Project 1

Deciphering the mechanism of ciliary trafficking in photoreceptors

PI: Hemant Khanna, PhD, Associate Professor, Department of Ophthalmology & Visual Sciences

Interview required – please contact PI at 508-856-8991 or Hemant.Khanna@umassmed.edu

Description:
This project focuses on understanding how defects in neuronal protein trafficking result in photoreceptor degeneration and blindness. Specifically, the student will learn about the different modes of assembly of assembly and function of photoreceptor sensory cilium, a microtubule-based extension of the membrane that detects the light signal. The student will also learn how mutations in ciliary genes cause photoreceptor degeneration. This project involves the use of basic cell and molecular biology techniques, including cell culture, immunofluorescence and retinal tissue sectioning and staining.

Student's role:
The student will be involved with the PI to learn the background and planning of the experiments. He/she will also work with a postdoc in the lab to carry out the experiments and learn troubleshooting. The student will also be expected to present his/her findings and discuss problems and future directions in weekly lab meetings.

Required skills:
Determination to work hard.

Location:
AS6-2008

Project 2

Epigenetic regulation of cardiovascular diseases

PI: Chinmay Trivedi, MD PhD, Associate Professor, Department of Cardiovascular Medicine/Medicine

Interview required – please contact PI at 508-856-6947 or chinmay.trivedi@umassmed.edu

Description:
Congenital and adult cardiovascular diseases are the most common birth defects. The underlying pathology is improper development that leads to the congenital cardiovascular defects, affecting nearly 40,000 births in the USA each year. My lab is interested in understanding the roles of chromatin and epigenetic modifications during cardiovascular development and diseases. Specifically, we study the roles of chromatin modifying enzymes, like histone deacetylase 3 (HDAC3), in cardiac and vascular progenitor cells. Using various genetic mouse models, we investigate pathogenesis of various congenital cardiovascular defects.

Student's Role:
Recently we demonstrated that histone deacetylase 3 (Hdac3) orchestrates
epigenetic silencing of Tgfβ1, a causative factor in human congenital heart disease pathogenesis. In murine embryos lacking Hdac3 in the second heart field cardiac progenitor cells, increased Tgfβ1bioavailability is associated with ascending aortic aneurysm, overriding aorta, double outlet right ventricle, bicuspid aortic valve, ventricular septal defects, and aortic and pulmonic valve stenosis. Using various molecular biology / biochemistry and histology related techniques (performed routinely in our lab), student will characterize causative relationship between Hdac3 and TGF-β in human disease samples.

Required Skill:
Microsoft office, Prior research experience in histology or cell and molecular biology /biochemistry is desired but not required.

Location:
The Albert Sherman Center, AS7-1016

Project 3

Healthy Aging and Falls Prevention among Community-dwelling Older Adults

PI: Wenjun Li, PhD, Associate Professor, Director of Health Statistics and Geography Lab

Interview required – submit via email – CV, 3-4 line statement of interest with current contact information for an interview (wenjun.li@umassmed.edu)

Description:
Falls are the leading cause of unintentional fatal and non-fatal injuries among older adults (age>65 years). Falls prevention is a national public health priority (Healthy People 2020 Obj. IVP-23.2 and OA-11). The overarching goal of our project is to shift the paradigm of falls epidemiology and prevention research by innovating new methods for quantifying older adults' time and space use, their place- and activity-specific fall risks, and rural-urban difference in the behavioral phenotypes. We will recruit 300 older men and women in Worcester County. During the 1-year study period, participants will be followed for 1 year to track their falls using monthly falls calendars and phone/online surveys if they fell. Participant mobility and activity patterns with respect to space, timing frequency and duration will be concurrently measured using a global positioning system (GPS) unit and an accelerometer at baseline, 6 months and 12 months. Participants will be followed using mail, online or telephone surveys every 6 months regarding their time and space use, health status, sleep, and use of assistive devices.

Student's role:
Field work in Central Massachusetts communities, including participant recruitment, survey administration; measurement of participant anthropometrics, physical activity and mobility, assessment of neighborhood nutrition and physical activity environment, and data processing.

Required skills:
Strong interest in community health, environment and aging; good interpersonal skills; enjoying field work in community settings. Students, who are interested in community work, must be physically fit (be able to walk long distances and long hours while carrying a small load).

Location:
School building and select communities in Central Massachusetts.

Project 4

Drug Injection Surveillance and Care Enhancement for Rural Northern New England

PI: Peter D. Friedmann, MD, Medicine, UMMS-Baystate, Department of Medicine

Interview required – submit via email – CV and a 3-4 line statement of interest with current contact information for an interview randall.hoskinson@baystatehealth.org

Description:
In 10 rural counties in MA, VT and NH adjacent to I-91, the DISCERNNE project will recruit and interview out-of-treatment persons who inject drugs to examine their risk behaviors for HIV, hepatitis C and overdose; their networks of fellow drug users; service use and needs. The field recruitment phase will occur during the spring, summer and fall of 2018.

Student's role:
The summer student will accompany a research coordinator and research assistants into the field (e.g. syringe service programs, public health programs, medical care sites, etc.) to enroll out-of-treatment persons who inject drugs and have them participate in a computer-assisted interview.

Required skills:
Students will be working with a stigmatized human population with great social and health care deficits in rural parts of Massachusetts, New Hampshire and Vermont. Qualifications include excellent interpersonal and communication skills; a flexible, non-judgmental attitude; a willingness to work in low-resourced community settings with marginalized persons; and an ability to follow directions. A current driver's license and a car preferred. Tattoos or piercings are welcomed. Student will need to complete all IRB required research trainings and personnel requirements prior to start.

Location:
Baystate Franklin Medical Center, Greenfield MA or Dartmouth-Hitchcock Medical Center, Lebanon NH.

Project 5

Development of a Novel Trauma Symptom Screening Tool for Use in Pediatric Primary Care

PI: Heather C. Forkey, MD, Department of Pediatrics

Interview required – submit via email - CV with current contact information for an interview (heather.forkey@umassmemorial.org)

Description:
Expanding evidence from molecular biology, genomics, immunology and neuroscience links the early experience of toxic stress with subsequent mental and physical illness. As recognition of the consequences of toxic stress has expanded, so too has interest in identification of affected children. However, it is difficult to predict individual consequences of toxic stress in children and, significantly, no single gold standard exists for the diagnosis of trauma symptoms in children. The tools that are currently available are too time consuming and cumbersome for the primary care setting, assess symptoms in only one domain, or are specific to PTSD, which, as described, is now thought to be only one of the manifestations of trauma exposure.

In order to address these current limitations, we are developing a screening tool for use in primary care settings. Preliminary work done has allowed us to develop a preliminary tool which has been through content validity testing with content experts. We will now be beginning the work of clinical validation of the tool through testing in a clinical setting. Student involvement in the project will be to work with PI to begin to pilot the use of this tool in the clinical setting, collect and evaluate results.

Student's role:
Student will participate in this tool validation study under the guidance of PI and research coordinator

Required skills:
Comfort interacting with patients, obtaining consent, reviewing protocol. Familiarity with Red Cap a plus.

Location:
Benedict Building, UMass

Project 6

Development of a Patient and Family Engagement and Educational Program for Primary Care of Patients with Opioid Use Disorder

PI: Amber Hewitt, PsyD, Assistant Professor, Department of Family Medicine and Community Health

Interview required – submit via email - telephone interview and 3-4 line statement of interest with current contact information for an interview (amber.hewitt@umassmemorial.org)

Description:
This research study and educational project, funded by the BCBS Foundation, and has two primary aims: (1) Qualitative and quantitative analysis of focus group, survey, and semi-structured interview data from patients with Opioid Use Disorder (OUD) and family members of persons with OUD and (2) Development of web-based educational modules for patients and family members impacted by OUD. The research arm of this project is an exploratory analysis of perspectives of patients and family members affected by OUD, with the purpose of informing the creation of educational curriculum for patients and families and to inform the clinical work of health care providers across disciplines in the treatment OUD. Regarding the perspectives of family members, focus groups and survey data will explore attitudes and knowledge regarding addiction treatment, medication-assisted treatment (i.e., use of naltrexone, buprenorphine, and methadone), barriers to accessing health care and treatment for their loved ones, commonly used avenues to access information, difficult interactions with health care system/providers, information they wish they had access to sooner, as well as information most salient for family members from their perspectives. Regarding the perspectives of patients, one-on-one interviews and survey data will explore attitudes and knowledge about factors that helped or hindered their efforts to decrease or stop opioid/heroin use, challenges interacting with the health care system, difficulty finding useful information, helpful and unhelpful aspects of past treatment experiences, and role of medication-assisted treatment. Focus group and survey data will be integrated with evidenced-based resources and expert opinion to form web-based educational modules.

Student's role:
- Reviewing and editing educational modules
- Assisting in the analysis of qualitative and quantitative data
- Assisting in the process of gathering data on patient and family member perspective of   the final curriculum

Required skills:
N/A

Location:
Main location - Center for Integrated Primary Care – University Campus, 3rd floor of Benedict building
Infrequently - the Fitchburg Family Practice

Project 7

Creating and Optimizing a Digital Goals-of-Care Decision Aid for Surrogate Decision Makers of Critically ill Moderate-Severe Traumatic Brain Injury Patients

PI: Susanne Muehlschlegel, MD, MPH; Associate Professor of Neurocritical Care, Departments of Neurology (Neurocritical Care), Anesthesia/Critical Care and Surgery

Interview required – please contact PI at 508-334-4651 or Susanne.muehlschlegel@umassmemorial.org

Description:
Traumatic brain injury (TBI) continues to be the leading cause of death and disability after trauma accounting for most of the 52,000 TBI-related deaths in the U.S. annually. **Moderate-severe TBI (msTBI), defined by a decreased level of consciousness**, comprises the majority of hospitalizations and deaths due to TBI, and 90% of all TBI-related medical costs. Since msTBI patients are rendered comatose or minimally responsive, surrogate decision makers as the patients' decision makers routinely face the life-or-death ("goals-of-care") decision about continuation or withdrawal of care. Surrogates' insufficient understanding of projected outcomes, risks and patient values, physician bias, and underlying disease severity all confound this decision. Remedying these issues through a decision support intervention may lead to better-informed goals-of-care decisions by families in msTBI patients. **Shared decision making** is a collaborative process that enhances patients' and surrogates' understanding about prognosis, encourages them to actively weigh the risks and benefits of a treatment, and match them to patient preferences, thereby decreasing decisional conflict and improving knowledge, decision readiness, and decision quality. **Decision aids (DAs)** are shared decision-making tools which have been successfully implemented and validated for many other diseases to assist difficult decision making. **No DA exists for goals-of-care decisions in msTBI.** Such a patient-centered DA has the potential to improve decision-making for msTBI patients by ensuring surrogates receive consistent, evidence-based prognostication while also addressing patients' preferences and values. **Our ongoing NIH-funded research has already produced a paper-based goals-of-care DA for surrogates of msTBI patients, and will soon be tested in a feasibility trial.** We are collaborating with investigators from Worcester Polytechnic Institute (WPI) and have developed a digital DA. The project's goal is to improve the digital DA's design through user-testing and iterative improvements based on feedback from families of neurocritically ill patients in our UMASS neuroICU family waiting room, and measure user acceptability. The ultimate goal is to produce a digital DA that is ready for use in a future multi-center trial.

Student's role:
- Approach families in the UMASS neuroICU family waiting room, obtain verbal consent (using IRB approved verbal consent script and fact sheet), observe users going through the DA on a study team laptop, iPAD or family member's own device, gather feedback from the test users.
- Work collaboratively with members of the study team (research coordinator, PI) and the WPI collaborators (a student and a PI) and to implement iterative improvements of the digital DA (to be done by WPI collaborators);
- Provide practical and clinical input as a medical professional to the WPI computer science collaborators
- Student will learn about team science, study design, subject verbal consent, literature research, applying other studies to the current research, how to work with families of critically ill patients, how to collaborate with non-medical researchers (for example from WPI).
- Student is expected to present the results locally to the immediate research group, local research symposia (at UMASS and WPI), and, if abstract accepted, at a national conference.
- We aim to prepare the results in abstract form for a poster presentation at a national meeting. Student will learn about abstract writing and submission
- A manuscript publication is expected to result from this project. Student will learn about manuscript writing and submission.

We have a longstanding history of mentoring students successfully. Please refer to our lab webpage and feel free to contact prior students. https://umassmed.edu/nccresearch

Required skills:
Enthusiasm, diligence, people-skills (need to be able to approach waiting families in the ICU waiting room and engage them in a positive interaction with minimal risk research), team work, reliability, excellent English skills, advanced computer knowledge with advanced skills in WORD, EXCEL, POWER POINT. No expert computer knowledge needed as all computer programming for the digital DA will be done by the WPI collaborators.

Location:
University Campus UMMS, Trauma and Neurointensive care unit at UMASS (Lakeside 2), including waiting room.

Project 8

The Role of Screen Time in Recovery from Concussion

PI: Theodore Macnow, Assistant Professor of Pediatrics, Department of Pediatric Emergency Medicine Division

Interview required – submit via email - CV with current contact information for an interview
Theodore.macnow@umassmemorial.org

Description:
Concussion is an increasingly recognized injury and cause of morbidity in the pediatric population. While clinicians' understanding of the pathophysiology and treatment in concussion has improved greatly, there is still much to be learned about this condition. Most clinicians agree that an initial 24-48 hour period of cognitive and physical rest are important in concussion recovery; however there is no standard for the use of screen time. Some clinicians favor screen time, saying it is a form of cognitive rest and one of the few options for pediatric concussion sufferers to keep themselves occupied; others strongly caution against the use of screen time arguing it prolongs the recovery. There are no randomized controlled trials looking at this question. This study will prospectively examine the effect of screen time on recovery from concussion. It will prospectively recruit patients aged 12 to 25 presenting to the pediatric emergency department with head injury and randomize them to allow for screen time as tolerated or completely abstain from screen time. Patients (or parents) will fill out an initial survey regarding mechanism of head injury, medical and demographic information, and current symptoms. Follow up emails and/or phone calls assessing amount of screen time and post-concussive symptom scores (PCSS) will occur daily for at least one week and until 14 days if symptoms have not resolved. The primary outcome is time to recovery from concussion defined as a PCSS score of 0. Secondary outcomes include time to return to school, time to return to sports, assessment of specific symptoms, and presence of symptoms with screen time. Data will be analyzed as an intention-to-treat analysis. Subgroups will be analyzed including: different ages, mechanisms for concussion (i.e. presumed occipital strike), and those with multiple concussions.

This project is part of the Junior Faculty Development Research program and Kavita Babu, MD in the emergency department is serving as a mentor for the primary investigator.

Students Role:
During a mutually agreed upon shift on weekdays, the student will be in the pediatric emergency department actively recruiting and consenting patients who present for closed head injury. The student will assist patients or parents in completing the initial survey. Also, while in the emergency department the student will perform follow up phone calls for patients already enrolled in the study who have not completed their daily online survey. The student will also begin to write the abstract and poster for submission to the Pediatric Academic Society (PAS) meeting in 2019 (abstract due November 2018). The long term goal of this project is a manuscript for publication in a medical journal. The student can expect to be credited as a middle author if they participate in the above expectations.

In addition to learning about all aspects of research including project design, recruitment, survey tools, data analysis, data presentation and manuscript writing, the student will have the experience of becoming immersed in the world of pediatric emergency medicine and have opportunity to shadow and learn from other patients who are not eligible for the study.

Required skills:
N/A

Location:
Pediatric Emergency Department, University Campus

Project 9

A qualitative study to identify the strategies that enable hospitals to achieve low risk-adjusted hospital mortality rates for hospitalized heart failure patients

PI: Tara Lagu, MD MPH, Research Scientist, Institute for Healthcare Delivery and Population Science Associate Professor, University of Massachusetts Medical School-Baystate, Department of Institute for Healthcare Delivery and Population Science and Department of Medicine

Interview required – submit via email - CV with current contact information for an interview (tara.lagu@baystatehealth.org)

Description:
This is part of the K01 award project for Tara Lagu, MD, MPH. In a prior study, we developed and validated a heart failure (HF) mortality prediction model using data from the Premier data warehouse (PDW) which contains detailed billing data for more than 300 US hospitals. We defined variables relevant to HF patients and examined the association between risk factors and mortality in a cohort of critically ill patients with HF. We found that patient demographics, comorbidities, initial medications and therapies, and diagnostic tests administered in the first 2 hospital days were all associated with mortality. Using these variables, we then validated the multivariable prediction model for HF patients in the HealthFacts database. Our c statistic was 0.79 in the development cohort and 0.70 in the HealthFacts validation cohort, indicating excellent performance. This has allowed us to identify hospitals that are "high performers"-those with low risk-adjusted mortality rates for HF patients. In the current project, a continuation of the K award project, we plan to conduct a qualitative study examining the organizational characteristics and practices of these high performing hospitals.

Student's role:
Qualitative interviews (potentially); qualitative coding

Required Skills:
N/A

Location:
3601 Main Street, 3rd Floor, Springfield, MA 01199
Potential to do some work from home

Project 10

Identifying barriers to early diagnosis of esophageal cancer

PI: Katie S. Nason, MD MPH, Department of Surgery, Division of Thoracic

Interview required – submit via email - CV with current contact information for an interview katie.nasonMD@baystatehealth.org

Description:
Screening efforts for esophageal adenocarcinoma (EAC) focus on patients with acid and bile reflux-induced Barrett's esophagus (BE), an endoscopically visible premalignant condition that predicts a significantly increased risk of EAC. Patients with Stage 1 EAC have an estimated 5-year survival of 70%, but survival declines precipitously with nodal and distant disease. EAC, therefore, is a cancer for which screening has tremendous opportunity to reduce overall mortality. Unfortunately, most patients present with advanced disease without ever having been screened, despite published guidelines for endoscopic screening and the population at risk for EAC remains poorly defined. Potential barriers include self-medication, a lack of health insurance or reliable transportation, patient and/or provider knowledge deficits about the association between GERD and EAC, lack of symptom severity and the widespread availability of anti-reflux medications. Another potential explanation stems from the fact that patients with mild symptoms and those who perceived themselves to be in control of their symptoms, such as through the use of antacids, do not seek medical attention. As such, identifying barriers to the detection of curable esophageal adenocarcinoma remains a significant challenge and requires the further exploration of patient and socioeconomic barriers.
Over the past 4 years, I have interviewed ~190 patients with newly diagnosed EAC using a quantitative questionnaire exploring lifetime symptom histories, healthcare system interactions, and attitudes towards their own health and the health care system in general. I also interviewed age, sex, and race-matched population controls to identify differences in these characteristics to target for intervention. Comparisons between the esophageal cancer cases and the population controls with regard to their attitudes and interactions with healthcare system are ready for data analysis.

Student's role:
The medical student would be paired with myself and a biostatistician to learn how to write code and performed the statistical analysis of the data from the quantitative interview study. The specific focus would be tailored to the students' interest with several topics available including attitudes towards health care, access to healthcare, and patient physician interactions. The student would also shadow me in the operating room to observe esophageal cancer surgery and in my esophageal clinic. Finally, the student would be taught chart review, data abstraction and database management.

Required Skills:
The student should have familiarity with basic computer skills, including use of word, excel, etc. We will teach the student how to use the statistical program, Stata. The student should be very motivated to learn study design and statistical analysis and be eager to participate in an intensive study of complex to physical techniques.

Location:
UMASS-Baystate Medical School – 3601 Main St., 3rd Floor Rm 322

Project 11

Transforming Clinical Practices: Challenges, Lessons Learned, and Early Findings

PI: Ronald Adler, MD, Associate Professor, Department of Family Medicine and Community Health

Interview required – submit via email - CV and 3-4 line statement of interest with current contact information for an interview (Ronald.adler@umassmemorial.org)

Description:
As part of the Transforming Clinical Practices Initiative (TCPI), the Southern New England Practice Transformation Network (SNEPTN) has recruited and engaged > 5500 clinicians across a wide variety of clinical disciplines; participants are working in all 50 states. The program is designed to prepare clinicians to succeed under value-based payment programs. We use a variety of quality improvement techniques and strategies to help practices evolve to more efficiently provide high-value care. We are currently at the midpoint of this four-year project.

Due to resource constraints, geographic factors, practice inertia, and competing interests in busy practices, progress has been slower than we had hoped. Nevertheless, we have built a diverse network of clinicians, many of whom have already made substantial improvements. To learn from our experience in the hope of informing our own activities for the balance of the project and to advise other organizations that may engage in similar efforts, we plan to:
- Describe activities and interventions thus far.
- Analyze data to identify high performers and low performers and determine factors that may predict relative success or failure. Such factors may include clinical specialty, specific practice characteristics (e.g., size, leadership structure, affiliations and ownership, etc.), QI interventions, time since recruitment, and others.
- Write a summary of preliminary findings.

Student's Role:
- Attend regular meetings.
- Literature review.
- Work with team members on data analysis.
- Work with team members to describe findings in writing.

Required Skills:
- Interest in topic!
- Literature review.
- Facility with Excel.
- Ability to work independently.

Location:
333 South Street, Shrewsbury, MA 01545

Project 12

Biological Control of Intestinal Parasites

PI: Raffi Aroian, PhD., Professor, Department of Molecular Medicine

Interview required – please contact PI at 508-856-8169 or raffi.aroian@umassmed.edu

Description:
Student will screen soil bacteria that provide biological control of intestinal parasitic roundworms.

Student's Role:
Isolate and identification of bacterial from soil; screening against parasitic roundworms for anti-worm activity

Required Skills:
Microbiology; general laboratory skills

Location:
Biotech 2

Project 13

Determinants of Hearing Outcomes Following Cochlear Implantation

PI: Aaron Rememschneider, MD MPH, Assistant Professor, Department of Otolaryngology

Description:
      The Otology Division, within the Department of Otolaryngology, along with the Department of Audiology at UMass Memorial Medical Center (UMMMC), via the Hearing Implant Program, provide hearing diagnostic and rehabilitative services to a large population of patients from central Massachusetts and beyond. Due to our large catchment area, we have one of the largest Cochlear Implant (CI) centers in the state. Patients have undergone implantation with both straight and pre-curved electrodes, allowing an outcomes comparison of patients receiving each electrode subtype. Most clinical studies of CI outcomes have been performed at large, urban, academic institutions, which may limit external validity of results. The population of patients at UMMMC consists of a unique combination of patients from urban, suburban, and rural settings with a range of socioeconomic statuses. **The UMASS Hearing Implant Program thus offers the unique opportunity to study both implant and patient factors that likely influence outcomes following surgery for hearing loss.** Subpopulations within our cohort will permit effective study of the effect of CI device type and social factors that influence hearing outcomes and quality of life. In order to accomplish these goals we have assembled a multi-disciplinary team of otologists, audiologists, and radiologists to fulfill the following aims:
AIM 1: Examine the effect of novel pre-curved electrode models on post-operative hearing outcomes in CI patients.
AIM 2: Determine how socioeconomic status and social support influences access to CI and affects post-surgical hearing outcomes.

Students Role:
The student will be involved with data acquisition (through audiology and ENT by observing in clinical sessions) and will then incorporation of this data into our established REDCap database. The student will then assist the PI and our senior research student, Danielle Trakimas MS in analyzing the data to fulfill AIMS 1 and 2 of our research project.

For AIM 1, the student will use the patient database to identify patients who have received straight and precurved electrodes developed by the Cochlear® corporation. Additional inclusion criteria will be: 1) Age 16 or older, 2) Available pre and postoperative implant audiometry, 3) English, non-English speaking and nonverbal patients, and 4) Pregnant and non-pregnant women. Exclusion criteria will be: 1) Prelingually deafened patients and 2) Developmental delay or intellectual disability. These factors are known to affect post-implantation word recognition. As such, this will result in two study groups:
1) Patients implanted with CI422 or CI522 electrodes (straight)
2) Patients implanted with CI532 electrodes (precurved)

Data Analysis:
The primary outcome measure will be the changes in longitudinal audiometric scores (AZ-Bio test in quiet) between patients' immediate preoperative values and their performance at 1 year post-operatively. Secondary outcome measures will include functional gain, as well as word and sentence recognition scores using additional audiometric evaluations (CNC, NU-6 scores). Additional outcome measures will include patient reports of hearing quality of life as measured using the hearing handicap inventory. Complications from surgery including perioperative and late problems will be assessed. We will quantify hearing gains for both straight and pre-curved CI groups and perform multivariate regression analysis to understand if additional equipment variables impact hearing outcomes. The calculated power to detect a 10% difference in mean AZ-Bio scores between study

groups with a two-sided, unpaired Student's t-test with 37 patients per group is greater than 80%. This analysis is based on our own pilot data and assumes a standard deviation of 15% for mean scores of both study groups and a 5% alpha threshold. At UMASS Hearing Implant Center, we routinely perform 40-50 implants per year. With retrospective data included, we anticipate adequate numbers of patients to sufficiently power this study. We have already established collaborations with the UMMMC Quantitative Methods and Data Informatics Cores to perform statistical analysis and accurate data collection.

For AIM 2: We hypothesize that patients with low socioeconomic status have significantly fewer hours of cochlear implant usage and decreased audiometric benefits, when compared to patients with high socioeconomic status. The student will use our database to identify a large population of patients who have undergone unilateral CI. Cases will include available preoperative and postoperative audiometry, race, ethnicity and primary address ZIP code.

Individuals seen and treated at UMASS medical center comprise a unique subset of patients from across the income and social strata. Patients who have received an implant can be grouped into 'low' income and 'high' income brackets. Effects from electrode type will be controlled by matching implant electrodes between groups. We will not exclude patients based on primary mode of communication, developmental status, medical history, or timing or etiology of hearing loss, as we will also investigate the effect of these factors. Within this subgroup of patients we will determine socioeconomic status by comparing ZIP codes of patients with economic information available in the most recent U.S. census report (https://www.census.gov/2010census/data/). This information will allow us to further subdivide patients to investigate the effect of socioeconomic status on CI outcomes. We have performed a preliminary analysis of socioeconomic status of adult and pediatric CI patients at UMMMC based on types of health insurance. **Figure 5** shows that health care coverage of pediatric and adult CI patients at UMMMC is evenly distributed between private and government-funded sources, supporting that a range of socioeconomic statuses exist within our patient population and permitting a robust analysis.

Data Analysis:
The primary outcome for **AIM 2** will be the difference between post-operative changes in AZ-Bio in quiet scores in patients from low and high socioeconomic status. Secondary outcomes measures include pure tone audiometry and word and sentence recognition scores. Additional recorded variables will include subjective patient reports of hearing, complications from surgery, and reported duration of use of the CI. We will also compare surgical, radiologic, medical and other social factors between the study subgroups to determine if these factors 1) have disproportionate effects on measured outcomes and 2) have greater effects within certain socioeconomic brackets. Power analysis was performed with assumptions outlined in AIM 1 and estimates greater than 80% power to detect a 10% difference in Az-Bio scores between groups with 37 patients per group. We have already established collaborations with the UMMMC Quantitative Methods and Data Informatics Cores to perform statistical analysis and accurate data collection.

Required Skills:
A background in statistics and epidemiology are important for outcomes research with multivariate analysis. An enthusiasm for working with patients with hearing loss and understanding how preoperative and intraoperative variables affect implant outcomes is also essential.

Location:
University campus – we have space in our ENT and audiology clinic for data acquisition and analysis.

Project 14

Open Notes in COPD: A study of the effects of inviting patients with COPD to read their clinic notes

PI: Kimberly A. Fischer, MD, MSc, Assistant Professor of Medicine, Division of Pulmonary, Allergy, and Critical Care Medicine

Description:
Chronic obstructive pulmonary disease (COPD) is a chronic illness that affects more than 15 million people in the United States. As with other chronic illnesses, there is increasing recognition of the importance of patient activation and self-management in COPD. Patient behaviors such as smoking cessation, taking medications as directed, and receiving vaccinations can have a significant impact on the course of COPD. However, little is known about how to effectively promote patient activation and engagement, and increase healthy behaviors in COPD.

Sharing physician notes with patients may increase patient activation and engagement in the management of chronic illnesses, including COPD. Patients who have been invited to review their doctor's notes through the OpenNotes project, report beneficial effects in many domains of patient activation. OpenNotes is therefore a promising tool for partnering with patients to manage COPD, and other chronic illnesses. However, to most effectively realize the potential of OpenNotes, a greater understanding of how patients process and use the information in provider notes is required. Additionally, the impact of OpenNotes on patient activation needs further characterization.

The overall goal of this project is to define the elements of provider notes that have a positive impact on patient activation and engagement in COPD self-management behaviors. This will be achieved through in-depth "think-aloud" interviews with patients with COPD who have been invited to read their clinic visit note or discharge summary. Additionally, patients with COPD who have been invited to read their doctor's notes will be longitudinally surveyed to assess the impact on patient activation, among other outcomes.

The project will define the elements of provider notes that have a beneficial impact on patient activation and engagement in COPD self-management behaviors. This will result in empirically derived recommendations to make sharing notes with patients as effective and useful to patients as possible.

Student's Role:
The primary role of the student will be to assist with all aspects of the cognitive or "think aloud" interviews with patients. This will include with recruiting patients, conducting interviews (following a training period), and coding the interviews. As a member of the multidisciplinary coding team, the medical student will have an integral role in developing the coding framework and the subsequent coding of participant interviews. It is expected that these activities will eventually lead to a manuscript providing the student with authorship opportunities, although this is not expected to come to fruition during the time course of the internship.
In addition to their main role in the qualitative aspects of this project, the student would also have opportunities to learn about survey research through the survey component of this project. This would entail assisting with recruitment and enrollment of participants, determination of response rates, survey data entry, and discussion of planned analysis. The student's participation in these activities would be the minimum amount necessary for them to gain exposure to survey research methodology without them being expected to devote significant time to such activities as data entry.
The principal investigator and student will jointly develop goals and a timeline for accomplishing discrete tasks at the outset of this project. They will meet weekly one-on-one to discuss progress and barriers to

accomplishing these goals, and to discuss research related topics. The student will also be expected to participate in weekly research team meetings which will include the principal investigator, co-investigators, a research assistant, and the medical student.

Required skills

There are no specific skills that are required. However, an interest in patient-centered communication and strong communication skills would enhance the student's contributions to this project.

Location:

University Campus, and at the Meyers Primary Care Institute which has offices at Biotech 1, and at 385 Grove St., in Worcester, MA.

Project 15

Therapeutic Management and Neurobehavioral Outcomes of Neonatal Abstinence Syndrome

PI: Elisabeth B. Salisbury, PhD, Department of Pediatrics

Interview required – please contact PI at 508-334-8627 or Elisabeth.Salisbury@umassmed.edu

Description:
Newborns exposed to opioids during pregnancy often present with a variety of withdrawal symptoms and dysregulated behaviors referred to as Neonatal Abstinence Syndrome. Although non-pharmacological strategies are used to treat withdrawing infants, most often infants require medication (including opioids) to manage withdrawal. Our lab is currently funded by NIH NIDA to study an innovative non-pharmacological intervention complementary to standard of care for treating opioid-exposed newborns. This is a randomized clinical trial that tests a novel non-pharmacological intervention for treating withdrawal in opioid-exposed newborns (clinicaltrials.gov NCT02801331). We are testing whether a specially-constructed crib mattress (non-commercialized) that delivers uniquely-defined gentle vibrations reduces withdrawal and improves clinical and neurodevelopmental outcomes in this vulnerable population.

Student's Role:
Student will receive general supervision from PI as well as direct supervision from lab members who are responsible for carrying out all aspects of our IRB approved, multidisciplinary research studies on opioid-exposed newborns. Our studies are conducted in the Newborn Nursery (NN) and Neonatal Intensive Care Unit (NICU) at UMass Memorial Hospital at UMass Memorial, and in the OB-GYN clinics. Student will be trained and gain experience in all aspects of bedside clinical research, including identifying candidates and obtaining informed consent, reviewing medical records, conducting studies at the infant's bedside including computerized data acquisition and physiological recording, conducting telephone interviews, compiling data and maintaining spreadsheets and research documents. The student will interact closely with the medical care team of study participants, participating families and members of the research team, and collaborate with investigators in the dual-site NIH funded project.

Required Skills:
Must complete the CITI training and receive CITI certification (Human Subjects Research). Must have proficiency in Office (Word, Excel, Power Point), willing to train and learn computer-based data acquisition and database systems, and willing to assist in all aspects of research including interacting with families, medical care team, research staff, and assist with phone interviews, medical record review, data acquisition, spreadsheets and research documents. Must be able to work independently and in group settings.

Location:
UMass Memorial - 119 Belmont Street: NICU and Newborn Nursery

Project 16

Molecular mechanisms regulating skeletal muscle differentiation

PI: Anthony Imbalzano, Professor and Associate Dean, Department of Biochemistry and Molecular Pharmacology

Description:
This project is part of the lab's effort to characterize the role of ATP-dependent chromatin remodeling enzymes and associated transcriptional machinery in the activation of skeletal myogenesis. This is basic science research aimed at understanding how tissue-specific gene expression is initiated during organismal development. The emphasis will be on delineating signaling pathways involving different protein kinases that phosphorylate chromatin remodeling enzymes as part of the mechanisms by which skeletal muscle differentiation is activated/blocked. We will use primary cells and immortalized cell lines grown in culture as model systems, and the experimental approach will include molecular biology and cell biology techniques such as SDS-PAGE, quantitative real time-PCR, molecular cloning, immunoprecipitation, chromatin immunoprecipitation, immunofluorescence, etc. See DOI: 10.1038/ncomms8441 and DOI: 10.1074/jbc.M117.799676 for recent publications.

Student's Role:
The engaged student will have an independent research project to characterize the molecular mechanisms by which specific kinases and/or phosphatases function in the context of cell differentiation using skeletal muscle differentiation as a model system. The student will work closely with an established postdoctoral fellow who is working on related issues in a collegial laboratory environment.

Required Skills:
Basic understanding of molecular and cell biology and interest cell signaling.

Location:
LRB 8th floor laboratories (870G-H)

Project 17

Patient as Teacher: Using Patient Videos to Prompt Advance Care Planning Discussions by Clinicians

PI: Jennifer Tjia, MD, MSCE, Department of Quantitative Health Science

Interview required – submit via email – CV with current contact information for interview jennifer.tjia@umassmed.edu

Description:
Advance care planning (ACP) is widely recognized as important for patients and families to prepare for current and future decisions about their medical treatment, particularly near the end of life. ACP allows for the greater likelihood of patient-centered health care delivery. It is unclear whether we can improve the likelihood that clinicians will initiate ACP discussions with seriously ill patients if we show clinicians videos of patients who speak about the importance of ACP in their lives. Our research group currently has video recordings of interviews with 18 patients with advanced cancer who speak about their illness and the importance of ACP. We are editing these videos to create teaching tools for clinicians, trainees and health professional students. This is an opportunity for a student interested in serious illness, ACP, oncology, hospice or end-of-life to use qualitative analysis to code interviews, create educational videos, and pilot test receptivity of the videos with end-users. There may be an opportunity to contribute to a manuscript based on the project. Depending on level of interest, the participating medical student may also have the opportunity to engage in other closely related research projects related to hospice and caregiver stress management that are at different research stages.

Student's role:
Qualitative analysis of video interviews, transcribing interviews, designing new videos, follow-up interviews with clinicians, literature search, manuscript writing.

Required skills:
- Human Subjects CITI training,
- Attention to detail
- Desire to learn NVivo (qualitative analysis software)

Location:
Albert Sherman Building/QHS

Project 18

Potentially spurious findings on PET/CT examination of patients presenting with non-small cell lung cancer and those undergoing PET/CT evaluation after stereotactic body radiation for clinical stage I non-small cell lung cancer.

PI: Lacey McIntosdh, DO, Assistant Professor of Radiology, Department of Radiation Oncology and John M. Varlotto, MD, Professor of Radiation Oncology, Department of Radiation Oncology

Interview required – submit via email – CV with current contact information for interview John.varlotto@umassmemorial.org

Description:
The project will be a retrospective review of lung cancer patients and will consist of two parts, with part b as a subset of part a.
A. Investigation of FDG uptake on PET/CT in sites not usually associated with metastases (thyroid, colon, and parotid) and if they represent significant secondary tumors or not in Stages I-III NSCLC.
B. Whether PET/CT can be used to determine failures after stereotactic body radiation for Stage I NSCLC.

Part A - PET/CT has been proven a staging modality for non-small cell lung cancer (1) and has been used to successfully reduce the number of thoracotomies preoperatively(2). However, because of the high sensitivity and low specificity of PET, FDG uptake can be seen in infectious, inflammatory, and other non-neoplastic conditions (3). Because unnecessary biopsies and colonoscopies can increase the price of care significantly, this study will assess whether uptake in these commonly FDG avid, but unlikely sites of metastases are of concern in Stages I-III Lung cancer. Endpoints of the study will include biopsy confirmation and/or lesion progression (or lack of) within 2 years of lung cancer presentation.

Student's role:
The student will learn how to conduct retrospective research via chart reviews, data accrual, and data analysis. The patient will also become acquainted with radiologic abnormalities on ct scans, pet scans, and other related imaging.

Required skills:
We will require a diligent student who is interested in clinical research. We would prefer a student with statistical skills, but these skills are not necessary for participation.
Part B - Stereotactic Body Radiation has been used to definitively treat medically-inoperable Stage I non-small cell lung cancer. These patients are often not candidates for lung biopsies, and therefore being able to determine local failure after radiation is important, especially because many of these patients are now candidates for immunotherapy in the first-line setting. One study has identified post-radiation SUVs of >5 on follow-up imaging can help distinguish SBRT-induced consolidation for local recurrence (4). Our investigation will assess whether we can validate these results while assessing other patient, tumor, radiologic and treatment characteristics.

Location:
The research will be conducted on any computer with Epic electronic medical record system(EMR).

Project 19

Withdrawal of Thyroxine in Children with suspected Mild and Transient forms of Congenital Hypothyroidism

PI: Ksenia Tonyushkina, MD, Department of Pediatrics

Interview required – submit via email – CV or 3-4 line statement of interest with current contact information for an interview Ksenia.Tonyushkina@baystatehealth.org

Description:
Children with congenital hypothyroidism are started on treatment immediately after diagnosis in order to prevent mental retardation. According to AAP recommendations, medication should be discontinued at age 3 years and TSH measured 1 month later to determine whether the condition is permanent or transient. There are no specific guidelines for normal TSH and T4 levels following discontinuation. Study by Aguiar et al, (J Pediatr, 2016) performed in our clinic showed that at least 41% of infants with suspected mild and transient forms of congenital hypothyroidism (CH) do not require life-long therapy. At the time of the data analysis about one third of individuals in the study cohort were under 3 years of age, but by now all of them have reached the age allowing for a safe trial off of thyroxine supplementation. The objective of this new proposed study is to retrospectively collect additional data on the subset of individuals who were previously identified as "trial off levoxyl was not attempted" and re-analyze predictors of transience vs. permanence of congenital hypothyroidism in this group as well as describe the clinical practices for thyroxine withdrawal and patterns of thyroid system responses to thyroxine withdrawal.

Student's Role:
data extraction from the medical records, data analysis/presentation, literature search/review, potentially manuscript authorship.

Required Skills:
Will teach

Location:
50 Wason Avenue, Springfield, MA

Project 20

Confronting the Opioid Crisis in Central Massachusetts: An Initiative to Increase Adherence to Opioid Prescribing Guidelines in Primary Care

PI: Phoebe Cushman, MD, MS, Assistant Professor, Department of Medicine

Interview required – submit via email – CV with current contact information for interview
Phoebe.Cushman@umassmemorial.org

Description:
Background: Benedict Primary Care Internal Medicine is the university-based outpatient Internal Medicine site, home to 22,500 patients cared for by 36 PCPs and 35 Internal Medicine residents. Our population includes 321 patients with chronic pain who received 2321 opioid prescriptions from April to September 2017.[1] Chart audits demonstrate lack of systematic attention to opioid prescribing guidelines.

Intervention: We will apply Lean Methodology[2] to develop and implement a safe opioid prescribing protocol within the clinic, with the ultimate goal of collaborating with other departments to spread best practices throughout the health system.

Our multi-component intervention is based on the TOPCARE (Transforming Opioid Prescribing in Primary Care) protocol, but adapted to fit the needs of UMass:[3,4]

1) Electronic registry of patients who take long-term opioids for chronic pain ("chronic pain patients")
2) Real-time management of registry to ensure
   - Controlled substance agreements signed for all patients
   - Appropriate follow-up intervals occur for patient visits ($\leq$ q3 months)
   - Regular urine toxicology screen collection, interpretation, and follow-up
   - Pill counts as needed
   - Regular Prescription Monitoring Program checks
   - Behavioral health and other interdisciplinary referrals as needed
3) 1-on-1 "academic detailing" sessions between Dr. Cushman and PCPs to teach them the protocol
4) Dr. Cushman to conduct clinic visits with chronic pain patients found to be raising "red flags" in their behavior

Outcomes:
   I)   **Patient safety domain**

   Primary
   1) % patients with signed controlled substance agreements
   2) % patients with $\geq$1 completed urine toxicology screens
   3) Average number of days between patient visits (goal $\leq$3 months)

   Secondary
   4) % patients co-prescribed benzodiazepines (increases risk of unintentional overdose)
   5) % patients on high dose opioids (>100 mg morphine equivalents)
   6) Change in opioid dose per patient
   7) % patients referred for interdisciplinary care (e.g. Behavioral Health, Spine Clinic, Acupuncture)

   II)   **Physician satisfaction domain**

We will collect quantitative and qualitative data from PCPs regarding satisfaction with systems implemented, access, flow, and support services for chronic pain patients.

III)   Patient satisfaction domain

We will use i-Pads to obtain rapid feedback from patients about their satisfaction with care related to their chronic pain.

Student's Role:
This is a clinical research/quality improvement. The student will be involved in all aspects of research design, implementation, data collection (both quantitative and qualitative), and data analysis. There will be opportunities throughout the summer to participate in clinical work related to the project (e.g. shadow Dr. Cushman during pain consults with patients). There will also be possible opportunities for authorship on publications related to this project.

Required Skills:
No specific background is required. The student will be working closely with Dr. Cushman, who has a MS in Health Services Research (BU SPH) and extensive experience in safe opioid prescribing and addiction. Our project is best be suited to someone who has interest in opioids, chronic pain, addiction, quality improvement, and/or medical informatics.

Location:
Benedict Building, UMass Memorial, University Campus

Project 21

Growth trajectories in premature infants post-NICU discharge; Implications for caloric supplementation guidelines

PI: Lawrence Rhein, MD, MPH, Associate Professor, Department of Neonatology

Description:
Up to 40% of former premature infants develop growth failure (weight < 10%ile) at time of NICU discharge. Infants often are discharged on enhanced caloric supplementation. Optimal timing to discontinue supplementation remains unknown.

Student's Role:
The student will learn how to create a database, and the nextract primary nutritional and growth information from a cohort of premature infants. Patterns of timing of discontinuation of caloric supplementation will be mapped and correlated with growth parameters to form new guidelines for implementation.

Required Skills:
N/A

Location:
Memorial Campus, NICU