence uptake, implementation, and integration of MFGs and youth outcomes (family response, provider preparedness, motivation and fidelity, community level support, including mistrust, encouragement of participation).

**Location:** Uganda, Ghana  
**Learning Experience:** Data entry, cleaning, analysis, coordinating across multiple IRBs, EBP adaptation, data collection, hands-on research experience in Ghana or Uganda, assisting the team with conference planning

---

**Mentor:** Dr. Shanti Parikh  
**Type of student:** Undergraduate, Graduate, Medical  
**Required Skills:** Student will need to use the following skills (experience not required, but familiarity or willingness to learn is needed): community entry; working with hard-to-reach communities; interviewing; using a translator; organizing data; managing & coordinating a team; qualitative analysis is a plus

---

**Project 1: Sexual Health, Mobility, and Networks among Sex Workers and Clients in Uganda’s HIV Hot Spots**

**Project description:** This is an on-going project that examines HIV and sexual health risks and risk reduction among sex workers and their clients in the Iganga region in central eastern Uganda. The HIV "hot spots" examined are truck stops along the TransAfrica Highway, sugar growing communities, and fishing communities in Lake Victoria.  
KEY QUESTIONS for this phase of the project include: gendered engagement with HIV and sexual health care, meanings and uses of money, risk reduction and risky behaviors, social networks (protective and risky), violence, substance (ab)use, and intertwined notions of masculinity, femininity, and respectability as it shapes sexual and health-seeking behavior.  
TASKS: (1) Students will begin the summer in St. Louis reading and analyzing transcripts already collected from this project as well as relevant outside literature, and might also help analyze quantitative survey data from an HIV care survey. (2) Based on the analysis and findings from the project’s existing data, students will then participate in revising the research instruments based on findings and literature. (3) Then students will travel to Uganda to implement the
research design, including conducting new and follow-up interviews in one or more of the selected hot spot region, surveying the hot spots, collecting information or data from HIV care centers, and gathering statistical data and maps. The Uganda component involves working with the local research team to translate the instruments, establish target numbers of people to interview in different categories (sex workers, clients, elders, healthcare providers, community members, HIV patients), data management (making sure equipment is working properly, downloading and organizing voice files, working with a person to translate interviews, and keeping track of data collected).

**Location:** St. Louis (for 2-3 weeks) and in Uganda (for 4-5 weeks)

**Learning Experience:** The student will learn community-based research and qualitative research methods and analysis, and specifically ethnographic research with high risk populations. The student will also learn strategies of working with sensitive issues and hard-to-reach communities. Emphasis will be placed on how to analyze existing primary interview data from a target population, and determine the next stages of a project (e.g., research design and revision)

---

**Mentor:** [Dr. Diana Parra Perez](#)

**Type of student:** Undergraduate, Graduate, Medical

**Required Skills:** Field work experience, data analysis experience, writing skills

**Project 1:** Public Access to enRiched Conditions (PARC) Initiative

**Project description:** Several studies have shown differences in availability of recreational resources such as public parks according to racial and socioeconomic status, with a lower prevalence in more underserved areas. Research on this topic in St. Louis has been scarce but according to the latest For the sake of All report, green areas and recreational options are generally lacking in underserved areas in St. Louis. Public space and free of use recreational opportunities such as open air gyms also known as fitness zones have been shown to contribute to increasing physical activity area levels in the parks where these types of programs are located. These programs have been found to primarily benefit segments of the population that are at higher risk for physical inactivity and other poor health outcomes such as obesity, including women, older adults and children, as well as low SES populations. We plan to select two intervention parks and two control parks matched based on similar socio economic and racial characteristics. We have identified two existing parks that offer this type of open-air exercise equipment or fitness zones (Trojan park and Millar Park), and will identify two control parks of similar characteristics to serve as the control areas. Our goal is to conduct systematic observation in the parks to assess use in terms of estimated age, gender and level of physical activity as well as other characteristics of the area and the equipment. We also plan to conduct intercept interviews assessing reasons for use, barriers and facilitators. The results will allow us to determine the value of providing resources for physical activity in public parks, particularly in underserved areas, thus addressing issue of health equity and community and social disparities in St. Louis.

**Location:** St. Louis

**Learning Experience:** Research design methods, data analysis, writing of manuscripts

---

**Mentor:** [Dr. Rupa Patel](#)

**Type of student:** Undergraduate, Graduate, Medical

**Gender Preference:** female

**Required Skills:** Organization, basic essay writing, basic ability to read scientific literature (with mentoring), ability to read journal writing instruction and follow specific formats, ability to use excel, word, powerpoint with good familiarity.

**Project 1:** Rohingya refugee crisis

**Project description:** Washington University in St Louis faculty have begun to assist NGOs develop community-based health programs and communication activities to increase uptake of health services in Bangladesh in order to serve Rohingya refugees. We will be conducting a literature review of the programs available for crisis settings to offer policy and programmatic recommendations to the WHO/UNHCR/IOM and local organizations. There are other opportunities with this project but all the projects involve writing manuscripts and reports based on literature reviews and secondary data from the field. The findings of the literature review will also be used to develop a grant application and students will help with grant writing.

**Location:** St. Louis
Learning Experience: Principles in refugee medicine, program evaluation, reviewing and organizing literature, elements in manuscript and grant writing, working with professionals from different disciplines (over the phone w/ officials in Bangladesh and university-based faculty in the USA) and collaborative teamwork, managing portions of a team related to completion of the manuscript/grant writing project, and communicating literature review findings.

Mentor: Dr. Philip Payne
Type of student: Undergraduate, Graduate, Medical
Required Skills: Basic computational and statistical expertise

Project 1: Designing/Implementing EHR Dashboards for Disease Outcome and Progression
Project description: Using EHR data to create or design visual dashboards for monitoring and visualizing advancement of diseases. Visualizing EHR data via Tableau dashboards can provide researchers and physicians a way to quickly analyze and gain insights on the outcomes, historical health conditions, medications and lab values. Design component of this project will be to identify the different metrics, charts and other visualizations which will provide maximum utility and information to the researchers for hypothesis generation and physicians for providing care.
Location: St. Louis
Learning Experience: Fundamental biomedical informatics theories and methods, familiarity with EHR-derived data, evaluation and study design.

Project 2: Designing a Context-Aware EHR Driven Alert system
Project description: Designing a framework to implement EHR based alerts in a hospital system that are context-aware. Context would include factors such as specialty (Cardiovascular, Neurology), status of patient (general ward / ICU), inpatient/out-patient, etc. The aim of project will be to identify all the factors that constitute the context for designing an alert system for hospitals. The student should select a specialty (for e.g. Cardiovascular) for prototyping a detailed alert generation framework including conditions, type, frequency and target users for the alerts.
Location: St. Louis
Learning Experience: Basic biomedical informatics theories and methods, familiarity with EHR data for secondary use, evaluation and study design.

Project 3: Analyzing Completeness and Accuracy of EHR for Bundled Payments Implementation
Project description: The aim of the project is to analyze and interpret the bundled payment summary documents for bariatric surgery and evaluate the completeness and accuracy of current EHR data for implementing episode-based payments. The first step will be to parse the Prom.
Location: St. Louis
Learning Experience: Basic biomedical informatics theories and methods, familiarity with EHR data for secondary use, evaluation and study design.

Mentor: Dr. Jennifer Philips
Type of student: Undergraduate, Graduate, Medical
Required Skills: Previous basic laboratory experience (molecular biology, tissue culture, and/or microbiology).

Project 1: How Mycobacterium Tuberculosis
Project description: Mycobacterium tuberculosis causes tuberculosis (TB), which kills more people than any other bacteria. We badly need new therapies and an effective vaccine. The success of M. tuberculosis depends on its ability to survive in macrophages, white blood cells that normally kill bacteria. Our goal is to understand how M. tuberculosis is able to manipulate these cells so they do not kill the bacteria, but instead provide a safe haven in which the bacteria thrive. The summer project will focus on characterizing how a particular Mtb protein modulates host cell biology to promote infection.
Location: St. Louis
Learning Experience: The students will gain an understanding of macrophage biology and bacterial pathogenesis. They will gain skills in molecular biology, culturing mammalian cells, and microbiology.
Mentor: Dr. Bobbi Pineda
Type of student: Undergraduate, Graduate, Medical
Required Skills: Highly motivated and passionate about learning about high risk infants

Project 1: **Adoptability of a Sensory Based Intervention for Preterm Infants in the NICU**

Project description: The purpose of the Supporting and Enhancing Sensory Experiences (SENSE) research study is to gain a better understanding about the effects of positive sensory experiences for preterm infants during NICU hospitalization. We will have recruited 61 infants born at 32 weeks estimated gestational age by summer 2018. Once parents sign an informed consent, the infant was randomized to one of two study groups: standard of care or intervention. Both groups received positive sensory experiences, but we aim for the intervention group to receive specific doses of auditory, tactile, vestibular, kinesthetic, and olfactory exposures every day of NICU hospitalization. The defined interventions were based on a rigorous process of development that consisted of evidence, expert opinion, parent opinions, and careful synthesis of what is feasible and grounded in our understanding of early human development. The sensory experiences were designed to be carried out by the parents, and a sensory support team filled in the gaps when the parents were not able to be present. All infants in the SENSE study had audiorecordings for a 16 hour period to measure the amount of auditory exposure in the environment and videorecordings for a 24 hour period to measure the amount of tactile exposure the infant receives. The recordings are designed to help us measure what sensory exposures the infant is experiencing in both the standard of care and intervention groups.

The student will identify sensory exposures from audio and/or video recordings to determine 'adoptability' of the intervention by delineating if the prescribed dose of sensory exposure has been achieved in the intervention group and also to determine differences in sensory exposure among the intervention and control group.

Location: St. Louis

Learning Experience: Early infant development; the NICU experience, how to code data from videotapes, running statistical analysis on SPSS, scientific writing

Project 2: **Baby Bridge Programming to Reduce Gaps in Therapy Services Following NICU Discharge: Parent Perceptions of Programming**

Project description: Due to the significant medical and developmental risks of the preterm infant and the psychological needs of the mother and father following preterm birth, early programming to ensure optimized functioning and well-being are critical following discharge from the neonatal intensive care unit. The Baby Bridge Program was developed to minimize the gap in services high-risk infants experience after discharge from the NICU. The Baby Bridge Program was created as a partnership between St. Louis Children’s Hospital and the Washington University Program in Occupational Therapy. Through the program, an occupational therapist met with the family in the NICU, collaborated with the medical team, and conducted comprehensive medical, neurobehavioral, feeding, and psychological assessments to inform targeted interventions and follow-up following discharge. The medical, neurobehavioral, feeding, and psychological assessments were conducted shortly before discharge from the hospital. This ensured that targeted areas for medical follow up and therapy had been identified and enabled therapy to start on the first visit in the home, within one week of NICU discharge. The Baby Bridge therapist then saw the infant and family in the natural environment of the home and conducted weekly therapy services until the initiation and consistent provision of therapy services by other community therapy providers, or until the infant no longer needed the services, whichever came first. After Baby Bridge programming stopped, parents completed a survey to determine their perceptions about Baby Bridge Programming.

The student will sort through surveys and report on parent perceptions of the Baby Bridge programming.

Location: St. Louis

Learning Experience: about policy and community based services following NICU discharge, how to code data, data analysis via SPSS, scientific writing, early human development.
**Mentor:** Dr. Mary Politi  
**Type of student:** Undergraduate, Graduate, Medical  
**Required Skills:** Good communication skills, Good organization skills, interest in learning working with participants on recruitment initiatives; writing skills preferred

**Project 1: Supporting Breast Reconstruction Decisions After Mastectomy or**  
**Project description:** Implementing clinical decision support for patients considering breast reconstruction after mastectomy. Decision tool incorporates personalized risk estimates for complications based on a validated risk prediction model and communicates that information to patients and clinicians to support choices about both type and timing of reconstruction. The tool will be tested in a pilot RCT from Jan - June and analyses will begin in June and July. Summer student can work on an individual project within to the overall study analyses and results.

**Location:** St. Louis  
**Learning Experience:** Best practices for decision support between patients and providers, challenges weighing pros and cons of breast reconstruction, analytic skills, implementation in clinical practices, importance of stakeholder engagement in designing, evaluating, and disseminating interventions

**Project 2: Supporting Health Insurance Choices After a Cancer Diagnosis**  
**Project description:** Revising an evidence-based decision tool about health insurance decisions, personalizing the information for cancer patients and survivors. The tool is being modified from Jan - June and recruitment will begin in July across federally qualified health centers and community social service organizations. This project will not involve analyses at the time (next summer), but there is potential to add a unique piece to the study at the recruitment stage and stay in touch about future analyses and writing of results.

**Location:** St. Louis  
**Learning Experience:** Health policy/health insurance reform challenges, best practices for designing and evaluating decision tools for the public, recruitment strategies for large research projects, importance of stakeholder engagement in designing, evaluating, and disseminating interventions

---

**Mentor:** Dr. Rumi Price  
**Type of student:** Undergraduate, Graduate, Medical  
**Required Skills:** Experience with community participation/engagement, social justice interest, general skills in data compilation, management and analyses

**Project 1:** Human trafficking diversion for girls in St. Louis (Girls at Risk) - community collaboration, data compilation;  
**Project 2:** Mapping human trafficking identified cases in the Missouri and Illinois (data compilation, data cleaning, analysis and GIS mapping);  
**Project 3:** Anti-human trafficking policy implementation (policy brief, efficacy assessment, data analysis);  
**Project 4:** St. Louis anti-violence initiatives (engagement, collaboration, strategic plan writing);  
**Project 5:** Technology application for PTSD management (data cleaning, analysis and writeup)  
**Location:** St. Louis  
**Learning Experience:** Various substudies - overall, the student will learn how collaborative works, research and social justice intersection, data management and analysis skills (depending on the level and specific projects)
Mentor: Dr. Alex Ramsey
Type of student: Undergraduate, Graduate, Medical
Required Skills: Some research experience (e.g., reviewing literature, designing surveys, conducting interviews, analyzing data)

Project 1: Implementation of Precision Medicine for Smoking Cessation
Project description: Our aim is to examine the acceptability and effect of personalized genomic results on smoking behaviors in different subgroups of adult smokers. We will examine the extent to which smokers in the community agree to genetic testing, recall their personalized genomic results, and change their smoking behaviors following review of their results. We will give particular attention to potential differences in outcomes between subgroups, including African Americans and European Americans.
Location: St. Louis
Learning Experience: The student will gain skills in research team collaboration, data collection and analysis, and applying concepts of dissemination and implementation science into clinical research.

Mentor: Dr. John Schneider
Type of student: Undergraduate, Graduate, Medical
Required Skills: Basic Biostatistics

Project 1: Measuring Quality in Care for Rhinosinusitis and Upper Respiratory Infections
Project description: Quality improvement for many outpatient treatments are poorly understood given the lack of data available. This project will use the Truven Marketscan Database to evaluate whether current and future quality metrics for Rhinosinusitis and other upper respiratory infections are followed by providers. The project will involve the creation of a large database of patient claims data to be analyzed.
Location: St. Louis
Learning Experience: Administrative database management, analytic techniques for quality improvement, upper respiratory disease management

Mentor: Dr. Laura Schuettpelz
Type of student: Undergraduate, Graduate, Medical
Required Skills: N/A

Project 1: Inflammation effects on hematopoietic stem cells
Project description: Student will work with graduate student or post-doc in the lab on a project investigating the role of inflammatory signals on hematopoietic stem cells. The lab uses mouse models to investigate how these signals influence both normal and pre-malignant stem cells. Techniques include flow cytometry, mass cytometry, cell culture and others.
Location: St. Louis
Learning Experience: Basic lab techniques, experimental design, mouse modeling of human leukemia and bone marrow failure

Mentor: Dr. Ozge Sensoy Bahar
Type of student: Graduate
Required Skills: IRB application, data collection & entry, research/work in a global setting and strong writing, communication, and organization skills

Project 1: Family Processes and Rural-urban Migration among Adolescents
Project description: The purpose of this qualitative study is to explore parental ethnotheories on childhood, child independent migration, and child labor, as well as family processes behind decision making including multi-level factors (both protective and risk) that influence female children's/adolescents' migration from home to work as child laborers. The study will explore the perspectives of three groups of parents/caregivers (n=90) from sending
villages in two of the poorest districts of Northern region with adolescent daughters: 1. who migrated to work in the informal economy; 2. Who dropped out of school but stayed in their village; and 3. who remained in school full-time. Given the gap in knowledge on parental perspectives on female child/adolescent migration for work in the cities, the findings of the proposed research study will contribute to the literature on child/adolescent migration for child labor.

Location: Ghana

Learning Experience: The student will have the opportunity to gain hands-on research experience for a global research project. Depending on what stage the study is in the summer, the student will learn about the IRB process, establishing and maintaining global research partnerships with NGOs, and other investigators in Ghana, development and refinement of qualitative interview protocols, recruitment and consenting, and potentially assist the investigative team in data collection.

Mentor: Dr. Liang Shan
Type of student: Undergraduate, Graduate, Medical
Required Skills: Lab experience

Project 1: Genome Editing of Human Hematopoietic Stem Cells to Confer Lifelong Protection Against HIV Infection
Project description: We have developed novel mouse models to support human hematopoiesis and reconstitution of human immune system in mice. We plan to develop a mouse model to genetically modify human hematopoietic stem cells (hHSC) which can differentiate into B cells and T cells with superior anti-HIV activity. More specifically, we will insert HIV-specific B cell receptor and T cell receptor coding genes into hHSCs and allow them to develop in our novel mouse models. After genetically modified human B cells and T cells are reconstituted in mice, we will evaluate antibody response and T cell response to HIV infection.
Location: St. Louis
Learning Experience: Students will gain experience in virology, immune response and stem cell biology. Besides, students will develop an understanding of HIV infection, pathogenesis and strategies for HIV vaccine development.

Mentor: Dr. Haina Shin
Type of student: Undergraduate, Graduate, Medical
Required Skills: Basic lab experience (pipetting, sterile technique, etc). Would be great if student was familiar with immunology-related techniques such as flow cytometry and immunohistochemistry.

Project 1: Vaginal Microbiome and Host Defense Against Sexually Transmitted Viruses
Project description: The microbiome is now known to be an important regulator of many host functions, but the local impact of the vaginal microbiome on host defense is relatively unexplored. Student will be examining the role of the vaginal microbiome in regulating different aspects of the immune response against sexually transmitted viruses such as herpes simplex virus.
Location: St. Louis
Learning Experience: The student will gain an understanding of the importance of local immune responses in protecting the host against incoming pathogens. The project will also provide the opportunity to gain expertise in several techniques including flow cytometry, immunohistochemistry, tissue digestion and handling of infectious material.

Mentor: Dr. Fred Ssewamala
Type of student: Graduate, Medical
Required Skills: Some global research, volunteer, or work experience; Interest/familiarity in HIV/AIDS research as well as economic empowerment; Experience in quantitative data analysis; Experience in conducting literature reviews, manuscript preparation; Strong organizational, writing, and communication skills

Project 1: Suubi+Adherence: Evaluating a Youth-Focused Economic Empowerment Approach to HIV Treatment Adherence
**Project description:** The Suubi+Adherence study examines the impact and cost associated with an innovative economic empowerment intervention to increase adherence to HIV treatment for HIV-infected adolescents. Suubi+Adherence is the first study to integrate and test economic empowerment and stability-focused interventions in relation to antiretroviral adherence for HIV-infected adolescents in Uganda. Suubi+Adherence is informed by an efficacious economic empowerment intervention previously tested with AIDS-orphaned children, and draws from asset-theory, and previous adherence studies.

**Location:** St. Louis

**Learning Experience:** The student will have the opportunity to work with an experienced research team on the analysis of the longitudinal dataset obtained from this study and contribute to manuscript preparation.

**Project 2: Suubi4Her: A combination Intervention Addressing HIV Risk Behaviors Among Older Adolescent Girls Transitioning into Adulthood in Uganda**

**Project description:** Suubi4Her is a 5-year (2017-2022) longitudinal randomized experimental study funded by the National Institute of Mental Health (NIMH--PI, Fred Ssewamala). This study will examine the impact and cost associated with Suubi4Her, an innovative combination intervention that aims to prevent HIV risk behaviors among 15-17 year-old girls living in communities heavily affected by poverty and HIV/AIDS in Uganda. The proposed study is informed by two previously tested interventions asset-based matched savings accounts (YDA) and family strengthening through Multiple Family Groups (MFG) which have successfully been implemented with younger primary school-going adolescents. Suubi4Her will test the theory that youth cognitive and behavioral change is influenced by economic stability while examining if enhanced intra-familial support and communication are needed to maintain positive behavioral health functioning and reinforce engagement in protective health behaviors. The study aims are to: 1) Examine whether the Suubi4Her intervention is effective in protecting adolescent girls against known HIV risk factors (including economically-motivated sex and intimate partner violence). 2) Elucidate the effects of the Suubi4Her intervention on behavioral health functioning (i.e., depression, self-efficacy and hopelessness) and examine the effects of these variables as potential mechanisms of change, mediating the relationship between each intervention and HIV risk reduction. 3) Evaluate the cost-effectiveness of each intervention condition.

**Location:** Masaka, Uganda

**Learning Experience:** The student will have the opportunity to strengthen research skills especially around consenting, recruitment, and data collection. The student will also have the opportunity to participate/observe the adaptation of an evidence-based intervention to the Ugandan context.

---

**Mentor:** Dr. Christina Stallings

**Type of student:** Undergraduate, Graduate, Medical

**Required Skills:** Basic lab experience

**Project 1: Molecular Pathogenesis of Mycobacterium tuberculosis**

**Project description:** The Stallings Laboratory studies mycobacterial pathogenesis, with an interest in identifying new antibiotics to treat mycobacterial infections. Of particular importance is the current global health crisis involving the Mycobacterium tuberculosis epidemic. M. tuberculosis infection kills more people than any other single pathogen. The rise in drug-resistant cases has made it clear that we are not equipped to battle this epidemic. The Stallings Laboratory has identified drug-like small molecules that inhibit M. tuberculosis growth by an unknown mechanism of action. The summer research project will involve characterization of the growth inhibitory properties of these compounds and investigate possible bacterial targets of the compounds. The objective is to eventually apply these compounds as new antibiotics to treat M. tuberculosis infections and as new tools to dissect M. tuberculosis pathogenesis. The techniques to be used will be a combination of microbiology, cell biology, molecular biology, and molecular pathogenesis.

**Location:** St. Louis

**Learning Experience:** The student will learn techniques involved in culturing and manipulating bacteria as well as genetic and biochemical approaches used in the laboratory.
**Project 2: Developing New Treatments for Tuberculosis**

**Project description:** The Stallings Laboratory has identified small molecules that inhibit Mycobacterium tuberculosis growth by unknown mechanisms. The project will involve characterization of the compounds and investigating possible targets of the compounds. The objective is to eventually apply these compounds as new antibiotics to treat tuberculosis and as new tools to dissect M. tuberculosis pathogenesis. The techniques to be used will be a combination of microbiology, cell biology, and molecular biology.

**Location:** St. Louis

**Learning Experience:** The student will learn how to perform and plan microbiological and molecular biology experiments, evaluate data, troubleshoot, and formulate hypotheses and data interpretations.

---

**Mentor:** Dr. Susan Stark

**Type of student:** Undergraduate, Graduate, Medical

**Required Skills:** Interested applicants should have strong verbal, written, organizational skills as well as an interest in aging, community participation and working with older adults.

---

**Project 1: Increasing Community Participation for Individuals Aging with a Long-Term Physical Disability**

**Project description:** The student will participate in an ongoing project working with community members to translate, adapt and evaluate evidence-based interventions to improve independence and community participation for people aging with long-term physical disabilities (PAwLTPD). A student will be able to analyze baseline data on participation levels of adults aging with disabilities to perform a descriptive study of this data.

**Location:** St. Louis

**Learning Experience:** Students will learn skills for analyzing data, conducting survey assessments, writing scientifically and conducting focus groups. Student will have opportunities to participate in community outreach, and study implementation.

---

**Project 2: Removing Home Hazards for Older Adults Living in Affordable Housing**

**Project description:** The student will participate in an ongoing project working on reducing fall risks for medically underserved older adults living in affordable senior housing. The aims of the project are to determine the acceptability and feasibility of delivering a home hazard removal program in low-income senior apartments and to determine whether the program is effective and cost-effective in reducing the rate and risk of falls. A student will have the opportunity to deliver an interactive fall risk education program to older adults living in the community.

**Location:** St. Louis

**Learning Experience:** Students will learn skills for analyzing data, and writing scientifically. Students will have opportunities to participate in community outreach, and study implementation.

---

**Mentor:** Dr. Rachel Tabak

**Type of student:** Undergraduate, Graduate, Medical

**Required Skills:** Qualitative and/or quantitative data analysis experience

---

**Project 1: Understanding the Interaction Between the Family Context and Implementation of an Intervention**

**Project description:** Use audio-recording and checklist data from lifestyle modification interventions delivered primarily in the home environment (to promote healthy weight behaviors) to understand the interaction between the family context and the intervention implementation. Quantitative data include intended lessons and interventionist perspective of parent engagement and barriers to implementation.

**Location:** St. Louis

**Learning Experience:** Experience working with qualitative and quantitative data as well as an understanding of dissemination and implementation science with these interventions as an example.
Mentor: Dr. Adetunji Toriola
Type of student: Undergraduate, Graduate, Medical
Required Skills: Data management skills, data analysis skills not required but familiarity with statistical analytic softwares are helpful; Good writing skills.

Project 1: Determinants of Mammographic Density
Project description: Mammographic breast density is one of the strongest risk factors for breast cancer, yet, the biological basis of mammographic density is poorly understood. We have recruited 383 women and collected detailed data on these women which will enable us to investigate the associations of various lifestyle, dietary, genetic and molecular factors with mammographic density. Available projects for the student to work on include evaluating the associations of (i) specific diets and dairy intake with mammographic density; (ii) genetic variations and mammographic density.
Location: St. Louis
Learning Experience: Designing and Implementing epidemiological studies; Data analyses; Manuscript writing

Project 2: Metformin Use and Pancreatic Cancer Survival
Project description: This project will use an existing dataset to evaluate the associations of metformin use with survival among patients with pancreatic cancer.
Location: St. Louis
Learning Experience: Focused literature search; Data management; Manuscript draft

Mentor: Dr. Isaiah Turnbull
Type of student: Undergraduate, Graduate, Medical
Required Skills: Data analysis, database manipulation and basic scripting experience

Project 1: Developing an ICD-Based Definition Of Acute Care Surgery
Project description: Acute and critical care surgery is a relative new sub-specialty within general surgery that combines the disciplines of trauma surgery, surgical critical care and acute care general surgery. Defining the scope of practice for acute care surgeons is a ongoing process. Professional societies have identified a range of surgical procedures that fall under the umbrella of "Acute Care Surgery" however, these definitions do not account for the significant volume of nonoperative patient care. We propose to develop a novel definition of Acute Care Surgery by identifying the diagnoses associated with these procedure codes then subjecting them to a consensus analysis among Acute Care Surgery faculty. This project will involve working with both institutional and national databases and will include significant data manipulation and analysis to develop the definition and also to perform validation using institutional data. The second phase will include developing and distributing the new definition for a Delphi-type consensus analysis, followed by analysis of these results.
Location: St. Louis
Learning Experience: Analysis of administrative data from clinical databases, data manipulation and analysis using SPSS, Delphi consensus analysis, internet based survey development and distribution with RedCap

Mentor: Dr. Leyao Wang
Type of student: Undergraduate, Graduate, Medical
Required Skills: For project 1: Basic molecular biology (wet lab) experience is required, data analysis skill is a plus; For project 2: Programming skills are needed. Students with software/app development and machine learning research experience is preferred.

Project 1: Nasal Virome in Respiratory Syncytial Virus (RSV) Bronchiolitis Infants
Project description: Bronchiolitis is common in infants and can subsequently lead to serious lower respiratory illnesses, such as asthma. Bronchiolitis is caused by infection, especially respiratory syncytial virus (RSV). However, it is believed that virus co-infection may play a potentially significant role in bronchiolitis severity. In this summer research project, we
will use metagenomic sequencing to identify a broad range of viruses in the nasal wash from bronchiolitis infants to reveal any correlation between nasal virome and clinical outcomes.

**Location:** St. Louis

**Learning Experience:** The student will learn the pipeline of viral DNA extraction/metagenomic sequencing/sequencing data analysis.

---

**Project 2: Mobile App for Asthma Exacerbation Record and Prediction**

**Project description:** Asthma exacerbation prediction is always a challenge. Personalized asthma prediction app will be of importance for asthma control. To reach this goal, during this summer research time, we aim to 1) develop a mobile app to closely follow asthma patients and record each exacerbation episode and related environmental and geographical information; 2) to test the feasibility of applying machine learning algorithm to predict real-time asthma exacerbation to alert patients.

**Location:** St. Louis

**Learning Experience:** The student will learn how to apply computational skills into disease-oriented study and get exposed to epidemiological study design.

---

**Mentor:** Dr. Denise Wilfley

**Type of student:** Graduate, Medical

**Required Skills:** Students with clinical research/human subject experience would be ideal. In addition, we seek students who are independent and thoughtful, as well as highly motivated and dedicated to their work.

---

**Project 1: The Effectiveness of Family-Based Weight Loss Treatment Implemented in Primary Care**

**Project description:** This is a multi-site, clinical trial aiming to evaluate over a two year period the effectiveness of Family-based treatment (FBT) for the treatment of childhood obesity, delivered by a trained interventionist co-located within primary care compared to enhanced usual care alone. Participants will be a representative sample of 528 families with a 6-12 year-old child and a parent who are both overweight/obese. Weight changes in approximately 228 siblings who are overweight/obese and between 2-18 years of age will also be studied. The summer project available would involve helping to develop curricula materials better suited for underrepresented minorities and low SES families, in addition to helping create video tutorials, etc., to supplement the treatment curriculum.

**Location:** St. Louis

**Learning Experience:** Students will be engaged in health disparity research and tailoring obesity treatment materials for particular populations, specifically taking things into account like food insecurity and low-income family needs.

---

**Mentor:** Dr. Elizabeth Yanik

**Type of student:** Graduate, Medical

**Required Skills:** data analysis experience, basic epidemiology knowledge

---

**Project 1: Smoking Cessation and Symptomatic Rotator Cuff Disease Risk**

**Project description:** Smoking is linked to increased risk of development and progression of symptomatic rotator cuff disease. But it is unclear how smoking cessation influences rotator cuff disease risk (i.e. to what degree are smoking effects on rotator cuff disease reversible?). Using the UK Biobank, a large population-based cohort of 500,000 people, this project will evaluate patterns of rotator cuff disease diagnoses among people with differing histories of tobacco use at study enrollment, with a particular emphasis on former smokers who have quit smoking for differing lengths of time.

**Location:** St. Louis

**Learning Experience:** The student will learn about epidemiology methods and working with “big data” resources. The student can gain experience in developing a study approach, executing statistical analyses, and contributing to a manuscript.