Scholarly Opportunities Guide

2017
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* Serving as a Co-Mentor
2017 Calendar

Application Timeline

Overview of Summer Opportunities Meeting ................................................................. 11/21/16

*Scholarly Opportunities Guide* Available Online ......................................................... 12/16/16

Introduction to the Pritzker Summer Research Program (SRP) Meeting ................................. 1/12/17

Link to Online Application Sent to Students .................................................................... 1/12/17

Deadline to Meet with Mentor ...................................................................................... 2/02/17

Online Application Due ................................................................................................. 2/16/17

“Intent to Participate” Form Due to BSLC 104 (This form needs both student and mentor signatures) ......................................................................................................................... 2/16/17

Notification of Acceptance in Summer Research Program ................................................. 3/10/17

Spring Quarter SRP Elective Begins ............................................................................... 3/27/17

Summer Research Program Schedule

Summer Research Program Begins ................................................................................ 6/12/17

Research Seminar #1: Introduction to Research............................................................ TBD

Research Seminar #2: Preparing your Written Report ................................................ 6/14/17

Stipend Check #1 *(References, Hypothesis and Introduction must be uploaded and validated on SRP website prior to check release)* ........................................................................ 7/03/17

Research Seminar #3: Preparing your Final Presentation ........................................... 7/24/17

Written Report of Summer Experience Due ................................................................ 8/18/17

Research Forum–Day 1 .................................................................................................. 8/23/17

Research Forum–Day 2 .................................................................................................. 8/24/17

Closing Celebration & Award Presentation .................................................................... 8/25/17

Stipend Check #2 *(All information must be uploaded and validated on the SRP website prior to check release)* ................................................................. 8/25/17

Summer Research Program Website

The main hub of the Summer Research Program is the web application. This is where student progress will be tracked, for both research and logistical purposes.
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For Questions about the Scholarship & Discovery component of the Pritzker curriculum, please contact:

scholarshipanddiscovery@bsd.uchicago.edu
Fact Sheet

The Summer Research Program is an eleven week program beginning on June 12, 2017 and ending August 25, 2017. Please note that the program begins one week before the start of the Summer Quarter.

The Summer Research Program Steering Committee, consisting of both basic and clinical science faculty members, meets periodically throughout the program to discuss the progress of the students and any additional issues that may arise.

The Summer Research Program has four major funding sources: the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK); the Minority Summer Research Grant from the National Heart, Lung, and Blood Institute (NHLBI); the National Institute on Aging (NIA); and the Pritzker School of Medicine.

Students meet weekly in Cluster Groups. Cluster Group faculty leaders have a structured set of experiences that they are asked to complete over the tenure of the program, including discussion of the research progress of each student and the opportunity to present the work in a small group prior to the Summer Research Forum.

Cluster Group attendance is mandatory, since these meetings are an integral part of the Summer Research Program. More than two unexcused absences will be viewed as relinquishing participation in the Summer Research Program.

Four full group research seminars have been planned. The first seminar focuses on scientific integrity. The second is designed to introduce students to research and the process of experimentation. The third seminar is to prepare students on how to present their research. The final seminar occurs at the Closing Ceremony where prizes and awards are given. These seminars are required—the dates can be found on the 2017 calendar (and may be subject to change).

Application materials will be available to students on January 12, 2017 following the "MS1 Introduction to the Summer Research Program" meeting. The application is to be submitted online by February 16, 2017.

Applications will be reviewed competitively for appropriateness. Emphasis will be placed on funding feasible research projects in which the student applicants have an opportunity to test a well-defined hypothesis.

Students are required to participate in a research elective during Spring Quarter for 50 units to meet a one week requirement of the twelve week program, since short term training grants permit funding for a minimum of three months.

Notification of selection is before Spring Break.

Approximately one week (See 2017 Calendar) before the end of the program, each student is required to submit a paper discussing their research, and outlining their research procedures and findings.

All students funded through this program are required to present their research at the Summer Research Forum, held the last two days of the eleven weeks. Each student will give a seven minute presentation, followed by a two minute question and answer session. Students are graded by judges from both the clinical and basic sciences. A total of six awards, in the amount of $150 each, are given to students: three for basic science and three for clinical science. An award was introduced in 1998 for the best overall presentation—the Dr. Joseph Kirsner Award of $200. And finally, in 2004, the Sigma Xi Award in the amount of $150 was introduced to recognize a project that may have an impact on society.

Depending on funds available, funding source, and time students allocate, stipends range from $4,000 to $5,500. Students whose research projects qualify for NIH funding will receive the maximum funding. Payments are made in two increments over the eleven week summer period. Prior to receiving the first stipend check (mid-July), students must submit their research references, hypothesis and introduction on the SRP website, and receive mentor validation. The final stipend payment is distributed at the end of the program after the student’s work is submitted and validated by mentor on the SRP website.

Research mentors are required to provide a small contribution of $400 in non-federal funds in order to extend the total program budget to fund all rigorous projects.

Students funded by the NIDDK and the NHLBI are able to offer research mentors an opportunity for a $550 off-set for student research supplies.
The objective of the Summer Research Program is to provide rising second year medical students exposure to medical research which animates and excites the student concerning the scientific basis of medicine.

Students should carefully select a mentor who has the time and willingness to commit to discussion/direction for the project.

Students should inquire about the scope of the project, persons available as resources (technicians, post-docs), and the size of the lab. It is critical to have a discussion with the mentor as to the feasibility of completing the work in eleven weeks. The complexity of the research set-up, availability of all apparatuses that are required, the expectations of the mentor, idea of time commitment per week and the mentor’s goals versus the student’s goals for the experience should be ascertained.

Student and mentor should meet early and at least weekly to set and review goals and expectations for the Summer Research Program, which would include:

- Establishing close working relationships on a day-to-day basis for problem-solving and trouble-shooting the student’s research technology
- Establishing a limited, achievable goal for the project during the eleven week summer program, which provides opportunity for student advancement of knowledge in an area promoting the student’s self interest and ownership of their project
- Enabling the student to acquire familiarity and expertise in utilizing one or more research techniques relevant to the mentor’s program and the student’s project
- Facilitating the student’s participation in regular laboratory meetings, journal clubs or other research team activities, which enhances the student’s scientific communication and awareness of how their research activity interacts with other laboratory or group activities
- Required participation in cluster group discussions with a research team leader and students with similar interests
- Learning how to write up research in the form of a scientific report

- Bringing the research to a productive close with a student/mentor review of data at the end of the eleven weeks, and work with student to prepare his/her research paper for final submittal prior to the presentation for the Summer Research Forum on either August 24 or 25, 2016*; and discussing the integration of research training and subsequent medical training in developing a career progressing toward the goal of becoming a clinician-scientist.

* Students are expected to attend all sessions and will be asked to peer review presentations of colleagues as part of their educational experiences.
Research Mentor/Cluster Groups Guidelines

Role of the Research Mentor

In order to ensure a better understanding of the expectation of the research mentor's role, see the following:

- The student's project should be of a reasonable scope to ensure the likelihood that, within eleven weeks, the student will be able to describe results in the required presentation at the Summer Research Forum, and, where possible, obtain publishable results.
- The student should not be assigned as a research technician to accomplish someone else’s project in the lab.
- The lab mentor needs to invest sufficient time in the student, including weekly conferences to discuss results and, where necessary, help to focus (or refocus) the direction of the project.
- The student and the research mentor should discuss the written report that is to be provided to the Pritzker School of Medicine at the close of the program.
- During the last week of the program the research mentor should discuss with the student how the information should be presented in the Summer Research Forum, including a practice presentation to the mentor and members of the lab.
- The research mentor should be available to attend their student's presentation at the Summer Research Forum to provide any necessary feedback to the judges or others in attendance.
- The research mentor is primarily responsible for validating the student's online assignments. This is important in order for students to receive their stipend.
- Research mentors are required to provide a small contribution of $400 in non-federal funds in order to extend the total program budget to fund all rigorous projects.

Cluster Group Guidelines

For Cluster Group Leaders and Students:

- Cluster Group Leaders will begin to meet with students the first week of the Summer Research Program to outline the goals of the Group, and will meet each week thereafter until the conclusion of the program.
- Each Cluster Group will identify one Student Liaison to facilitate communication with their Cluster Group Leader throughout the program.
- It is imperative that students assigned to that Cluster Group attend as one of the professional activities of the program and actively participate with faculty leaders who are volunteering their time during the summer.
- The normal structure of these group sessions is for students to present their project hypothesis, research methodologies, progress and problems. Suggestions, guidance, and critiquing are all part of the exchange between students and the Cluster Group Leader.
- One of the most important goals of the Cluster Group is to facilitate the writing of the final scientific report.
- Each week students will be required to submit a section of their report to the SRP website (srp.uchicago.edu). Part of each Cluster Group session will be devoted to the essentials of that section of the final scientific report.
- If progress is being impeded for a student for whatever reason, it is appropriate to raise these concerns to the Cluster Group Leader. Should the Cluster Group Leader not be able to resolve the issue, the problem(s) will be remanded to the Summer Research Program Co-Chairs for discussion.
- When feasible, Cluster Group Leaders are encouraged to talk about broader professional development issues (such as how one incorporates research into one’s career goals, and the resulting rewards, difficulties, and sacrifices) as well as consideration of other research opportunities beyond the summer (resources, funding, and mentor availability).
- Cluster Group Leaders may be asked to validate the student’s online assignments if the mentor is unavailable.
Guidelines for Final Report

Scientific reporting is an essential part of any research activity and this preliminary report will be followed up, in many instances, by publication of the project in a peer-reviewed journal. Please work with your research mentor to develop a thoughtful, accurate report which addresses each of the items listed below:

- Introduction
- Methodology
- Results

Frequently Asked Questions

1. Why are certain projects considered part of the “mission”?
   Over 50% of general SRP positions are funded through NIH training grants which are to train students in the NIH mission areas of diabetes, digestive and kidney disease, and aging. A minority training grant also exists for funding projects related to cardiovascular disease and hematology. The remainder of positions are funded through the Pritzker School of Medicine. Because Pritzker funding is finite, ensuring SRP funding for Pritzker students overall depends on ensuring that at least half of our students work in our mission areas.

2. I looked through the SRP book and have not found a project that I am interested in. What should I do?
   We advise that you review the SRP book and circle any and all projects that you may be interested in. Schedule a meeting with the faculty who very likely will showcase the SRP project and/or other related projects. Many faculty have additional projects that may not be listed in the book. Often times, faculty know of other projects (with them or other faculty) that are IRB approved and may be relevant to your area of interest. If you are still at a loss, contact scholarshipanddiscovery@bsd.uchicago.edu as soon as possible to discuss potential opportunities.

3. I have an idea about a project, how can I find a mentor?
   We strongly encourage that you pursue an ongoing IRB-approved project with a mentor who is invested in that project. Student-initiated research projects for the SRP are unlikely to be approved for several reasons including: 1) lack of IRB approval or delay in project initiation due to seeking IRB approval (IRB approval may take months); 2) lack of a mentor investment in the project. The goal of SRP is to provide you with the skills and experience of conducting research. For those with the desire to conduct a student-initiated project, obtaining a PhD or additional training equivalent with mentorship is appropriate.

4. When should I begin meeting with a research mentor?
   You can meet with a mentor if you find a project you are interested in. You may find it helpful to wait until after the Introduction to the Summer Research Program meeting on January 12th, 2017. You can look at last year's project guide as a starting point for finding mentors. Projects listed in the book indicate faculty interest in mentoring students for research projects and can facilitate finding a project. The book also lists the track record of prior mentors, which is a very good starting point to find a successful project. At the January 12th meeting, you will receive a hard copy of the Scholarly Opportunities Guide containing research projects that BSD faculty have submitted. You will also have the opportunity to interact with experienced mentors from each department who can connect you to other mentors or recommend projects based on your interest. You can view the project guide on the Pritzker website:

   http://pritzker.uchicago.edu/page/summer-research-program
   Click on “2017 Scholarly Opportunities Guide”
5. I emailed a potential mentor last week and have not heard back from him/her? What should I do?

We recommend that you pursue two or three opportunities at the same time. You do not need to wait to hear from one faculty member before investigating other options. **Keep in mind that faculty are busy.** They may be away at a conference, dealing with a major deadline, or trying to keep up with multiple e-mails. **You must factor this into the time it will take to contact your mentor (and set up an appointment).** Many students often get into a bind because they wait until two or three weeks before the deadline to find a mentor, only to panic since the mentor can’t meet with them for a variety of reasons listed above. These applications also tend to be of lower quality since less time and faculty input is invested in them. If you truly cannot coordinate a meeting time with your mentor (or do not hear back at all), we strongly advise that you pursue a different mentor and project. Your mentor should be invested in you and if they are not able to contribute the time to ensure a timely and high quality application for the deadline, it is unlikely that your summer experience will be much different. If you miss the application deadline (as with all research and educational opportunities including medical school), it is unlikely that your application will be considered.

6. I’m interested in going into specialty X (i.e., dermatology, radiology, ENT, orthopedic surgery, etc.). Will doing research help me get into that specialty?

**Please note you are not “closing yourself out of a specialty” through a choice of SRP Project.** Residencies expect you will dabble in research, especially early in your medical education. Moreover, you will have an opportunity to do specialty-specific research in your fourth year when you will ultimately decide what you will go into. While it is important to identify a mentor in your clinical area of interest, these “clinical” mentors may not be suitable research mentors (especially if they are predominantly engaged in clinical work). Smaller, predominantly clinical specialties often may not have numerous research mentors and/or opportunities. In addition, it is important to remember that **high quality research that leads to scholarly work (regardless of field) will enhance your residency application.** It is in your best interest to find a mentor with a demonstrable track record of mentoring students and producing scholarly work (*HINT: The Scholarly Opportunities Guide includes prior mentorship history*). By limiting the clinical specialty of your potential research mentor, you are forgoing opportunities with successful mentors in basic science & clinical research applicable to many types of patient problems and/or specialties (i.e. immunology research relevant for dermatology; cancer biology or ethics relevant for almost any specialty, etc.)

7. I would like to go abroad and do research somewhere else. Can I get funding through SRP?

In general, SRP funding is available for a limited number of global health research opportunities with University of Chicago faculty mentors who have IRB-approved projects that are ongoing. SRP funding is only available for work with University of Chicago faculty members. For those students that are funded through other mechanisms who wish to participate in the SRP forum, applications will be considered. Please refer to the Scholarship & Discovery team inquiry for Innovation funding for further information.

8. I would like to participate in an international health, military or other service-learning opportunity (or have some other personal commitment during the summer). Does this mean that I cannot participate in SRP?

It depends on the degree to which the opportunity or commitment interferes with your required obligations in the program. Many students take advantage of international or service opportunities that occur after SRP ends and before school starts (ideal case). If this is not possible, the SRP application includes an area to describe your schedule conflicts, whether payment is provided for your participation in another activity that overlaps with SRP time, and a plan to overcome the barrier to your participation in SRP. Your potential mentor must also agree to this plan. **Keep in mind that your SRP application (and funding level) will be evaluated for the quality of the research proposed AND the level of conflict with completing the research.** The committee will review each application on a case by case basis. For students with conflicts, SRP reserves the right to adjust funding commensurate with degree of participation.
9. I would like to TA the Human Body Course and also do SRP. Is this allowed?

For students who wish to participate in SRP, we recommend serving as an anatomy TA after the conclusion of SRP in late August to allow for full participation in SRP especially towards the end of the research when the focus is on preparing the final paper and presentation. Rare exceptions may be made for exceptional students who wish to participate fully as an anatomy TA and also in SRP. These decisions are made by SRP Co-Chairs in conjunction with Dr. Callum Ross and are based on their ability to function as an anatomy TA while incurring a full-time obligation of SRP, the quality of the research proposed, the mentor for the project, and the student's ability to carry out the research.

10. When can I begin working on the SRP project?

We recommend waiting until after the Steering Committee has reviewed your application and notified you of your acceptance into the program at the beginning of the Spring Quarter. Research proposals may be rejected or require substantial revision prior to acceptance, therefore it is important that you invest the time necessary to develop a scientifically rigorous proposal with your mentor. Use time during the Winter Quarter to find a mentor and to develop a robust project.

11. I need STATA or statistical support for my project. What should I do?

As a student, you have full access to STATA 13 from your personal device using the remote desktop.

Please also note that if you are using a PC, remote desktop should be automatically installed; if you are a Mac user, you will need to personally install the remote desktop. With questions regarding this process, please contact IT services: itservices@uchicago.edu or 773-702-5800

To access STATA 13 using the remote desktop, please follow the directions below:

1) Click on the Start Menu → Select All Programs → Accessories → Remote Desktop Connection
2) In the Computer field, type: vlab.uchicago.edu. Select Connect.
3) Use your Cnet ID to log in. The Domain should be “adlocal”. Once logged in, select Start.
4) Click on the Start Menu once more and select Programs → Applications → STATA 13
5) Explore and enjoy endless possibilities of data analysis at your fingertips

If you do not have a personal computer or prefer to access STATA remotely from a lab, you can access STATA 13 remotely using the computers in the Crerar library (http://www.lib.uchicago.edu/e/crerar/index.html).

Statistical software, including STATA, is often provided by mentors. Since not all students require STATA and a variety of software programs are used by mentors, we rely on faculty to provide resources that you will need to complete your project. Students who wish to purchase their own copy of software for their laptop can do so through ITS (http://answers.uchicago.edu/page.php?id=20254) or directly through the manufacturer at their own expense.

Also know that biostatistical support is available to faculty mentors through the Biostatistics Clinic and an appointment can be made through the following website (biotime.uchicago.edu/Clinic.aspx). The Biostats Clinic provides free, short-term statistical consultation.

12. How can I make sure that I get a paper out of my SRP project?

A Summer Quarter project in and of itself is unlikely to lead to scholarly work (especially a publication). Students who continue their relationship with their mentor well into their medical school training (i.e. second year, Fentress award during forth year) are more likely to successfully produce scholarly products (posters, abstracts, papers) than those that limit themselves to Summer Quarter exposure. Therefore, we advise not pursuing any project with the expectation that your summer work alone will result in a scholarly product. We do, however, strongly encourage students to work with mentors that have a track record of scholarly work with students. HINT: It's often a good idea to ask students who have worked with a mentor before regarding their success in this area.
FAQs

Frequently Asked Questions about Scholarship & Discovery

13. What will mentors know about Scholarship & Discovery?

Many of the mentors that have listed in the book are experienced mentors who have sponsored students for many years. While we have sent out information to the faculty who listed in the book explaining Scholarship & Discovery, it is very possible that mentors are still learning about the initiative. We advise that you talk to mentors about working with them over the summer first and keep in mind that they may still be learning about Scholarship & Discovery. If any mentors are unclear, you can direct them to our website (scholarshipdiscovery.uchicago.edu) and email (scholarshipanddiscovery@bsd.uchicago.edu) and we can follow up with information. The key for mentors to understand is that they don’t need to “do anything extra” to be your Scholarship & Discovery mentor other than to help you to complete a project.

14. Do I have to do SRP for Scholarship & Discovery? Do I have to use my SRP project for S&D?

Remember summer work is optional – while we anticipate many of you will choose to participate in SRP and use your SRP project for Scholarship & Discovery, it is not required that you do so. We encourage you to choose the best project that matches your broad interests and also take advantage of other opportunities available to Pritzker students in a variety of activities (TA, community service, travel, etc.). Your track choice will be made in the beginning of second year.
Application for 2017

(THE IS AN EXAMPLE OF THE ONLINE APPLICATION)

Instructions

Please work with your mentor in order to complete and submit this online application by Thursday, February 16th. This application includes five sections; Student Information, Mentor Information, Project Information, Oversight* and Certification.

* Please note that your project must have either IRB or IACUC approval at the time it is submitted in order for it to be reviewed and considered for funding.

You will be able to save the electronic form. This will be especially useful in the event that the Steering Committee asks you to revise the information prior to approving your project.

Once you have submitted this application, please complete the Intent to Participate form by reading and signing and having your mentor read and sign. It is available in the Summer Research Program section of the Pritzker Website. The Intent to Participate Form will need to be submitted to Candi Gard in BSLC 104 by February 16th in order for your application to be reviewed.

Student Information

NAME

First .................................................. Last ..................................................

ADDITIONAL INFORMATION

UChicago Email ..................................................

DO YOU ANTICIPATE THAT YOU WILL MISS ANY PART OF THE SUMMER RESEARCH PROGRAM (JUNE 12–AUGUST 25)?

☐ Yes
☐ No

IF YES ABOVE, PLEASE PROVIDE THE DATES THAT YOU WILL BE AWAY:

Start Date .................................................. End Date ..................................................

PLEASE EXPLAIN THE REASON FOR YOUR ABSENCE:

................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................................
Application for 2017

PLEASE INDICATE ANY OF THE PROGRAMS THAT YOU PLAN ON PARTICIPATING IN (CHECK ALL THAT APPLY):
- Anatomy Human Body Peer Educators
- MCA Pipeline Program RA or PE – Peer Educator
- Military
- Peer Educator
- Remedy
- Other
- None of the Above

HOW LIKELY ARE YOU TO USE THIS PROJECT TO FULFILL YOUR SCHOLARSHIP & DISCOVERY REQUIREMENT?
- Not very likely
- Somewhat unlikely
- Not sure
- Somewhat likely
- Very likely

AT THIS TIME, WHAT TRACK ARE YOU INTENDING ON PURSUING?
- Scientific Investigation: Basic Science
- Scientific Investigation: Clinical Science
- Scientific Investigation: Social Science
- Medical Education
- Healthcare Delivery Sciences
- Community Health
- Global Health

ON A SCALE FROM 0-100 (WHERE 100 DENOTES TOTAL CERTAINTY), HOW CERTAIN ARE YOU OF YOUR TRACK CHOICE? PLEASE USE YOUR MOUSE TO MOVE THE SLIDER ALONG THE SCALE.

CERTAINTY SCALE:
0---------------------------------------------------------------100

The next three questions will NOT have any impact on your application. As part of our obligation to the NIH, we periodically will ask you to report on your research experiences. Your participation is imperative to the receipt and renewal of funding from the NIH for programs such as the Summer Research Program, MD/PhD programs, various minority training programs (including pipeline programs for younger students) and other large institutional training grants. This is part of a longitudinal tracking system that includes reassessments at graduation and every five years thereafter. Your responses to these periodic assessments is part of ensuring that Pritzker remains a top academic institution for years to come.

DO YOU INTEND TO PURSUE A CAREER IN ACADEMIC MEDICINE?
- Definitely
- Likely
- Not Likely
- Absolutely Not

HOW EXTENSIVELY DO YOU EXPECT TO BE INVOLVED IN RESEARCH DURING YOUR MEDICAL CAREER?
- Exclusively
- Significantly Involved
- Somewhat Involved
- Involved in a Limited Way
- Not Involved

ARE YOU INTERESTED IN A CAREER THAT RELATES TO ANY OF THE FOLLOWING AREAS:
- Aging/Studies of Older People
- Blood
- Brain/Neurology
- Diabetes
- Ethics
- Gastro/Digestive Diseases
- Heart
- Kidneys
- Nutrition
- None of the Above
# Application for 2017

## Mentor Information

### Mentor Name
First ................................ Last ...........................................................
Mentor Email .................................................................

### Mentor Contact Information
Department .................................................................
Section (If Applicable) ...........................................................

### Lab Contact Person (If Applicable)
First ................................ Last ...........................................................
UChicago Email .................................................................

### How Did You Find Your Mentor (Check All That Apply)

- [ ] Scholarly Opportunities Guide
- [ ] S&D Track Leader
- [ ] S&D E-Harmony Personalized Advice Letter
- [ ] S&D Team
- [ ] Website
- [ ] Course Faculty or Lecturer
- [ ] Career Advisor
- [ ] Peer (MS2-MS4)
- [ ] Other

### How Important Were the Following in Choosing Your Mentor?

<table>
<thead>
<tr>
<th>Mentor's specialty is one I am considering</th>
<th>Very Important</th>
<th>Somewhat Important</th>
<th>Important</th>
<th>Minimally Important</th>
<th>Not At All Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mentor's seniority</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Mentor's track record of leading students to publication</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Mentor seemed interested in me personally</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Mentor is a career role model for me</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Mentor received positive reviews from prior students</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Mentor enthusiasm for their work</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Mentor availability to students</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Mentor success in research overall</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

### What Other Characteristics Did You Consider in Choosing a Mentor? (Open Ended)
Application for 2017

Project Information

TITLE OF RESEARCH PROJECT

DID YOU LOCATE THIS PROJECT IN THE 2017 SCHOLARLY OPPORTUNITIES GUIDE?

☐ Yes
☐ No

PLEASE INDICATE WHICH CATEGORY BEST DESCRIBES YOUR RESEARCH:

☐ Basic Sciences ☐ Community Health ☐ Medical Education ☐ Social Sciences
☐ Clinical Research ☐ Global Health ☐ Healthcare Delivery Sciences (Quality & Safety)

NIH & FOUNDATION FUNDING FOR SRP IS PROVIDED BY CERTAIN PRIORITY AREAS. PLEASE CHECK ALL OF THE CATEGORIES THAT APPLY TO YOUR RESEARCH:

☐ Aging/Studies of Older People
☐ Blood
☐ Brain/Neurology
☐ Diabetes
☐ Ethics
☐ Gastro/Digestive Diseases
☐ Heart
☐ Kidneys
☐ Nutrition
☐ None of the Above

ALL PARTICIPANTS IN SRP PARTICIPATE IN CLUSTER GROUPS TO FURTHER ADVANCE LEARNING REGARDING GENERAL RESEARCH ISSUES AND FACILITATE REVIEW OF PROGRESS BY FACULTY AND PEERS. PLEASE CHECK ALL OF THE CATEGORIES THAT APPLY TO YOUR RESEARCH:

☐ Anesthesia
☐ Basic Pathway
☐ Cancer Cellular Mechanisms
☐ Community Based Research
☐ Endocrinology
☐ Gastroenterology
☐ Geriatrics
☐ Health Disparities
☐ Hospital Care
☐ Immunology
☐ Medical Education
☐ Medical Ethics
☐ Medical Imaging
☐ Molecular/Cell Biology
☐ Neuroscience
☐ Orthopedics
☐ Otolaryngology or Allergy
☐ Pediatrics
☐ Quality/Cost of Cares
☐ Surgery
☐ None of the Above
BACKGROUND OF THE RESEARCH PROBLEM AND THE HYPOTHESIS TO BE TESTED
(This should not be copied from the research mentor’s grant)

PLEASE STATE YOUR HYPOTHESIS (AS A DECLARATIVE SENTENCE)
(Please read thoroughly before entering your hypothesis)

A scientific hypothesis is a declarative sentence about something in the world that can be determined to be true or false based on empirical investigation. The characteristics of a testable hypothesis are below:

- Translation of your question into an educated prediction or guess
- Take a position and try to provide a direction... “increase,” “decrease,” “no effect,” “related to,” “higher,” “lower”
- Associated with a numerical probability (this is the educated guess)
- Conservative (believable)
- Use precise terminology (provide some background to explain terms that are not universally known)
- Measurable (make sure the terms used are measurable... for example if you are measuring “cognitive status,” you may want to state: Cognitive status, as measured by lower MMSE score...)
- Try to start with "We hypothesize that..."

SPECIFIC AIMS
Develop research style specific aims that:
- Match your hypothesis and refer to your research project (as opposed to your personal learning goals)
- Can be accomplished within the duration of the Summer Research Program (June 12 – August 25)

OUTLINE OF METHODS AND APPROACHES
Your methods section should aim to be 2-3 paragraphs describing the study design, how data will be collected (or what you are measuring) and then how you will analyze it. Keep in mind that the Summer Research Program is only three months long.

YOUR ROLE IN THIS PROJECT
More often than not, research at the University of Chicago is ongoing, and you may be working with others, but on a subset of a larger project. Please clarify your role in this project (what YOU will primarily be responsible for doing over the summer versus other people who will help you).

PERSONAL LEARNING GOALS
(As it relates to the research you are proposing)
Application for 2017

DOES THIS PROJECT REQUIRE THAT YOU USE STATA FOR DATA ANALYSIS?

☐ Yes
☐ No

*NOTE:* STATA and any other software is to be PROVIDED by the mentor (and not SRP due to reserve funds for student stipends). We follow this metric to better understand statistical usage need for SRP to plan for the future.

DOES THIS PROJECT REQUIRE INTERNATIONAL TRAVEL?*

☐ Yes
☐ No

*IF YES TO THE PREVIOUS QUESTION PLEASE FILL OUT THE FOLLOWING:

WHAT DATES WILL YOU BE OUT OF THE COUNTRY?
Start Date ____________ End Date ______________

WHAT WILL YOU BE DOING DURING YOUR TRAVEL RELATED TO YOUR RESEARCH?

WILL YOUR MENTOR TRAVEL WITH YOU?

☐ Yes
☐ No

WILL YOU HAVE ACCESS TO STAFF RESOURCES TO HELP YOU AT YOUR DESTINATION WHILE YOU ARE THERE?

☐ Yes
☐ No

*NOTE: If your international project is accepted for funding, additional paperwork will be necessary.

SPRING PREPARATORY REQUIREMENT (REQUIRED SPRING ELECTIVE)

Students are required to participate in a research elective during spring quarter (50 units) to meet an additional one week requirement of the eleven week summer program, since short term training grants permit funding for a minimum of three months.

This requirement translates into a MINIMUM of:

- 1 hour per week working directly with your faculty mentor, and
- 4 hours per week of independent study (learning lab techniques, literature review, etc.)

*NOTE: Your mentor may have additional requirements in order to prepare you to hit the ground running on June 12th.

PLEASE INDICATE THE NUMBER OF DIRECT AND INDEPENDENT HOURS THAT YOUR MENTOR HAS APPROVED PER WEEK:

Hours with Mentor ___________________________

Hours of Independent Study ___________________________

By completing this application, you are "registering" for a 50 unit elective. You do not need to do any additional paperwork to register. The registrar will follow-up with your mentor at the end of Spring Quarter to determine if this requirement has been fulfilled.
Application for 2017

Oversight

Federal regulations require an Institutional Review Board (IRB) to review research on human subjects if the research involves federal funding. The University of Chicago has determined that all research undertaken at this institution, or by those persons affiliated with this institution, must undergo the same level of review as research that falls under federal regulations.

The University of Chicago currently has five independent IRBs:

- 1 Social and Behavioral Sciences IRB
- 1 Social Service Administration IRB
- 3 Biological Sciences Division IRBs (known as Committees A, B, and C)

Each IRB is fully constituted with the appropriate number of scientific and non-scientific, affiliated and non-University-affiliated members, as well as members from different genders and ethnic backgrounds, as required by federal regulations.

The Biological Sciences Division (BSD) Institutional Review Boards are administered by the Office of Research Services. The BSD IRBs are responsible for all biological or medical research conducted at the University of Chicago and/or the University of Chicago Medical Center.

WILL HUMAN SUBJECTS OR TISSUES BE STUDIED?

☐ Yes
☐ No

IF YES, IS THIS RESEARCH APPROVED BY THE IRB?

☐ Yes, the IRB protocol number is
☐ No, this research has received an EXEMPTION by the IRB
☐ No, this protocol WAS submitted to the IRB on this date
☐ No, this protocol WILL BE submitted to the IRB on this date

Using animals in research or teaching requires the prior approval of the Institutional Animal Care and Use Committee (IACUC). The IACUC works closely with the Animal Resources Center (ARC), which is responsible for the animal procurement, facilities, husbandry, and specialized veterinary services. The use of animals in research and teaching is governed by federal regulations issued by the United States Department of Agriculture and the National Institutes of Health Office for the Protection from Research Risks. The University has developed policies and procedures for both the IACUC and the ARC which ensure institutional compliance with these agencies’ regulations.

WILL ANIMAL SUBJECTS OR TISSUES BE STUDIED?

☐ Yes
☐ No

☐ Yes, the IACUC protocol number is
☐ No, this research has received an exemplification by the IACUC
☐ No, this protocol WAS submitted to the IACUC on this date
☐ No, this protocol WILL BE submitted to the IACUC on this date

Certification

By checking “I agree,” I certify that I have worked with my mentor to complete this application and am aware of my responsibilities in participating in the 2017 Summer Research Program beginning Monday, June 12, 2017.

In order for this application to be reviewed, I am aware that I must submit a signed “Intent to Participate” form (including both my signature and my mentor’s signature) to Candi Gard in BSIC 104 no later than February 16, 2017.

☐ I Agree
Intent to Participate

Summer Research 2017–“Intent to Participate”

DUE FEBRUARY 16TH IN BSLC 104

Both students and mentors who wish to be considered for participation must complete this form as part of the application process. This is to be dropped off in BSLC 104 no later than February 16, 2017.

STUDENT SECTION:

My signature below indicates that I have submitted my application online and that I intend to adhere to the Summer Research Program as described in the 2017 Scholarly Opportunities Guide. My full participation in this program will culminate in a presentation at the Research Forum as well as a stipend provided in two payments.

Some of the responsibilities associated with this program include reporting to the lab/mentor on Monday, June 12, 2017 (one week prior to the beginning of Summer Quarter) to begin the project and attending the activities identified in the 2017 Scholarly Opportunities Guide. This includes the Summer Research Program seminars as well as the Cluster Group meetings. (Any date conflicts are noted in my application.)

All assignments will need to be uploaded on time and validated by my mentor. Assignments will need to be validated prior to the receipt of stipend payments.

I will work closely with my mentor on my final paper and presentation. I will present my research project on the date and time that will be assigned to me (either August 23rd or August 24th). I will also attend the Closing Celebration on August 25th.

Student Signature .......................... Date

Student Name (Please Print) .................................................................

MENTOR SECTION:

My signature below indicates that I agree to mentor the above mentioned student for the:

B. Required Spring Elective (March 27, 2017 – June 10, 2017)

Some of the responsibilities associated with mentoring include establishing a close working relationship with this student, meeting weekly to discuss the project, reviewing the student’s work, including the assignments that are uploaded on the SRP website for validation, and providing constructive criticism to help the student prepare the final paper and his/her oral presentation.

I am encouraged to attend the student’s final presentation on the date to which s/he is assigned (either August 23rd or August 24th).

NOTE: I also agree to contribute $400 in non-federal funds towards the student’s stipend.

Mentor Signature ......................................................... Date

Mentor Name (Please Print) ................................................................

Name of Administrator (Please Print) ..........................................

FAS Account Number ........................................................................

Reminders About Research Ethics

IRB and IACUC

All studies involving people OR human samples require IRB approval. Only the IRB can determine EXEMPT status. The investigator cannot simply decide that the study meets criteria for exemption. Please refer to the IRB webpage for additional information: bsdirbbsd.uchicago.edu

All studies involving lab animals require IACUC approval: researchadmin.uchicago.edu/iacuc/index.shtml

In both cases, work CANNOT BEGIN until approval has been obtained.

If you are joining an ongoing study, your mentor likely already has IRB and/or IACUC approval. You must still:

Confirm that you have been added to the protocol as an additional investigator

Complete any additional training required to be added to the protocol per IRB (NOTE: Your IRB training from Scholarship & Discovery 1a does NOT cover you for work with pediatric patients)

Data Security

Please be aware that portable data is vulnerable data and that the leading cause of data loss is stolen or misplaced personal computing devices. Moving data, especially protected health information (PHI), poses unique security risks for the University. Failure to abide by a few common-sense principles could result in disastrous consequences.

Some Guidelines:

- Personal computing devices are becoming more and more portable and secure sensitive information stored on those devices is more important than ever. We are all at risk and the stakes are high. Secure your device by following the steps outlined in the device specific guidelines located under the Guidelines and Procedures section at http://securitybsd.uchicago.edu/security-policies/.

- All devices (e.g., laptops, computer, tablets, and phones) must be protected with strong passwords AND encrypted. If you lose a device that is encrypted, it significantly decreases the burden of proof about data loss. Although it may seem obvious, do not write the password on the encrypted media. For more information, visit http://securitybsd.uchicago.edu/encryption.

- Never email unencrypted PHI to someone outside of the University. If you must email PHI, the Secure E-Mail Portal provides a secure way for employees to email Restricted information, such as PHI, to recipients outside of UCM and the BSD. For more information, visit the UCM Information Security Office Data Guardian Program webpage at http://home.uchospitals.edu/; Go to Quick Links on the left hand side of the screen and click on “Information Security Office” > Data Guardian Program.

- Everyone must enroll in 2Factor Authentication (2FA). 2FA enhances the security of your CNetID by using your phone to verify your identity. This prevents anyone but you from using your account to log in to University websites, even if they know your CNetID password. Please visit https://2fa.uchicago.edu and click on ‘Go to 2Factor’ to enroll today!

- Never store restricted information in an unencrypted state where it might be compromised. This includes removable media such as flash drives and CDs. UChicagoBox — a cloud-based file storage and sharing service is available for storing patient information (HIPAA). Please visit http://securitybsd.uchicago.edu/wp-content/uploads/sites/2/2016/09/UChicago-Box-Instructions-for-BSD.pdf for instructions on how to use the UChicagoBox, as well as a step by step guide on how to secure Restricted information.

- If you suspect that your data has been compromised, report it immediately to your mentor/PI and the departments below:

<table>
<thead>
<tr>
<th>DEPARTMENT</th>
<th>EMAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSD Information Security Office</td>
<td>securitybsd.uchicago.edu</td>
</tr>
<tr>
<td>UCM Information Security Office</td>
<td>helpbsd.uchicago.edu, or by phone # 2x3456</td>
</tr>
<tr>
<td>Office of Corporate Compliance</td>
<td>omecbsd.uchicago.edu, or by phone # 1-877-440-5480</td>
</tr>
</tbody>
</table>
Authorship

Many students will be authors on abstracts, posters, or manuscripts that result from Summer Research. All students will receive training on authorship criteria during the Program. In advance of this training, students should be aware of the formal criteria for authorship that are endorsed by the International Committee of Medical Journal Editors (ICMJE):

Authorship requires:

- Substantial contributions to: the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
- Drafting the work or revising it critically for important intellectual content; AND
- Final approval of the version to be published; AND
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.http://www.icmje.org/news-and-editorials/new_rec_aug2013)html (accessed 12/11/2014)
Research Opportunities
Anesthesia & Critical Care

MENTOR: David Dickerson, MD
DEPARTMENT: Anesthesia & Critical Care
TELEPHONE: (773) 702-6842
EMAIL: ddickerson@dacc.uchicago.edu
IRB/IACUC NUMBER: TBA

PROJECT TITLE
Assessing the Coagulation Profile of Obstetric Patients Receiving a Range of Prophylactic Heparin Doses

PROJECT DESCRIPTION
Venous thromboembolism (VTE) rates, including deep venous thrombosis (DVT) rates are significantly increased during the peripartum period and are a leading cause of maternal morbidity/mortality (1). VTE occurs in 0.5-2.2 per 1000 deliveries (2,3) and VTE including pulmonary embolism accounts for 9% of all maternal deaths (3). During pregnancy the risk of VTE increases 4-10 times that of non-pregnant patients (2,3), and during the postpartum period, increases 15-35 times that of non-pregnant patients (3). Therefore the American Congress of Obstetricians and Gynecologists as well as the Royal College of Obstetricians Gynecologists recommend pharmacologic prophylaxis with unfractionated or low molecular weight heparin for venous thromboembolic events (VTE) in select pregnant patients who are at higher risk for VTE, including most hospitalized antepartum patients (1,2).

Neuraxial procedures are commonly used for labor analgesia and anesthesia for cesarean delivery due to their favorable safety profile compared to general anesthesia (4). Patients on anticoagulants are at increased risk of complications after neuraxial procedures, such as epidural hematoma (5), and therefore many clinicians check partial thromboplastin time (PTT) after initiating heparin prophylaxis before administering neuraxial anesthetics. This may lead to delays in care and/or increased use of general anesthesia for emergency cesarean delivery.

The current University of Chicago Medical Center practice calls for:

- Heparin dosing per recommendations (i.e., Unfractionated heparin 5000 Units SubQ BID 1st trimester, 7500 Units SubQ BID 2nd trimester, 10000 Units SubQ BID 3rd trimester) (1,2)
- PTT 2 hours after the 3rd dose of heparin (based on the fact that peak effect after subcutaneous dosing is 2 hours and steady state occurs after 3 doses) to rule out coagulopathy
- Platelet count after 4 days (i.e., after 8th dose) to rule out heparin-induced thrombocytopenia, as recommended by the American Society of Regional Anesthesia (6).

However, the incidence of heparin-induced coagulopathy and thrombocytopenia in pregnant patients receiving VTE prophylaxis is unknown, and therefore the necessity of obtaining routine PTT and platelet measurements when initiating pharmacologic prophylaxis is unclear.

METHODS
We will be gathering both retrospective and prospective data. We will identify all pregnant patients who received are receiving heparin prophylaxis according to our current protocol which began approximately June, 2016, through the University of Chicago pharmacy database. We will review medical records for data extraction. Demographic data will include age, height and weight or body mass index, and estimated gestational age in weeks and days. Relevant medical and obstetric co-morbidities will be recorded including presence of preeclampsia, HELLP, renal disease (with creatinine if known), hepatic disease, or known coagulation disorder. We will note heparin dose, dates/times that heparin is administered, most recent PTT/platelet count before heparin administration when available, PTT/platelet count collected after first heparin administration, and dates/times of PTT/platelet counts. We will also record whether or not neuraxial or general anesthesia was administered and whether anesthetic complications occurred.
SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Abstract/poster will be presented at Society for obstetric anesthesia annual meeting (May 2018), American Society of Anesthesiologists annual meeting and International Anesthesia Research Society (April 2018). Project will also be presented at the UCM quality symposium. Manuscript will be prepared for leading journal in anesthesiology.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Blood

MENTOR: David Dickerson, MD
DEPARTMENT: Anesthesia & Critical Care
TELEPHONE: (773) 702-6842
EMAIL: ddickerson@dacc.uchicago.edu
IRB/IACUC NUMBER: Exempt

PROJECT TITLE
Retrospective Analysis of Safety and Efficacy of Perioperative Lidocaine Infusion for Refractory Pain

PROJECT DESCRIPTION
In 2015, the UCM implemented an intravenous lidocaine guideline for perioperative pain management refractory to conventional treatment. Lidocaine decreases central hyperexcitability by blocking both the initiation and conduction of nerve impulses by blocking sodium channels which results in local anesthesia.(1,2) It has been reported in literature that intravenous lidocaine has analgesic, anti-inflammatory and antihyperalgesic properties.(3,4) The mechanoinsensitive nociceptors, a subgroup of nociceptors that play a key role in the initiation and maintenance of hyperalgesia, are found to be sensitive to intravenous lidocaine. (5) Intravenous lidocaine has been studied in the perioperative setting and has shown to shorten hospital stay, reduce post-operative pain and opioid consumption.(4,5,6,7,8) Furthermore, this therapy is recommended in the most recent multisociety guidelines for postoperative pain treatment.(9) In this retrospective cohort-matched study, patients with complex pain receiving lidocaine infusion will be assessed for efficacy and safety.

METHODS
A chart review will be conducted of patients receiving lidocaine infusion from February 2016 to February 2017. Patient demographics, pain scores, analgesic medications, pain and medical history, length of stay, and operative versus non operative status will be collected as will the similar data for a matched cohort. Safety and efficacy data will then be shape recommendations for potential implementation of this therapy in non ICU care settings and the emergency department.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Medical students will present at the IARS meeting in Chicago in April of 2018 as well as at the World Congress of Regional Anesthesia and Pain medicine conference. Medical students will be able to participate in the Quality Center’s pain stewardship activities while working on this project providing a curriculum in institutional process improvement.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Neurology
**PROJECT TITLE**
Implementing Preoperative, Non-Opioid Analgesics: An Endeavor in Health Care Delivery Science

**PROJECT DESCRIPTION**
The role of preoperative medications in perioperative pain control has been established in the literature for several years, yet implementation of these preoperative therapeutics has been limited at UCM despite potential for improved pain control and reduced opioid exposure. In November of 2016, a preoperative order set was created to enable timely and evidence-based administration of preoperative nonopioid analgesics acetaminophen, gabapentin, and diclofenac. Patients having orthopedic surgery at the University of Chicago Medicine will all be receiving these medications as appropriate beginning in December 2016. Provider perspectives related to the implementation of these medications were surveyed pre-intervention and will be re-surveyed in June of 2017.

**SPECIFIC AIMS**
The aim of this study is to examine provider perspectives on feasibility, safety, and efficacy of preoperatively administered nonopioids medications at the DCAM ambulatory surgery center. Additionally, the study will examine the effects of preoperative non opioid medication administration on recovery room length of stay, pain scores, and opioid exposure.

**METHODS**
Charts of all patients having orthopedic surgery from December 2016 to May 2017 in the DCAM at UCM will be assessed for use of the preoperative order set as well as which analgesics were administered. Demographics, surgery type, patient medical and pain history, preop and postop pain scores, opioid dosing, and PACU length of stay will be collected and compared between patients receiving the preoperative medications and a matched cohort that did not receive preop non opioid analgesics. Pre and post survey data of providers will be coupled with the safety and efficacy data to shape further implementation of this order set across the institution.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Medical students will present at the IARS meeting in Chicago in April of 2018 as well as at the World Congress of Regional Anesthesia and Pain medicine conference. Medical students will be able to participate in the Quality Center's pain stewardship activities while working on this project providing a curriculum in institutional process improvement.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Healthcare Delivery Sciences (Quality & Safety)

**NIH MISSION:** Neurology
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PROJECT TITLE
Comparison of Two Sedation Regimens for Awake Fiberoptic Intubation

PROJECT DESCRIPTION
There are a number of methods for intubating patients with airways too difficult to manage using direct laryngoscopy. The most frequently used method is intubation with a fiberoptic bronchoscope. This method is well described, but significant work remains to optimize the technique, identify its pitfalls, and select the best drugs for patients undergoing “awake” fiberoptic intubations.

SPECIFIC AIMS
We will compare three different medicating regimens for bronchoscopic intubation of the trachea under topical anesthesia and determine the anatomic “catching points” when an endotracheal tube is passed over the scope through the vocal chords. We will also perform a retrospective review of difficult fiberoptic intubations.

METHODS
A series of clinical trials will include patients undergoing general anesthesia in the operating room. Intubations will be performed using flexible bronchoscopy.

CONFERENCES AVAILABLE FOR PARTICIPATION
The Department of Anesthesia and Critical Care has a full, year-round schedule of didactic sessions for residents and medical students. Daily teaching sessions are held every Monday, Tuesday, and Friday morning; Grand Rounds are every Wednesday morning. Students in the airway laboratory are encouraged to attend as many of these sessions as possible to familiarize themselves with the breadth of the field of anesthesia. The advisors meet with the members of the airway laboratory several times a week to analyze data and evaluate plans for ongoing studies. Students are expected to present their work at one or more national meetings. Students will also have the opportunity to help in the preparation of manuscripts at the project’s completion.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Healthcare Delivery Sciences (Quality & Safety))

NIH MISSION: Lungs
PROJECT TITLE
The Economic Impact of the PreOp Clinic

PROJECT DESCRIPTION
Over the past several years we have examined the causes of day-of-surgery case cancellations and delays. Initial work looked at the impact of the anesthesia preoperative clinic on case cancellations and delays. Subsequent work has concentrated on the demographic characteristics that place a patient at higher risk for a day-of-surgery case cancellation. The long-term goal of the project is to create a model for predicting case cancellations and delays.

SPECIFIC AIMS
To create and validate a model for predicting day-of-surgery cancellation and delays.

METHODS
Prospective examination of day-of-surgery case cancellations followed by a prospective evaluation of the model in patients scheduled for surgery at the University of Chicago Medicine/Medical Center.

CONFERENCES AVAILABLE FOR PARTICIPATION
The Department of Anesthesia and Critical Care has a full, year-round schedule of didactic sessions for residents and medical students. Daily teaching sessions are every Monday, Tuesday, and Friday morning; Grand Rounds are every Wednesday morning. Students are encouraged to attend as many of these sessions as they can to familiarize themselves with the scope of the field of anesthesia. The advisors meet with the members of the laboratory several times a week to analyze data and evaluate plans for ongoing studies. Students are expected to present their work at one or more national meetings. Students will also have the opportunity to help in the preparation of manuscripts at the project’s completion.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Lungs
ANESTHESIA & CRITICAL CARE

SPECIFIC AIMS
The purpose of this study is to determine the incidence of pre-operative thromboses in the lower extremities and to assess the impact of various anesthetic techniques (i.e., general anesthesia, neuraxial anesthesia, regional blocks, local with sedation, etc.) on the development of post-operative DVTs.

METHODS
All patients scheduled for operations will be approached and consented for enrollment in the study. After consenting an U/S study of the veins of the legs will be performed in the preoperative holding area to determine the patency of the vessels and the presence or absence of clot in the vessels. This study will be repeated after the operation to determine if there has been a change in the patency of the veins during the operation.

CONFERENCES AVAILABLE FOR PARTICIPATION
The Department of Anesthesia and Critical Care has a full, year-round schedule of didactic sessions for residents and medical students. Daily teaching sessions are every Monday, Tuesday, and Friday morning; Grand Rounds are every Wednesday morning. Students are encouraged to attend as many of these sessions as they can to familiarize themselves with the scope of the field of anesthesia. The advisors meet with the members of the laboratory several times a week to analyze data and evaluate plans for ongoing studies. Students are expected to present their work at one or more national meetings. Students will also have the opportunity to help in the preparation of manuscripts at the project’s completion.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Blood

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PROJECT TITLE
The Use of Digital Recording of Family Members to Improve Emergence From Anesthesia

PROJECT DESCRIPTION
As patients awaken from general anesthetics they may experience periods of confusion and disorientation. This disorientation is especially difficult for patients who do not speak English or for whom English is a second language. Our project is an ongoing effort to identify phrases and instructions used by an anesthesiologist at emergence and to translate them into the patient’s native tongue. The project has grown to encompass the post-anesthetic care of our patients and to identify and translate the necessary phrases in that venue as well. Recorded messages from parents have also been played back for pediatric patients (English-speaking and non-English-speaking) at emergence.

SPECIFIC AIMS
The study will assess the impact that the use of translated commands has on patient safety, satisfaction, and management. In addition, we will look at the impact that recorded messages from parents have on the rate of emergence agitation in children (English-speaking or non-English-speaking) following non-painful procedures.

METHODS
Patients for whom English is not the first language and parents of children undergoing non-painful procedures requiring a general anesthetic (i.e. MRI scanning) will be identified. Family members will then be asked to make recordings of the
necessary phrases (stored as .mp3 files on a laptop computer). These phrases will then be played for the patient at emergence or in the PACU.

CONFERENCES AVAILABLE FOR PARTICIPATION
The Department of Anesthesia and Critical Care has a full, year-round schedule of didactic sessions for residents and medical students. Daily teaching sessions are every Monday, Tuesday, and Friday morning; Grand Rounds are every Wednesday morning. Students are encouraged to attend as many of these sessions as they can to familiarize themselves with the scope of the field of anesthesia. The advisor meets with the members of the laboratory several times a week to analyze data and evaluate plans for ongoing studies. Students are expected to present their work at one or more national meetings. Students will also have the opportunity to help in the preparation of manuscripts at the project’s completion.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

nih mission: Lungs

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Project Title
Use of the BIS Monitor to Decrease the Incidence of Intraoperative Awareness Events

Project Description
This project looks at the effects of various perioperative medications on the ability to form memories and the simultaneous effects these medications have on the bispectral index (a processed EEG algorithm used to determine depth of anesthesia).

Specific Aims
The specific aim of the project is to determine if there is a correlation between BIS scores and memory formation following preoperative medications, intraoperatively, and during the recovery period from general anesthetics.

Methods
Drug doses and BIS readings are recorded at various stages before, during, and after general anesthetics. Subjects are given words to remember at each step of the evaluation. The subjects’ ability to recall words is then correlated with the timing of drug administration and the corresponding BIS readings.

Software Required: STATA

Conferences Available for Participation
The Department of Anesthesia and Critical Care has a full, year-round schedule of didactic sessions for residents and medical students. Daily teaching sessions are every Monday, Tuesday, and Friday morning; Grand Rounds are every Wednesday morning. Students are encouraged to attend as many of these sessions as they can to familiarize themselves with the scope of the field of anesthesia. The advisor meets with the members of the laboratory several times a week to analyze data and evaluate plans for ongoing studies. Students are expected to present their work at one or more national meetings. Students will also have the opportunity to help in the preparation of manuscripts at the project’s completion.
POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Neurology

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PROJECT TITLE
The Effect of Mobile Devices on Anesthesia Provider’s Accuracy and Latency of the Response to a Critical Intraoperative Event

PROJECT DESCRIPTION
Faster and arguably more effective communication can now be facilitated with a click from your finger on your handheld device. However, these same devices can lead to significant distractions that could lead to adverse events. For example, LeBeau reported that when a driver was driving at 70 miles per hour on a deserted air strip, that same driver reacted slower when texting and e-mailing than when legally drunk. Electronic handheld devices have also facilitated faster retrieval of medical information, improved clinical decision support and data analysis, and the potential for more efficient and effective communication. However, these same personal electronic devices (PEDs) have opened the door for emerging patient safety concerns. In particular, providers who use PEDs during operating room patient related care may be susceptible to associated distractions that could lead to patient adverse events. While many anesthesia providers are using PEDs for patient related care, others have used these devices for non-patient related care resulting in adverse events and have been subject to legal action.

Despite the potential for hazardous patient events to occur when anesthesia providers are engaged in using PEDs, there is presently little evidence to suggest a direct link between PEDs and these unwanted occurrences in the operating room. The ASA closed claims reported a relatively small number of claims related to OR distractions (13 out of 5822). A study in 2009 investigated the effect on patient care when anesthesia providers were reading or involved with non-patient related conversations. The study suggested that these activities did not result in anesthesia provider related reduced vigilance or a reduction in the ability to multitask during the maintenance phase of intraoperative care. Similarly, the same authors suggested that reading in the operating room (a similar distraction as reading on a mobile device) could actually increase vigilance by reducing anesthesia provider boredom.

Still, distraction related claims were determined to be substandard care in 91% of the claims compared to 50% of the time in other claims in the closed claims database.

Therefore, we propose to investigate the potential effect of using a mobile device in a simulation exercise that involves a cardiac arrest during a routine laparoscopic cholecystectomy. The providers’ accuracy and latency by which they respond to the emergency event with and without use of the mobile devices will be examined.

SPECIFIC AIMS
We hope to discover through a simulation exercise of a life threatening intraoperative event whether the accuracy and latency upon initiation of the event are negatively impacted by using a mobile device simultaneously.

METHODS
The study proposal will undergo Internal Review Board (IRB) approval at NorthShore University HealthSystem. The study will take place at Evanston Hospital in the Grainger Center for Simulation and Innovation. Consenting volunteer Anesthesia
providers will undergo the same orientation to the simulation environment. The providers will manage a simulated intraoperative critical event. Study subjects will be randomized to two groups:

1) Group A (No distraction): This group will manage patient care without an embedded scenario distraction.
2) Group B (Distraction): This group will manage patient care while text messaging through a mobile device.

The outcome measures will include the difference in accuracy by which the tasks are completed by the volunteers and the latency by which the volunteers respond to the task required to manage this adverse event.

CONFERENCES AVAILABLE FOR PARTICIPATION
The student will take part in our quarterly Anesthesiology simulation conferences.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety), Medical Education

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PROJECT TITLE
Utility of a Mobile Application for Functional Assessment Prior to Non-Cardiac Surgery

PROJECT DESCRIPTION
The pre-operative evaluation of patients undergoing non-cardiac surgery relies on assessment of the patient’s functional status to determine whether further cardiac testing, such as a stress test, is warranted prior to proceeding for surgery. Functional status is currently measured subjectively by asking patients questions about activities of daily living (can you walk up a flight of stairs?) or walking speed (can you walk 4mph?). However, these estimates are highly subjective and can be difficult to quantify. We believe that mobile devices, capturing a patient’s step/movement information, can provide a superior assessment of a patient’s functional status. We have created a mobile application (iOS only) that can be downloaded on a patients phone and send us the step/movement information of patients prior to surgery to create a functional assessment based off of this information.

SPECIFIC AIDS
To assess whether step/motion data captured by ihealth can be used to generate a more accurate and quantitative assessment of a patient’s functional status prior to non-cardiac surgery.

METHODS
Patients will be enrolled in our study in the anesthesia and perioperative medicine clinic (APMC) prior to surgery. Once enrolled we will install a mobile application that we have developed in conjunction with IT Services to send us a patient’s historical step/movement information, a short survey that they will fill out and performance of six minute walk test performed in the clinic. The information will then be downloaded into STATA and an analysis of their activity will be performed.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Anesthesia & Critical Care Grand Rounds including CQI/M and M and daily Resident Conference

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Heart
Evaluation of the University of Chicago Medical Center Response to Cases of Sexual Violence in the Emergency Room

In the United States, rape and sexual assault are crimes that continue to plague both men and women, affecting 1 in 5 women and 1 in 71 men. While many cases of sexual violence go unreported and untreated, emergency rooms (ER) remain a primary point of care for survivors of sexual violence, seeing over 140,000 cases of sexual assault per year in the U.S. (Saltzman et al., 2007). To address the needs of sexual assault survivors in the ER, Sexual Assault Nurse Examiner (SANE) programs have been developed to train ER nurses to both conduct forensic medical exams and to attend to the specific needs of survivors. Despite the overall increase in the number of SANE programs in the U.S. over the past 30 years, the medical system can still be a source of re-victimization for survivors of sexual assault (Ahrens et al., 2000; Campbell, 2005; Martin, 2005). Survivors can be subject to judgmental language or victim-blaming by ER staff and the forensic exam can be a source of trauma when conducted by a non-SANE trained medical professional (Maier 2008; Girardin, 2005). Furthermore, not every hospital follows recommendations for treatment of sexual assault patients. In two studies, Patel et al. found that only 17.4% of U.S. hospitals and only 9.6% of Illinois hospitals provided all 10 patient care practices recommended by the comprehensive medical care management (CMCM) model for survivors of sexual assault (Patel et al., 2008; Patel et al., 2013). Given the importance of the medical system to the healing process of survivors, this project seeks to assess the current state of the University of Chicago Medical Center’s response to cases of sexual violence in the Emergency Room. The project will evaluate ER protocols and compliance, ER staff beliefs and knowledge of procedures, and sexual assault advocate and social worker perceptions on treatment of sexual assault patients. If possible, the project will seek feedback from survivors themselves on their experiences in the ER. The ultimate goal is to understand ways that the U of C medical center might inadvertently contribute to the re-victimization of survivors, with the hope of finding ways to address these issues.

SPECIFIC AIMS

The aim of this project is to formally assess the current practices and procedures at the U of C Medical Center for cases of sexual assault in the ER. The project will seek to understand the ER’s official protocol for sexual assault and how this protocol is used practically. The project will also determine the current beliefs and perceptions of ER staff regarding survivors of sexual assault, as well as the knowledge base of staff members of standard policies and procedures for providing proper medical care to survivors. The project lastly aims to understand the perspective of sexual assault advocates from the YWCA, social workers, and survivors of sexual assault regarding potential sources of re-victimization.

METHODS

This project will use a set of standard Quality Improvement baseline assessment tools. First, we will conduct an analysis of the U of C ER’s official protocol for sexual assault cases, comparing it to a checklist created from the literature and standard guidelines, such as the U.S. Department of Justice’s National Protocol for Sexual Assault Medical Forensic Exams. To assess compliance with the U of C protocol, we will conduct a chart review of patients presenting for sexual assault treatment to determine the proportion of cases that correctly follow all medical, legal, and social procedures. Next, we will conduct a series of mixed quantitative and structured qualitative surveys of ER medical staff, including attending physicians, residents, nurses, and social workers. These surveys will assess 1) staff attitudes and beliefs about sexual assault survivors and 2) staff knowledge of correct hospital procedures and legal policy for cases of sexual assault. Attendings and residents will also be assessed on their knowledge of how to
complete a Sexual Assault Forensic Exam. In addition, we will conduct a mixed quantitative-qualitative survey of advocates from the YWCA about their perspectives on 1) the U of C’s procedures for sexual assault cases and 2) medical staff interaction with sexual assault survivors. Finally, if it can be done in an appropriate fashion, we hope to conduct surveys of survivors of sexual assault about their experiences in the U of C emergency room.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
National Sexual Assault Conference, June 2017
International Conference on Sexual Assault; Domestic Violence; and Systems Change, April 2018

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Healthcare Delivery Sciences (Quality & Safety)

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PROJECT TITLE
Maternal Health Outcomes at University of Chicago and NorthShore Hospitals

PROJECT DESCRIPTION
Building on preliminary work at the University of Chicago, this project will identify predictors of adverse maternal outcomes and factors that may be protective among women at high risk for poor pregnancy outcomes. Prior research has shown that women with chronic diseases and those from historically disadvantaged groups have higher rates of maternal morbidity. We are interested in whether preventive care (especially in the preconception period) and provider training or other factors can affect these outcomes. We will analyze data drawn from electronic health records to assess the following outcomes among women who deliver a baby or have any pregnancy-related hospitalization within the University of Chicago or NorthShore systems: 1) Severe maternal morbidity; 2) NTSV cesarean birth (nulliparous, term, singleton, vertex).

SPECIFIC AIMS
1) Describe the prevalence of the specified outcomes among patients at University of Chicago and NorthShore hospitals.
2) Identify patient, provider, and utilization factors associated with each outcome. Factors explored will include:
   1) Preconception care; 2) Prenatal care; 3) Preconception patient health markers, including hemoglobin A1c, blood pressure, body mass index, and chronic disease diagnoses; 4) Characteristics of prenatal and intrapartum providers (such as specialty, training, years in practice); 5) Patient sociodemographic characteristics.

METHODS
Data will be drawn from the clinical data warehouses at the University of Chicago and NorthShore University HealthSystem. The study at University of Chicago has IRB exemption (protocol #15-0490) to examine de-identified patient data, and preliminary analysis has started. A new IRB exemption will be sought for a similar data query at NorthShore. Dependent and independent variables will be identified from problem lists (diagnoses), procedures, lab values, and other data documented in the electronic medical record.

SOFTWARE REQUIRED: STATA, SAS (optional)
Conferences Available for Participation
North American Primary Care Research Group

Possible Scholarship and Discovery Track(s): Healthcare Delivery Sciences (Quality & Safety)

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Project Title
Making the Call: Assessing Attribution of Birth Outcomes to Providers on Labor and Delivery

Project Description
Cesarean sections (C-sections), when not medically indicated, pose significant safety risks to mothers and babies, and raise healthcare costs by an estimated $5 billion annually. Low-risk primary C-sections have been targeted as a quality measure to improve maternity care in the US, with Healthy People 2020 setting a target of 23.9% for hospitals. Providers will increasingly be held accountable for rates exceeding national targets; however, a provider’s rate may be determined based on faulty attribution. A patient’s birth outcome depends on decisions made throughout her intrapartum course. The provider who decides she needs a C-section may not be the provider who actually performs the C-section, or who ultimately is listed as the delivering clinician in the EHR and on the newborn’s birth certificate. Given that provider-level rates of C-section are calculated using a standard field in the EHR (eg – “delivering clinician”), this calls into question how well the provider-level rate of C-section actually captures the quality of care delivered by that clinician. This project will use detailed chart reviews of patients’ intrapartum courses to evaluate the concordance between the provider who made the call to move to C-section and the provider to whom the C-section will be ascribed.

Specific Aims
1) Identify the primary intrapartum decision-maker in changing a planned vaginal birth to a Cesarean section in a random sample of intrapartum episodes from nulliparous, term, singleton, vertex (NTSV) C-section births occurring at NorthShore University Health System hospitals.
2) Determine concordance between the delivering clinician as listed on the delivery summary, birth certificate, and the actual clinical decision-maker.
3) Map patients’ intrapartum exposures to different care providers in NTSV C-section and vaginal birth.

Methods
Chart reviews will be performed using randomly sampled NTSV C-section and vaginal birth patients, admitted for labor with initial planned outcome of vaginal birth, delivering at NorthShore University Health System hospitals in 2016. Data extraction forms will be used to collect relevant data points.

Conferences Available for Participation
North American Primary Care Research Group; Academy Health Annual Research Meeting; or Society of Teachers of Family Medicine

Possible Scholarship and Discovery Track(s): Social Sciences, Healthcare Delivery Sciences (Quality & Safety)
**PROJECT TITLE**
Inflammatory Connective Tissue Diseases and Cardiovascular Health

**PROJECT DESCRIPTION**
Over the past two decades, we have acknowledged the connection between inflammation and cardiovascular disease. In the absence of other underlying inflammatory diseases, people with higher circulating markers of inflammation have higher risk of atherosclerosis and cardiovascular events, and this risk may rival the risk conferred by other traditional cardiovascular risk factors. It is reasonable, therefore, to expect that patients with underlying inflammatory connective tissue diseases (like rheumatoid arthritis, lupus, dermatomyositis, psoriasis, Sjögren Syndrome) would have higher cardiovascular risk. In large part, this is true. Indeed, at the University of Chicago, the prevalence of atherosclerotic cardiovascular disease is significantly higher in those with such systemic inflammatory diseases (as compared to the general population), and the strength of this association appears particularly pronounced in young African-American patients. We seek to elucidate this connection within our community and to understand which factors drive the strengthened connection within particular subsets of patients.

**SPECIFIC AIMS**
1) Compared to the general population, is the incidence of cardiovascular disease higher in patients with underlying inflammatory connective tissue disease at the University of Chicago, and can we identify factors within the population (disease type, race, age, sex, etc) that are associated with higher incidence?
2) In our community, are particular disease-modifying therapies (or lack of such therapies) for those with inflammatory connective tissue disease associated with differences in incident cardiovascular disease?
3) Do young patients with atherosclerotic cardiovascular disease have more systemic inflammatory disease than the general population?

**METHODS**
The main methods will be data collection and analysis from patient medical records. This will be done electronically, with potential need to confirm diagnoses and treatments through individual record review. It will involve basic statistical analysis. There are also opportunities for further hypothesis generation through analysis of de-identified aggregate patient data from the Clinical Research Data Warehouse through the Center for Research Informatics.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**
The gCV Cardiovascular Research Seminars; Cardiology Grand Rounds.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Social Sciences, Clinical Research, Community Health

**NIH MISSION:** Heart
MACROPHAGE POLARIZATION AND Atherosclerosis

Atherosclerosis is the root cause of most myocardial infarctions and strokes and therefore accounts for more worldwide mortality than any other pathological process. Macrophages are the cells that become foam cells, major constituents of atherosclerotic plaques. Critical aspects of the intracellular signals that determine macrophage behavior are unclear. We also know that not all macrophages are created equal -- some are inflammatory, some are regulatory, some are detrimental, and some are protective -- but exactly how this polarization happens requires elucidation. Our laboratory investigates signals that drive macrophage polarization and their impact on atherosclerosis.

SPEcific Aims
1. Determining the relative abundance of M1 (inflammatory) and M2 (regulatory) macrophages in atherosclerotic lesions in mice as a function of time (aging) or genetic variation (using a knockout important for macrophage signaling).

METHODS
The methods will be appropriate for the project selected, but will most likely include some of the following: cell culture, protein and RNA isolation, immunoblotting, qPCR, flow cytometry, immunohistochemical staining, and immunofluorescence staining. Gene chip analysis may be possible.

CONFERENCES AVAILABLE FOR PARTICIPATION
The gCV Cardiovascular Research Seminars; Cardiology Grand Rounds.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Aging, Blood, Heart
HFpEF, heterogeneity in clinical manifestation in HFpEF, and potentially differences in the underlying pathophysiology. There is currently an unmet need to understand the pathophysiology underlying HFpEF. A unifying but untested theory suggests that comorbidities lead to a systemic inflammatory state, which triggers endothelial and microvascular dysfunction, resulting in diastolic stiffness, cardiac remodeling, and fibrosis leading to a HFpEF phenotype. We now have the tools to directly measure coronary microvascular function using coronary guidewire techniques. Similarly, myocardial fibrosis detection and quantification is more readily assessed using cardiac magnetic resonance imaging (cMRI). Guidewire techniques can be used to calculate the coronary flow reserve (CFR), a measurement of flow through both the epicardial and microvascular circulation. The index of microvascular resistance (IMR) is a validated technique that combines pressure and the modilution techniques to measure microvascular resistance. Cardiac MRI can be used to evaluate focal and diffuse myocardial fibrosis, and speckle-tracking and tissue Doppler echocardiography can examine cardiac mechanics. Novel serum biomarkers of inflammation, left ventricular stress, and fibrosis have been developed to further define the pathophysiology of HFpEF. Thus, these tools now allow for the comprehensive evaluation of the coronary microvasculature in relation to cardiac fibrosis and mechanics.

SPECIFIC AIMS
Characterize myocardial endothelial and microvascular blood flow in 65 patients with HFpEF, 20 controls with HFpEF risk factors, and 20 normal controls without HFpEF risk factors. H1. Increasing comorbidity burden is associated with worse CFR and IMR; and the severity of abnormal CFR and IMR will be amplified in the presence of elevated LV diastolic pressure. H2. The frequency of abnormal CFR and IMR is higher in HFpEF compared to comorbidity-matched controls and healthy controls.

METHODS


Inclusion Criteria: 1) HFpEF – Framinham criteria for heart failure, LVEF >50%, diastolic dysfunction on echocardiogram, 2) referred for cardiac catheterization, 3) age 18-89 years, 4) informed-written consent.

Exclusion Criteria: 1) Obstructive coronary artery disease, 2) valvular heart disease, 3) constrictive pericarditis, 4) prior LVEF <40% Data Collection: After consent is obtained, charts will be abstracted for clinical information (e.g., comorbidities), medications, and prior cardiac testing, and all data will be recorded in a research database. Cardiac catheterization will proceed with left and right heart catheterization followed by coronary flow study. FFR, CFR, and IMR data with adenosine will be recorded and entered into the database. All subjects will undergo echocardiography at some point within 12 months of the cardiac catheterization.

Statistical Analysis: Invasive markers of flow and resistance (FFR, CFR, IMR) will be summarized with median values and interquartile ranges, as prior studies have demonstrated a non-normal distribution. IMR will be divided into tertiles, and baseline demographic, comorbidity, physical examination, laboratory, echocardiographic, and diastolic pressure parameters will be reported within each tertile, with differences between groups assessed using the Kruskal-Wallis test for continuous variables and the Pearson Chi-squared test for categorical variables. All individual variables including number of comorbidities with a P-value of <0.1 will be considered for inclusion into multivariable forward stepwise models to determine independent predictors of IMR.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Cardiology Section Research Conferences (Thursdays); Catheterization Laboratory Clinical Conferences (Mondays and Fridays); Blair Laboratory Meetings (Monday mornings).

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Aging, Heart
PROJECT TITLE
Drivers for Rehospitalization After Pulmonary Vein Isolation for Atrial Fibrillation

PROJECT DESCRIPTION
Pulmonary vein isolation (PVI) is a new catheter-based technology used in the treatment of paroxysmal and persistent atrial fibrillation (AF). Despite widespread increase in the use of PVI to treat AF, the impact of PVI on subsequent hospitalization is unknown.

SPECIFIC AIMS
To assess rates and causes for rehospitalization after PVI.

METHODS
The Truven Health MarketScan® Research Databases capture person-specific clinical utilization, expenditures, and enrollment across inpatient and outpatient. We will query the database for all PVI procedures and determine subsequent rates of hospitalization.

SOFTWARE REQUIRED: STATA, SAS (Biostatistician is part of the project team.)

CONFERENCES AVAILABLE FOR PARTICIPATION
Heart Rhythm Society
American College of Cardiology
American Heart Association

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

nih mission: Heart

PROJECT TITLE
Use of Autonomic Modulation Devices and Subsequent Hospitalization for Heart Failure

PROJECT DESCRIPTION
Autonomic modulation is currently being performed with FDA-approved devices in the treatment of anginal pain (spinal cord...
Research Opportunities

MEDICINE–DERMATOLOGY

stimulation) and in managing epilepsy (vagal nerve stimulation). These devices demonstrate “off-target” effects in that they also alter autonomic tone and may reduce incidence of heart failure.

SPECIFIC AIMS
To assess rates of heart failure hospitalization in patients treated with devices which alter autonomic tone.

METHODS
The Truven Health MarketScan® Research Databases capture person-specific clinical utilization, expenditures, and enrollment across inpatient and outpatient. We will query the database for use of autonomic devices and determine rates of hospitalization for heart failure in this cohort. We will compare the rate of hospitalization in that group with similar age and gender matched cohort with similar disease states but no devices.

SOFTWARE REQUIRED: STATA, SAS (Biostatistician is part of the team)

CONFERENCES AVAILABLE FOR PARTICIPATION
Heart Rhythm Society
American College of Cardiology
American Heart Association

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Heart, Neurology

Medicine–Dermatology

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PROJECT TITLE
Empowering Primary Care Providers through Education Workshops Followed by One-on-One Orientation as a New Model to Deliver Timely Efficient Care

PROJECT DESCRIPTION
Wait times for specialty referrals in medicine have become an increasingly important issue as the nature of healthcare delivery has changed. Skin diseases are commonly encountered by primary care providers. Literature reports that approximately 40% of patients who present to their primary care physician have at least one skin problem; and, in nearly 60% of them, a skin disease is their chief complaint (Lowell, Froelich, Federman & Kirsner, 2001). This data may reflect a shortage of dermatologists which leads to primary care providers being continuously asked to care for a wide range of skin diseases and controversy regarding their abilities to manage them. Concurrently, this may also account for the increasing number of dermatology referrals and long-wait times for patients to receive a specialist consultation. According to a study published by the Archives of Dermatology Journal, more than 60% of the dermatologists’ practices exceed the criterion cutoff waiting time for new and established patient appointment times. The waiting time for a new patient appointment ranged from 0 to 197 days with a mean of 33 days. Sixty-four percent of the appointments exceeded the criterion cutoff of 3 weeks. The waiting time for established patient appointments
ranged from 1 to 132 days with a mean of 32 days. Sixty-three percent of the appointments exceeded the 2-week criterion cutoff for established patient (Suneja, Smith, Chen, et al, 2001). Decisions about the delivery of dermatologic healthcare services and in planning educational programs designed to improve dermatologic care should consider all previous information. The University of Chicago Medical Center has partnered with nearly 30 federally qualified health centers (FQHC) as part of the Southside Health Collaborative. While all of these FQHC receive a significant amount of patients requiring dermatologic care, just a few of them are able to fulfill the demand. To improve the capacity of the primary care providers at managing common skin diseases and deliver more timely efficient care, we developed and implemented a Dermatology Educational Curriculum focused on common dermatoses and tailored to primary care providers at the Friend Family Center. The goal of this study is to demonstrate if the implementation of this dermatologic curriculum to reinforce the physician’s knowledge followed by one-on-one orientations (“referral gate”) on especially complex cases by a dermatologist can effectively increase the confidence and capacity of primary care providers to diagnose and manage skin diseases and, consequently, the delivery of more timely and efficient care.

**SPECIFIC AIMS**

1) Determine the usefulness of a schema based on educational workshops followed by one-on-one orientations (“referral gate”) to empower primary care providers on diagnosis and management of common simple dermatoses.

2) Evaluate if trained primary care providers can effectively manage common simple dermatoses, demonstrated by the decreased dermatology referral rates and wait times for a dermatologist appointment.

**METHODS**

We have developed and implemented a curriculum on common dermatoses seen by primary care providers. Students will work with research members in the development and implementation of a schema of questions to be filled out utilizing retrospective chart review to assess the physician’s confidence at managing skin diseases and the length of the dermatology-related appointment after the full intervention. They will also collaborate with the research team to collect and analyze the dermatology referral rates registered at the clinic both pre and post intervention. The collection of data will be performed from five months prior the educational intervention, five months after the educational intervention (and before the “referral gate” intervention) and, five months posterior to the implementation of the “referral gate” intervention in order to be able to record more accurate information. We will analyze the data and use the findings to improve future physician education.

**CONFERENCES AVAILABLE FOR PARTICIPATION**

We anticipate that students will be able to participate in the monthly Research and Innovations in Medical Education (RIME) Conferences at the University of Chicago. Final findings will be prepared for submission to the Annual University of Chicago Medical Education Day, Annual American Academy of Dermatology Meeting, Association of American Medical Colleges Annual Meeting, American Medical Seminars. Students will have an opportunity to present their work at one or more of these meetings.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Healthcare Delivery Sciences (Quality & Safety), Medical Education, Community Health
PROJECT TITLE
The Consequence of Intermittent Hypoxia on Hippocampal Neurophysiology

PROJECT DESCRIPTION
Sleep apnea (SA) is a respiratory disorder that causes chronic intermittent hypoxia (CIH) throughout the sleep cycle. In addition to elevating the risk for cardiovascular disease and stroke, it is well-documented that SA correlates with cognitive decline in both children and adults. While neuroimaging studies suggest that the hippocampus may be particularly vulnerable to injury by SA, the neurobiological basis by which SA affects this structure remains poorly understood. The dentate gyrus is a principal component of the hippocampal circuit and requires both adult neurogenesis and synaptic plasticity to maintain normal function. We propose to examine how chronic intermittent hypoxia (CIH), affects the neurobiology of the dentate gyrus. We use an innovative and comprehensive approach to unravel the molecular, cellular, and network basis by which CIH leads to brain injury and cognitive deficit. We test the hypothesis that by causing CIH, SA generates oxidative stress that disrupts the neural stem cell niche and impairs synaptic plasticity in the dentate gyrus. Understanding the effects of SA on these mechanisms of hippocampal neurobiology is significant for advancing prevention and treatment of cognitive decline in a condition that affects the quality of life for many Americans.

SPECIFIC AIMS
We hypothesize that chronic intermittent hypoxia (CIH) remodels hippocampal neurophysiology by altering network properties and hippocampal neurogenesis. To test this, we aim to measure synaptic transmission in brain slices and track the development of adult-born neurons of the hippocampus. The following studies will be performed in tandem during the program experience.

Study 1: Using electrophysiology, the student will characterize synaptic transmission in the dentate gyrus and CA1 neuronal population of the hippocampus following CIH.

Study 2: Using immunohistochemistry, the student will track the development of adult-born neurons through several different cellular stages during and following CIH.

The student will choose one study as his/her primary focus but will have the opportunity to participate on the other study during the summer.

METHODS
The Student will learn brain slice electrophysiology to study local neural networks. He/she will learn immunohistochemistry to characterize cellular development and differentiation. He/she will learn basic statistical methods for comparisons between two or more experimental groups.

SOFTWARE REQUIRED: Prism

CONFERENCES AVAILABLE FOR PARTICIPATION
The student may participate as co-author on an abstract submitted to the Society for Neuroscience in November 2017.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences
PROJECT TITLE
Assessing the Feasibility, and Acceptability of Sermons on Health in Mosque Communities

PROJECT DESCRIPTION
The student will work on the evaluation aspects of a multi-year study aimed at developing a religiously-tailored Muslim community-based health intervention to enhance Muslim women’s intention to obtain mammography and more specifically to evaluate a data-driven and religiously tailored sermon that addresses religion-related barriers to preventive health in American Muslim populations. Data from semi-structured interviews will be analyzed to assess the acceptability of the sermon modality, elicit views on how the sermon impacted participants’ cancer screening attitudes, and assess whether sermons maintained fidelity to thematic outline.

SPECIFIC AIMS
These will vary with the experience and interests of the candidate. However in general the research interns will be involved with a collaborative team and work on:

- Community-engagement activities and liaising
- Systematic literature reviews
- Qualitative data analysis using NVivo
- Manuscript preparation and writing

METHODS
The student will help to analyze interview data by learning and deploying qualitative methods such as coding to get at common themes in the data set. They will also conduct literature reviews to identify gaps in knowledge regarding sermons and religious messages in health programming. The researcher will help to prepare manuscripts from this project by formatting and developing tables and other such organizational tasks.

CONFERENCES AVAILABLE FOR PARTICIPATION
Society of Behavioral Medicine; American Public Health Association

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences, Community Health
PROJECT TITLE
Adapting a Religious Health Fatalism Measure for Muslim Populations

PROJECT DESCRIPTION
This project builds upon recently completed survey and focus groups that found experiences of religious discrimination in healthcare and notions of religious coping to be associated with decreased mammography screening rates. We seek to create a religious fatalism measure for the Muslim population that would allow health care providers to better understand the needs of their patients, provide individualized care, and improve the doctor-patient relationship.

SPECIFIC AIMS
These will vary with the experience and interests of the candidate. However in general the research interns will be involved with a collaborative team and work on:

- Community-engagement activities and liaising
- Systematic literature reviews
- Qualitative data analysis using NVivo
- Quantitative data analysis using bivariate and multivariate regression in STATA
- Manuscript preparation and writing

METHODS
The student will help to analyze data by learning and deploying qualitative methods. They will also conduct literature reviews to identify gaps in knowledge regarding fatalism measures used in Muslim and non-Muslim populations. The student will help to prepare manuscripts from this project by formatting and developing tables, writing up background information, and other such organizational tasks.

CONFERENCES AVAILABLE FOR PARTICIPATION
Society of Behavioral Medicine; American Public Health Association

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences

PROJECT TITLE
Hypothermia and Cellular Aging

PROJECT DESCRIPTION
Cultured cells exhibit decreased replicative potential and eventually become senescent (Hayflick limit). Aging cells also appear to
be less resistant to environmental stress. Cellular aging or senescence is believed to act as a break in the development of cancer and may be related to tumor suppressors and telomere length, but is not well understood. Hypothermia protects against cellular stress and extends the life span of many organisms including mice, but its effect at the cellular level is unexplored. This project will determine if hypothermia affects cellular senescence and stress response.

**SPECIFIC AIMS**

To determine if subtle decreases in temperature extends replicative lifespan in cultured primary cell lines and the ability to withstand environmental stress.

**METHODS**

Several primary fibroblast cell lines will be cultured in mild or moderate hypothermic conditions with or without hypoxia. Cellular growth rate, replicative life span, and changes in metabolism will be characterized (seahorse analyzer). Micro arrays and or proteomics will be performed on cells demonstrating changes in response to culture conditions compared to normothermic, normoxic treated cell lines.

**SOFTWARE REQUIRED:** Prism

**CONFERENCES AVAILABLE FOR PARTICIPATION**

If the research is successful, the applicant may be able to present at the American Society for Cell Biology meeting in December 2017.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences

**NIH MISSION:** Aging, Heart

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**Medicine—Endocrinology, Diabetes and Metabolism**

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**PROJECT TITLE**

Canagliflozin and Renal Events in Diabetes with Established Nephropathy Clinical Evaluation Trial (CREDENCE) - Janssen Research & Development

**PROJECT DESCRIPTION**

This is an international clinical trial that randomizes a drug used to treat diabetes, canagliflozin versus placebo to evaluate decline in kidney function. We are one of many centers around the world.

**SPECIFIC AIMS**

To define whether an SGLT2 antagonist will slow progression of diabetic kidney disease

**METHODS**

Multicenter clinical outcome trial organized and run at our center in our unit under the direction of a coordinator.
SOFTWARE REQUIRED: I use a stats person

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Kidneys

Mentor: George Bakris, MD
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IRB/IACUC Number: TBA

**PROJECT TITLE**
Study of Diabetic Nephropathy with Atrasentan (SONAR)

**PROJECT DESCRIPTION**
Multi-center international trial that evaluates an endothelin-1 receptor antagonist on progression of diabetic nephropathy in thousands of patients

**SPECIFIC AIMS**
To evaluate when atrasantan, an ET-1 receptor antagonist will slow progression of diabetic nephropathy better than placebo and usual care.

SOFTWARE REQUIRED: Centrally done stats

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Kidneys, Diabetes

Mentor: Liana Billings, MD, MMSc
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**PROJECT TITLE**
FIND MODY: Leveraging the electronic medical record to FIND individuals with Maturity-onset Diabetes of the Young (MODY) who have been misclassified as Type 1 or Type 2 Diabetes and implement gene-directed pharmacotherapies as well as identify new causal mutations.

**PROJECT DESCRIPTION**
The overarching goal of this project is to identify people with MODY in order to implement life-changing therapeutic interventions in those with specific known genetic mutations, establish the optimal MODY screening criteria that can be
deployed in a large electronic health record, identify new genetic variation associated with the MODY phenotype, and build a registry that will enable further studies in pharmacogenetics and identification of new mutations.

**SPECIFIC AIMS**

1) Leverage the electronic medical record to identify patients at high-risk for maturity-onset diabetes of the young (MODY) who are classified as type 1 or type 2 diabetes.
2) Demonstrate the superiority of various screening techniques employed in Aim 1 by providing genetic testing for individuals identified as being high-risk for MODY by at least one screening method.
3) Using this information, develop methods in the electronic medical record to prospectively identify patients who should be screened for MODY.

**METHODS**

1) Perform a bioinformatic query that is launched into the electronic medical record which extracts discrete characteristics that can be used to calculate a score for each MODY screening method.
2) Identify participants at “high-risk” of MODY and offer genetic screening.
3) Compare the performance of the screening methods used to identify individuals at high-risk for MODY.

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Medical Grand Rounds; NorthShore Diabetes Clinical and Research Conference; Thyroid Cancer Conference; Endocrine Research Conference; Clinical Research Methodologies Course. This project is being done with collaborations from investigators at University of Chicago who may have additional conferences to offer.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research

**NIH MISSION:** Diabetes

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**MENTOR:** Matthew Brady, PhD

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**IRB/IACUC NUMBER:** 09-337-B

**PROJECT TITLE**

Impact of Bariatric Surgery on Insulin Sensitivity in Human Fat Biopsies

**PROJECT DESCRIPTION**

A growing number of people in the United States are overweight. The increase in amount of body fat can lead to the development of other diseases such as type 2 diabetes. Unfortunately, it is usually very difficult for humans to maintain significant weight loss through alterations in diet and increased exercise, and weight loss promoting drugs can have dangerous side effects. In the past decade, the surgical reduction of stomach size (bariatric surgery) has become an increasingly popular option to promote weight loss, with over 200,000 surgical procedures being performed in 2009 in the United States. Bariatric surgery routinely results in long term weight loss of between 30-50% and greatly decreases the risk of developing diseases such as diabetes. Interestingly, bariatric surgery also has immediate beneficial effects in patients, allowing many of them to reduce the amount of their medications within two weeks of surgery, before significant weight reduction has occurred. The way in which bariatric surgery rapidly improves patient health independently of weight loss is not currently understood, but improved fat cell function could play a role. The goal of this project is to remove little pieces of fat from patients 2 weeks before undergoing bariatric surgery and two weeks after the surgery. Fat cell function will then be determined and directly compared in the same patients, before and after surgery. Any improvements in fat cell function will then also be compared to changes in the patients’ health in the two weeks following surgery.
MEDICINE–ENDOCRINOLOGY, DIABETES AND METABOLISM

SPECIFIC AIMS
To test the hypothesis that bariatric surgical procedures in humans rapidly improves insulin sensitivity in adipose tissue before significant long term weight loss has occurred.

METHODS
Subcutaneous periumbilical fat biopsies will be obtained from research volunteers approximately two weeks prior and two weeks after bariatric surgery. Primary adipocytes will be prepared by collagenase digestion and floatation centrifugation. Insulin sensitivity will be determined by performing insulin dose response curves and analyzing samples by phospho-specific immunoblotting and potentially metabolic assays. In parallel, mRNA will be prepared for microarray analysis of gene changes induced by bariatric surgery.

CONFERENCES AVAILABLE FOR PARTICIPATION
Adipocyte Biology Group Meetings, Weekly Endocrinology Clinical Case Presentations.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Diabetes

MENTOR: Ronald Cohen, MD
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IRB/IACUC NUMBER: 70984

PROJECT TITLE
Role of SMRT in the Adipocyte

PROJECT DESCRIPTION
Obesity predisposes to the development of Type 2 diabetes and other metabolic disorders, and the adipocyte is now understood to be an active endocrine cell. However, the mechanisms regulating adipocyte differentiation and function are still unclear. Our lab investigates the role of the nuclear protein SMRT (silencing mediator of retinoid and thyroid hormone receptors) in the adipocyte. Previous work has shown that SMRT +/- mice exhibit increased adiposity compared to control mice when fed a high-fat diet. Ongoing work evaluates the role of SMRT in adipocyte differentiation and insulin sensitivity.

SPECIFIC AIMS
To define the role of SMRT in adipocyte differentiation and function.

METHODS
Mouse handling, Western blot, PCR, RT-PCR, Oil Red O staining, lipolysis assays

CONFERENCES AVAILABLE FOR PARTICIPATION
Endocrinology Research Seminars, Committee on Molecular Metabolism and Nutrition Seminar Series, Lab Meetings, Other Conferences.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Diabetes

48  Research Opportunities
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PROJECT TITLE
Etiology, Management and Outcomes of Neonatal Diabetes Mellitus

PROJECT DESCRIPTION
The overall goal of the Bell/Philipson/Greeley/Naylor program has been to elucidate all aspects of monogenic diabetes. Utilizing our online national Monogenic Diabetes Registry (http://monogenicdiabetes.uchicago.edu), our efforts have included uncovering genetic diagnoses, understanding natural history and associated features, clarifying best treatment, and tracking long-term outcome. Along with our international collaborators, we have led efforts to clarify monogenic determinants of early onset diabetes, including our discovery of heterozygous mutations in the insulin gene as the second most common cause of permanent neonatal diabetes (defined as treatment-requiring diabetes diagnosed under 6 months of age). The subjects in the Registry serve as a living biobank for further studies that have included basic science investigation of molecular mechanisms of disease, development of next-generation sequencing panels for comprehensive testing, cost-effectiveness analysis of genetic testing, determinants of successful treatment outcomes in those with particular genetic etiologies allowing for use of oral agents in lieu of insulin, characterization of associated neurodevelopmental disabilities and sleep disturbances, and the value of patient/family online discussion support groups.

SPECIFIC AIMS
To clarify genotype-phenotype associations predicting treatment outcome and other associated features in monogenic forms of neonatal diabetes.

METHODS
Analysis of sequencing data for detection of disease-causing variants, analysis of Registry data for hypothesis testing, development of surveys for novel data collection, as well as a variety of other possible options.

CONFERENCES AVAILABLE FOR PARTICIPATION
Lab meetings; weekly “Endorama” clinical endocrinology case conferences; Endocrinology Research Seminars; Committee on Molecular Metabolism and Nutrition Seminar Series; Other relevant research seminars per the interest of the student.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Diabetes
**PROJECT TITLE**
Dissecting Cross Talk Between Renin-Angiotensin System (RAS) and Notch Signaling in Human and Experimental Colon Cancer

**PROJECT DESCRIPTION**
Renin angiotensin system (RAS) regulates vascular and renal homeostasis and participates in immune regulation and inflammation. We have shown that vitamin D suppresses experimental colon cancer development at least in part by suppressing renin expression. Notch signals are required for colon cancer development but potential cross talk between RAS and Notch have not been elucidated in colon cancer.

**SPECIFIC AIMS**
To determine whether RAS signals activate Notch signals in colon cancer. We will use a variety of approaches including inhibitors, siRNA and activators to define the relationship between RAS and Notch signals in colon cancer cells.

**METHODS**
1) Cell culture methods and colon cancer cell lines
2) Mouse colon tumors from studies using vitamin D and RAS inhibitor
3) Losartan to assay RAS and Notch signals by Western blotting, immunostaining and real time PCR.
4) Human colon cancers to assay RAS and Notch signals

**SOFTWARE REQUIRED:** Excel

**CONFERENCES AVAILABLE FOR PARTICIPATION**
GI research conferences; Weekly GI lab meetings; Research journal club

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences, Clinical Research

**NIH MISSION:** Digestive Diseases
MEDICINE–GASTROENTEROLOGY, HEPATOLOGY AND NUTRITION

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IRB/IACUC NUMBER: A3523-01

PROJECT TITLE
Microbiome-Based Interventions for Diet-Induced Obesity

PROJECT DESCRIPTION
This project will examine the role of specific metabolites generated by gut microbes that affect host circadian rhythm and energy balance in states of health and under conditions of diet-induced obesity. Circadian rhythm (CR) is an important regulator of energy balance, and our studies have shown that gut microbes provide critical input into the regulation of CR. Several metabolites produced by gut microbes directly affect CR regulation in the brain, liver, and gut. In diet-induced obesity, the functions and metabolome of the gut microbiome are disrupted, resulting in aberrant cues and the disruption of CR and energy balance. Preliminary studies have shown that if these metabolic signals are restored, CR can be restored and DIO can be inhibited. The timing and route of their administration appear to be critical to optimize these beneficial effects. The goal of this study will be to screen and characterize microbe-derived metabolites in hepatic organoids and in mice consuming high fat, high caloric diets to determine if they counteract the development of diet-induced obesity and through what mechanism of action.

SPECIFIC AIMS
1) Screen and select from a panel of gut microbe-derived metabolites those that regulate hepatic organoid circadian rhythm and metabolic states.
2) Test high value metabolites produced by gut microbe in mice consuming high fat, high caloric diets to determine their effects on CR, energy balance, and resistance to diet-induced obesity.

METHODS
1) Hepatic organoids derived from during hepatic stem cells will be used to screen and test known bioactive microbe-derived metabolites to determine their effects on gene expression and rhythmicity of Bmal1 and Per2 (circadian clock genes). Organoids will be prepared by the Digestive Disease Research Core Center and gene expression will be determined by quantitative PCR.
2) Selected microbe-derived metabolites will be administered either by gavage, intraperitoneal, or intracecal routes at specific timed-intervals. Their impact on CR will be assessed by PCR measures of tissue circadian clock gene expression. Measures of serum hormone levels and adiposity will also be performed.

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly lab meetings; Weekly GI and Endocrine research conferences; Seminars sponsored by the Committee on Molecular Metabolism and Nutrition.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Diabetes, Digestive Diseases
MECHANISMS UNDERLYING IL-15 MEDIATED IMMUNOPATHOLOGY

PROJECT DESCRIPTION
IL-15 plays a critical role in autoimmunity and celiac disease. It alters profoundly the transcriptional program of cytotoxic T cells (CTLs) and significantly increases their cytolytic properties and survival. 50% of the transcriptional alterations are dependent on histone deactylase activity (HDAC). HDAC inhibitors including butyrate inhibit the pathogenic effects of IL-15. The goal of this project is to identify which HDAC protein is critical for the IL-15 mediated pathogenic effects. Identifying a specific inhibitor opens the door for the initiation of clinical trials in preclinical models of celiac disease and eventually in patients responding poorly to a gluten free diet.

SPECIFIC AIMS
1) Using specific HDAC inhibitors determine which HDAC is required for the IL-15 mediated pathogenic effects in CTLs using quantitative PCR to assess expression of granzyme B and the antiapoptotic factors Bcl2 and BclXL. Preliminary data suggest that HDAC 6 may play a critical role.
2) Having identified the HDAC candidate determine whether blocking it specifically inhibits the functional cytolytic properties and survival of CTLs.

METHODS
Quantitative PCR, Flow cytometry, Cytotoxic assays

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Digestive Diseases
our laboratory optimized ex vivo culture techniques (primary colon tissue and stem cell-derived organoid cultures) from normal tissue obtained during colonoscopy to study molecular and cellular phenotypes across individuals and ethnicities. Compared to studying responses in vivo, modeling of cellular environments ex vivo allows for a controlled way to study effects of exposures on phenotypes, such as gene expression. Here, we apply these techniques to test the central hypothesis that colonic transcriptional responses to vitamin D and aspirin differ between AA and European Americans (EA), and that these inter-ethnic differences could impact CRC risk and clinical response.

**SPECIFIC AIMS**
Characterize inter-ethnic differences in transcriptional response to 1,25D & aspirin and test for a genetic contribution to observed differences.

**METHODS**
We treat primary ex vivo colon cultures in parallel with the chemopreventive agents and their controls in 60 AA and 60 EA and sequence RNA to: 2A) Identify shared and unique genes and networks by treatment and ethnicity in order to elucidate the biology of chemoprevention in the colon and differences across ethnic groups; and 2B) Test for a genetic basis underlying observed transcriptional responses by allele specific expression (ASE).

**CONFERENCES AVAILABLE FOR PARTICIPATION**
GI research conference; GI clinical conference; Weekly lab meetings

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences

**NIH MISSION:** Digestive Diseases

**MENTOR:** Vanessa Leone, PhD  
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**PROJECT TITLE**
The Role of Human Commensal Microbes in Modulating Obesity Outcomes

**PROJECT DESCRIPTION**
Recent research suggests that the trillions of gut microbes located within the intestine play a crucial role in development of metabolic diseases, including obesity and diabetes. The technological advancements in next generation sequencing have given researchers further insight into the richness of gut microbes in human health and disease. Studies thus far clearly show a vast amount of heterogeneity of gut microbial communities between individuals, making it difficult to therapeutically target and improve the gut microbiome within a specific disease state. Several studies have suggested that the use of probiotics (live microorganisms that, when administered in adequate amounts confer a health benefit onto the host) can help to restore metabolic health in obese subjects. However, success of probiotic use to treat obesity and related metabolic disorders has been mixed and it remains unclear as to why probiotics work in some subjects, but not others. Improving our understanding of how and if existing probiotics work within an individual would provide clarity as to who would and who would not respond therapeutic exposure as well as which probiotic might be most effective. Furthermore, identifying novel strains of probiotic species from healthy humans could also provide unique strategies to improve the gut microbial community within an individual and help to alleviate metabolic diseases, such as obesity.
MEDICINE–GASTROENTEROLOGY, HEPATOLOGY AND NUTRITION

SPECIFIC AIMS
Determine how novel strains of gut microbes isolated from lean healthy subjects can prevent development of obesity even in the face of high fat, high simple carbohydrate Western diet.

METHODS
1) Isolate species and strains of gut microbes from lean human subjects.
2) Characterize strains of gut microbes via sequencing of the 16S rRNA gene.
3) Using in vitro (enteroids) and in vivo (germ-free mice) technologies, determine how novel microbes influence molecular metabolism and metabolic outcomes.

CONFERENCES AVAILABLE FOR PARTICIPATION
Digestive Diseases Week (DDW) 2017; Experimental Biology 2017

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Digestive Diseases

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IRB/IACUC NUMBER: 71525

PROJECT TITLE
Metabolic Syndrome and Gut Innate Immunity

PROJECT DESCRIPTION
The connection between gut microbiota and metabolic disorders such as obesity and diabetes has been well established, but how metabolic dysfunction in turn influences gut mucosal immunity is less clear. The gut innate immune system plays a key role in the regulation of intestinal homeostasis. As an integral part of the mucosal innate immune system, innate lymphoid cells (ILCs) are a growing family of newly discovered tissue-resident immune cells that have important effector functions in immune protection, tissue homeostasis, repair and remodeling. In the gut ILCs play key roles in intestinal protective immunity and the maintenance of mucosal barrier integrity. We have found that the populations of gut ILCs are markedly different between obese mice and their lean counterparts, suggesting that metabolic dysregulation greatly influences gut innate immunity. The goal of this project is to address how metabolic dysfunction impacts the development and function of gut ILCs.

SPECIFIC AIMS
1) To assess the effects of metabolic dysfunction on the development of gut mucosal ILCs using obese and diabetic animal models.
2) To assess the impact of metabolic dysfunction on ILC-mediated gut mucosal innate immunity using bacterial and parasite infection models.
**METHODS**

Gut lamina propria and lymph node cells will be isolated from genetically obese mice and high fat diet induced obese mice, and these cells will be analyzed by fluorence activated cell sorting (FACS) for ILC populations. These mice will also be studied when orally infected with bacteria or parasites. Bone marrow transplantation technique and gene knockout mice will be used in the study.

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Weekly lab meeting; Weekly GI research conferences; Research seminars on campus

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences

**NIH MISSION:** Aging, Blood, Diabetes, Digestive Diseases, Heart

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**MENTOR:** Yanchun Li, PhD

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**PROJECT TITLE**

Epigenetic Effects of Diabetes on Macrophages

**PROJECT DESCRIPTION**

Diabetes is known to affect innate immunity and alter innate immune cell functions. For example, hyperglycemia promotes the inflammatory phenotype of monocytes and macrophages. The molecular mechanism underlying the hyperglycemic effects, however, remains incompletely understood. Our preliminary studies show that hyperglycemia alters the epigenome of monocytes and macrophages leading to activation of pro-inflammatory cytokine genes and many other genes. The goal of the project is to assess how high glucose regulates gene expression in monocytes/macrophages in vitro and in vivo.

**SPECIFIC AIMS**

1) To explore the epigenetic changes and their underlying mechanism induced by high glucose in monocytes/macrophages.
2) To explore the metabolic and signaling pathways that mediate the epigenetic effects of high glucose.

**METHODS**

Monocytes/macrophages will be obtained from culture of established cell lines, derived from bone marrow cells and isolated from blood or peritoneal cavity of type 1 and type 2 diabetes mice. Peripheral blood mononuclear cells will also be obtained from diabetes patients. Gene expression and protein alterations will be analyzed by real time RT-PCR and Western blotting. Changes in the epigenome will be assessed by ChIP-Seq. Epigenetic changes and chromatin remodeling will be assessed by ChIP assays. Gene promoter activity will be assessed by luciferase reporter assays.

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Weekly lab meeting; Weekly GI research conferences; Research seminars on campus

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences

**NIH MISSION:** Aging, Blood, Diabetes, Digestive Diseases, Heart, Lungs
PROJECT TITLE
The Role of High Glucose Diets in Bacterial Virulence Factor Expression and Intestinal Damage that Contributes to Inflammatory Bowel Disease

PROJECT DESCRIPTION
Inflammatory bowel diseases (IBD) are diseases of intestinal epithelial cell (IEC) death, mucosal damage, and altered barrier function. Bacteria have been extensively implicated in IBD through studies showing that the gut microbial community is altered in IBD and that bacteria are necessary for development of colitis in murine models. A role for bacteria is also supported by IBD-associated genetic polymorphisms in bacterial sensing and response genes. However, the specific mechanisms whereby bacteria contribute to IBD remain relatively unknown.

This project will focus on how bacteria switch between commensal and virulent states in the gut and how expression of virulence in normally commensal bacteria contributes to inflammatory bowel disease. Patients with IBD have increased numbers of adherent E. coli in their intestine, but the reasons for this are unknown. E. coli express the adherence protein FimH and increase their adherence to intestinal tissues when they encounter stressful conditions. One stressful condition that increases FimH expression and E. coli adherence to cells is growth under high glucose conditions. Therefore, this project will test the hypothesis that high glucose diet consumption promotes FimH expression, epithelial adherence, and intestinal inflammation that contributes to colitis.

SPECIFIC AIMS
1) Determine the role of high glucose diets on expression of the E. coli virulence factor FimH and tissue adherence.
2) Determine the role of diet-induced FimH expression in E. coli-induced inflammation and intestinal damage

METHODS
In these studies the student will utilize tissues from mice colonized by E. coli and fed a high glucose diet as well as primary intestinal epithelial cells exposed to E. coli grown under high glucose conditions. The student will perform fluorescent microscopy, quantitative real time PCR, immunoblotting, and classic microbiological techniques in this project.

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly lab meetings, departmental clinical and basic science seminars.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Digestive Diseases
MEDICINE–GASTROENTEROLOGY, HEPATOLOGY AND NUTRITION

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PROJECT TITLE
The Role of Bacterial-Induced Inflammation in Intestinal Gluconeogenesis and Type 2 Diabetes Mellitus

PROJECT DESCRIPTION
Type 2 diabetes mellitus (T2DM) is a disease of chronic inflammation and insulin resistance. The gastrointestinal (GI) tract and its resident microbes have been implicated in T2DM since gastric bypass surgery improves disease and T2DM patients have changes in microbial community composition in their gastrointestinal (GI) tracts. However, the mechanisms through which bacteria contribute to initiation or perpetuation of inflammation and insulin resistance remain poorly understood.

This project will focus on how bacterial-induced inflammation regulates glucose metabolism in the small intestine. The small intestine absorbs glucose, utilizes it for energy production and biosynthesis, and can perform gluconeogenesis to export glucose to the liver in times of need. Inflammation can alter glucose metabolism, theoretically to prepare cells to defend against bacterial invasion or damage. Therefore, this project will test the hypothesis that bacterial-induced inflammation promotes glucose production and export from intestinal epithelial cells to the liver.

SPECIFIC AIMS
1) Determine the role of bacteria in intestinal gluconeogenesis.
2) Determine the role of bacteria in gluconeogenesis in intestinal epithelial cells.

METHODS
In these studies the student will utilize small intestinal tissues and blood samples from germ free and conventionally raised mice as well as primary intestinal epithelial cells exposed to bacteria. The student will perform colorimetric/fluorescent assays of glucose and glucose metabolites, quantitative real time PCR, and immunoblotting.

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly lab meetings, departmental clinical and basic science seminars.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Diabetes
PROJECT TITLE
Physician Preferences Towards Offering Hepatitis C Positive Organs to Patients Waiting for Organ Transplantation

PROJECT DESCRIPTION
There is an increasing shortage of donor organs across transplant specialties resulting in increased wait times and high mortality rates for patients waiting for organ transplantation. The use of extended criteria and high-risk organs has been increasingly utilized with great success. The use of hepatitis C positive organs into negative recipients is also currently under investigation, especially given the high cure rates associated with current hepatitis C therapy. However, much is unknown about not only patient attitudes towards accepting such organs, but also provider preferences in offering hepatitis C positive organs. Understanding provider attitudes is important as physicians’ recommendations can often affect patient decisions.

SPECIFIC AIMS
1) To determine provider preferences (including primary care physicians, gastroenterologists, hepatologists, and transplant surgeons) towards offering hepatitis C positive organs to patients without hepatitis C across kidney, liver, and heart transplantation.
2) To determine if differences exist between specialties in their willingness to offer a hepatitis C positive organ to their patients.

METHODS
Survey of provider specialties through their respective societal agencies.

SOFTWARE REQUIRED: Excel

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly GI clinical case conference; GI research conference; Organ transplant listing meeting

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Digestive Diseases
MEDICINE–GASTROENTEROLOGY, HEPATOLOGY AND NUTRITION

In a critical organ shortage. This results in increased wait times and high mortality rates for patients on an organ transplantation list. In response, organs that were once considered marginal (such as extended criteria donors, donors after cardiac death, and high risk organs) are increasingly being utilized. Given this, there has been interest in the use of hepatitis C positive organs for patients with a history of hepatitis C, specifically in liver and kidney recipients. Currently, there are ongoing studies examining the use of hepatitis C positive organs into patients without a history of hepatitis C with immediate hepatitis C treatment after transplantation. Given the high cure rates for hepatitis C in the era of direct acting viral therapy, this is certainly an option. However, what is unknown are patient attitudes towards receiving such an organ.

SPECIFIC AIMS
1) To determine attitudes towards receiving a hepatitis C positive organ in patients without hepatitis C that are listed for kidney and/or liver transplantation.
2) To determine if attitudes towards a hepatitis C positive organ changes with increased wait time on the organ transplantation list or as the patient’s clinical status worsens.

METHODS
Survey of patients on university of Chicago liver, kidney, and heart transplantation list.

SOFTWARE REQUIRED: Excel

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly GI clinical case conference; GI research conference; organ transplant listing meeting

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Digestive Diseases

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PROJECT TITLE
Role of Fucosylation in Crohn’s Disease

PROJECT DESCRIPTION
Deficiency of fucosyltransferase 2 (FUT2) in humans which is involved in inducible fucosylation has been linked (by GWAS studies) to Crohn’s disease (CD). GWAS analysis in patients with CD indicates that FUT2 loss is important for the disease development. However, about 20% of all humans lack FUT2 activity (termed ‘non-secretors’ as they do not fucosylate blood group antigens in the tissues and secretions, including saliva) and remain free of intestinal inflammation under steady state conditions. Thus, lack of fucosylation is likely not a causative, but a contributing factor in CD development. In this study, we will assess if fucosylation affects the severity of inflammation in patients with Crohn’s disease.

SPECIFIC AIMS
Test if the disease severity and clinical outcome in patients with Crohn’s disease is different in FUT2+ and FUT2- patients.

METHODS
FUT2 positive and negative status will be assessed by a previous GWAS study.
Archived paraffin sections from ileal and colonic (control) biopsies from on qualified patients will be obtained for the detection of fucosylation with UEA-1 lectin by immunofluorescence. The intensity and distribution of UEA-1 lectin expression will be assessed in each sample.

Correlation will be made between FUT2 genotype, ileal fucosylation, histologic disease activity, endoscopic disease activity, and clinical disease activity. In order to assess the changes in fucosylation with time, ileal biopsies will be compared across multiple exams in the same patients and fucosylation compared with changes in histologic inflammation. In order to assess if fucosylation impacts disease-related outcomes, comparison will also be made between FUT2 genotype, ileal fucosylation, and disease severity as assessed by the number of Crohn’s-related surgeries, time to progression to a second surgery after a first operation, number of Crohn’s related hospitalizations, need for biologic therapy, average number of corticosteroid prescriptions per year, number of years in follow up with at least one recorded harvey bradshaw index >4, and percentage of endoscopic exams in endoscopic and histologic remission. In addition, patients who always remained in endoscopic and histologic remission will be compared to those who had disease activity at any point in follow up.

CONFERENCES AVAILABLE FOR PARTICIPATION
Inflammatory Bowel Disease Research in Progress Meeting occurring every other week; Dr. Pekow’s laboratory meeting weekly; Dr. Alexander Chervonsky who will guide immunostaining work has laboratory meetings weekly.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Digestive Diseases

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PROJECT TITLE
Longitudinal Changes of Patient Reported Outcomes and Quality of Life Measures in Inflammatory Bowel Disease

PROJECT DESCRIPTION
University of Chicago Inflammatory Bowel Disease Center has announced a groundbreaking partnership with the Center for Research Informatics and a healthcare startup to study wearable devices as instruments for measuring disease activity and quality of life in patients with Crohn’s disease and ulcerative colitis. As part of a larger fully funded initiative, we have developed a number of hypotheses related to physical activity and disease activity. It has been recognized in retrospective and large databases such as the Nurses Health Study that individuals who are more physically active are less likely to develop inflammatory bowel disease. We believe that physical activity will directly correlate to disease activity and quality of life. In order to test these hypotheses, we will be using Fitbit technology synced to a proprietary smart phone app which will record data and prompt patients for completion of validated instruments related to quality of life, symptoms, and sleep quality.

SPECIFIC AIMS
We will specifically correlate physical activity, as measured by Fitbits, to disease activity in both Crohn’s disease and ulcerative colitis during this project.
METHODS
The protocol is already approved by the IRB. Students will be involved in all aspects of this study, including novel analyses and original components of the project. Patients will be recruited from the Inflammatory Bowel Disease Center clinics and mostly from Dr. Rubin’s clinics. Patients will be provided a free Fitbit and taught how to download and use a proprietary application on their smart phones. The app prompts the patient to fill out specific validated quality of life, sleep quality, pain, and additional instruments over a period of time. After 30 to 60 days of data collection, data will be aggregated and analyzed to compare disease activity to physical activity and overall quality of life will be analyzed. Based on these results, sub-studies and additional hypotheses will be generated.

CONFERENCES AVAILABLE FOR PARTICIPATION
Students who participate in this project will shadow Dr. Rubin in his international inflammatory bowel disease clinics and will also have the opportunity to shadow him in the GI Procedure Unit to learn about endoscopic procedures. They will attend the Inflammatory Bowel Disease Center “Research In Progress” meetings every other week, the Multidisciplinary Case Conference every other week, and the University of Chicago led national Telehealth Conference once monthly. Students are encouraged to separately attend any other GI conferences of interest including the Monday case conference, Thursday research conference, and Friday Fellows board review conference. In addition, students will be supported for attendance at CME meetings which Dr. Rubin coordinates, including a national meeting in July held in Chicago. Any conference which the student’s abstract is submitted to will also be available for students to attend with Dr. Rubin’s support.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Digestive Diseases
**METHODS**

This will be a retrospective case control study design that will utilize available electronic medical records and the established and validated registry of IBD patients at the University of Chicago. This registry is the largest of its kind in the world. Patients will be identified using a previously described algorithmic approach to patient records, and outcomes will be determined based on chart review, prerecorded disease activity indices, and medication records from the registry. Univariate and multivariate analysis, as well as survival curves of time to relapse, recurrence of Clostridium difficile, and other outcomes will be analyzed.

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Students who participate in this project will shadow Dr. Rubin in his international inflammatory bowel disease clinics and will also have the opportunity to shadow him in the GI Procedure Unit to learn about endoscopic procedures. They will attend the Inflammatory Bowel Disease Center “Research In Progress” meetings every other week, the Multidisciplinary Case Conference every other week, and the University of Chicago led national Telehealth Conference once monthly. Students are encouraged to separately attend any other GI conferences of interest including the Monday case conference, Thursday research conference, and Friday Fellows board review conference. In addition, students will be supported for attendance at CME meetings which Dr. Rubin coordinates, including a national meeting in July held in Chicago. Any conference which the student’s abstract is submitted to will also be available for students to attend with Dr. Rubin’s support.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research

**NIH MISSION:** Digestive Diseases

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**IRB/IACUC NUMBER:** Exempt

**PROJECT TITLE**

Meta-Analytic Approach in Identifying High-Risk Colon Cancer Populations

**PROJECT DESCRIPTION**

Certain diseases carry higher colon cancer risk, however, observational cohort studies are often under-powered and may demonstrate conflicting results. Meta-analysis can pool the data of multiple studies and provide evidence with higher statistical power.

**SPECIFIC AIMS**

Identify and quantify the risk of colon cancer in certain patient populations

**METHODS**

Literature search, data gathering, use of meta-analysis software, manuscript preparation.

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Full paper or abstract submission to journals or annual DDW meeting

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research
PROJECT TITLE

SIESTA (Sleep for Inpatients: Empowering Staff to Act)

PROJECT DESCRIPTION

Although sleep is imperative to biological function and of critical importance in the recovery process from acute illness, hospitalization is far from restful. Almost half of Medicare patients who have been hospitalized nationwide state that their hospital room was not kept quiet at night. Our prior work has demonstrated that hospitalization is a period of acute sleep deprivation for patients, nighttime noise levels in hospital rooms are often high, and hospital noise levels are associated with clinically significant sleep loss. Our prior work has also demonstrated that this sleep loss is associated with higher morning blood pressure. Furthermore, at the root of these sleep disruptions are modifiable factors, such as staff conversation and medical care interruptions.

In addition to guarding against ongoing sleep loss in hospitalized patients, hospitalization is a ‘missed opportunity’ to screen patients for sleep-disordered breathing and provide them with education regarding proper sleep hygiene. Given the very high prevalence of sleep-disordered breathing among hospitalized patients, it is recommended that hospital staff routinely screen patients for potential sleep disorders so that patients can receive optimal treatment in a timely fashion. Although experts in sleep, nursing, and hospital medicine agree on the need to optimize sleep in hospitals and improve screening for sleep disorders among hospitalized patients, no educational program to date has focused on training hospital staff to achieve this change. To address these concerns and improve patient’s sleep in US hospitals, we aim to develop, implement, and evaluate the SIESTA (Sleep for Inpatients: Empowering Staff to Act) educational program.

We will draw upon the skills of a multidisciplinary group of faculty and consultants with expertise in sleep medicine and research, adult learning theory, public health education outreach, continuing medical education, and e-learning. Together, we will use innovative educational methods grounded in experiential learning theory to promote staff learning and behavior change. Our educational program will specifically align with the Kolb model of experiential learning, founded on the notion that a discrete experience triggers knowledge that is contextualized and then applied to subsequent experiences. In the first stage, concrete experience (CE), the learner has an active experience. During the second stage, reflective observation (RO), the learner then consciously reflects on that experience. In the third stage, abstract conceptualization (AC), the learner attempts to learn a theory or model to explain the experience. Finally, during the fourth stage, active experimentation (AE), the learner formulates a plan to test the model or theory or plan a forthcoming experience.

SPECIFIC AIMS

1) To conduct a needs assessment of hospital staff and patients to inform the development of the SIESTA program and toolkit which aims to improve sleep in hospitalized patients using the Kolb Experiential Learning Cycle.
2) To evaluate the effect of the SIESTA educational program on hospital-based staff (physicians, residents, nurses) satisfaction, knowledge, and behavior including patient sleep outcomes and hospital noise.

METHODS

The SIESTA program will build on the prior research presented below and conducted by PI Dr. Vineet Arora and colleagues to create an educational intervention designed to prepare staff to assist patients in obtaining better sleep in hospitals. Specifically, we will employ novel educational tools to train hospital staff (nursing staff, hospital-based physicians such as residents and hospitalists) how to preserve sleep for hospitalized patients.
SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Society of General Internal Medicine, Society of Hospital Medicine, Research Innovations in Medical Education, Medical Education Day, and General Medicine Research in Progress

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety), Medical Education

NIH MISSION: Aging

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PROJECT TITLE
Understanding Sleep and Activity in Patients Discharged from the Hospital

PROJECT DESCRIPTION
Better sleep is associated with a variety of improved health outcomes in older adults, such as improved cognition, mood, physical health. Because of these reasons, it is recommended that older adults should improve their sleep hygiene and optimize their surrounding environment to obtain the best sleep possible. Unfortunately, this is especially difficult when older patients are hospitalized, due to a variety of factors that may disrupt sleep, such as the environment (e.g. noise), routine medical care (e.g. vital signs, medications) or illness (e.g. pain). Our group has shown that sleep loss in the hospital is substantial and may have an impact on a variety of health outcomes, such as high blood pressure or poor memory. One outcome of interest is how patients recover their sleep after the hospitalization.

SPECIFIC AIMS
1) Assess the feasibility of using actigraphy to objectively measure sleep duration and quality in a cohort of 500 older ambulatory community-dwelling patients after being discharged from the hospital, in order to compare sleep duration and quality while at home (post-hospitalization) versus as an inpatient.
2) Assess the feasibility of using actical to objectively measure activity count and energy expenditure of a cohort of 500 older ambulatory community-dwelling patients after being discharged from the hospital, in order to compare activity and energy expenditure while at home (post-hospitalization) versus as an inpatient. 56 Research Opportunities Medicine–General Internal Medicine
3) Assess the feasibility of using subjective sleep questionnaires to measure sleep quality for a cohort of community dwelling seniors after being discharged from the hospital, in order to compare sleep quality while at home (post-hospitalization) versus as an inpatient.

METHODS
The study population is community-dwelling ambulatory patients age 50 or above hospitalized on the University of Chicago general medicine and hematology/oncology services that have consented to our parent study, the Hospitalist Project (amendment 62 to protocol #9967). Eligible patients will be identified for participation using the ongoing Hospitalist Project infrastructure (amendment 62 to #9967). Exclusion criteria include: (1) transfer from the ICU or another hospital; (2) cognitively impaired
(abbreviated MMSE<17 determined during Hospitalist Study inpatient assessment); (3) not ambulatory; (4) residents of a nursing home or skilled nursing facility; (5) on bedrest; (6) documented sleep disorder in their medical history (i.e. obstructive sleep apnea, narcolepsy, etc).

Eligible patients will be identified for participation using the Hospitalist Project and interviewed during their first 24 hours of admission using an Initial Sleep Evaluation. At that time, the Daily Sleep Assessment will be administered and then repeated every morning between 10am and 12pm until discharge. Each patient will be asked to wear an Actiwatch to objectively record sleep until the day of discharge. Patients will be asked to continue wearing this watch one week after discharge. Median length of hospital stay is 4 days.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Outcomes Research Workshop and General Medicine Research in Progress; Society of Hospital Medicine; Society of American Geriatrics & Society of General Internal Medicine.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

**NIH MISSION:** Aging

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**PROJECT TITLE**
Understanding Pediatric Experience of Sleep In Hospitals

**PROJECT DESCRIPTION**
Although sleep is imperative to biological function and of critical importance in the recovery process from acute illness, hospitalization is far from restful. Almost half of Medicare patients who have been hospitalized nationwide state that their hospital room was not kept quiet at night. Our prior work has demonstrated that hospitalization is a period of acute sleep deprivation for patients, nighttime noise levels in hospital rooms are often high, and hospital noise levels are associated with clinically significant sleep loss. Our prior work has also demonstrated that this sleep loss is associated with higher morning blood pressure. Furthermore, at the root of these sleep disruptions are modifiable factors, such as staff conversation and medical care interruptions.

In the last year, we have intervened on an adult general medicine unit with staff (nurse, resident, and hospitalist) education and modifications to the EPIC order sets (the option to forgo overnight vitals, the option to change labs from 4a to 10p, and the ability to choose BID instead of q8 Heparin). We also monitored noise and objective and subjective sleep in patients on this unit with actigraphy and daily surveys. In the coming year we are planning expanding this study to Comer Children’s hospital, where we hope to enroll children in actigraphy to measure objective sleep quality and duration as well as survey the parent on the child’s sleep quality and any disruptions they may have experienced in order to assess what may be some points of intervention to improve inpatient sleep for children.
MEDICINE–GENERAL INTERNAL MEDICINE

SPECIFIC AIMS
1) Assess the feasibility of using actigraphy to objectively measure sleep duration and quality in a cohort of 50 community-dwelling children while inpatients at Comer Children’s Hospital.
2) Assess the feasibility of using subjective sleep questionnaires to measure sleep quality and nocturnal disruptions for a cohort of approximately 50 community dwelling children.
3) Develop an intervention to improve inpatient sleep for children admitted to Comer 5.

METHODS
Eligible patients will be identified for participation and interviewed during their first 24 hours of admission using an Initial Sleep Evaluation. At that time, the Daily Sleep Assessment will be administered and then repeated every morning between 10am and 12pm until discharge. Each patient will be asked to wear an Actiwatch to objectively record sleep until the day of discharge.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Outcomes Research Workshop and General Medicine Research in Progress; Society of General Internal Medicine; Society of Hospital Medicine & Research Innovations in Medical Education.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety), Medical Education

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PROJECT TITLE
TEACH Spreading Teen Research-Inspired Videos to Educate Schoolmates (STRIVES)

PROJECT DESCRIPTION
Despite several decades of effort that have produced meaningful insights into factors affecting the entry of minority students into careers in health research, there is still a great need to further promote entry of minority students into health research. Our research on how minority youth select careers has shown that when minority students are interested in career in health research, a dedicated program with realistic career experiences and multi-tiered mentors can increase knowledge, attitudes and behaviors needed for a career in health research. However, we found that such programs are much less effective if students do not have a pre-existing interest in careers in health research. Unfortunately, few students are interested in research careers at baseline and little is known about how to augment their interest. Research on interventions that can “prime the pump” for pipeline programs by boosting baseline interest in research careers is vital.

Peer social networks may be a potential way to increase interest in careers in health research among underrepresented minority students. The explosion of social media and smartphones has facilitated the creation of social learning networks online which is a well-documented way for teenagers to interact with each other and to obtain trusted information. According to the Pew Internet Project, nearly three quarters of online teens use social network sites. Roughly 85% of teens who use social networking sites are active participants, engaging in activities such as posting comments or pictures. Nearly 40% of teens report sharing content online that they personally created, such as self-created videos.
Interestingly, there is reason to believe that online social networking interventions that aim to boost career interests would be more effective for underrepresented racial and ethnic groups as well as teens from low income families than for whites. Data suggests that online social network use is higher among teens from low-income families than in teens from wealthier households. Moreover, minority families are more likely than whites to remotely access the internet via mobile devices. This highlights the enormous potential for online social media interventions to influence career interest and engagement in minority youth.

Studies suggest that messages that have the potential to change people’s attitudes and behaviors often originate from a trusted peer. This is especially true in teens, who value the opinion of and seek to emulate their peers. While peer pressure is often cast as a negative phenomenon among teens, the use of positive peer pressure to change behavior among teens is gaining in popularity. Positive peer pressure has been used in many youth-to-youth messaging campaigns related to difficult to change behaviors such as alcohol and drug abuse or safe sex. Drawing upon these theories for motivating and engaging teens, this proposal aims to test the effectiveness of a novel peer-to-peer social media marketing campaign to spread video vignettes created by teens to inspire other teens to consider careers in clinical research.

SPECIFIC AIMS

1) To engage high achieving minority youth enrolled in an intensive pipeline clinical research program in performing focus groups and surveys of their peers to characterize what types of messages would be most likely to motivate their peers to consider a career in clinical research.

2) To engage high-achieving minority youth participating in a pipeline clinical research program in a social media campaign in which they will create a short video to promote interest in clinical research careers and spread it to their schoolmates.

3) To evaluate the reach of social media campaign led by students in a pipeline clinical research program to spread a video they create to improve interest in clinical research careers.

METHODS

To identify themes that could be used to inspire and motivate their peers, we will coach students in TEACH students to conduct focus groups with other high achieving youth in the Collegiate Scholars Program.

Based on the messages that we discover in the focus groups, we will then coach students to create a short video that aims to inspire students to learn more about careers in clinical research. To create the video, students will create a script that relates to the themes that emerged from focus groups. Students will also be taught the Activation Theory of Information Exposure, which highlights the most effective messages are both informative but also entertain.

To measure reach of the social media campaign, we will use internet analytics to track the number of views and momentum of the campaign.

To assess the effectiveness of the social media campaign on schoolmates, we will use a model that was developed for marketing and advertising to evaluate the effectiveness of our program.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION

Outcomes Research Workshop; General Medicine Research in Progress

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences, Medical Education
PROJECT TITLE
Identifying Messages to PROmote Value and Education (IMPROVE) of Generic Prescribing

PROJECT DESCRIPTION
One of the most obvious, but unfortunately underused, strategies to improve value of care is prescribing generic drugs. A recent IMS Health report concluded that generic drug use “saved the American health care system more than $824 billion over the past decade, and $139.6 billion in 2009 alone.” Not only are generic drugs often 75% cheaper than retail prices of the brand-name, they are also equally efficacious. Some studies have even shown improved medication adherence, translating into better patient outcomes, with generics.

Given the potential benefit to patients, payers, and the healthcare system, it is imperative that frontline clinicians take personal responsibility for prescribing generic medications for patients. While there is an overall high utilization of generic drugs in the U.S. compared to other countries, it is important to recognize that utilization of generics varies by therapeutic class. Namely, clinicians can be reluctant to prescribe generic antidepressants or oral contraceptives, two of the most routinely prescribed medications by primary care providers. Concerns regarding generic substitution in these classes center around dosing adjustments needed to achieve bioequivalence or non-adherence giving rise to unintended consequences such as depressive episodes or unintended pregnancy. In contrast, there is a higher rate of prescribing generic cholesterol lowering drugs, although there is still billions of dollars in excess spent each year on brand-name statins.

Understanding prescriber barriers and facilitators to prescribing generic drugs is critical to improving ‘generic efficiency’ for a particular class of drugs, or the percentage of drugs in a class prescribed that are generic. Unfortunately, many clinicians may hold negative perceptions about generic medications. More than one quarter of physicians in one survey would NOT use generics as first-line medications for themselves or for their family. Currently, pharmaceutical representatives are the most common information source about market availability of generic medications. This underscores the need for developing and testing powerful evidence-based messages that can counteract existing marketing strategies that promote prescribing costlier brand-name drugs. While educational interventions to improve generic prescribing have been attempted none are based on principles of adult learning theory or use stakeholder input to inform the messaging and learning strategy to achieve practice change. Our goal is to develop messaging and interventions to promote generic prescribing of antidepressants, oral contraceptives, and cholesterol lowering agents for busy time-crunched primary care clinicians, specifically nurse practitioners (NPs) and primary care physicians (PCPs).

SPECIFIC AIMS
1a) Ascertain factors that promote or hinder the prescribing of certain generic drug classes among practicing NPs and PCPs.
1b) Identify key gaps in knowledge about specific generic drug classes among NPs and PCPs.
2) Identify the most effective messages and educational strategies to promote knowledge acquisition and increase prescribing of specific generic drug classes among practicing NPs and PCPs.
3) Develop and test the effectiveness of a standardized educational intervention to improve prescribing of generic antidepressants, OCPs and statins (based on results of Aims 1 and 2, and in partnership with the FDA and drawing on principles of adult learning theory). The Summer Research Project will focus on the survey portion of this study.
METHODS
The survey will be disseminated through the American College of Physicians (ACP) and the American Association of Nurse Practitioners (AANP). This survey will utilize ACP and AANP’s preexisting research panel of participants. Both panels select using stratified random sampling to ensure they are representative of membership within the US across multiple demographics.

The survey is divided into two parts- a section of Likert questions focused on generic skepticism and general perceptions and a vignette section where participants answer Likert questions in response to a series of proposed prescribing scenarios.

Survey data will be analyzed using descriptive statistics to summarize means, medians and measures of spread (confidence intervals, standard deviations). In addition, whether differences in perceptions about generic substitutions exist by drug classes, or between PCPs and NPs, will be ascertained.

The goal of the summer will be to analyze the survey results and ascertain effective intervention possibilities for Aim 3 of the study. Data will be analyzed in aggregate. We will use basic cross tabs and frequencies to identify trends and patterns in the data. We will test research hypotheses with ANOVAs, linear regression, chi-square tests, and correlations, as appropriate for the type of data (discrete, continuous, binary) and the research question.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Outcomes Research Workshop; General Medicine Research in Progress; Society of General Internal Medicine; and Research Innovations in Medical Education.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences, Healthcare Delivery Sciences (Quality & Safety)

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PROJECT TITLE
VISTA: Value, Improvement, Safety, and Team Advocates: Curriculum and Culture Change to Cultivate Physicians for the Future

PROJECT DESCRIPTION
Our future physicians will be expected to function in new models of care as leaders in “healthcare delivery science.” Future population health models require clinicians to practice in a well functioning team providing safe, high quality, high value care. While medical students nationwide receive piecemeal didactic training in these areas, cohesive structures to impart these skills are lacking. Moreover, instead of advocating for their patients in the healthcare system, medical students often feel marginalized due to the hidden curriculum that reinforces a culture in which they are not empowered to speak up. Such hierarchies have been linked to increased risk of preventable adverse events.

To that end, we propose an innovation addressing several consortium themes- training students in healthcare delivery science; shaping tomorrow’s leaders; and working with the healthcare delivery system in new ways. Specifically, we will create and implement a longitudinal experiential program to train all students to function as effective advocates for “healthcare delivery sciences”: Value of care, Improvement science, Safety of patients, & Team training (VISTA).
MEDICINE–GENERAL INTERNAL MEDICINE

SPECIFIC AIMS
Project’s objectives and expected outcomes: The objectives of VISTA are:

1) To implement and evaluate a longitudinal skills-based immersive learning curriculum to provide medical students with the skills to advocate for a better healthcare system for patients in the areas of value, quality improvement, patient safety, and team training.

2) To prepare and support medical students to serve as advocates in the VISTA areas during their clinical experiences using an online micro-blogging learning community with trained faculty VISTA coaches and relevant mobile applications and web resources accessed via mobile devices.

3) To execute and support a culture change strategy to support empowering medical students as active champions of the healthcare delivery system.

METHODS
Multi-modal including survey, electronic/device usage, OSCE, etc. Several opportunities exist within the context of this large project and specific individual project methods and goals can be discussed with the investigators.

SOFTWARE REQUIRED: STATA

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Healthcare Delivery Sciences (Quality & Safety)

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PROJECT TITLE
Addressing Latino Diabetes Disparities through Multi-Level Interventions

PROJECT DESCRIPTION
Latinos suffer from disproportionately high rates of diabetes and diabetes-related complications. Addressing Latino diabetes disparities involves interventions targeted at health systems, providers, and patients.

Our team has conducted: (1) site visits to safety net clinics in the Midwest to assess the facilitators and barriers to delivering diabetes care through shared medical visits or group visits; (2) healthcare provider trainings on Latino cultural competency; and (3) a church-based diabetes education program for Latino patients with diabetes.

Summer students can elect to work on one or more these projects.

SPECIFIC AIMS
1) To identify unique characteristics of safety net clinics in managing patients with diabetes.

2) To assess provider perspective on using local patient stories in a Latino cultural competency training program.

3) To assess the correlates of poor glycemic control and self-rated health among a sample of low-income Latinos with diabetes.

4) To assess themes from in-depth interviews with patients using photos they took regarding their life with diabetes.

METHODS
1) We will be analyzing qualitative interview and quantitative survey data from providers that we collected during site visits to Midwestern health centers to assess facilitators and barriers to diabetes care in these settings.
2) We will be analyzing interview data from providers who completed the cultural competency training program to receive in-depth feedback on the training.

3) From the patient education pilot intervention, we will analyzing baseline and follow-up data to assess correlates of self-rated health and glycemic control.

4) We will be conducting qualitative data analysis of patient interviews regarding photos they took describing their life with diabetes.

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly Research in Progress Conference, Outcomes Research Workshop, and Diabetes Research Meeting. Students will also have weekly or biweekly one-on-one meetings with their primary mentor.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Community Health, Social Sciences

NIH MISSION: Diabetes

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PROJECT TITLE
Pilot Light Nutrition Education Program for Chicago Public School Children

PROJECT DESCRIPTION
Pilot Light involves a collaborative effort among U Chicago researchers, elite chefs from Chicago restaurants, and Chicago Public Schools to teach healthy nutrition and cooking skills to school children, as part of a broader program of research to decrease childhood obesity and diabetes risk. Pilot Light curriculum is designed to deliver grade-appropriate education which integrates classroom lessons on math, history and science subjects with lessons on food production and preparation. Pilot Light was developed and originally implemented in schools on Chicago’s North Side; we are now adapting and implementing a culturally tailored version for Chicago’s South Side which incorporates elements of African American history and culture.

SPECIFIC AIMS
1) Implement the Pilot Light curriculum in two Chicago Public Schools on Chicago’s South Side.
2) Conduct qualitative assessment with teachers, parents and school children to assess feasibility and engagement with this culturally tailored curriculum.
3) Assess pre- and post-outcomes outcomes including children’s knowledge, beliefs and skills around nutrition and cooking, as well as BMI.

METHODS
The existing Pilot Light curriculum has been developed to meet Common Core standards and address topics in the current 3rd, 4th and 5th grade curricula for Chicago Public School children. Collaborators from Pilot Light, University of Chicago and Chicago Public Schools are working to adapt and expand the curriculum, including topics relevant for African American students on Chicago’s South Side. The adapted curriculum will be delivered by teachers and pilot tested with 3rd- 5th graders at Langford Academy this year, with expansion planned to additional schools throughout the city. Assessment will include qualitative surveys, interviews and focus groups as well as measurement of pre- and post-BMI for participants. Summer
activities will include analysis of data collected during the school year, and possible pilot demonstrations with qualitative assessment during summer camps / summer school.

SOFTWARE REQUIRED: Hyperresearch (qualitative data analysis)

CONFERENCES AVAILABLE FOR PARTICIPATION
Outcomes Research Workshop (8:30–9:45 Wednesday mornings); Diabetes Translation Research Workshop (11 am–noon on Fridays); Research in Progress workshop (noon–1 pm on Fridays).

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Community Health

NIH MISSION: Diabetes

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PROJECT TITLE
Your Voice! Your Health! A study of how to engage and empower LGBTQ people of color within healthcare settings

PROJECT DESCRIPTION
Your Voice! Your Health! is a three-year project led by Dr. Marshall Chin, along with an extensive team of expert investigators in the field of shared decision making (SDM). This project aims to reduce healthcare disparities in the LGBTQ community with shared decision making (SDM) across different racial/ethnic minority groups and selected health conditions important to these populations. The specific areas of study include: anal cancer screening, HIV PrEP prophylaxis, hepatitis C, obesity and body image, metabolic syndrome/diabetes, intimate partner violence (IPV), mental health, gender transition and primary care in transgender persons, aging issues, and healthcare providers’ experiences in SDM with LGBTQ patients of color.

SPECIFIC AIMS
1) Systematically review key issues surrounding SDM in LGBTQ racial and ethnic minority populations: We are exploring what is known about SDM domains, contextual factors that affect SDM, and identifying existing tools that have improved SDM in LGBTQ racial and ethnic minority populations.
2) Obtain stakeholder input and feedback around desired shared decision making interventions: We are obtaining the input and feedback from stakeholders (including organizations, community groups, health care delivery systems, clinicians, and patients) representing LGBTQ racial and ethnic minority populations and under-resourced settings to: a) determine content, presentation, and process for SDM, b) tailor to media and health information technology, c) determine priorities for development and implementation of SDM products, and d) determine the contextual factors that affect SDM (e.g., clinic design, incentives, implementation issues).
3) Create tools to help stakeholders implement and evaluate shared decision making interventions in LGBTQ racial and ethnic minority populations.

METHODS
We plan to obtain input and feedback from stakeholders via one-on-one interviews and focus groups.
CONFERENCES AVAILABLE FOR PARTICIPATION
Section of General Internal Medicine / Hospital Medicine / Family Medicine Research-in-Progress (RIP) Conference.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Community Health, Social Sciences, Clinical Research, Healthcare Delivery Sciences (Quality & Safety), Medical Education

NIH MISSION: Aging, Diabetes

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PROJECT TITLE
Cost-Effectiveness Analyses of New Technologies and Care Innovations in Diabetes

PROJECT DESCRIPTION
We are involved in multiple health economic evaluations of new interventions in diabetes care. The goal of these projects is to calculate the cost-effectiveness of the new intervention compared to usual care. CEA 1: The DiMonD Study is a prospective, multi-center randomized controlled trial of continuous glucose monitoring in Type 1 and Type 2 Diabetes. Specific health economics objectives are to evaluate cost effectiveness and quality of life measures between the two groups. For cost effectiveness: Evaluate within-trial cost-effectiveness attributable to the use of continuous glucose monitoring (CGM), as well as, the lifetime cost-effectiveness of the intervention attributable to the use of CGM. For quality of life measures: Evaluate diabetes-related health states and measure health care utilization and economic consequences attributable to the CGM group compared to the SMBG (self-monitored blood glucose) group. CEA 2-4: We are also conducting the cost effectiveness analyses of three separate trials being supported by the Helmsley Trust. These projects focus on adolescent and young adult Type 1 Diabetes patients. We are evaluating the cost effectiveness for the following programs/interventions:

1) A telehealth care program for college-aged participants.
2) A shared medical appointment program for adolescent Latinos.
3) A team clinic program with shared group appointments.

SPECIFIC AIMS
The common aim of all four projects is to determine the incremental cost-effectiveness of novel interventions in diabetes care compared to usual care.

METHODS
We will conduct within-trial and long-term cost-effectiveness analyses. The within-trial analyses require analysis of empirically collected costs and health outcomes. For the long-term analysis, we will use type 1 and type 2 diabetes simulation models to forecast health care costs and rates of complications associated with the treatment comparisons. The main outcome of both analyses is the incremental cost-effectiveness ratio (difference in Costs/differences in Quality-adjusted life years).

SOFTWARE REQUIRED: STATA, @Risk (We will provide computer with necessary software to conduct analyses. We also have bio-statistical support.)
CONFERENCES AVAILABLE FOR PARTICIPATION
We have a monthly diabetes decision making research group meeting as well as weekly meeting of the Chicago Center for Diabetes Translation Research.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences

NIH MISSION: Diabetes

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PROJECT TITLE
Behavioral Health Integration in Primary Care: Implementing Depression Screening and Collaborative Care Model for Depression Management within UCMC Primary Care Group

PROJECT DESCRIPTION
Depression affects nearly 1 in 10 US adults, and rates of depression are two- to threefold higher among patients with chronic disease. Depression is mainly cared for by primary care providers; however, diagnosis, screening, and management of depression in primary care are poor. This project aims to assess the impact of depression, anxiety and suicide screening using an innovative tool, the Computerized Adaptive Test-Mental Health, compared to standard short-screeners, and behavioral health integration in primary care on population health management. We will implement systematic depression screening and a collaborative care model for depression management in primary care at the University of Chicago. With a multidisciplinary team of experts, we will tailor population-wide screening and management to the local environment using implementation science methods. Outcomes (e.g., rates of depression, change in depression severity, weight, health care utilization, and costs) will be measured to assess the effectiveness of the program.

SPECIFIC AIMS
Aim 1: To implement population-wide screening and collaborative care management for depression, anxiety and suicide in a primary care setting.
Aim 2: To measure changes in outcomes and utilization resulting from implementation of screening and collaborative care management for depression in primary care practice.

METHODS
Use implementation science methods to interface the expertise of stakeholders; implement a streamlined process of screening and collaborative care management for depression based on stakeholder input and literature review.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences
MEDICINE–GENERAL INTERNAL MEDICINE

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PROJECT TITLE
Personalized Care for Patients with Type 2 Diabetes: Importance of Individualization of Glycemic Target Goals

PROJECT DESCRIPTION
Diabetes affects over 20 million people in the U.S. and costs an estimated $245 billion dollars each year. The vast majority (85%) of patients with diabetes take either pills or insulin to control their blood sugars, with a total estimated cost of $3 billion annually. Guidelines have traditionally emphasized that adults with diabetes should strive for A1C levels <7.0%. However, major trials have provided conflicting evidence for the benefits of tight glycemic control. More recent guidelines emphasize the importance of individualization of A1C goals based on individual patient characteristics including age, comorbid conditions, life expectancy, and micro- and macro-vascular complications. Based on a nationally representative sample of adults with diabetes and using glycemic targets individualized by age, diabetes duration, and history of diabetes-related complications, the majority of U.S. adults with diabetes would have a recommended A1C target \( \geq 7.0\). Individualization of glycemic targets represents a paradigm shift in diabetes care with important implications for patient outcomes and health care costs. The goal of this project is to evaluate and improve guidelines for diabetes care; assess physician awareness, knowledge, and practice of individualizing glycemic targets; and develop policy and programs to increase the use of individualized glycemic targets in clinical practice.

SPECIFIC AIMS
Aim: To develop and implement regional and national surveys of physicians in order to (a) assess their awareness, knowledge, and practice of individualizing glycemic targets, (b) establish and assess the clinical variables that they prioritize when individualizing glycemic control, and (c) characterize systemic barriers to adoption of individualization.

METHODS
Survey of physicians regionally and nationally; cost effectiveness analysis; epidemiological analysis

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences

NIH MISSION: Diabetes

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PROJECT TITLE
Medical Scribes Pilot: Impact of Scribes on Patient-Doctor Relationship, Physician Satisfaction, and Patient Experience

PROJECT DESCRIPTION
The use of electronic health records (EHRs) has grown exponentially in clinical practice; however, there is growing concern that EHRs may interfere with the doctor-patient relationship and lead to physician burnout. The expansion of EHRs was fueled by
the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009, which provided incentives for the adoption of EHRs. From 2008, the rate of EHR use at hospitals increased from 9% to 75% in 2014. While many improvements resulted from EHRs, there have also been unintended consequences. A 2013 AMA/RAND study of physician satisfaction found that EHRs negatively impacted workplace satisfaction by increasing demands of data entry, poor EHR workflows, and interference with face-to-face care.

Locally, at the University of Chicago, we also found that EHRs have negatively impacted the doctor-patient relationship. In a previous Bucksbaum grant, we found that patients were dissatisfied with physician body language and poor integration of EHRs for patient education (i.e. results review, disease management, etc.). We conducted a systematic literature review on the impact of EHR use on the patient-doctor relationship and communication and identified best practices for patient-centered EHR use. In response, we developed a curriculum to educate faculty, residents and medical students on better EHR communication practice. However, even with our physician curriculum, several physician participants suggested that the burdens of EHR documentation were too great to be solved by better communication techniques.

One novel solution to the burdens of EHR documentation is the use of medical scribes to document information in the EHR in real-time during patient-clinician encounters. Previous studies have shown that scribes can increase productivity, decrease patient wait times, and contribute to increased physician satisfaction in emergency departments and urology and cardiology outpatient clinics. Interestingly, while concerns exist that patients may not feel comfortable with a “non-essential” person in their visits, these studies found that the use of scribes had no negative impact on patient satisfaction and, in actuality, this finding may be reasonable, since scribes allow physicians to focus on their patients, instead of dividing their time between communication and documentation. To date, however, little research exists on the effects of scribes in primary care.

We aim to pilot a scribe program in the PCG and assess the impact on patients and physicians. We will conduct a 3-month pilot of scribes with five faculty members, who voiced interested in working with scribes.

SPECIFIC AIMS

1) To understand how patients perceive scribe use by primary care physicians, with a focus on the impact on the patient-doctor relationship and communication.

2) To examine the impact of scribes on physician satisfaction and burnout.

3) Compare quality of notes composed by scribes vs. notes completed by physicians not working with scribes.

METHODS

Our main outcome is to assess patient and physician satisfaction with the scribe program. Our secondary outcomes are to assess changes in the quality of clinical documentation and clinical productivity as a result of the scribe program. To assess patient satisfaction, we will have each physician serve as their own control. The physician will have access to the scribe for only some of their clinic sessions. We will conduct brief surveys of their patients for sessions that the physician has and does not have a scribe. Patients of participating physicians will be asked to complete a brief post-clinic visit survey focused on communication with their physician during clinic visits and their satisfaction with the scribes (if present), by adapting a tool Dr. Lee previously developed in a prior Bucksbaum-funded study to assess patient satisfaction with physician EHR use. Because of the limits of time, we will necessarily survey a convenience sample of patients for each faculty. Our previous work suggests that 20 patients (10 patients with scribes and 10 patients without scribes) per physician (100 patients total) need to be surveyed in order to obtain a stable estimate of the quality of the physician’s EHR use.

To assess physician satisfaction, we will ask physicians to complete a brief survey and qualitative interview after the 12-week pilot. The survey will be similar to the baseline survey from April 2016 (attached as separate file) and focus on their attitudes toward working with scribes, clinic workflow, work-life balance and burnout, and communication with patients. To assess changes in the quality of clinical documentation, we will complete a chart review to assess the quality of clinic notes; this review will be blinded and will compare individual physician’s notes when they have and have not had a scribe for clinic sessions.

We will also assess for quality of the note documentation by scribes vs. physicians working without scribes. We will align our note quality measures with the quality indicators of ours institution and evaluate for timelines of closure of note, inclusion of appropriate health screening measures and other metrics. We will create a checklist to evaluate note quality and perform a chart review to assess notes composed by scribes and those composed by physicians not working with scribes.
SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Society of General Internal Medicine; AAMC

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

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PROJECT TITLE
Improving Diabetes Care and Outcomes on the South Side of Chicago

PROJECT DESCRIPTION
The University of Chicago is partnering with six clinics and other community organizations to improve diabetes care and outcomes for residents of the South Side. Our multi-factorial intervention incorporates culturally tailored patient activation, cultural competency and communication training for clinicians and clinic redesign with patient advocates, quality improvement, care management, and enhanced community partnerships.

SPECIFIC AIMS
Short-term Goals:
- Improve processes and outcomes of diabetes care for residents in the predominantly African-American South Side of Chicago by implementing a collaborative model program in six clinics.
- Identify the costs of intervention implementation from the business case perspective of the outpatient clinics. Determine the major barriers and solutions to successfully implementing this regional intervention.

Long-term Goals:
- Strengthen a coalition of the University of Chicago, safety net health centers, and community-based organizations in Chicago’s South Side.
- Increase awareness of diabetes disparities within the community and empower the community to draw upon its new knowledge, assets, and resources to combat this problem.

METHODS
Chart review, patient survey, provider survey, cost analyses, qualitative interviews of clinic leaders, providers, and staff.

CONFERENCES AVAILABLE FOR PARTICIPATION
General Internal Medicine Research in Progress Conference; Outcomes Research Workshop; Diabetes Outcomes Research in Progress Conference.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Social Sciences, Community Health, Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Diabetes
Research Opportunities

MEDICINE—GENERAL INTERNAL MEDICINE

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PROJECT TITLE
Innovations in Health Care Delivery: Responding to a National Readmissions Reduction Penalty Program for Chronic Obstructive Pulmonary Disease

PROJECT DESCRIPTION
Chronic obstructive pulmonary disease (COPD) is the third leading cause of death and hospital readmissions in the US, particularly for patients aged 65 and older. The Medicare Hospital Readmissions Reduction Program (HRRP), as part of its mandate to improve quality and cut costs, penalizes hospitals for exceeding the expected 30-day readmission rate after discharge following an acute exacerbation of COPD (AECOPD). In response, hospitals are formulating quality improvement interventions despite a lack of evidence that these interventions are effective. We run a multidisciplinary, coordinated-care program to reduce COPD readmissions at the University of Chicago Medicine (UCM). Reducing preventable readmissions for patients with COPD is a priority for hospitals facing HRRP penalties. Efforts will require a comprehensive and innovative approach. Improving patients’ self-management is critical.

Through this inter-professional quality improvement initiatives, we have several objectives. First, we are determining if our multi-faceted program can reduce readmissions. Second, we are analyzing if the program is cost-efficient, when factoring in potential reduced penalties from Medicare versus the costs of the program itself. Further, we are working to identify higher risk sub-populations, including frail seniors, to determine if additional program elements are required to reduce frail seniors’ risks for readmissions. Finally, we are developing and testing innovative technology-based interventions to improve care transitions and self-management at home. For our frail senior patients, we are also utilizing an accelerometer, similar to a Fitbit or other fitness trackers, to determine the influence of activity levels post-discharge on hospital readmissions.

SPECIFIC AIMS
1) To determine the effectiveness of a multi-component inter-professional team-based approach to improving hospital-based care for inpatients with COPD to reduce readmissions (QI project)
2) To determine the cost-efficiency of this multi-component inter-professional team-based approach (Cost-effectiveness project)
3) To determine the utility of a comprehensive, multidisciplinary, coordinated-care program for senior frail patients with COPD utilizing novel hip accelerometry to monitor activity and sleep at home after discharge (Observational study)
4) To evaluate the impact of a medical education program to engage medical students as part of the inter-professional team through value-added roles (Medical education project)

METHODS
Study participants will be recruited from patients participating in the COPD readmissions reduction program. A subset of patients will be approached for each study, based on eligibility criteria, and will be enrolled. Students will participate in enrolling participants, completing the assessments, analyzing preliminary results, and being part of the QI team to continue to refine and improve our COPD program.

SOFTWARE REQUIRED: STATA

78 Research Opportunities
CONFERENCES AVAILABLE FOR PARTICIPATION
The student will be expected to participate in weekly research group meetings and is encouraged to attend a weekly Outcomes Research Workshop. Final work will be considered for national annual conferences, such as Society of Hospital Medicine or American Thoracic Society.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Lungs

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PROJECT TITLE
Evaluating Tools for Clinical Assessment of Health Literacy and Tech Literacy Level in Hospitalized Patients

PROJECT DESCRIPTION
Health literacy is the ability of individuals to obtain, process, and understand basic health information and services needed to make appropriate health decisions. It includes the skills and abilities to use and interpret text, documents, and numbers effectively. Inadequate health literacy is a major public health concern and is associated with poor knowledge of health conditions, lower use of preventative services, higher rates of non-adherence to therapy, higher hospitalization rates, and poorer self-reported health. Low health literacy affects adults in all ethnic groups but is more common in older patients, recent immigrants, patients in lower socioeconomic status, and patients with chronic diseases. As more health related information and interventions increasingly involve the use of technology-based platforms, patients with low technology literacy may also be at risk for poor health outcomes.

An understanding of the prevalence of low health and tech literacy and factors related to inadequate literacy in general medicine patients would facilitate the development and testing of interventions tailored to this high-risk population.

SPECIFIC AIMS
1) To perform an assessment of health and technology literacy to estimate the prevalence of inadequate health and tech literacy in our study population
2) To identify patient characteristics associated with inadequate health and tech literacy
3) To determine patient willingness, ability and access to technology for at-home self-management education programs delivered through innovative technology platforms

METHODS
Eligible patients will be identified for participation using the Hospitalist Project infrastructure. The student will perform patient interviews and assessment of health literacy using the Rapid Estimate of Adult Literacy in Medicine-Revised (REALM-R). The student will analyze prevalence of health literacy and the adequacy of the REALM-R assessment tool for our patient population.

SOFTWARE REQUIRED: STATA
MEDICINE–GENERAL INTERNAL MEDICINE

CONFERENCES AVAILABLE FOR PARTICIPATION
The student will be expected to participate in weekly research group meetings and is encouraged to attend a weekly Outcomes Research Workshop. Final work will be considered for national annual conferences, such as Society of Hospital Medicine, Society of General Internal Medicine, or Health Literacy Annual Research Conference.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Aging

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PROJECT TITLE
A Contraception Counseling Quality Improvement Initiative for Primary Care

PROJECT DESCRIPTION
Despite advances in contraceptive options in the United States the portion of unintended pregnancies remains at approximately 50%. Recently there has been a push for further integration of contraceptive prescribing into primary care. The CDC 2014 guideline states that primary care providers should provide contraceptive counseling and prescribe the selected method or refer the patient to a specialist for Long Acting Reversible Contraception (LARC) placement. We propose a quality improvement project to gather baseline data on the Primary Care Group (PCG) prescribing practices to improving the care of reproductive aged women at the University of Chicago Medical Center. This information will be used to develop the content of a contraception-counseling curriculum for the PCG residents as well as a faculty development session on contraceptive prescribing. Based on this information we will determine what systems changes are needed to streamline the contraceptive prescribing and counseling process in the PCG clinic.

SPECIFIC AIMS
1) Determine the number of reproductive aged women served in the PCG clinic and what percent of these women are using a contraceptive method.
2) Evaluate what types of contraceptive methods are being prescribed to PCG patients.
3) Evaluate the rate of teratogenic medication prescribing to reproductive aged women and if these women are using a reliable form of contraception.

METHODS
We have petitioned the Epic Analytic Core for data including all of the women age 15-45 who were seen in the PCG clinic between Oct 2015-Nov 2016. Using ICD-10 billing codes for family planning or contraception diagnosis (Z30) we will track the clinic’s overall rate of contraception prescribing and counseling. We will then determine the rate of prescribing among different provider groups including resident, attending, internal medicine providers and med-peds providers. A number of charts will be randomly selected for manual chart review to confirm the method of contraception by grouping these methods into oral contraceptive pills/ring/patches (OCP), barrier methods, abstinence, surgical sterilization, implants, injections and intrauterine devices (IUD) as well as rate of gynecology referrals for contraceptive counseling. Also we will conduct a review of the medication list for teratogenic medications.

SOFTWARE REQUIRED: STATA
**MEDICINE–GENERAL INTERNAL MEDICINE**

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Society of General Internal Medicine regional and national meetings, the Congress on Women’s Health national meeting, the American Medical Women’s Association national meeting, weekly Research in Progress conference and Research in Medical Education monthly conference

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Healthcare Delivery Sciences (Quality & Safety), Medical Education

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**PROJECT TITLE**
Interprofessional Team Members as Partners in Resident Education

**PROJECT DESCRIPTION**
Interprofessional care leads to improved patient outcomes and increased patient and physician satisfaction. Thus, it is essential for trainee physicians to learn the foundational skills necessary to work within and lead interprofessional teams. In light of the positive outcomes seen with interprofessional practice and the clear need for a physician workforce capable of thriving in these environments, medical education has placed an increasing focus on interprofessional education. Resident physicians often work in parallel with allied health professionals and receive little to no formal training about interprofessional collaborative practice. Thus, we sought to develop a model for resident physicians to learn to work effectively in interprofessional teams within the primary care setting. Curriculum develop was done using a systematic approach. A needs assessment was conducted. Two different portions of the curriculum are underway during the 2015-2016 academic year: 1. A curricular program for 1st year internal medicine residents with nursing staff focusing on knowledge, skills, and attitudes for interprofessional practice and nursing staff, 2. A curricular program for 2nd and 3rd year internal medicine residents focused on the interprofessional teamwork for patient with diabetes and examining patient-level outcomes. Students can choose to focus on one of several components of the project.

**SPECIFIC AIMS**
To develop, pilot, and evaluate an educational model of interprofessional team members serving as educators for resident physicians.

**METHODS**
Both quantitative and qualitative methods will be utilized to evaluate the curriculum.

**SOFTWARE REQUIRED:** A biostatistician is part of the project team. STATA or ATLAS.ti access will be provided as needed.

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Students can participate in the Research in Medical Education Conference at University of Chicago. Findings will be submitted to University of Chicago Medical Education Day, Central Group on Educational Affairs, Association of American Medical Colleges, and Association of Program Directors in Internal Medicine. Students will have an opportunity to present their work at one or more of these meetings.
**Medicine–Geriatrics and Palliative Medicine**

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**PROJECT TITLE**  
SHARE Network (South Side Healthy Aging Resource Experts)

**PROJECT DESCRIPTION**  
The SHARE Network is a large federally-funded (Health Resources and Service Administration) project with multiple components, all aimed at addressing the geriatrics work force shortage in both health care and community-based settings.

**SPECIFIC AIDS**  
1) Provide geriatrics training to practicing health care professionals through ECHO Geriatrics, an interactive videoconferencing case-based curriculum.  
2) Provide geriatrics training to older adult community members through Healthy Aging community events.  
3) Assess community health needs for older adults on the South Side of Chicago.  
4) Provide geriatrics training to staff at skilled nursing facilities on the South Side of Chicago.

**METHODS**  
This is a large project with several opportunities for student involvement depending on interest. For example:  
1) Analyze data from ECHO Geriatrics series delivered to date to assess effectiveness of this curriculum  
2) Analyze focus group data from community-dwelling older adults and caregivers on the South Side of Chicago to describe unmet health care needs.  
3) Design and pilot a nursing home “Leadership Academy” program for nurses and certified nursing assistants.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**  
Section of Geriatrics research meeting (weekly); Geriatrics and Palliative Medicine Grand Rounds (weekly); Geriatrics Summer Intensive Lecture Series

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Social Sciences, Medical Education, Community Health

**NIH MISSION:** Aging
MEDICINE–HEMATOLOGY/ONCOLOGY

PROJECT TITLE
Defining the Role of Inherited Genetics in Mesothelioma

PROJECT DESCRIPTION
Malignant mesothelioma (MM) is a highly lethal cancer that develops from cells lining serosal surfaces of the body. Traditionally, MM is thought of as an environmental disease due to its strong association with asbestos exposure. However, of the many exposed to asbestos, few develop MM and up to 20% of MM cases occur in individuals with no known asbestos exposure. Thus, additional risk factors must contribute. Despite decades of research, the precise mechanisms involved in mesothelioma pathogenesis remain unclear. Identification of driver pathways would allow development of optimized therapies and the ability to identify those at highest risk for novel screening and prevention approaches. The study of rare families clustering a single cancer has been successfully used in other cancers to identify these driver pathways. Recently, a similar approach in MM families identified inherited mutations in BAP1 as the first inherited risk factor for mesothelioma in a small subset of patients. Further study of how BAP1 contributes to MM pathogenesis has already led to novel diagnostics and identification of an at risk population in need of novel prevention and early detection approaches. However, additional inherited factors, including whether or not even already known hereditary cancer genes contribute to MM, remain to be elucidated.

In this proposal, we will determine the prevalence of germline genetic mutations in 142 genes involved in hereditary cancer susceptibility in 200 patients with MM. Through our established IRB approved MM registry, we will correlate identified inherited genetic mutations with family history, tumor characteristics, and outcomes. This work has the potential to identify key pathways in mesothelioma development that will then be the subject of future translational laboratory investigations.

SPECIFIC AIMS
To determine the prevalence of germline genetic mutations in 142 genes involved in hereditary cancer susceptibility in 200 patients with MM and correlate germline and somatic mutations with clinical outcomes.

METHODS
Targeted genomic capture and next generation sequencing (NGS) will be performed using a custom pan-cancer gene panel of 292 genes at the University of Chicago Molecular Diagnostic Laboratory. Data analysis will be performed by the student and Dr. Churpek. The student will correlate findings with clinical data already maintained in her laboratory for consented patients. Future work will include functional follow-up of novel pathways identified via this initial genomic screen as well as exome or whole genome sequencing of families clustering cancer cases without known mutations.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
ASCO, Mesothelioma Applied Research Foundation meetings, weekly cancer risk and mesothelioma multidisciplinary patient conferences and weekly lab meetings; monthly journal club

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Lungs
**PROJECT TITLE**

Monitoring Tyrosine Kinase Inhibitor Response in Chronic Myeloid Leukemia Patients by Longitudinal Collection and Evaluation of ‘omics’ Data

**PROJECT DESCRIPTION**

We are conducting a perspective clinical study to collect multiple biological samples from chronic myeloid leukemia (CML) patients who undergo tyrosine kinase inhibitor (TKI) treatment. Detailed clinical data is collected throughout the treatment course; while various omic level data (including DNA/mRNA/non-coding RNA/protein) data will be generated from patients’ blood at 7 pre-determined time points. We will construct a longitudinal multi-omic model to predict TKI treatment effect. Functional experiments will be conducted to validate the role of DNA/mRNA/non-coding RNA/protein in TKI sensitivity. Long term goal: Use longitudinal collected and integrative omics (DNA/mRNA/non-coding RNA/protein) data to predict patients’ treatment outcomes and improve our understanding of disease progression and drug response.

**SPECIFIC AIMS**

1) Acquire whole-genome DNA/RNA/protein data from each study participant.
2) Construct longitudinal integrative personal omics profile for each study participant.
3) Perform functional experiments in CML cell lines and patient derived materials.

**METHODS**

DNA/RNA sequencing will be conducted at the Genomic core and data analysis will be performed in my lab. Functional experiments include but not limited to genotyping, qPCR, gene knockdown and over-expression.

**CONFERENCES AVAILABLE FOR PARTICIPATION**

AACR

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):**  Basic Sciences

**NIH MISSION:**  Blood
explanation for this variation between people—comprising the field of pharmacogenomics. A number of germline genetic variants have been described which confer increased predisposition to serious or rare drug adverse events, or which describe increased chance of drug response/effect. It is likely that clinicians have failed to capitalize on this information adequately, probably because many of these variants are new, and some require further testing/validation. Our lab has developed several clinical studies which attempt to test and validate genetic variants in patients with different diseases, including patients with cancer as well as other diseases.

**SPECIFIC AIMS**

If clinicians could better predict which individuals are at the greatest risk of experiencing drug-related toxicities or those most likely to benefit, then the overall care of patients could be greatly improved. We are testing this concept in a large study called “The 1200 Patients Project” (cpt.uchicago.edu/page/1200-patients-project) which is examining pharmacogenomic variants in patients with any type of disease in a novel pre-emptive testing method where patients are tested once (with a single blood sample) with a broad “drug susceptibility profile” that can then be used by their physicians to make individualized prescribing choices.

**METHODS**

Students will have the opportunity to develop research questions concerning pharmacogenomic implementation, drug outcomes using genetic information, medication decision-making, adherence, toxicity prevention, patient education, and aspects of the doctor-patient relationship pertaining to genomic information.

**SOFTWARE REQUIRED:** SPSS, Excel

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Students will be expected to actively participate in weekly lab meetings.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research

**NIH MISSION:** Aging, Blood

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**IRB/IACUC NUMBER:** 8962

**PROJECT TITLE**

Dissecting Genomic and Epigenomic Basis of Cancer in Diverse populations

**PROJECT DESCRIPTION**

Patients with basal-like breast cancer (BLBC) have poor overall survival and suffer a high rate of metastasis to the brain or lung within three to five years of initial presentation. Absence of a cure for advanced BLBC warrants early detection of BLBC, which might save more lives. Of all racial/ethnic groups, women of African ancestry are disproportionately affected by young onset BLBC. Aberrant DNA methylation is frequently observed in BLBC. DNA methylation is the most robust epigenetic marks and can be analyzed using clinical specimens including FFPE, tumor biopsies and liquid biopsies. Because expression of long non-coding RNAs (lncRNAs) is controlled temporally in response to neoplastic stimuli, we investigate the potential for lncRNA promoter methylation marks to be used for early detection and prediction of tumor progression in aggressive breast cancers.
**MEDICINE - HEMATOLOGY/ONCOLOGY**

**SPECIFIC AIMS**

1) To identify genetic and epigenetic factors as well as clinicopathological features associated with BLBC-specific IncRNA expression.

2) To determine IncRNA promoter methylation marks specific for BLBC using FFPE, tumor biopsy and liquid biopsy specimens.

**METHODS**

The association of IncRNA expression with clinicopathological features of BLBC (response to therapy, metastasis and disease free survival) will be determined using clinical data and gene expression profile datasets. Tissue/liquid specimens will be recruited from the tissue bank and bisulfite sequencing of DNA methylation sites in IncRNA promoters will be performed. The Cancer Genome Atlas (TCGA) datasets will be utilized to validate our results. To functionally annotate IncRNAs, we will utilize CRISPR knock-out genome editing tools.

Excel. Statistical analysis tools preferred.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Center for Clinical Cancer Genetics Case Conference Meeting and Laboratory Research Meeting; Radiology Research Meeting; Interdisciplinary Breast Conference.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences, Clinical Research

**NIH MISSION:** Aging, Blood, Diabetes

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**PROJECT TITLE**

Developing Regional Centers of Research Excellence in Chronic Non Communicable Diseases in West Africa and South East Asia

**PROJECT DESCRIPTION**

The Center for Global Health (CGH) supports and develops new interdisciplinary relationships and collaborations that address complex challenges to human well-being, such as those identified in the UN Declaration on Chronic Non Communicable Diseases (NCDs) and The Global Burden of Disease. We have identified several key areas of specialty that are highly interdisciplinary and will enhance collaboration across departments in this country and abroad. An exciting area of research is development of an international network of researchers to advance “Big Data Science” in partnership with the Computation Institute and Argonne National Laboratories. Using cloud computing, genome and epigenome sequences can be analyzed in Chicago to personalize cancer care, a process that can be easily applied to other diseases, such as diabetes, cardiopulmonary diseases, and obesity. Big Data Science can be used to monitor infectious disease outbreaks and to develop a robust interdisciplinary program in metabolism that integrates microbiome, immunology and metabolomics. Chronic diseases like cancer can be catastrophic to families creating mental distress. The possibility exists to conduct research that informs policy and to implement programs that disseminate recent scientific advances to improve global health and well being.
SPECIFIC AIMS
1) To conduct needs assessment survey and identify emerging problems in global health especially in Nigeria and Bangladesh utilizing interdisciplinary, data-driven research approaches.
2) To provide unique training opportunities for students interested in community-based interventions to improve chronic diseases like DM, HTN, and Cancer.
3) To examine predictors of mental illness amongst patients with Chronic Non-Communicable Conditions across the Lifespan.

METHODS
As primary mentor Dr. Olopade has ongoing collaborative work in health promotion, screening for breast and cervical cancers as well as research on the genetic and environmental factors linking Diabetes and Obesity to breast cancer.

SOFTWARE REQUIRED:
STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Center for Global Health organizes summer series.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences, Global Health

NIH MISSION: Aging, Blood, Diabetes, Digestive Diseases, Heart, Kidneys, Lungs, Neurology

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PROJECT TITLE
Correlations Between Measured Effects of Breast and Cervical Cancer and Mental Health at the University College Hospital in Ibadan, Nigeria

PROJECT DESCRIPTION
Studies have been done in various regions of the world to examine predictors of mental illness amongst patients with cervical cancer and have found that modes of treatment of cervical cancer (radiation or surgery) can have differing effects on factors such as mental health, psychosocial distress, and sexual functioning (Frumovitz et al., 2005). It has also been shown that the diagnosis of a gynecologic cancer can induce mental health issues such as anxiety and depression in patients (Suzuki et al., 2011, Drolet et al., 2012). Similar studies have been done with breast cancer. In a study aimed at identifying predictors of clinical distress in breast cancer patients, researchers found that fatigue, lack of muscle strength, experience of a low level of life satisfaction, more frequent cancer, and neuroticism were predictors of clinical distress (Wong et al., 2016). A study of Nigerian women with breast cancer found that low income, absence of previous history of breast cancer, and early stage of breast cancer were significant determinants of anxiety disorders (Fatiregun, 2016). Despite such studies, there is a gap in understanding of what domains of well-being correlate most with mental health and quality of life in Nigerian women with cervical cancer and breast cancer.
MEDICINE–HEMATOLOGY/ONCOLOGY

SPECIFIC AIMS
The current study aims to identify correlations between several domains of well-being (physical, family/social, emotional, functional) with mental health in Nigerian women with cervical cancer and breast cancer.

METHODS
This study is descriptive, cross-sectional, quantitative study. The study consists of questionnaires that will measure the variables to be correlated (domains of well-being with mental health). The study is being conducted at University College Hospital in Ibadan, Nigeria in oncology departments including gynecologic oncology and radiation oncology. The population for this study is Nigerian adult women diagnosed with cervical cancer and breast cancer.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly: Center for Clinical Cancer Genetics Case Conference Meeting and Laboratory Research Meeting; Interdisciplinary Breast Conference.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Global Health

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PROJECT TITLE
Developing Blood Based Biomarkers for Early Detection of Aggressive Basal-Like Breast Cancer

PROJECT DESCRIPTION
Patients with basal-like breast cancer (BLBC) have poor overall survival and suffer a high rate of metastasis to the brain or lung within three to five years of initial presentation. Early detection of BLBC has the potential to save more lives because there is no cure for advanced BLBC. BLBC is overrepresented among young women of all race/ethnicity and women of African ancestry who developed breast cancer. Aberrant DNA methylation is frequently observed in BLBC. DNA methylation is the most robust epigenetic marks and can be analyzed using clinical specimens including FFPE, tumor biopsies and liquid biopsies. Because expression of long non-coding RNAs (lncRNAs) is controlled temporally in response to neoplastic stimuli, we are investigating the potential for lncRNA promoter methylation marks to be used for detection and prediction of BLBC development and progression in young women.

SPECIFIC AIMS
1) To identify genetic and epigenetic factors as well as clinicopathological features associated with BLBC-specific lncRNA expression.
2) To determine lncRNA promoter methylation marks specific for BLBC using FFPE, tumor biopsy and liquid biopsy specimens.

METHODS
The association of lncRNA expression with clinicopathological features of BLBC (response to therapy, metastasis and disease...
free survival) will be determined using clinical data and gene expression profile datasets. Tissue/liquid specimens will be recruited from the tissue bank and bisulfite sequencing of DNA methylation sites in lncRNA promoters will be performed. The Cancer Genome Atlas (TCGA) datasets will be utilized to validate our results. To functionally annotate lncRNAs, we will utilize CRISPR knock-out genome editing tools.

**SOFTWARE REQUIRED:** Linux, Python, R, Bioinformatics, computational biology and functional genomics methods and tools

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Weekly: Center for Clinical Cancer Genetics Case Conference Meeting and Laboratory Research Meeting; Interdisciplinary Breast Conference

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences, Clinical Research

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<tr>
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<th>Funmi Olopade, MD</th>
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**PROJECT TITLE**
Utilization of Complementary Alternative Medicine, Diet, and Exercise Among Women Before and After a Diagnosis of a Having a High Risk for Developing Breast Cancer

**PROJECT DESCRIPTION**
Women with breast cancer often seek ways to improve their health and cancer diagnosis through the use of different approaches including complementary and alternative medicine (CAM), diet and exercise. Limited information exists on the use of such health behaviors before and after women are diagnosed with a high risk for developing breast cancer.

**SPECIFIC AIMS**
To identify health behaviors such as CAM, diet and exercise among women at HR-BC, and measure how the utilization of health behaviors decreases the diagnosis of high-risk breast cancer.

**METHODS**
Women already enrolled in a multimodality screening study for patients at high risk for BC (defined as a ≥20% lifetime risk) were given a questionnaire to evaluate their use of CAM therapies, diet, exercise before and after a diagnosis of HR-BC. Patients' were also asked to complete the Short-Form 36 (SF-36), State-Trait Anxiety Inventory (STAI) and Beck Depression Inventory (BDI).

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Weekly: Center for Clinical Cancer Genetics Case Conference Meeting and Laboratory Research Meeting; Interdisciplinary Breast Conference.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research, Global Health
**PROJECT TITLE**

Somatic Genomic Alterations in TERT Promoter of Breast Cancer Genomes

**PROJECT DESCRIPTION**

Common genetic variants at TERT locus and leukocyte telomere measures are documented to be associated with risks of multiple cancers. In addition, TERT promoter mutations have been suggested to correlate with increased TERT expression and telomerase activity in different cancer types. We have used SwiftSeq to uniformly call somatic genomic alterations (e.g. single nucleotide variants, insertion and deletions, structural variants) in the whole genome sequencing data from TCGA BRCA (Whites n=47; African-American n=30; Asian n=3) and our ongoing Nigerian Breast Cancer mini-TCGA (n=100). Furthermore, whole exome sequencing data (n=1,164) is also available in both TCGA and Nigerian breast tumors. Our goal is to identify somatic mutation frequency and spectrum of mutations in TERT promoter region in these datasets, and investigate the correlation between the mutations and clinicopathological features such as estrogen receptor status, age, etc.

**SPECIFIC AIMS**

1) To profile somatic genomic changes in TERT promoter in breast tumors in different ethnic populations.
2) To examine the correlation between genotypes and phenotypes.

**METHODS**

To determine whether the off-target reads from exome sequencing are useful for mutation detection in the promoters. Annotated VCF (Variant Call Format) files will be filtered and partitioned, particularly focusing on TERT promoter region that needs to be defined. Different somatic variant types will be evaluated for the mutation profiling and the statistical analysis.

**SOFTWARE REQUIRED:** Linux, Python, R, Bioinformatics, computational biology and functional genomics methods and tools

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Weekly: Center for Clinical Cancer Genetics Case Conference Meeting and Laboratory Research Meeting; Interdisciplinary Breast Conference.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences, Clinical Research
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PROJECT TITLE
A Multi-Modality Surveillance Program for Women at High Risk for Breast Cancer

PROJECT DESCRIPTION
Advances in cancer genetics have identified cancer susceptibility genes (BRCA1/2) that place women at 50-85% lifetime risk for breast cancer. Current risk reduction options for high-risk women include prophylactic surgery, or heightened surveillance. The optimum surveillance strategy for high risk women is unknown. Studies suggest that MRI might improve early detection of breast cancer. There are, however, concerns with incorporating MRI into standard surveillance practices for high-risk women. While the detection of early cancers may increase with MRI, the number of false positives requiring biopsy and/or follow-up imaging studies may also increase. This may lead to increased medical costs, increased risks of iatrogenic injury, and decreased psychosocial well-being and quality of life. In addition, the studies to date are not mature enough to conclude that newer modalities of surveillance decrease breast cancer mortality among high-risk women. Nonetheless, many high-risk women and surgical and chemopreventive alternatives unacceptable and wish to pursue surveillance strategies. This longitudinal study was designed to address these questions regarding incorporation of screening MRI in a sample of women at high risk for the development of breast cancer.

SPECIFIC AIMS
1) To examine the molecular characteristics of screen detected premalignant and malignant lesions in high risk women undergoing MRI screening
2) To determine the genomic Landscape of driver mutations and passenger mutations of screen detected breast cancer in high risk women

METHODS
Women at high risk for developing breast cancer undergo yearly mammograms supplemented with semi-annual MRI and clinical breast exam. Each participant completes 5 years of screening plus an additional 5 years of follow-up surveillance. Participants will complete measures of quality of life and psychosocial well-being semi-annually years 1 through 5. In addition, event-related anxiety will be assessed after each multi-modality screening event and after each recall event for repeat imaging or biopsy to assess anxiety levels related to radiographic or biopsy recall and to assess anxiety over time.

Sensitivity, specialty, and PPV of different imaging modalities will be compared in BRCA1 and BRCA2 mutation carriers and women at high-risk of breast cancer based on a personal or family history and risk prediction models. Frequency of interval cancers in women undergoing surveillance with these imaging modalities will be estimated.

A database of clinical characteristics, results and interventions has been generated. Biological specimens including blood, saliva and urine have been saved for future analysis and hypothesis generation. To date, we have created a database of nearly 2800 women. We are evaluating 14 interval cancers and nearly 30 benign lesions and will compare mutation spectrum with spectrum in a cohort of non-screen detected breast cancer from high risk women available in our MRI imaging database.

SOFTWARE REQUIRED: Excel, Bioinformatics tools preferred
CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly: Center for Clinical Cancer Genetics Case Conference Meeting and Laboratory Research Meeting; Radiology Research Meeting; Interdisciplinary Breast Conference.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

Medicine–Hospital Medicine

MENTOR: Shannon Martin, MD, MS  
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PROJECT TITLE
Consulting Wisely: Applying Principles of High Value Care to Develop a Consultation Objective Structured Clinical Examination (OSCE) for Incoming Interns during the Graduate Medical Education New Intern Orientation

PROJECT DESCRIPTION
Requesting a consult from a specialist is a valuable tool in patient care, particularly with increasing complexity and growth of medical knowledge and understanding of disease. There are specific clinical scenarios in which consultation has been shown to have significant benefit; however, consultation is rarely the focus of educational initiatives targeting high value care. It is likely that there is great variability in the practice of requesting a consultation with potential for overuse and waste. Investigating and characterizing this variability and developing a “Consulting Wisely” framework to deliver to trainees will help improve the use of high value consultations.

SPECIFIC AIMS
1) To describe factors associated with high variability in consultation utilization.
2) To use information gleaned from this analysis to further refine trainee education in consultation practices to promote high value consultation, or “Consulting Wisely.”
3) To apply “Consulting Wisely” to the existing training in consultation communication for all entering interns at the University of Chicago by means of a consultation OSCE.

METHODS
The first phase of the project pertains to the research and analysis necessary to understand factors affecting consultation practices in the training environment. We hypothesize that there is significant variability in the use of consultation during hospitalization, and this variability may have potential for overuse and waste. Using billing and administrative data available over several years, we will perform an analysis of characteristics that may influence utilization of consultation on the University of Chicago general medicine service. These likely predictive factors may include demographic, secular, team-related, self-reported knowledge/practice, and workload-related factors. The second phase is to develop information learned in the first phase as further instruction in requesting high value consultation. We will present the results of our analysis in a framework intended to address maximizing value in consultation: “Consulting Wisely.” Finally, we will pilot our framework by adding to the existing boot camp consultation OSCE that was piloted in 2016 at the GME orientation. This is universal training in consultation communication for all entering interns at our institution with an online module and in-person OSCE. Ideally, the student would spend a small percentage of time working on the project during the spring semester of 2017 and would then spend a more substantial time designing the “Consulting Wisely” framework, incorporating it into the consultation OSCE and analyzing the data during the summer of 2017.
SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Outcomes Research Workshop; General Medicine Research in Progress; Research Innovations in Medical Education; Society of General Internal Medicine; Society of Hospital Medicine; AAMC Medical Education Meeting; Academic Internal Medicine Week

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Medical Education

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PROJECT TITLE
Comprehensive Care Program

PROJECT DESCRIPTION
As part of the Affordable Care Act, we have received a 3-year, $6.1 million grant from the Centers for Medicare and Medicaid Innovation to develop and execute a randomized trial to test a new model of care for patients at increased risk of hospitalization.

SPECIFIC AIMS
This project is immense, involving at least a dozen faculty, and has a large number of separate workgroups each working on various aspects of the project, including: (1) Clinical Integration; (2) Inpatient Design; (3) Ambulatory Design; (4) Social Service; (5) Patient Recruitment (6) Provider and Patient Education, Empowerment, and Communication; (7) Resident and Medical Student Education; (8) Research/Evaluation; (9) Administration.

METHODS
There are many opportunities for student engagement. These include:
1) Helping to design and study clinical practice and clinical integration processes (e.g., handoff processes, use of new health IT Applications, modeling of business plan and processes);
2) Helping to design, implement and study social service interventions, both for patients in the hospital and patients in community settings;
3) Helping in community and stakeholder outreach for patient recruitment, including studies of those efforts;
4) Development and studies of patient and provider educational materials;
5) Development and studies of resident and medical student education materials;
6) Studies of patient outcomes for patients enrolled in the studies.

Based on specific student interests, we will develop specific projects with one or more faculty mentors.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly Team Meetings of all Workgroups and Weekly Outcomes Research Workshops.
POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Community Health, Medical Education, Social Sciences, Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Aging, Blood, Diabetes, Digestive Diseases, Heart, Kidneys, Lungs

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PROJECT TITLE
Cost-Effectiveness of Medical Interventions

PROJECT DESCRIPTION
Students may be involved in one of several projects including cost-effectiveness analyses of treatments for diabetes and prostate cancer, and analysis of the tools used to measure quality of life in cost-effectiveness analyses.

SPECIFIC AIMS
Analyzing cost-effectiveness of medical interventions.

METHODS
Students may be involved in technical analyses that require extensive mathematical and programming skills, or in studies that emphasize the development and administration of surveys in a variety of settings.

SOFTWARE REQUIRED: STATA, Epic, and MRVIEW

CONFERENCES AVAILABLE FOR PARTICIPATION
Section of General Internal Medicine Research Meetings and Hospitalist Program Research Meetings.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety), Social Sciences

NIH MISSION: Aging

MENTOR: David Meltzer, MD, PhD
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PROJECT TITLE
Effects of Medical Education and Specialization on the Quality and Cost of Care

PROJECT DESCRIPTION
Since 1997, we have been collecting data studying the costs and outcomes of patient care on the general medicine service at the
U of C and, more recently, 5 other major academic medical centers. Our data base now contains over 80,000 patients. We are using this data to study questions such as how hospitalists affect the costs and outcomes of general medical care, the role of clinician experience in improving costs and outcomes, how clinicians learn from each other in clinical settings, and a range of issues about measuring the quality and outcomes of care, especially for older patients and underserved populations. There are also new projects involving the collection of genomic data for hospitalized patients as part of an effort to develop strategies for personalized medicine. Students may be involved in patient interviews, statistical analyses of existing data, chart review projects, grant writing, literature review, clinical pathway development and evaluation, or a combination of these. Students may be paired with a hospitalist physician to develop a specific research project related to a new clinical initiative. Some of our projects may be structured to allow interested students to simultaneously mentor a group on honors high school students and undergraduates as part of a summer research program. Many of our projects in involve quantitative analysis of data so we provide access to biostatisticians and classes in programming to help students to be maximally effective in completing their projects.

SOFTWARE REQUIRED: STATA, Epic, and MRVIEW

CONFERENCES AVAILABLE FOR PARTICIPATION
Section of General Internal Medicine Research Meetings and Hospitalist Program Research Meetings.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Medical Education, Healthcare Delivery Sciences (Quality & Safety), Social Sciences

NIH MISSION: Aging

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PROJECT TITLE
The Effect of Red Blood Cell Transfusion on Fatigability in Hospitalized Patients with Anemia

PROJECT DESCRIPTION
Guidelines from the AABB recommend that the presence of patient symptoms in addition to hemoglobin (Hb) concentration influence the decision to transfuse red blood cells in hospitalized patients with anemia. Intuitively, patients with symptoms from their anemia are more likely to benefit from the increased tissue oxygenation of a transfusion than are patients without symptoms, and evidence suggests that in certain patients receipt of a transfusion while hospitalized reduces patient fatigue, the primary symptom of anemia. Although fatigue is a commonly emphasized outcome and important symptom for patients with anemia, how transfusion affects fatigue is complicated because fatigue is affected by both energy and activity. Interventions that increase energy and activity may increase fatigue through increased exertion, while interventions with no effect on energy can lead to inactivity and deconditioning, which further influences fatigue. Ultimately, how transfusion affects changes in fatigue relative to changes in patients’ physical function is a more clinically relevant outcome, but there is limited data describing the effect of transfusion on fatigue relative to physical function. Therefore, understanding how transfusion affects patients’ fatigability, a construct that measures fatigue in relation to a defined activity of a specific intensity and duration, is a critical questions that can provide insight into how transfusion while hospitalized may be able to mitigate the role of anemia and fatigue in the disability pathway and affect patients’ independent function after hospital discharge.
SPECIFIC AIMS
To use the University of Chicago Hospitalist Project research infrastructure to assess fatigability, fatigue, and functional status among hospitalized patients with anemia during and 30 days after hospitalization and to understand clinical predictors of these measures, including their association with transfusion during hospitalization.

METHODS
Students will screen all hospitalized medical patients for anemia daily, and approach eligible patients for recruitment into the study. Students will then administer our questionnaires to participating patients. Using the Hospitalist Project infrastructure to follow discharged patients over time, students will call patients 30-days after their discharge from the hospital to re-administer the questionnaires.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Outcomes Research Workshop

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Aging, Blood

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PROJECT TITLE
The Patient-Centered Longitudinal Experience

PROJECT DESCRIPTION
Patient-centered care is widely supported as an aspirational aim for health systems, with evidence to support improved patient satisfaction, treatment adherence, and clinical outcomes. Unfortunately, traditional educational models and training environments are not designed to foster a patient-centered approach to care, with few opportunities to experience care from the perspective of a patient or to engage longitudinally in their patients’ care.

We developed the Patient Centered Longitudinal Experience (PCLE) as a novel program in which preclinical medical students are paired with patient partners to co-navigate the patient’s healthcare experience over an 8 month period. This opportunity is embedded within a required M1 clinical preceptorship experience. Clinical sites include the University of Chicago Comprehensive Care Program and La Rabida Children’s Hospital.

SPECIFIC AIMS
1) To refine the Patient-Centered Clinical Experience as a unique track within the current M1 Longitudinal Program.
2) To conduct a pilot test of the Patient Centered Longitudinal Experience to assess: 1) the feasibility of delivering the program; and 2) its preliminary efficacy in improving patient-centered attitudes and behavior, interprofessional orientation, and interest in primary care.
METHODS
We will use a mixed methods approach to evaluate the program from the perspectives of students, patient partners, and faculty mentors. Data sources include student surveys, patient encounter logs, student reflection essays, faculty surveys, and patient surveys. Data from students participating in the patient-centered longitudinal experience will be compared with students participating in the practice-centered track.

SOFTWARE REQUIRED: STATA, NVivo

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly meetings of the Comprehensive Care Program; Research Innovations in Medical Education; Society of General Internal Medicine conference

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Medical Education

NIH MISSION: Aging

Medicine—Infectious Diseases and Global Health

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PROJECT TITLE
Optimizing Outcome for Hepatitis C: Examination of Treatment Strategies, Health Policy and Economic Evaluation

PROJECT DESCRIPTION
Approximately 3 million persons are chronically infected with hepatitis C in the United States, and as this population ages the risks of end-stage hepatic disease and liver-related death are projected to reach unprecedented levels in the next 10-20 years. Chronic infection can lead to significant morbidity and mortality due to liver scarring (fibrosis, staged 1-4), and is associated with high resource utilization and cost. Newly available antiviral therapies have improved efficacy and high tolerability, but are expensive and have led to restrictive prior authorization criteria imposed by payers and decreased access to treatment. We use decision analytic methods to examine the clinical impact and cost-effectiveness of US and Illinois- based health policies surrounding hepatitis C screening and treatment.

SPECIFIC AIMS
1) Examine clinical and budget impact of hepatitis C to the Illinois state Medicaid program.
2) Examine the clinical and budget impact of Medicaid prior authorization criteria for new, direct-acting antiviral therapies for hepatitis C.
3) Examine the patient-oriented impact of out of pocket costs associated with hepatitis C disease and treatment using survey methods.

METHODS
1) Descriptive analytics of claims and resource utilization data. 2) Survey analysis. 3) Decision analytic modeling.

SOFTWARE REQUIRED: STATA (Biostatistician available)
MEDICINE–INFECTIOUS DISEASES AND GLOBAL HEALTH

CONFERENCES AVAILABLE FOR PARTICIPATION
Outcomes Research Workshop, Infectious Diseases Section Research In Progress Conference, Annual Meeting of the Infectious Diseases Society of America (ID Meeting), Annual Meeting of the American Association for the Study of Liver Diseases (Liver Meeting).

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Social Sciences, Community Health

NIH MISSION: Digestive Diseases

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PROJECT TITLE
Predicting Retention in Care among People Living with HIV

PROJECT DESCRIPTION
HIV-positive individuals who receive regular medical care have improved health outcomes and are significantly less likely to transmit HIV to others. However, less than half of people living with HIV in the US are retained in care. We have developed an electronic algorithm to predict which patients who are currently retained in care are at risk for falling out of care in the future. This project will involve validating that prediction model by interviewing HIV-positive patients and performing medical record review.

SPECIFIC AIMS
1) Understand HIV-positive patients’ risk factors and barriers to receiving regular medical care
2) Determine the sensitivity and specificity of an electronic algorithm for identifying risk factors for retention-in-care failure.

METHODS
This project will utilize a longitudinal cohort of HIV-positive patients seen at the University of Chicago. Students will engage in interviews of a cohort of patients determined to be high risk for retention-in-care failure. They will also perform medical record review to determine the accuracy of the electronic medical record-based model for determining certain risk factors (e.g., psychiatric illness, substance use) for retention-in-care failure.

SOFTWARE REQUIRED: No software needed,

CONFERENCES AVAILABLE FOR PARTICIPATION
International AIDS Conference, HIV Research for Prevention Conference

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Social Sciences, Community Health
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**PROJECT TITLE**  
HIV Risk and Prevention Venues for Younger Men Who Have Sex with Men (MSM) in Chicago and Houston

**PROJECT DESCRIPTION**  
Research suggests that the risk and prevention behaviors of individuals are less important than some of the social and structural drivers of HIV infection. For example, younger Black MSM have 7x the rates of HIV infection as white MSM, yet they have equivalent condom use and white MSM have higher rates of sex-drug use (a well-known cofactor for HIV transmission). Social and structural drivers of infection which include social networks and venues where young MSM affiliate (ie bars, clinics, clubs etc.) may be key to eliminating onwards transmission via targeted interventions. Particular attention to online venues may also assist in our understanding of important avenues for intervention.

This project will examine the patterns of venue affiliation in Chicago and Houston through mixed-methods interviews and qualitative/quantitative analyses. Respondents will be recruited in the field in both cities.

**SPECIFIC AIMS**  
1) Determine how prevention and risk is distributed across different venues in Chicago and Houston.  
2) Explore how risk may be transmitted through venues in addition to other traditional transmission pathways such as sex and other risk networks.

**METHODS**  
The project will utilize a longitudinal cohort design to follow YMSM over time. Mixed methods interviewing with digital recording will be conducted.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**  

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Community Health, Global Health, Social Sciences
PROJECT TITLE
Wuhan University Medical Education Reform (WUMER) Project Evaluation

PROJECT DESCRIPTION
Since 2009, the WUMER Project has provided technical assistance for the reform of the Wuhan University Medical School curricula and pedagogy based on a modified version of the Pritzker School of Medicine Pritzker Initiative. Using both general and focused course surveys, we have explored the attitudes, knowledge, and beliefs of students and faculty towards reforms in courses in the basic sciences (Human Body; Cells, Molecules, and Genes; Tissue Structure and Function; Response to Injury; Clinical Pathophysiology and Treatment (CPPT); Clinical Skills and Early Patient Contact; Clinical Reasoning; and the Clinical Clerkships in Medicine, Surgery, Community and Family Medicine (General Practice), Pediatrics, Ob-Gyn, Neurology, and Psychiatry). More recently, the WUMER Project has provided technical assistance for the development of Residency Training Programs at the WUMS teaching hospitals. Several adjunctive activities have been initiated by WUMER's participating students and faculty, including characterization of mental health care and its medical curricular contents; description of geriatric and palliative care services and its medical curricular contents; and the use of traditional Chinese medicine in community health centers and its relationship to Western Medicine; investigation on the development of interdisciplinary studies such as Clinical Ethics, Communication Skills and Doctor-Patient Relationship. In some cases, separate IRB approval has been sought as part of these investigations, for example with infection control studies of gram negative bacteremia and C. Difficile infections in the teaching hospitals of Wuhan.

SPECIFIC AIMS
1) To assess faculty and student knowledge, attitudes and beliefs regarding medical school curriculum reforms and graduate medical education reforms;
2) To assess student performance on knowledge assessments in specific disciplines, and to compare performance in reform students compared to standard curriculum students.

METHODS
Following verbal informed consent and an introduction to the survey, students and faculty complete 30-60 minute surveys regarding general and course-specific curriculum reforms. Specific questions related to the specific course are included. Faculty and student surveys are developed using ACGME and AAMC instruments with modifications for international use with collaboration from Wuhan faculty. Students also complete brief knowledge assessments in the course topic, and results are compared between the reform and the standard curriculum students. Students are requested to dedicate 2/3 of their time in Wuhan towards the SRP and WUMER goal of the project, and encouraged to pursue independent interests for the remaining 1/3 of their time.

SOFTWARE REQUIRED: SPSS

CONFERENCES AVAILABLE FOR PARTICIPATION
Medical Education Day; University of Chicago; Consortia of Universities in Global Health; Global Health Education Consortium; Wuhan University Medical Education Form

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Global Health, Medical Education
**Medicine–Nephrology**

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**IRB/IACUC NUMBER:** 1053

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**PROJECT TITLE**
Clinical and Translational Research Experience in the Clinical Research Center of the Institute for Translational Medicine

**PROJECT DESCRIPTION**
The Clinical Research Center (CRC) of the Institute for Translational Medicine (ITM) is the major center for ongoing clinical research at the University of Chicago. Daily protocols from endocrinology, nephrology, cardiology, pulmonary medicine and general medicine are ongoing and include over 30 active protocols. This project allows interested medical students to work on the CRC during their rotation and be involved directly in the conduct of clinical studies done by a variety of investigators including evaluation of the artificial pancreas which is an FDA driven study, evaluation of fat biopsies for better understanding alterations in insulin and glucose homeostasis as well as diabetes, evaluation of new therapies for hypertension and congestive heart failure and alterations in metabolism as they relate to circadian rhythms. Students will be required to review protocol submissions, work with research subject advocates and investigators. Interact with the research lab personnel in performing specific lab tests, and research nurses as they perform specific protocols. A maximum of 4 students can be accepted for this project.

**SPECIFIC AIMS**
To evaluate human subject research on a number of NIH funded protocols evaluating a number of disease processes including chronic kidney disease, hypertension, diabetes, obesity, metabolism, multiple sclerosis, cat allergies, asthma, the microbiome and more. This is a research floor based elective that will allow students to review and assess research projects understand the issues related to patient recruitment, enrollment and study protocol performance.

**METHODS**
Student based evaluation of selected research projects, interviews with principal investigators, participation in the conduct of the research projects, providing an overview of the goals of the protocols that were studied during the time on the research floor.

**CONFERENCES AVAILABLE FOR PARTICIPATION**
ITM weekly conferences, Statistical SPOR lectures and conferences, subspecialty specific conferences related to the study of choice.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research

**NIH MISSION:** Aging, Diabetes, Digestive Diseases, Heart, Kidneys, Lungs, Neurology
MENTOR: Arlene Chapman, MD
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PROJECT TITLE
Water, Water, Genie in a Bottle. How Smart Bottles help Adherence in Patients with Underlying Nephrolithiasis and ADPKD

PROJECT DESCRIPTION
Severity of both kidney stones (nephrolithiasis) and ADPKD, the most common cause of hereditary kidney disease have been reported to benefit from increased fluid intake. Importantly constant fluid intake may be more important than overall fluid intake in a 24 hour period because episodes of decreased fluid intake increase the risk for crystal formation and cell signaling in cystic epithelial cells to proliferate. We are now testing the benefit of real time monitoring of fluid intake through smart bottle technology where patients are given direct feedback regarding the level of fluid intake that they receive on a daily basis. Smart water bottle technology provides minute to minute information and feedback to patients regarding their total and most recent volume of fluid intake to allow feedback regarding the importance of high content fluid intake.

SPECIFIC AIMS
Smart bottle technology as compared to physician direction has a positive impact on 1) overall daily fluid intake and variability of fluid intake throughout the day in two patient populations where increased fluid intake has been suggested to impact severity of disease, nephrolithiasis and ADPKD.

METHODS
This is a randomized prospective longitudinal study enrolling patients with nephrolithiasis and ADPKD to receive physician counseling vs. smart water bottle technology to achieve 3 liters of fluid intake in a 24 hour period. The goals are to determine if 24 hour fluid intake and within day variability fluid intake is improved with smart water bottle technology as compared to physical counsel. Groups will be compared at the end of 4 weeks of enrollment as well as at 3 and 6 months to assess 1) 24 hour fluid volume intake 2) patient satisfaction and 3) within day variability of fluid intake.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Daily renal conferences; Weekly research lab conferences; Weekly stone research group conferences; Both ADPKD and Nephrolithiasis clinic experience

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Aging, Heart, Kidneys
**PROJECT TITLE**
Genetic Modifiers of Disease Severity in Autosomal Dominant Polycystic Kidney Disease

**PROJECT DESCRIPTION**
ADPKD is the most common hereditary kidney disease caused by mutations in either the PKD1 or PKD2 genes. Significant interfamilial variability is present in ADPKD suggesting that other genetic modifiers contribute to disease severity. A number of candidate genes, known to affect kidney function including the UMOD, CASR, KIM1, APOL1, and many others may contribute to disease severity and complications in ADPKD. This project utilizes a large already collected database of over 700 affected ADPKD individuals and evaluates either known functional snps in candidate genes or evaluates sequence variations of yet unknown significance in candidate genes across a large number of well-phenotyped ADPKD individuals. The students are expected to identify a gene of interest, learn its biological significance, learn how to set up methodologies to sequence the particular variation in the gene of interest, complete the genetic tests and analyze the results in the ADPKD patient population where genetic information is available. A variety of genes are currently being evaluated and individual projects are at different stages of completion.

**SPECIFIC AIMS**
Assess the role of candidate modifier genes in disease severity defined as total kidney volume or cyst burden and measures of kidney function i.e. eGFR and complications i.e. early onset hypertension, gross hematuria, nephrolithiasis and renal pain.

**METHODS**
Redcap data bases are used for patient populations
Isolating DNA from buffy coats
Next Gen sequencing used for building snps
Importing results into Redcap for genetic results for candidate gene
Analysis with support from biostatistician on the project to determine impact of sequence variation on disease severity.

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Daily renal conferences; Weekly lab conferences; Genetics conferences two to three times/week

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research

**NIH MISSION:** Heart, Kidneys
Identification of Diagnostic and Mechanistic Markers in PKD

PROJECT DESCRIPTION
Autosomal dominant polycystic kidney disease (ADPKD) is the most common inherited kidney disease and the fourth leading cause of kidney failure. It is characterized by localized autonomous cellular proliferation, fluid accumulation within the cysts, and intraparenchymal fibrosis of the kidney. However, diagnosis of PKD has been largely dependent on clinic symptoms and imaging tests while mechanisms of accumulation and maintenance of the cystic fluid and the resultant inflammation remain undefined. We hypothesize that specific metabolomic products or cytokines found in the cyst fluid may be identified and developed as a diagnostic and mechanistic marker(s). Preliminary studies that analyzed paired urine and plasma samples in a case-control framework comparing ADPKD patients with normal kidney function to age and gender-matched healthy controls demonstrated that the histidine and purine metabolism pathways are differentially altered between ADPKD patients and controls, implying features of potential diagnostic and mechanistic value.

SPECIFIC AIMS
1) Analyze cystic fluids obtained from ADPKD patients with metabolomic assay to identify and confirm our preliminary findings; access paired urine and plasma samples to compare profile of cytokines in ADPKD patients with normal kidney function to age and gender-matched healthy controls using microarray assay.
2) Using in vitro cultured cystic epithelial cells and normal primary renal epithelial cells to recapitulate the changes and define the mechanisms.

METHODS
A variety of research strategies and techniques will be applied in the proposed studies, including collecting and processing cystic fluid samples obtained from PKD patients, cell culture, and microarray assay. Bioinformatics analysis of the metabolomics and array studies will be performed to identify potential candidates. Conditioned medium collected from cystic epithelial cell lines and primary cell cultures will be subjected to the same assays. Specific markers identified will be further confirmed using isotype labeling study or ELISA assay.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
The student will have the opportunity to present locally at lab meetings and the Nephrology Research Conferences in the section and Department of Medicine Research in Progress Conferences. In addition, the student will have the opportunity to submit his or her work to national conferences such as the American Society of Nephrology.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Kidneys
PROJECT TITLE
Attitudes about Genetic Testing in Potential Kidney Donors

PROJECT DESCRIPTION
Mutations in the APOL1 gene are common in African Americans (one risk allele has about 40% prevalence), and contribute to a much higher rate of kidney disease in this group. People who want to donate a kidney are at somewhat higher risk of long term kidney failure (30/10,000) themselves, but this is likely much higher in those carrying two risk alleles for APOL1. We have recently been recommending and performing genetic testing for APOL1 in potential donors to help better educate them about this risk. Prospective donors may have a limited understanding of issues such as genetic testing and the risk of consequences after donating a kidney, and this discussion is necessarily complex. This study will measure African Americans’ baseline attitudes about their health, kidney disease, and genetic risk before and after a brief structured education about the purpose of APOL1 genetic testing, so that we can assess the benefits of education and testing. This project will provide students experience in discussing challenging, personal issues with patients and expose them to complex discussions of personalized genetic medicine, which have both medical and ethical ramifications.

SPECIFIC AIMS
1) Determine attitudes in potential kidney donors about kidney health, kidney donation, and long term risks due to kidney donation.
2) Determine changes in these attitudes after a brief structured educational intervention followed by possible genetic testing for APOL1.

METHODS
Potential kidney donors are assessed in transplant clinic on a weekly basis and are thoroughly evaluated for a variety of medical and psychosocial factors. African American potential donors will be invited to participate in this study. Participants will be administered a survey instrument designed to measure their beliefs about the factors that affect their health, their attitudes and motivations about donation, and their willingness to undergo genetic testing as a guide to the safety of donating. Immediately following this, the physician will provide education to the potential donor about the risks, benefits, and rationale of APOL1 genetic testing. Several weeks later, after genetic testing results have been shared with the patients, they will be contacted for a follow-up survey about how these attitudes and beliefs may have changed, and whether they found the APOL1 genetic testing helpful or harmful. These survey data will be analyzed for whether the decision to undergo testing and the test results affect the response to this education.

SOFTWARE REQUIRED: Excel or Sigmastat

CONFERENCES AVAILABLE FOR PARTICIPATION
American Transplant Congress; American Society of Nephrology

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences, Healthcare Delivery Sciences (Quality & Safety), Community Health

NIH MISSION: Kidneys
**MEDICINE–NEPHROLOGY**

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**PROJECT TITLE**  
Kidney Transplant Recipient Behaviors and Attitudes Related to Diet and Exercise

**PROJECT DESCRIPTION**  
Many people gain weight after kidney transplant. This is a serious problem as it contributes towards high blood pressure and diabetes mellitus. Nevertheless, many renal transplant recipients have little daily physical activity and do not participate in a regular exercise program and have difficulty modifying their diets. We seek to determine the prevalence of weight gain in our population as well as the prevalence of overweight and obesity in the kidney transplant population. In addition, we will explore knowledge, attitudes and behavior related to weight loss and physical activity in this population.

**SPECIFIC AIMS**  
I. To examine the rates of weight gain along with obesity and overweight in a single center renal transplant population through chart review  
   H1.1 Transplant recipients have high rates of obesity and overweight  
   H1.2 Obesity contributes to post-transplant morbidity.  
   H1.3 Patients feel better after transplant and often eat more  
II. To investigate current knowledge, attitudes and behaviors related to weight loss, physical activity and exercise through patient surveys.  
   H2.1 Obese and overweight patients do not perceive weight as a problem  
   H2.1 Knowledge and behaviors related to physical activity is low in transplant recipients  
III. To explore the acceptability and feasibility of a transplant specific exercise intervention  
   H3.1 The program would be acceptable to patients  
   H3.2 Patients might face difficulties with participation due to lack of transportation, limited time due to clinic and family responsibilities and limited mobility.

**METHODS**  
We will conduct a retrospective cohort study to examine all patients older than 18 who have received a kidney transplant at the University of Chicago Renal Transplant clinic between January 2014 and April 2017 Using the electronic medical record, we will collect information about patient sociodemographics (age, gender, race, marital status, insurance type, zip code), clinical conditions (diagnosis, body mass index, co-morbidities) and medications (steroids and other immunosuppressives)

Our outcomes will be patient time from transplant admission and change in weight, BMI, high blood pressure, new onset diabetes mellitus, self-contentment with current BMI.

In addition, we will prospectively survey patients who appear in transplant clinic about their knowledge, attitudes and behaviors related to weight, physical activity and exercise. We will also ask questions about patient desire to participate in an exercise program and query for perceived barriers to participation.

**SOFTWARE REQUIRED:** STATA (The research team will provide software and biostats support. Our lab has a biostatistician who will assist and analysis.)
CONFERENCES AVAILABLE FOR PARTICIPATION
The student will have the opportunity to present locally at the Nephrology Research Conferences, Transplant Outcomes, Meetings and Department of Medicine Research in Progress Conferences. In addition, the student will have the opportunity to submit his or her work to national conferences including the American Society of Nephrology, American Transplant Congress.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences, Healthcare Delivery Sciences (Quality & Safety), Community Health

NIH MISSION: Kidneys

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PROJECT TITLE
Relationship Between Sodium and Calcium Transport in the Distal Convoluted Tubule

PROJECT DESCRIPTION
Sodium and calcium transport in the distal convoluted tubule were previously thought to only be loosely related. However, data from our group recently indicates that calcium transport is influenced by stimuli that typically affect sodium transport. This project would seek to demonstrate the relationship between sodium and calcium transport in the distal convoluted tubule of the kidney.

SPECIFIC AIMS
Characterize the affects of aldosterone, a potent stimulator of sodium transport, on calcium transport.

METHODS
Cell culture, Western blotting, ELISA, real time PCR (qPCR)

SOFTWARE REQUIRED: SigmaPlot

CONFERENCES AVAILABLE FOR PARTICIPATION
Section of nephrology research conference, lab meetings, Section of nephrology research conference

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Kidneys
**PROJECT TITLE**
Attitudes and Understanding of the Early Complications in Patients with Autosomal Dominant Polycystic Kidney Disease among Primary Care Physicians

**PROJECT DESCRIPTION**
Autosomal Dominant Polycystic Kidney Disease (ADPKD) is the most common hereditary renal disease characterized by the development of renal cysts and enlargement of the kidneys leading to renal failure usually in the 6th decade of life. Although early stage ADPKD is thought to be asymptomatic, more than 80% of patients reported some physical symptoms such as pain, discomfort and fatigue. Further, significant kidney enlargement and cyst expansion occurs before any decline in renal function and the height adjusted total kidney volume (htTKV) over 650 ml/min can predict the development of stage III chronic kidney disease. Hypertension occurs before any decline in renal function and it affects 60-75% of young adults with ADPKD. Although we currently do not have any FDA approved therapies impacting cyst growth, we have evidence that strict blood pressure control using ACE-inhibitors was associated with 14.2% slower annual increase in TKV. Dietary and life style modifications including low salt diet, increased fluid intake of >3L of water/day is recommended to patients very early in the course of ADPKD. Patients at risk of developing ADPKD (family history of ADPKD) should be closely monitored for development of hypertension and they should have periodic urinalysis and renal function checked.

Patients with ADPKD and patients who are at risk for development of ADPKD (family history of ADPKD) are seen initially by primary care physicians. Level of understanding of early stage ADPKD among primary care physicians is not known. The lack of understanding can also result in delayed referral due to perceived non-utility of nephrology care until the development of chronic kidney disease. Late referrals could result in increased morbidity and resource utilization. Understanding the impact of ADPKD on patients, importance of early management of complications and the importance of early intervention on the renal function will result in early referrals of these patients to nephrologists. Early referral will also allow the patients to become aware of any potential research studies.

**SPECIFIC AIMS**
1) To examine the current understanding of early complications of ADPKD among the primary care physicians
2) To examine the current management of patients with early ADPKD and patients at risk for development of ADPKD and referral patterns among the primary care physicians.

**METHODS**
Primary care practices in the city of Chicago willing to participate will be included in the study. The primary care physicians will be asked to complete the surveys and questionnaires capturing physicians’ perceptions of the impact of early disease, their awareness, experience and role in the management of patients with early stage ADPKD and also with patients at risk for development of ADPKD. Students will have a chance to survey the primary care physicians.

**SOFTWARE REQUIRED:** Excel

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Weekly lab meetings and Weekly renal grand rounds.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Healthcare Delivery Sciences (Quality & Safety), Community Health

**NIH MISSION:** Kidneys
MEDICINE–NEPHROLOGY

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PROJECT TITLE
Impact of APOL 1 Risk Variants in African American patients with Autosomal Dominant Polycystic Kidney Disease

PROJECT DESCRIPTION
Autosomal Dominant Polycystic Kidney Disease (ADPKD) is the most common hereditary renal disease characterized by the development of renal cysts and enlargement of the kidneys leading to renal failure usually in the 6th decade of life. Significant kidney enlargement and cyst expansion occurs before any decline in renal function and the height adjusted total kidney volume (htTKV) over 650 ml/min can predict the development of stage III chronic kidney disease. 85% of patients with ADPKD have mutations in the PKD1 gene located on the short arm of chromosome 16 which encodes polycystin-1 (PC1). ADPKD is less commonly caused by a mutation in the PKD2 gene located on chromosome 4. Patients with PKD1 gene have more severe disease with a mean age of end stage renal disease of 55, 20 years earlier than PKD2 patients. PKD2 encodes the protein polycystin-2 (PC2). PKD2 patients typically have milder disease with later onset of end-stage renal disease (ESRD), death, and hypertension. Truncating mutations in PKD1 patients have severe disease compared to patients with non-truncating PKD1 mutations.

Apolipoprotein L1 gene (APOL1) high–risk genotype, consisting of two copies of the G1 or G2 alleles, is associated with higher risk for CKD progression among patients with non-diabetic chronic kidney disease. This high risk genotype is most common among African Americans compared to Caucasians (13% vs <1%). Patients with high risk APOL1 genotypes are at a higher risk of developing focal segmental glomerulosclerosis and HIV nephropathy.

We hypothesize that African American patients with ADPKD and high risk APOL1 alleles have higher prevalence of hypertension and microalbuminuria and develop stage III CKD earlier compared to patients with 0 or 1 risk APOL1 allele after adjusting for TKV, age and gender.

SPECIFIC AIMS
1) Genotype for APOL1 risk alleles in African American patients with polycystic kidney disease.
2) Determine the effect of different APOL1 risk alleles on the prevalence of hypertension, microalbuminuria and stage III CKD
3) Compare the prevalence of hypertension, microalbuminuria and stage III CKD in patients with ApoL1 low risk alleles (presence of 0 or 1 risk allele) and high risk alleles (presence of 2 risk alleles).

METHODS
The data will come from different sources. HALT-PKD cohort, a clinical interventional study for adults with ADPKD, TEMPO cohort, a clinical interventional study for adults with ADPKD, Consortium for Radiological Imaging for the Study of polycystic kidney disease (CRISP) and COHORT study, a prospective observational study of PKD. The samples from African American patients will be analyzed for APOL1 genotype. The data that we will look at include HtTKV, S. creatinine, eGFR, hypertension and microalbuminuria.

Students can help with genotyping for APOL1 risk alleles and also gathering data from the databases.

SOFTWARE REQUIRED: Excel

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly lab meeting, weekly renal grand rounds.
POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Kidneys

Medicine–Pulmonary/Critical Care

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PROJECT TITLE
Sepsis Early Prediction and Subphenotype Illumination Study (SEPSIS)

PROJECT DESCRIPTION
Sepsis, defined as life-threatening organ dysfunction in response to infection, contributes to up to half of hospital deaths and is associated with over $24 billion in annual costs in the U.S. The clinical definition of sepsis combines both caregiver suspicion of infection and a measure of severity of illness. Currently, clinical intuition is used to determine when a patient is infected. However, the wide variation in clinical experience, skill, and thresholds for suspecting infection results in some patients being undertreated, with delays in therapy that have been associated with poor outcomes, while other patients are over-treated, and thus exposed to the adverse effects of these treatments. Therefore, there is a need for a systematic, objective tool to identify ward patients with infection.

SPECIFIC AIMS
The purpose of this study is to develop a novel algorithm for identifying ward patients with infection.

METHODS
The student will create a “gold standard” dataset of patients with and without infection by performing chart review on patients with culture orders, antibiotics, or who died on the wards.

We will then compare the accuracy of retrospective methods for identifying infected patients, such as ICD-9 codes, to the gold standard dataset. Finally, an algorithm that can be used to prospectively identify infected patients will be developed using variables such as vital signs, laboratory results, and interventions in the dataset.

Students will be involved in the collection data by reviewing charts in the electronic health record and then performing analyses to determine predictors of infection in hospitalized patients.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
The student will be expected to participate in weekly research group meetings and is encouraged to attend a weekly Outcomes Research Workshop. Final work will be considered for national annual conferences, such as American Thoracic Society, Society of Hospital Medicine, or American Heart Association.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)
PROJECT TITLE
Predicting ICU Readmissions using Clinician Intuition

PROJECT DESCRIPTION
Patients transferred to the intensive care unit (ICU) have increased mortality, length of stay, and cost compared to those not transferred during their hospital stay. For patients whose condition improves, a decision is then made to transfer the patient to the general wards. ICU transfer decisions are typically made using clinical judgment and institutional policies regarding the level of care that can be provided on the wards. Patients readmitted to the ICU have higher hospital lengths of stay, costs, and mortality compared to those patients discharged from the ICU but not readmitted. Previous studies have demonstrated that up to 10% of patients are readmitted to the ICU and that mortality ranges from 20-40% for those readmitted compared to 3-8% for those not readmitted. Taken together, this suggests that over a quarter of deaths from this population are attributable to readmitted patients. Many of these readmissions are likely preventable.

SPECIFIC AIMS
The purpose of this study is to develop a model to predict ICU readmission using both objective patient data and subjective clinical intuition, which could be implemented in hospital policies to act as a decision aid for clinicians seeking to transfer patients to a general ward in order to ultimately reduce costly ICU readmissions.

METHODS
We are conducting brief surveys of both ICU and ward clinicians to assess their subjective intuition about whether a patient will be readmitted to the ICU and collecting objective patient data from the electronic health record. We will use these results to determine the accuracy of caregiver intuition for predicting medical ICU readmission; to compare objective and subjective predictions of ICU readmissions and to combine them into a comprehensive risk score, and; to determine if physician workload is an independent risk factor for ICU readmission.

Students will be involved in the collection and analysis of survey data.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
The student will be expected to participate in weekly research group meetings and is encouraged to attend a weekly Outcomes Research Workshop. Final work will be considered for national annual conferences, such as American Thoracic Society, Society of Hospital Medicine, or American Heart Association.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Heart
**PROJECT TITLE**
Using a Real Time Risk Stratification App to Improve Sleep Quality and Patient Satisfaction on the Wards

**PROJECT DESCRIPTION**
Despite technological advances, nursing practice with respect to vital signs has not changed significantly since the days of Florence Nightingale, where every patient had vital signs checked routinely at set hours around the clock, regardless of risk. This project will use continuous real-time vital sign monitoring and electronic health record data to calculate a composite risk score, which will be used to risk-stratify patients in order to deliver personalized care. Each night participants who are deemed low risk will not be woken for routine nighttime vitals. We hypothesize that this patient-centered approach will result in higher subjective sleep quality and patient satisfaction, without any increase in adverse events.

**SPECIFIC AIMS**
To compare the quality of sleep, satisfaction, and adverse outcomes between the interventional group using risk stratification and the control group, receiving standard of care.

**METHODS**
This is a randomized trial. Patients will be approached for informed consent and then will be randomized to receive the intervention or control. In the intervention group, subjects who meet the low-risk criteria will not be woken during the night for spot-check vital signs. Patients who do not meet the low-risk criteria will continue to be woken for nighttime vital sign checks per standard of care. We will conduct baseline and follow up surveys to evaluate quality of sleep and satisfaction with the hospital stay. In addition, continuous heart rate, respiratory rate, and movement data will be collected by a contactless monitoring device. Monitor data and medical record data will be used to compare adverse event rates in the interventional and control groups.

The student will participate in obtaining informed consent, collecting survey data, and analyzing preliminary results.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**
The student will be expected to participate in weekly research group meetings and is encouraged to attend a weekly Outcomes Research Workshop. Final work will be considered for national annual conferences, such as American Thoracic Society, Society of Hospital Medicine, or American Heart Association.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

**NIH MISSION:** Heart
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PROJECT TITLE
Fibroblast Growth Factor Signaling in Lung Injury and Pulmonary Fibrosis

PROJECT DESCRIPTION
Idiopathic Pulmonary Fibrosis (IPF) is characterized by progressive pulmonary scarring and decline in lung function. Lung epithelial injury and aberrant recovery is believed to be central to the pathogenesis of IPF. The median survival for IPF is 3-5 years after diagnosis, the underlying cause of IPF is not known, and pharmacologic treatments have limited efficacy. Fibroblast Growth Factors (FGFs) are implicated in the pathogenesis of IPF, although the mechanism through which FGFs promote fibrogenesis is unclear. We study cellular mechanisms of FGF and growth factor signaling in pulmonary fibrosis, using transgenic mouse models of lung injury and pulmonary fibrosis. Projects in the lab focus on cell-specific growth factor signaling and their role in 1) recovery from lung injury and 2) fibroblast activation and pulmonary fibrosis.

SPECIFIC AIMS
Examples of projects include:

1) Study the requirement of FGF2 for epithelial recovery following injury. This project involves assessment of lung epithelial proliferation and differentiation in FGF2 wild-type and knockout mice using lineage tracing analysis. To determine if FGF2 is protective in response to injury, mice with inducible overexpression of FGF2 will be used.
2) Determine the requirement of epithelial FGF receptor signaling in the development of pulmonary fibrosis. This project involves the use of mice with lung epithelial-specific FGF receptor knockouts, and will evaluate development of pulmonary fibrosis in response to bleomycin treatment.
3) Determine fibroblast-specific signaling involved in pulmonary fibrosis. This project will involve gene expression and protein analysis of fibroblasts from mice treated with bleomycin. The mice in this project are engineered to have fibroblast-specific FGF receptor knockouts, fibroblasts from WT or knockout mice are collected using cell sorting, and quantitative RT-PCR or western blot analysis is performed using both cultured and freshly sorted cells.

METHODS
Techniques required will depend upon the project performed. Techniques used in the laboratory include the following: Histology, Immunohistochemistry, Immunofluorescence, western blot, quantitative RT-PCR, Flow cytometry, cell sorting, primary cultures of mouse lung epithelium and fibroblasts, mouse intubation and administration of intratracheal bleomycin.

SOFTWARE REQUIRED: Graphpad (Graphpad and any other required software will be provided)

CONFERENCES AVAILABLE FOR PARTICIPATION
Pulmonary Research In Progress Seminar, Weekly lab meeting

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Lungs
PROJECT TITLE
The Role of Proline Synthesis Pathway for Collagen Protein Production in Lung Fibrosis

PROJECT DESCRIPTION
Organ fibrosis and resultant organ failure account for at least one third of deaths worldwide. For example, idiopathic pulmonary fibrosis (IPF) is a progressive disease characterized by scarring of lungs. IPF affects approximately 89,000 people in the U.S. There is no cure for IPF, and despite the recent emergence of antifibrotic therapies, the median survival remains 3.5 years, which is similar to survival in many cancers. IPF is characterized by excessive deposition of collagen, which leads to progressive impairment of gas exchange due to replacement of alveoli with fibrotic tissue. This project will focus on the effect of transforming growth factor-β (TGF-β), the key cytokine in IPF, on the cellular metabolic changes that drive the synthesis of proline, which makes up 17% of collagen.

SPECIFIC AIMS
1) Determine whether TGF-β induces the cellular metabolic pathways that govern de novo proline synthesis in human lung fibroblasts.
2) Determine whether the enzymes that regulate proline synthesis are upregulated in lungs from patients with IPF.
3) Determine whether proline synthesis pathway is required for collagen protein synthesis in human lung fibroblasts.

METHODS
Techniques required will depend upon the project performed. Techniques used in the laboratory for the project include the following: Western blot, quantitative RT-PCR, immunohistochemistry, Immunofluorescence, cellular bioenergetics (cellular oxygen consumption and acid production) and cultures of primary lung fibroblasts.

SOFTWARE REQUIRED: GraphPad, Prism

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly lab meetings, Pulmonary Research In Progress Seminars and Clinical Conference.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Lungs
HAP Exposure and Blood Pressure Variation and Cardiovascular Risk in Adults and Children

PROJECT DESCRIPTION
Chronic exposure to air pollution is an established risk factor for morbidity and mortality from cardiovascular and cerebrovascular diseases (CVD), and hypertension is considered as a primary risk factor for CVD. Elevated systolic blood pressure is a major risk factor for atherosclerosis, cerebrovascular and coronary artery diseases, congestive heart failure, renal failure, peripheral vascular disease and premature death. A relatively small but sustained increase in diastolic blood pressure also increases the risk for coronary events and strokes by approximately 30% and 40%, respectively. We have recently demonstrated that transition from kerosene/firewood to ethanol fuel led to significant reductions in personal exposures to pollutants such as particulate matter, systemic inflammation and diastolic BP. Preschool children spend much of their time in the home with their mothers and are therefore exposed to similar levels of HAP as their mothers. Childhood blood pressure (BP) is an important predictor of hypertension and cardiovascular risk later in life though the risk factors for elevated BP in children are currently unknown. We will use a cohort of women who recently participated in a randomized controlled intervention study that evaluated the impact of ethanol stove intervention on pregnancy outcome and their children to investigate the long term implications of exposure to HAP on changes in blood pressure in mothers, their children and another adult in the same households. This study will examine the variation in blood pressure (BP) in adults and children between the intervention group (ethanol-using) and control group (firewood/kerosene-using). It will also examine the BP of an older adult from the same household who is not responsible for the family cooking.

SPECIFIC AIMS
To determine the prevalence of hypertension, pre-hypertension and cardiovascular risk among household members (women, children, an older adult) who are exposed to HAP and compare these changes between two groups of women: intervention group who has been randomized to cook using ethanol, and the control group who will continue using firewood/kerosene as cooking fuel.

METHODS
Systolic and diastolic blood pressure (BP) in the study groups are already being measured in triplicate using an automated digital devise that has been validated against a sphygmomanometer (OMRON-70CP) and recorded. Additional measures will continue during the summer. Similar BP readings are being recorded in children using a pediatric cuff. Participants will be seated comfortably for five minutes before the BP measurements are made every minute on the supported right arm in accordance with standard recommendations. The average of the last two measurements will be recorded. Comparisons will be made between the intervention and control groups to determine the impact of exposure to HAP on BP changes. We will also relate these changes to CRP levels.

SOFTWARE REQUIRED: STATA, SPSS

CONFERENCES AVAILABLE FOR PARTICIPATION
CUGH, ATS and CHEST

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Global Health

NIH MISSION: Heart
**PROJECT TITLE**
HAP Exposure, Olfaction and Nasal Microbiome

**PROJECT DESCRIPTION**
Concentrations of household air pollution (HAP) from biomass smoke have been associated with many adverse health consequences in adults including Type 2 diabetes, hypertension, cardio and cerebrovascular changes, impaired olfaction, lung function, cataracts, various cancers, and all-cause mortality. The upper airway is the portal of entry of household air pollution (HAP) and represents an accessible site for evaluation of its effects on respiratory disease. Indeed, increased exposure to air pollution has been linked to elevated nasal and lung symptoms. Components of nasal physiology, such as olfaction, are at high risk from injury due to air pollution. The olfactory nerve, by necessity of its function in chemosensation, is directly exposed to inhaled air and therefore subject to the deleterious effects of pollutants, both directly due to neurotoxicity and indirectly due to inflammation. The olfactory nerve is a pathway for pollutants to the central nervous system, and therefore may also reflect injurious neurologic effects as well. Olfactory loss is an independent risk factor for 5-year mortality and particulate matter exposure is associated with olfactory loss in older adults. Thus, decreased olfaction may represent a relatively unique and sensitive biomarker of exposure to HAP, with major health implications worldwide. Despite the magnitude of the problems associated with exposure to burning biomass, epidemiologic data on the associated olfactory changes is lacking. This study will examine the change in olfaction in adults between the intervention group (ethanol-using women) and control group (firewood/kerosene-using women). We will also examine the question of whether HAP affects microbes in the upper airway.

**SPECIFIC AIMS**
To evaluate the change in olfactory function due to HAP exposure and compare these changes between two groups of women: intervention group who has been randomized to cook using ethanol, and the control group who will continue using firewood/kerosene as cooking fuel. We will also investigate the impact of HAP exposure on nasal microbiome in the different study groups to test the hypothesis that nasal inflammation from HAP influences airway microbe composition.

**METHODS**
Olfactory function will be evaluated using commercially available Sniffin’ Sticks smell pens (Burghart Medical Technology, Wendel, Germany). Sniffin’ Sticks reliably deliver the same concentration of n-butanol with each presentation for at least 3 years with correct use and proper storage, including in large field studies across climates. Nasal brushing samples will be obtained using standard methods for large field studies (e.g., the Human Microbiome Project).

**SOFTWARE REQUIRED:** STATA, SPSS

**CONFERENCES AVAILABLE FOR PARTICIPATION**
CUGH; ATS; American Rhinologic Society; International Society for Environmental Epidemiology

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Global Health
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**PROJECT TITLE**  
Exposure to Benzene, Toluene and Xylene and Lung Function and Biomarkers of Genotoxicity and Oxidative Stress in Petrol Station Attendants in Ibadan, Nigeria  

**PROJECT DESCRIPTION**  
This study evaluates exposure to benzene, toluene and xylene and lung function and biomarkers of genotoxicity and oxidative stress in petrol station attendants in Ibadan, Nigeria. Petrol filling stations belong to the downstream sector of the oil and gas industry, which is a major driver of many economies, including Nigeria. Millions of automobiles on Nigerian roads run on PMS (Premium Motor Spirit) or diesel fuel with an additional increased use of PMS and diesel in large and small scale-industries due to poor and irregular supply of electricity from the National grid thus increasing exposure of Petrol Station attendants (PSAs). Currently there are 26,684 petrol stations in Nigeria with an increasing number of female petrol station attendants. Benzene, toluene and xylene (BTX) are the commercial petroleum aromatics in petrol (gasoline) and could be easily absorbed through the respiratory tract and skin. Petrol station attendants are therefore exposed to BTX. Exposures to BTX are known to cause genotoxicity. Exposure to benzene generates metabolites that induce oxidative stress and damage to DNA. Impaired respiratory functions from exposure to PMS have been reported among petrol filling station workers. Recent studies using systematic reviews and meta-analysis suggest exposure to traffic-related air pollutants, Particulate Matter 2.5 micrometers (PM2.5) and Nitrogen dioxide (NO2) are possible risk factors for Type 2 Diabetes and Hypertension. PSAs do not have pre-employment medical examinations or regular medical checkups to detect potential serious effects of the exposures they may have. No study in Nigeria has evaluated blood levels of BTX in PSAs and their genotoxic and oxidative stress effects. This will be the first study to assess diabetic risk among PSAs in order to establish an association between exposure to BTX and diabetes. Almost all studies on PSAs have been among male PSAs. This study will determine frequency of chromosomal aberrations in female PSAs. We hope to generate empiric data to support pre-employment medical examination, regular program for health surveillance of PSAs including biological monitoring and clinical examinations, as well as the possibility of using PPEs, vapor recovery systems and instituting self-service fuel.  

**SPECIFIC AIMS**  
1) To assess workplace hazards and health problems of petrol station attendants  
2) To analyze and compare personal air sample concentrations of BTX and PM2.5 in petrol stations and workplaces of controls.  
3) To evaluate and compare urine levels of BTX in petrol station attendants and controls.  
4) To evaluate and compare selected biomarkers (urinary 8-oxoDG, superoxide dismutase, malondialdehyde and C-reactive protein) for genotoxic and oxidative stress effects of BTX in petrol station attendants and controls.  
5) To assess and compare pulmonary function parameters in petrol station attendants and controls.  
6) To assess and compare HbA1c and Fasting plasma glucose (FPG) petrol station attendants and controls.  

**METHODS**  
The study is a comparative cross-sectional study. Cluster sampling technique will be used to select three out of the five urban local government areas in Ibadan. A total sampling of all PSAs in these LGAs will be interviewed. For Aims 2, 3, 4, 5 and 6, one LGA will be selected out of the three LGAs. All PSAs in the selected LGA will be recruited. Controls (Tailors) will be matched for age, sex and smoking habits with the study group. Personal exposure monitoring, spirometry, biomarker assays for exposures and breakdown products of exposures, anti oxidants as well as HbA1c assays will be determined and comparisons made between the exposed and control groups.
SOFTWARE REQUIRED: STATA, SPSS

CONFERENCES AVAILABLE FOR PARTICIPATION
Consortium of Universities for Global Health (CUGH); American College of Occupational and Environmental Medicine (ACOEM); CHEST, American Thoracic society

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Community Health, Global Health

NIH MISSION: Lungs

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PROJECT TITLE
Home Sleep and Metabolism

PROJECT DESCRIPTION
The overall purpose of this study is to investigate the effects of sleep extension on glucose metabolism and energy balance in habitual short sleepers, while they live in their normal environment.

SPECIFIC AIMS
1) Sleep extension will improve insulin sensitivity and beta cell function.
2) Sleep extension will reduce average daily energy intake.
3) Sleep extension will increase total daily energy expenditure, mainly due to an increase in physical activity.

METHODS
Randomized controlled trial

CONFERENCES AVAILABLE FOR PARTICIPATION
Sleep, Endocrinology and Diabetes conferences

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Community Health

NIH MISSION: Diabetes
PROJECT TITLE
Type 2 Immune Responses are Protective In Septic Patients

PROJECT DESCRIPTION
For this project, students will collect blood and patient information from patients admitted to the hospital for sepsis. The student will then process that blood for subsequent analysis of the immune responses of those patients to better understand the role of protective type 2 immune responses. Our preliminary data suggests that these roles are protective in certain contexts and we seek to explore this further as a possible option for developing novel immunotherapies.

SPECIFIC AIMS
Understand how type 2 immune responses (normally associated with allergies and asthma) are protective in patients with sepsis.

METHODS
Students will collect whole blood from patients, as well as specific demographic and clinical information (including culture data, white blood cell counts, vital signs, and comorbid medical conditions). They will then process this blood into leukocytes and serum/plasma for cryopreservation. Once an adequate number of samples are collected, the student will analyze these data using flow cytometry and cytokine multiplex assays to examine the activated immune responses. The student will then correlate these with clinically collected data and determine which comorbidities and immune responses are associated with improved outcomes.

SOFTWARE REQUIRED: STATA, Graphpad

CONFERENCES AVAILABLE FOR PARTICIPATION
Results may be presented at the annual American Thoracic Society meeting in May, the American Association of Immunologists annual meeting in May, the Society for Critical Care Medicine meeting in January, or the Autumn Immunology meeting in Chicago in November.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Heart, Lungs
MEDICINE–RHEUMATOLOGY

SPECIFIC AIMS
Understand how type 2 immune responses (normally associated with allergies and asthma) are protective in a mouse model of Staphylococcus aureus sepsis.

METHODS
We have several different transgenic and knockout mouse models that we can infect with Staphylococcus aureus to understand the critical components of the mouse immune response that are activated and either contribute to, or protect against, mortality. Specifically, the student will learn basic microbiologic techniques, mouse handling and tissue analysis, an introduction to flow cytometry for analysis of immune cells, ELISA, and multiplex cytokine assays.

SOFTWARE REQUIRED: Graphpad

CONFERENCES AVAILABLE FOR PARTICIPATION
Results may be presented at the annual American Thoracic Society meeting in May, the American Association of Immunologists annual meeting in May, the Society for Critical Care Medicine meeting in January, or the Autumn Immunology meeting in Chicago in November.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Heart, Lungs

Medicine–Rheumatology

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PROJECT TITLE
Impact of Exercise on Allograft Rejection

PROJECT DESCRIPTION
The kinetics of transplant rejection are mainly determined by the number of genetic disparities between the transplant donor and the transplant recipient, but environmental factors such as diet or the microbiota have recently been shown to modulate alloimmunity and transplant outcomes. In this project, we will test the impact of exercise on skin allograft rejection and the mechanisms underlying observed changes in active versus sedentary mice.

SPECIFIC AIMS
To assess the kinetics of skin graft rejection and strength of alloreactivity in active versus sedentary mice.

METHODS
Skin transplantation performed by a lab microsurgeon. Flow cytometric analysis of alloimmune responses under guidance of experienced graduate student. Bioinformatic analysis of intestinal and skin microbial communities.

SOFTWARE REQUIRED: Prism
CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly lab meeting. Committee on Immunology seminar, journal club, work-in-progress and retreat.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Blood

Neurobiology & Neurology

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PROJECT TITLE
The Impact of In-Patient Stroke Alert System in a Comprehensive Stroke Center

PROJECT DESCRIPTION
In-hospital acute stroke patients are distinct from those occurring in the community. In-hospital strokes are in general more severe, and these patients tend to have different stroke mechanisms, receive lower adherence to process-based quality measures and have worse outcomes. The percentage of stroke mimics occurring during in-hospital stroke alerts has been reported to be as high as 50%, which is significantly higher than mimics presenting to the emergency department.

We have observed that in-patient stroke alerts have gained popularity among non-neurological services resulting in a high number of false positive alarms due to the rate of stroke mimics. Also, the complexity of patients admitted to services such as surgery, cardiology and intensive care units represent a major challenge for the evaluation and decision-making regarding acute thrombolytic therapies.

SPECIFIC AIMS
1) To describe our experience as a comprehensive stroke center before and after the implementation of an in-patient stroke alert system.
2) Perform comprehensive analysis of our in-patient stroke alert population as compared to stroke alerts in the Emergency Department.
3) We will compare the stroke severity, rate of stroke mimics, stroke mechanism, adherence to process-based quality measures, acute therapy provided (i.e. IV-tpa, thrombolysis, or IA t-pa) and patient outcomes.

METHODS
Data collection will be performed through chart review of the electronic medical record. Patient characteristics, demographic information (age, gender, and ethnicity), hospital location of stroke alert, initial presenting symptom, initial NIHSS, medications, specific quality of care measures and outcomes will be recorded.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
International Stroke Conference; American Academy of Neurology; American Neurologic Association; Neuro-Critical Care Society
POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Neurology

MENTOR: Peggy Mason, MD
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IRB/IACUC NUMBER: 71967

PROJECT TITLE
Empathy in Rats

PROJECT DESCRIPTION
Using a paradigm established in our laboratory, we are exploring the biological basis for pro-social behavior in rats. Current projects include parsing out the motivational states of the helper rat, examining the required relationship between the helper and recipient of help, as well as identifying the social deficits in rodent models of autism.

SPECIFIC AIMS
To examine the motivational states involved in empathic helping behavior.

METHODS
Behavioral assays with rats; blood sampling and ELISA detection of hormones.

CONFERENCES AVAILABLE FOR PARTICIPATION
Society for Neuroscience (Fall)

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Social Sciences

NIH MISSION: Neurology

MENTOR: Raymond Roos, MD
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PROJECT TITLE
Research Studies in Amyotrophic Lateral Sclerosis

PROJECT DESCRIPTION
Mutations in superoxide dismutase type 1 (SOD1), TDP-43, and an expanded repeat in the noncoding region of C9ORF72 have been identified as causes of familial amyotrophic lateral sclerosis (FALS), also known as Lou Gehrig's disease). Mutations in these proteins cause them to misfold and form aggregates and this may lead to interference with the normal protein-protein interactions which are important for cell survival. Our studies involve investigations of how misfolded proteins cause the disease and ways that one may rescue cells from this toxicity.
**SPECIFIC AIMS**
Explore the role of the ER stress and the integrated stress response in causing FALS and how one can use this knowledge in the treatment of FALS.

**METHODS**
Transgenic mice that express mutant SOD1 as well as neural cells will be used in the investigations.

**SOFTWARE REQUIRED:** Prism (provided for project)

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Lab Meetings

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences

**NIH MISSION:** Neurology

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**MENTOR:** V. Leo Towle, PhD
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**PROJECT TITLE**
Investigations into the Neural Substrates of Language and Memory

**PROJECT DESCRIPTION**
Using direct invasive neurophysiologic recordings from the human cortex, we are trying to understand the flow of information across cortical areas during language and memory tasks. We have described the location and timing of cortical activations during tasks in which the subjects hear and then repeat words (Brain 131:2013). The sequential activation of auditory cortex, Wernicke’s area, Broca’s area and motor cortex are easily observed. We are expanding these investigations to include visual and auditory memory tasks for abstract and concrete words, along with semantic and episodic and semantic memory recall tasks. The project requires obtaining recordings from epilepsy surgery patients and processing the data using imaging software developed in the laboratory.

**SPECIFIC AIMS**
We hope to develop a comprehensive model of memory and language processes based on empirical recordings, which will characterize the widely distributed serial and parallel processing of information across human cortex. We hope that it would result in reduced cognitive deficits after surgery for medically intractable seizures.

**METHODS**
Children and adults that undergo brain surgery for the treatment of seizures often report increased and persistent memory problems postoperatively. This is in spite of the placement of chronic subdural grids implanted over the cortex to map the location of their seizures and the functional organization of their brain. Unfortunately, there is currently no way to identify areas that are necessary for memory formation and recall at this time. We utilize this clinical opportunity to explore the electrophysiologic activations recorded from as many as 126 electrodes implanted over cortex during cognitive tasks. Active brain areas emit high frequency oscillations when they are processing information, allowing us to track the dynamic spread of information. We hope to build a model of information flow based on the spatiotemporal dynamics of these recordings. The findings have implications regarding theories of how the brain organizes and stores information, and may be helpful in
improving the quality of life of these patients.

SOFTWARE REQUIRED: Word, Excel, SPSS, Windows, Ubuntu, Laboratory-Developed Software (provided for this project)

CONFERENCES AVAILABLE FOR PARTICIPATION
The research team meets weekly to discuss the project’s progress and any issues that may have arisen. In addition, the student would have weekly meetings with the PI to discuss his/her research project. Finally, the student is welcome to attend any meetings relevant to the work.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Neurology

**Obstetrics & Gynecology**

MENTOR: Ann Borders, MD, MSc, MPH
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PROJECT TITLE
Breastfeeding Peer Counselor Community Partnership

PROJECT DESCRIPTION
This investigation aims to determine the impact of a breastfeeding peer counselor program on breastfeeding initiation and continuation rates for patients of the NorthShore Community Health Clinic (NCHC). The HCHC serves mostly low-income Black and Hispanic mothers, among whom breastfeeding rates are significantly lower than the general US population. Rates of ever breastfeeding for the general US population were 79.2% in 2014; breastfeeding at six months was 49.4%; breastfeeding at one year was 26.6%; and exclusive breastfeeding at six months was 18.8% (CDC). For black mothers initiation rates were closer to 58.9%, and while rates of initiation for Hispanic mothers was around the national average at 80% (CDC), the overall breastfeeding initiation rate for those living in poverty is closer to 57% (McDowell, Wang et al. 2008). A baseline assessment of clinic breastfeeding rates is currently underway to establish whether the NCHC population reflects the national rates among Medicaid, Black and Hispanic populations.

SPECIFIC AIMS
To assess the impact of breastfeeding peer counselor consultation, as part of standard prenatal care, on breastfeeding outcomes.

METHODS
Qualitative and quantitative data will be collected through surveys, participant observation, and medical chart reviews.

SOFTWARE REQUIRED: SPSS (hospital computer)

CONFERENCES AVAILABLE FOR PARTICIPATION
TBD
POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences, Healthcare Delivery Sciences (Quality & Safety), Community Health

MENTOR: Ann Borders, MD, MSc, MPH
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PROJECT TITLE
Illinois Perinatal Quality Collaborative – Obstetric Initiatives

PROJECT DESCRIPTION
The 2016 Pritzker Summer Research Program student will be invited to work with the Illinois Perinatal Quality Collaborative (ILPQC) central team located at NorthShore University HealthSystem Evanston Hospital including the ILPQC Executive Director, Dr. Ann Borders, the State Project Director, Dr. Patricia Lee King and the State Project Coordinator, Kate Finnegan. ILPQC works with over 100 Illinois birthing hospitals on obstetric and neonatal quality improvement projects. We will work with the student to develop a project with ILPQC. The student will work with us to determine the best fit for a project. Options will include analysis of Birth Certificate Accuracy final data and/or Maternal Hypertension baseline data analysis. In addition, we have data collected on 32 of the 38 perinatal quality collaboratives nationwide and additional information could be collected and interpreted. The goal would be abstract development with a draft paper for peer-reviewed publication. This work could play an important role in the dissemination of Illinois Perinatal Quality Collaborative (ILPQC) Obstetric quality improvement work in the national OB and MFM community.

SPECIFIC AIMS
The aim of the Birth Certificate Accuracy Quality Improvement Initiative is by December 2015, to improve birth registry accuracy so that 17 focused variables identified on the birth registry accuracy audit sheet will be transmitted from medical record to birth registry accurately in 95% of records. The aim of the Maternal Hypertension Quality Improvement Initiative is by December 2016, to reduce the rate of severe morbidities in women with preeclampsia, eclampsia, or preeclampsia superimposed on pre-existing hypertension by 20%.

METHODS
For the Birth Certificate Accuracy Quality Improvement Initiative, the 2016 Pritzker Summer Research Program student will work with his/her mentor to analyze some component of the progress of over 100 participating hospitals across the state towards these aims and other process measures, as well as potential differences by patient racial/ethnic mix, payer mix, OB service level, and geographic location. For the Maternal Hypertension Initiative, the student could work with his/her mentor to analyze a proposed aspect of the baseline data collected on process and outcome measures.

SOFTWARE REQUIRED: STATA (STATA or another statistical software package may be needed to analyze the data. If so, access to the software or an epidemiologist with access to the software will be provided.)
PROJECT TITLE
Prevalence and Correlates of having a Regular Provider among Women Presenting for Abortion after Passage of the Affordable Care Act

PROJECT DESCRIPTION
The purpose of this research is to understand the demographic and clinical make-up of the patient population presenting to the Ryan Center for pregnancy termination. We are especially interested in learning how physician access and contraception access has changed after implementation of the Affordable Care Act since its roll out began.

SPECIFIC AIMS
To determine the prevalence and correlates of having a regular physician among women presenting for induced abortion after the implementation of the Affordable Care Act.

METHODS
This will consist of a retrospective chart review using charts from women who presented for pregnancy termination between 8/2011-12/2015. We will then conduct bivariate analyses, comparing women with and without a regular physician, and multi-variable regression modeling, to identify factors associated with not having a regular physician.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Community Health

PROJECT TITLE
Neuroimmunological Causes of Pelvic Pain

PROJECT DESCRIPTION
Emerging evidence suggests a role for neuroimmunological pathways in the development of many chronic pain conditions. Our lab focuses on the neurobiology of pain in murine models, with an emphasis on uro-gynecological pain conditions. One hypothesis is that infection of pelvic organs results in sensitization of nociceptive pathways, resulting in organ dysfunction and chronic pain. We have recently identified putative targets for reducing sensitization and would like to explore their utility in an
animal model of pelvic pain. This research project heralds the potential to identify new therapeutics for the treatment of pelvic pain conditions.

**SPECIFIC AIMS**

1) Investigate the effects of direct activation of the TLR signaling pathway in uterine contractility, arterial perfusion, pain and inflammation.

2) Characterize the effects of TLR antagonists and reducing pain in an animal model.

**METHODS**

Our lab studies transgenic mice using a combination of optical nerve stimulation, laser doppler, physiological, histological and behavioral techniques. This project also engenders opportunities for collaboration with local experts in immunological signaling and parturition allowing the development of additional molecular biological skills.

**SOFTWARE REQUIRED:** Excel (Necessary software will be provided by our laboratory.)

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Our department holds a weekly grand rounds. Students and residents have also submitted abstracts and attended International Association for the Science of Pain, Anesthesiology, Society for Neuroscience, Society for Gynecological Investigation, International Pelvic Pain Society, Society for Neuroscience

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences

**NIH MISSION:** Digestive Diseases, Neurology

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**PROJECT TITLE**  
Novel Imaging Methods to Decipher the Cause of Bladder and Uterine Pain  

**PROJECT DESCRIPTION**  
Our NIH funded laboratory (www.painscientist.org), has developed new methods for identifying the cause of pelvic pain conditions. We utilize fMRI, ultrasonography and EEG to determine the causes of menstrual and bladder pain. Despite the high prevalence of dysmenorrhea (40-70% of American women), the fundamental biological causes remain unknown. A critical subset of these women suffering from menstrual pain do not respond to conventional treatments (such as non-steroidal anti-inflammatory drugs [NSAIDS]), and may be at further risk for developing chronic bladder pain, resulting in billions of dollars in lost productivity. A more complete model of the underlying mechanisms is urgently needed to guide drug discovery in dysmenorrhea. Our research program has focused on key gaps in this model: the role of uterine and neurological factors that contribute to pain severity. Our subjects are also undergoing longitudinal trials to test the effects of treatments for menstrual pain.

**SPECIFIC AIMS**

1) Investigate the relationship between physiological events in the uterus and bladder (contractions, oxygenation, and perfusion) and pain in humans with interstitial cystitis and dysmenorrhea.

2) Characterize the effects of treatments such as non-steroidal anti-inflammatory medications and oral contraceptives on humans with interstitial cystitis and dysmenorrhea.

3) Determine the role of neurological factors with EEG recordings during episodes of pain.
METHODS
We have already obtained fMRI, Ultrasound, and EEG recordings prospectively from substantially characterized women with
dysmenorrhea and painful bladder syndrome. Students will have an opportunity to analyze the role of individual factors in
dysmenorrhea and painful bladder syndrome from an already obtained dataset. This project provides an opportunity for learning
approaches towards merging clinical and basic research. Medical students and resident physicians in the lab will also learn many
fundamental principles of pain medicine and gynecology.

SOFTWARE REQUIRED: Excel (Additional software will be provided by our lab as needed.)

CONFERENCES AVAILABLE FOR PARTICIPATION
Our department holds a weekly grand rounds. Students and residents have also submitted abstracts and attended International
Association for the Science of Pain, Anesthesiology, Society for Neuroscience, Society for Gynecological Investigation,
International Pelvic Pain Society, Society for Neuroscience

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Digestive Diseases, Kidneys, Neurology

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PROJECT TITLE
Peripheral Nerve Based Therapeutics for Uterine and Bladder Pain

PROJECT DESCRIPTION
Our lab focuses on the neurobiology of pain with an emphasis on urogynecological pain conditions. Pelvic nerves play a crucial
role in uterine and bladder function and pain modulation, yet peripheral nerve based therapies have not achieved universal success.
Our goal is to decipher the mechanisms of pelvic neurophysiology to pioneer novel therapeutic pain management strategies. The
basic research proposed in this project will be a cornerstone for the development of better pain medicine techniques in humans.

SPECIFIC AIMS
1) Evaluate the role of the inferior hypogastric, and pudendal nerve in uterine perfusion during healthy and model pelvic pain
   states.
2) Compare neurological and anti-inflammatory strategies for improving pelvic pain in an animal model.

METHODS
Our lab studies transgenic mice using a combination of optical nerve stimulation, laser doppler, physiological, histological and
behavioral techniques. Research participants will have the opportunity to develop basic research skills. Additional training from
expert laparoscopic surgeons would allow the opportunity to hone advanced surgical skills.

SOFTWARE REQUIRED: Excel (Necessary software will be provided.)
Conferences Available for Participation

Our department holds a weekly grand rounds. Students and residents have also submitted abstracts and attended International Association for the Science of Pain, Anesthesiology, Society for Neuroscience, Society for Gynecological Investigation, International Pelvic Pain Society, Society for Neuroscience.

Possible Scholarship and Discovery Track(s): Basic Sciences

NIH Mission: Digestive Diseases, Neurology

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Project Title

Autophagy in Inflammation-Induced Preterm Labor

Project Description

We have recently produced evidence that autophagy (the process of cellular renewal and recycling that was recognized by this year’s Nobel Prize in Physiology or Medicine) is tightly regulated during pregnancy, and that disruption of autophagy is a feature of preterm labor in a mouse model. The current project uses previously collected maternal and fetal specimens from this model to further characterize the role of autophagy. The effect of a substance that profoundly limits labor in this model (i.e. surfactant protein A, SP-A) on components of autophagy pathways will be analyzed.

Specific Aims

Determine the effect of SP-A on the expression and function of autophagy pathway components in a mouse model of inflammation-induced preterm labor.

Methods

Previously collected maternal (blood and uterus) and fetal (placenta, fetal bodies) samples will be analyzed by various molecular techniques, including RT-PCR, western blot, and immunohistochemistry.

Software Required: Excel, GraphPad

Conferences Available for Participation

Weekly lab meetings; Weekly Ob/Gyn Grand Rounds; Weekly Perinatal Conference; Periodic NorthShore University HealthSystem Research Institute joint lab meeting

Possible Scholarship and Discovery Track(s): Basic Sciences

NIH Mission: Lungs, Neurology
PROJECT TITLE
Metabolic Changes During Ovarian Cancer Metastasis

PROJECT DESCRIPTION
The high mortality of ovarian cancer (OvCa) is caused by the wide dissemination of cancer cells within the abdominal cavity, which results in significant tumor burden. The first cells which metastatic OvCa cells encounter are the mesothelial cells which line the peritoneum and omentum of the abdominal cavity. OvCa cells ‘activate’ these mesothelial cells, which in turn drives OvCa metastasis. Recently, we began to delineate the role of metabolites secreted by OvCa cells during this process. We hypothesize that metabolites secreted by OvCa cells induce EMT and promote fibronectin secretion in mesothelial cells, which in turn supports cancer metastasis. Based on these results, we propose a systematic study of secreted metabolites. The metabolic pathways altered in mesothelial cells that have undergone EMT in co-culture with OvCa cells has been determined using global metabolomics methods. The goal of this project is to understand the functional role of the identified metabolites. Therefore, individual metabolites will be tested for their ability to promote EMT in mesothelial cells. EMT is used as a read-out, since this transition indicates that mesothelial cells have become activated, cancer-associated stromal cells. Specifically, mesothelial cells treated with these metabolites will be evaluated for their ability to enhance OvCa adhesion, proliferation, and invasion. The completion of the proposed studies will increase our understanding of the mechanism by which OvCa cells induce EMT in human primary mesothelial cells. http://obg.bsd.uchicago.edu/FacultyResearch/lengyellab.htm

CONFERENCES AVAILABLE FOR PARTICIPATION
Lab meeting every week. Grand Rounds every week.

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PROJECT TITLE
Does Uphold Lite Vaginal Mesh affect OAB symptoms? A retrospective cohort study reviewing changes in OAB symptoms following Uphold Lite Mesh placement.

PROJECT DESCRIPTION
Does Uphold Lite Vaginal Mesh affect OAB symptoms? A retrospective cohort study reviewing changes in OAB symptoms following Uphold Lite Mesh placement.

SPECIFIC AIDS
Our aim is to investigate if there are significant changes in OAB symptoms following surgical treatment of POP using Uphold Lite Vaginal Support system. We will compare urgency, frequency and urge urinary incontinence 6 and 12 months following procedure in group that was noted to have OAB prior to surgery and group that did not have any symptoms of OAB prior to surgery.
METHODS
We propose a retrospective cohort study including patients who underwent reconstructive surgery for pelvic organ prolapse using Uphold Lite Vaginal support system procedure in the North Shore Hospital System from 1/1/2008 – 1/1/2016 for POP by four trained urogynecologist. Patient population will include patients who included both uterine sparing procedure and uterine removal procedure. We will identify patients who underwent these procedure by surgical Codes XXX in the medical records.

POP-Q evaluation as well as PFDI inventory questionnaire (Question 15 and 16) as well baseline frequency, urgency and urgency incontinence will be obtained from initial visit in our practice. Follow up data will be obtained 6 and 12 months following surgery. We will carefully examine in there are any changes in OAB symptoms if two different groups and what medications or treatments was provided to affected group.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
International Urogynecological Association Conference; The American Urogynecologic Society Conference

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Aging

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PROJECT TITLE
Evaluation of Current Practices to Treat Emergent Severe Blood Pressures in Labor and Delivery

PROJECT DESCRIPTION
Significance and background of study:
Approximately 3-5% of pregnancies are complicated by preeclampsia, one of the leading causes of maternal morbidity and mortality in the United States. (1, 2) Maternal morbidities in preeclampsia, if severe, can include renal and liver failure, pulmonary edema, disseminated intravascular coagulation and hemorrhage, and eclampsia. (2, 3) Unfortunately, preeclampsia and its associated maternal morbidity and mortality are on the rise, some studies reporting as much as by 30% in the last 20 years. (4,5) To decrease maternal morbidity and mortality, there’s been a national push to develop and implement protocols for rapid treatment of severe range blood pressures in pregnant women. This is in part due to the fact that severe hypertension in pregnancy can cause central nervous system injury. In fact, in the United Kingdom, two thirds of maternal deaths in a nationwide report were noted to be secondary from cerebral hemorrhage or infarction. (6)

SPECIFIC AIMS
To evaluate whether current Labor and Delivery practices are adequately treating maternal severe hypertension in a correct and timely manner.

METHODS
We will conduct a retrospective cohort study based on all women delivering at The University of Chicago between January 1, 2013 and May 31, 2016. We will use data stored in the Perinatal Database maintained by the Department of Obstetrics and Gynecology using information extracted directly from Epic. Data not available in the perinatal database will be pulled directly
from patient charts. This database is maintained for the purposes of mandated state reporting for perinatal network hospitals. Our primary outcome of interest is time and adequacy of severe range maternal blood pressures. Secondary outcomes will include maternal morbidity (includes mortality, eclampsia, HELLP, liver/renal failure, thrombocytopenia, DIC, pulmonary edema, stroke, ICU admission, need for blood transfusion, etc.), neonatal outcomes (disposition, APGAR scores, etc.), and maternal length of stay and readmission.

**Hypothesis:** Emergently reducing severe range blood pressures within one hour will decrease maternal morbidity and mortality.

**Data to be Collected:** Name (to be deleted prior to analysis), MRN (to be deleted prior to analysis), age, race, ethnicity, BMI, height, weight, gravidity, parity, prior pregnancy complications, diagnoses of gestational diabetes, hypertension, HELLP, and preeclampsia, abruption, maternal death, liver/renal failure, pulmonary edema, thrombocytopenia, DIC, stroke, gestational age at delivery, mode of delivery (vaginal, cesarean, instrumental, VBAC), labor (spontaneous or induced), indication for delivery, time from first severe range blood pressure to action from a provider, medications given for severe blood pressures, postpartum hemorrhage, estimated blood loss, blood products used, hysterectomy, wound infection, days in the hospital, readmission, intra-uterine growth restriction, birth weight, APGAR score, intrauterine fetal demise, presence of fetal anomalies, neonatal admission to NICU and fetal demise.

**Analytical Approach:** Descriptive statistics will be conducted including mean, median, frequency, etc. Chi-square tests and t-tests will also be conducted using SAS or R statistical software. A biostatistician will assist with developing more complex tests; data will be de-identified before sharing with the biostatistician.

**Risks and Benefits:** There is a slight risk of loss of confidentiality; however, only designated research staff will have access to patient data. The data will be stored on a secure network on a password protected computer. Identifying information will be removed after completion of data collection. There are no direct benefits to subjects; however, information learned from this study may help inform management of these high risk pregnancies in the future specifically developing protocols at University of Chicago to control blood pressures.

**Data Monitoring:** The data will be monitored by the study PI, co-investigators, and designated research staff. Staff will ensure that the chart review is conducted according to protocol and will maintain data confidentiality.

**Informed Consent:** A waiver of consent is being requested as this is a retrospective review, minimal risk, and obtaining consent from our study population is impractical due to the size and scope of the project.

**CONFERENCES AVAILABLE FOR PARTICIPATION**
NASSHP, ISSHP, SMFM

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research, Healthcare Delivery Sciences (Quality & Safety)
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IRB/IACUC NUMBER: TBA

PROJECT TITLE  
Evaluation and Development of Interventions for Management of Postpartum Hypertension in Haiti

PROJECT DESCRIPTION  
Hypertensive disorders during pregnancy are a major cause of maternal mortality causing 14% of maternal deaths worldwide 1. Preeclampsia is the most common complication during pregnancy and is the leading cause of maternal mortality in developing countries 2. From the previous studies done on Haiti, we have shown that rates of preeclampsia and eclampsia are especially high in Haiti reaching almost 18%, more than 5 times the rate in the U.S. (2-3%)3 and at least double the global rate (2-8%)4. Although hypertension before delivery has been well researched, studies on postpartum hypertension (PPHTN) are lacking. Infrequent postpartum medical visits and asymptomatic patients contribute to this lack of knowledge; in addition, little is known about the pathophysiology of PPHTN and most studies have been retrospective 5, 6. There is a paucity of proper and consistent protocol regarding monitoring and treatment of postpartum blood pressures 7. A recent study conducted by our group over the summer 2016, noted that the prevalence of PPHTN in Haiti was 57% (97/175). Severe PPHTN was associated with pregnancy complications such as abruption (14.6%, 6/41 patients), fetal (16.6%, 6/41 patients) and neonatal death (7.3%, 3/41 patients). Only 56% of the patients with severe PPHTN and 21% of mild PPHTN received any type of antihypertensive medications postpartum.

SPECIFIC AIMS  
To evaluate current treatment practices of postpartum hypertension and to develop specific interventions and protocols to decrease maternal morbidity associated with postpartum hypertension.

METHODS  
We plan to continue the investigation into PPHTN. We will first evaluate the current practices in the identification and treatment of PPHTN by interviewing primary obstetricians through surveys. Specifically, we want to determine if the problems and barriers are lack of education, or resources or both. Based on these responses, we will then propose interventions and protocols that involve adequately treating patients in the postpartum period with the recommended antihypertensive medications. This protocol will be implemented in the maternity ward of Hôpital Albert Schweitzer (HAS) among women with singleton pregnancies and who are more than 18 years old. By implementing these protocols and studying their efficacy, we can open a whole new era of prevention, and treatment resulting in reduction of maternal morbidity, especially in low resource countries such as Haiti.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Global Health
PROJECT TITLE
Development of Pharmacologic Approaches for the Prevention of Ovarian Cancer

PROJECT DESCRIPTION
There is immense potential to decrease ovarian cancer incidence and mortality through prevention. Extensive epidemiological evidence has shown that routine use of the combination estrogen–progestin oral contraceptive pill (OCP) confers a remarkable 30-50% reduction in the risk of developing subsequent epithelial ovarian cancer. Based on our research findings, we believe the progestin component of the OCP is functioning as a chemopreventive agent by activating potent and well-known molecular signaling pathways. Human data demonstrate that progestin-potent OCPs confer twice the ovarian cancer protection as newer weak-progestin OCPs.

A strategy to increase progestin potency is to combine a progestin with a second preventive agent that is non-toxic and enhances progestin efficacy. In this regard, there is strong epidemiological and laboratory evidence in support of vitamin D for the prevention of malignancy, including ovarian cancer, making vitamin D an attractive second agent. Importantly, we have discovered that progesterone and vitamin D have synergistic inhibitory effects on cell viability in cells derived from the ovarian epithelium. This effect is shown by a marked increase in apoptosis. We have also made the novel discovery that progestin can inhibit and degrade CYP24, the enzyme that renders vitamin D inactive. By inhibiting vitamin D’s degradation via inhibition of CYP24, the active form of vitamin D has a longer local biologic half life, and thus cellular effect.

Recent evidence has shown that what has been identified as ovarian cancer may in fact arise from the fallopian tube. We hypothesize that progestins and vitamin D both target the early steps of carcinogenesis in the fallopian tube epithelium and/or ovarian surface epithelium, and that the combination of progestin and vitamin D will more effectively prevent ovarian cancer than either agent administered alone. The student will have the opportunity to further develop this hypothesis by examining the inhibitory effect of vitamin D (1,25 dihydroxyvitamin D3), progesterone, and the combination in tumor-derived cells lines and in a prospective study using genetically modified mice that develop fallopian tube cancer.

SPECIFIC AIMS
1) To determine the relative efficacy of vitamin D, progesterone, and combined vitamin D and progesterone in inhibiting growth of tumor cells in culture and of tumors in mice.
2) To determine the impact of treatment with vitamin D, progesterone, or combined vitamin D and progesterone on CYP24 enzyme production in tumor cells in culture and tumors in mice.

METHODS
For the in vitro studies, established tumor cell lines will be grown and treated with 1,25 dihydroxyvitamin D3 or an analog, with progesterone, and with vitamin D and progesterone combined. Total RNA and protein will be extracted for the analysis of gene expression by RT-PCR and for protein production of CYP24 and apoptosis-related molecules.

For the in vivo studies, mice that have been genetically modified to produce fallopian tube cancer will be treated with vitamin D, progesterone, or the combination, and tumor growth will be monitored. Tumors will be assessed for apoptosis by both morphologic and molecular assays. They will also be assayed for the expression of molecular markers including CYP24, Ki-67, and transforming growth factor-beta. Statistical comparisons using ANOVA will be made among treatment groups and controls.
The Rodriguez lab conducts frequent lab meetings in which the student will participate as a full member, presenting his/her experiences in the lab each week. The Department of Obstetrics & Gynecology holds weekly Grand Rounds. The American Association for Cancer Research and the Society of Gynecologic Oncologists annual meetings provide an opportunity for abstract submission and presentation of mature research findings. Depending on the progress made, the student could be eligible to participate.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences

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**PROJECT TITLE**  
Predictors of Surgical vs. Non-Surgical Treatment of Pelvic Organ Prolapse

**PROJECT DESCRIPTION**  
Pelvic organ prolapse (POP) is a common problem, leading to surgery in 12.6% of American women by the age of 80. POP is the descent of the pelvic organs, commonly presenting in symptomatic patients as a feeling of a “bulge” or pressure in the vagina or rectum. Treatment for pelvic organ prolapse includes both surgical and non-surgical options. Medical, personal, cultural, and psychosocial factors may affect whether a patient selects surgical management for prolapse.

**SPECIFIC AIMS**  
Using data from a prospective database in the Section of Urogynecology, we aim to understand potential racial differences and other mitigating factors in the selection of treatment choice for POP.

**METHODS**  
Beginning in September 2014, upon entry into the practice all new patients to the University of Chicago Medicine’s Section of Urogynecology were sent an informational packet about participating in section’s Pelvic Organ Prolapse Database (POPD). Over 200 women have consented to participate. Data entry from the EMR, data cleaning, and analysis is performed on an ongoing basis.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**  
American Urogynecologic Society (AUGS)

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research
Ophthalmology & Visual Science

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PROJECT TITLE
Ocular Hypotony and Corneal Astigmatism

PROJECT DESCRIPTION
This project will investigate the relationship between ocular hypotony and corneal ectasia/astigmatism.

SPECIFIC AIMS
To determine whether patients with chronic ocular hypotony (i.e. low eye pressure) have a greater degree of corneal astigmatism and/or irregular astigmatism than normotensive eyes. Age will also be assessed to determine whether it is an independent factor in corneal astigmatism in patients with hypotony.

METHODS
Patients with chronic, unilateral hypotony will be included in this study. This will be a multi-center study, with the following additional sites: University of Illinois at Chicago, Washington University in St. Louis, University of Minnesota. Corneal astigmatism will be measured with a Pentacam in the clinic setting for both the hypotonous and normotensive eye. The differences in quantity and quality of corneal astigmatism between hypotonous and normotensive eyes will be calculated and determined. Age will also be assessed to determine whether it is an independent factor in corneal astigmatism in patients with hypotony.

SOFTWARE REQUIRED: Excel (or similar)

CONFERENCES AVAILABLE FOR PARTICIPATION
The results of this project may be submitted to the Association for Research in Vision and Ophthalmology (ARVO) conference.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Aging
OPHTHALMOLOGY & VISUAL SCIENCE

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PROJECT TITLE
Toxoplasma Infection During Gestation in the US and Morocco

PROJECT DESCRIPTION
General Research Topic: To determine whether it is possible to implement monthly screening for acquisition of Toxoplasma infection during gestation in the US and Morocco as best standard of care, to improve maternal and child health, and using point of care testing. This program will be analyzed to compare possible benefits in terms of individual, public-maternal child health, and cost savings for the government and other health care providers. Serologic testing for toxoplasmosis has been found to be beneficial for patient care, feasible, to save lives and quality of life and to be cost savings in France and Austria, and has been adapted in Brazil and Ecuador.

SPECIFIC AIMS
Aim 1: To determine whether monthly testing for acquisition of toxoplasma during gestation can be implemented in practices in the US and in Morocco with standard testing.

Aim 2: To genotype the isolates from placenta and peripheral blood for 6 patients with full genome sequencing. This will be implemented to begin to determine whether there is association of parasite genotype with manifestations at birth. The students will help with collection of samples, isolation of parasites. Full genome sequencing will be performed on DNA isolated in Panama and sequencing will be performed at JCVI.

METHODS
The overarching goal and significance of the project will be to implement this education, screening, treatment program on a limited scale in the US and Morocco; This will allow us to assess the efficacy of attempting to do so through physician education, implementing gestational serologic screening using inexpensive point of care testing and assessing its ease of use, robustly implementing a perinatal infections clinic and follow up program (XN, XS, D, MT, MS). This will allow us to begin to identify the types of parasites in Morocco which we expect to be genetically diverse (ZC, CR) and confirm areas of high prevalence of infection and disease identified last summer. The goal of this program is to improve care and maternal and child health in Morocco for toxoplasma infections but also to provide a broader basis to prevent other illnesses that effect pregnant women and their children. This will build an understanding of the parasites in this area in terms of genetics, susceptibility to medicines, epitopes that will allow vaccine in Panama to be efficacious.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research, Social Sciences, Healthcare Delivery Sciences (Quality & Safety), Medical Education, Community Health, Global Health
PROJECT TITLE
Toxoplasma Infection During Gestation in the US and Panama

PROJECT DESCRIPTION
General Research Topic: To determine whether it is possible to implement monthly screening for acquisition of Toxoplasma infection during gestation in the US and Panama as best standard of care, to improve maternal and child health, and using point of care testing. This program will be analyzed to compare possible benefits in terms of individual, public-maternal child health, and cost savings for the government and other health care providers. Serologic testing for toxoplasmosis has been found to be beneficial for patient care, feasible, to save lives and quality of life and to be cost savings in France and Austria, and has been adapted in Brazil and Ecuador. Panama has passed a law that mandates a serologic test during pregnancy. Also reporting is mandated. But students in the past spring and summer have studied how well this is working, and although this definitely has been implemented, with remarkable success, and education programs have been shown to be successful in a variety of formats for patients, in the medical community at large the physicians have limited knowledge and skill with this approach. There is limited implementation of screening with on average between 30% and 60% of health clinics screening. Limitation of knowledge, reagents and appreciation of the importance are the limitations. Educational materials for health clinic physicians and obstetricians to implement this improved standard of care have been prepared and found to be effective teaching materials for high school students, medical students are being tested now, patients, and in the next phase of the project will be incorporated into education programs that will be tested to determine how well they help physicians to improve knowledge and care. In the US two obstetricians will implement monthly screening using standard tests along with a point of care test to determine whether this can be implemented easily and conveniently in the US as well. We will try to implement true point of care testing in the clinic to determine if that is felt to be a beneficial approach that might make screening easier and less expensive.

SPECIFIC AIDS
Aim 1-To determine whether monthly testing for acquisition of toxoplasma during gestation can be implemented in practices in the US and in Panama with standard testing (list price $650 per test x 10 tests in the US, we will work to find a much more economical way to test with this reference test because the charge of $650 is the real road block in the US. It makes it not feasible to do the test. Point of care test ($4 per test) would make it feasible. The longer range goal is to have the first and last test be performed by a multiplexed nano test that detects antibodies to Toxoplasma IgG and IgM, CMV IgG and IgM, Rubella, HIV, Syphills, Hepatitis B, Zika Virus ($25 per test) for the first and last of the monthly test. This plasmongold test works with 1 microliter of saliva is, expected to be available in early 2017. In between the first and end of gestation test Toxoplasma serology can be checked with the LD Bio test which is a tractable, low tech and easy system. We have proven both are effective and inexpensive in France and the US in research laboratory settings. The challenges will be: 1-developing an effective education program for physicians in the US and Panama City. Then, extending this in more rural areas in Panama where there is care for pregnant women who may have a baby with congenital toxoplasmosis. Thus, one goal will be to implement this education and care program and assess its effectiveness for physicians at multiple levels, particularly for obstetricians and in the health clinics, and especially in indigenous communities where 8 different languages are spoken. In the US we expect to be able to document that this type of program is effective and feasible in a pilot study knowing that the present tests for which obstetricians are capitated and must pay from their capitated often total $1000 resources, $650 per test x 10 tests = $6500 which simply is not feasible. 2. In Panama in these settings another major challenge and goal will be to assure treatment and follow up is available for the patients detected. We anticipate during the spring and summer there will be 18 pregnant women identified and 6-8 babies
identified among the 6000 pregnant women screened. 2400 will be screened prospectively with 1200 seronegative women requiring monthly screening and approximately ~6 seroconversions identified and medicines made available. 3600 are likely to appear only for delivery. Thus this will be the beginning of comparing the severity of disease in the babies born in both circumstance and ease of management in both circumstances in Panama.; 3-An economist will perform a concomitant cost/ benefit/ DALY analysis. These materials will be discussed with the Ministry of Health and efficacy of establishing this system and cost will be considered. The goal will be to determine whether it can create a paradigm for use of this system throughout Panama that improves well being and care, and is cost savings for care for children and pregnant women through prevention of disabling diseases.

Aim 2- To genotype the isolates from placenta and peripheral blood for 6 patients with full genome sequencing. This will be implemented to begin to determine whether there is association of parasite genotype with manifestations at birth. We are especially interested in whether there is polymorphism in the genotypes of parasites on either side of the canal which formed as a land bridge separating the two continents, and whether this leads to different manifestations of babies born on either side of the canal. The students will help with collection of samples, isolation of parasites. Full genome sequencing will be performed on DNA isolated in Panama and sequencing will be performed at JCVI. In the US we may by referral have about the same number of isolates. This is a project of Zuleima Caballeros, PhD and Claudia Renfugio, PhD, DVM, students will contribute and it will be continued/ extended in Panama after students leave.

METHODS

The overarching goal and significance of the project will be to implement this education, screening, treatment program on a limited scale in the US and Panama; This will allow us to assess the efficacy of attempting to do so through physician education, implementing gestational serologic screening using inexpensive point of care testing and assessing its ease of use, robustly implementing a perinatal infections clinic and follow up program (XN,XS, D,MT, MS). This will allow us to begin to identify the types of parasites in Panama which we expect to be genetically diverse (ZC,CR) and confirm areas of high prevalence of infection and disease identified last summer. The goal of this program is to improve care and maternal and child health in Panama for toxoplasma infections but also to provide a broader basis to prevent other illnesses that effect pregnant women and their children. This will build an understanding of the parasites in this area in terms of genetics, susceptibility to medicines, epitopes that will allow vaccine in Panama to be efficacious.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research, Social Sciences, Healthcare Delivery Sciences (Quality & Safety), Medical Education, Community Health, Global Health

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PROJECT TITLE
Effect of Pharmacological Pupil Dilation on Optical Biometry Measurements Using the Lenstar 900 for Fourth-Generation Intraocular Lens Calculation Formulas

PROJECT DESCRIPTION
Prior to cataract surgery, optical biometry is used to measure the patient’s eye in order to calculate an intraocular lens to be placed at the time of surgery. Historically, these intraocular lens formulas relied upon a limited number of variables gleaned from these measurements. In recent years, fourth-generation intraocular lens calculation formulas have emerged which expand the number of variables that are measured and used to determine intraocular lens powers.
OPHTHALMOLOGY & VISUAL SCIENCE

Typically, these measurements can be taken either prior to or after pharmacological dilation of the pupil. However, we now know that certain eye measurements change before and after pupillary dilation.

In short, this project seeks to examine the difference, if any, in the intraocular lens calculations determined by the optical biometry machine based on current (fourth) generation formulas that may be affected by pupil dilation.

SPECIFIC AIMS
The project seeks to examine the difference in measurement of patients’ eyes prior to and after pupillary dilation that may affect the intraocular lens calculation formulas. If there is a noted difference, this may have implications on whether or not patients should get their optical biometry measurements prior to cataract surgery with an undilated or post-dilated pupil.

METHODS
We hope to recruit approximately 50 patients who are scheduled for routine cataract surgery for this project. The research assistant will help to take measurements with the biometry machine prior to and after dilation.

SOFTWARE REQUIRED: STATA

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

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PROJECT TITLE
Early Results of Intravitreal Injection of Antibiotic-Steroid after Cataract Surgery at a Tertiary-Care Referral Center

PROJECT DESCRIPTION
This project will be a retrospective chart review on patients who have undergone intravitreal injection of antibiotic-steroid after routine cataract surgery.

Most patients typically receive topical antibiotic, steroid and non-steroidal drops to use after cataract surgery. This has significant cost issues to patients. In addition, multiple studies have shown that patient compliance is significantly less than expected, especially in elderly patients who may have difficulty using topical eye drops after surgery.

Recently, there has been a renewed wave of interest in eliminating and/or decreasing the need for drops by injecting a combination antibiotic-steroid at the time of cataract surgery. The University of Chicago is the first academic center in the city to employ this technique for patients after cataract surgery.

This project will examine the results of patients who received this injection, and determine whether or not this may be a suitable alternative for patients in lieu of topical therapy.

SPECIFIC AIMS
This project will examine the results of patients who received this injection, and determine whether or not this may be a suitable alternative for patients in lieu of topical therapy.

METHODS
Retrospective chart review (approximately 400-500 patients)
SOFTWARE REQUIRED: STATA

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

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PROJECT TITLE
Investigation of Retina Vascular Capillaries Characteristics Using Optical Coherence Tomography Angiography in African Americans

PROJECT DESCRIPTION
Diabetes is one of the most serious health problems that the African American community faces today since, compared to the general population, African Americans are disproportionately affected by diabetes and 13.2% of all African Americans aged 20 years or older have diagnosed diabetes and African Americans are 1.7 times more likely to have diabetes compared to non-Hispanic whites. Diabetes is associated with an increased risk for a number of serious microvascular complications like diabetic eye disease-retinopathy, nephropathy, neuropathy and African Americans experience an even greater threat. Several studies have found that African Americans have a higher risk of developing diabetic retinopathy and vision loss from diabetic eye disease compared with Caucasians even while controlling for the known risk factors. Limited studies exist that investigate the factors that make African Americans more vulnerable to diabetic retinopathy.

Optical coherence tomography angiography (OCTA) is a recently developed, noninvasive, dye-less imaging modality, which can visualize moving blood within retinal vessels. Clinical studies of retinal vasculature have long relied on fluorescein angiography to provide important details about the retinal microvasculature. Fluorescein angiography can only visualize the large superficial retinal vessels and is invasive with intravenous dye injection and time consuming. The major advantage of OCTA is its ability to resolve the vascular layers of the retina in three dimensions and distinguish for the first time in vivo, fast and non-invasively the three different retinal capillary plexuses: the superficial, middle and deep capillary plexus in the macula.

Some studies suggest that early changes seen in the retinal capillary plexuses could correlate with risk of diabetic retinopathy severity and vision loss but these studies include mostly Caucasians or do not differentiate between ethnicities. Even though there are some data indicating that the retinal tissue in healthy control African Americans is significantly thinner compared to Caucasians, no data are available regarding retinal microvasculature and retinal capillaries characteristics between African Americans and Caucasians that could predispose African Americans to diabetic retinopathy and vision loss from diabetes.

We propose a study investigating the retinal vascular capillaries by optical coherence tomography angiography in African Americans and compare the findings to Caucasians.

SPECIFIC AIMS
We aim to investigate if the characteristics of retinal vascular capillaries evaluated non-invasively by optical coherence tomography angiography in African Americans as are different compared to Caucasians.

The results of this study may contribute new insight to the factors that make African Americans more prone to diabetic retinopathy, blindness compared to other ethnicities and may stimulate biomedical studies that could elucidate the pathogenesis of development of diabetic retinopathy in African American community leading to earlier detection and prevention.
OPHTHALMOLOGY & VISUAL SCIENCE

The University of Chicago is situated in a racially, ethnically, and socioeconomically diverse community with large portion of our patients being African Americans. This study could provide some light into the biological mystery of predisposition of African Americans to microvascular retinal complications and blindness and promote our mission for patient-centered care and reducing health disparities.

METHODS
Optical Coherence Tomography Angiography will be performed in healthy African American adults (non-diabetic) and will be compared to age and sex matched Caucasian adults (non diabetic). The evaluation of the retinal capillaries plexuses will include a combination of numerical and morphologic characteristics such as capillary diameter (width), capillary length, shape, distribution, capillary density, presence of avascular areas.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly Ophthalmology Grand Rounds and Didactics, Ophthalmology clinics, Research meetings with mentor every 1-2 weeks.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Community Health

NIH MISSION: Blood, Diabetes

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PROJECT TITLE
Direct application of Matrix-Assisted Laser Desorption/Ionization-Time of Flight Mass Spectrometry (MALDI-TOF MS) on Aqueous and Vitreous Samples for Rapid Endophthalmitis Diagnosis.

PROJECT DESCRIPTION
Endophthalmitis is a severe intraocular infection frequently resulting in rapid permanent blindness. Early identification of the microorganism is key for management especially when empiric treatment is not effective. The current diagnosis methods with conventional phenotyping techniques of cultures from aqueous and vitreous samples have low sensitivity and are time consuming, especially for less common pathogens. MALDI-TOF mass spectrometry (MS) is a novel technology that has changed dramatically the microbiological identification, offering faster diagnosis, identifying wider spectrum of pathogens at reduced costs. The purpose of this study is to investigate MALDI-TOF MS application directly on aqueous/vitreous samples from experimental endophthalmitis for rapid identification of pathogen. Our study proposal could validate MALDI-TOF MS as a new technique offering immediate and accurate diagnosis of endophthalmitis. It could revolutionize current approaches potentially enabling future targeted molecular treatments against virulence factors and toxins specific to each pathogen in addition to early appropriate antimicrobial therapy.

SPECIFIC AIMS
1) To investigate the feasibility of identifying the pathogen in experimental models of endophthalmitis by direct MALDI-TOF MS application on aqueous and vitreous specimens.
2) To compare time to diagnosis, sensitivity and specificity of direct application of MALDI-TOF MS on experimental endophthalmitis specimens with conventional microbiology culture and phenotyping methodology.

**METHODS**

MALDI-TOF MS analysis will be applied to aqueous and vitreous samples from in vitro models and in vivo models of Staphylococcus Aureus experimental endophthalmitis. Conventional microbiological techniques will also be applied to aqueous and vitreous samples from in vitro models and in vivo models of Staphylococcus Aureus experimental endophthalmitis. Time to diagnosis, sensitivity and specificity using MALDI-TOF MS will be compared to conventional microbiological techniques.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Weekly Ophthalmology Grand Rounds and Didactics; Ophthalmology clinics; Research lab meetings with mentor every 1-2 weeks; Ophthalmology Seminars

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences, Healthcare Delivery Sciences (Quality & Safety), Global Health

**NIH MISSION:** Blood, Neurology

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**PROJECT TITLE**

Investigation of Microvascular Environment Characteristics in African Americans with Nailfold Capillaroscopy

**PROJECT DESCRIPTION**

Compared to the general population, African Americans are disproportionately affected by diabetes as 13.2% of all African Americans aged 20 years or older have diagnosed diabetes and African Americans are 1.7 times more likely to have diabetes compared to non-Hispanic whites. Diabetes is associated with an increased risk for a number of serious microvascular complications like diabetic retinopathy (DR), nephropathy, neuropathy and African Americans experience an even greater threat. Several studies have found that African Americans have a higher risk of developing DR and vision loss from diabetic macular edema compared with Caucasians even while controlling for the known DR risk factors. Limited studies exist that investigate the factors that make African Americans more vulnerable to serious microvascular diabetic complications like diabetic eye disease.

Nailfold capillaroscopy (NC) is a painless, non-invasive, sensitive, easy to perform and affordable technique for evaluating microvascular involvement, currently used mainly in connective tissue diseases and has been reported to predict the risk of development of future systemic microvascular complications in these patients. Pathological nailfold capillaroscopic abnormalities have been reported in high prevalence in diabetic patients but very few studies correlating these changes with risk and development of microvascular diabetic complications are available and almost exclusively include Caucasian patients. Interestingly, nailfold capillaries abnormal findings have been associated with risk of developing glaucoma, another common eye disease that is 5 times more common, causes blindness 6 times more frequently and occurs earlier in African Americans. Recent retinal and optic nerve imaging developments indicate that microvascular environment possibly play significant role in the pathogenesis of glaucoma.
We propose a study investigating the microvascular environment by nailfold capillaroscopy in African Americans and compare the findings to Caucasians.

**SPECIFIC AIMS**

We aim to investigate if the characteristics of microvascular environment in African Americans as evaluated non-invasively by nailfold capillaroscopy are different compared to Caucasians.

The results of this study may contribute new insight to the factors that make African Americans more prone to microvascular complications compared to other ethnicities and may stimulate biomedical studies that could elucidate the pathogenesis of development of DR and other microvascular complications in African American community leading to earlier detection and prevention.

The University of Chicago is situated in a racially, ethnically, and socioeconomically diverse community with large portion of our patients being African Americans. This study could provide some light into the biological mystery of predisposition of African Americans to microvascular complications and promote our mission for patient-centered care and reducing health disparities.

**METHODS**

Nailfold capillaroscopy will be performed in healthy African American adults (non-diabetic) and will be compared to age and sex matched Caucasian adults (non diabetic). The evaluation of the capillaroscopic pattern will include a combination of numerical and morphologic characteristics such as capillary diameter (width), capillary length, shape, distribution, mean capillary density, presence of avascular areas, hemorrhages, neoangiogenic capillaries.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Weekly Ophthalmology Grand Rounds and Didactics; Ophthalmology clinics; Research meetings with mentor every 1-2 weeks; Ophthalmology Seminars

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research, Community Health

**NIH MISSION:** Blood, Diabetes

### Orthopaedic Surgery and Rehabilitation Medicine

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**PROJECT TITLE**

Proximal Interphalangeal Joint Contractures in the setting of Trigger Digits of the Hand

**PROJECT DESCRIPTION**

Patients with trigger finger or a tenosynovitis of the flexor tendon that causes the tendon to catch on the flexor tendon sheath, are known to have joint stiffness of the finger, specifically at the level of the proximal interphalangeal joint (PIP). However, there is no literature to date that discusses this finding nor the impact surgical intervention has on final range of motion of the joint. This will be both a retrospective and prospective study to understand the incidence, demographics and influence of current treatment practices on the PIPJ stiffness.
SPECIFIC AIMS
Qualify and quantify the natural history of PIPJ stiffness with concomitant trigger finger. Quantify number of patients that have PIPJ stiffness before and Quantify number of patients that have PIPJ stiffness after surgery, quantify degree of contracture, rate of resolution of stiffness after surgery and length of time till stiffness resolution. Also would recommend looking at comorbidities, length of time of triggering present to see if these correlate with development of contracture/stiffness.

METHODS
We will identify patients of our hand surgeons (Drs. Conti Mica, Reavey, Wolf, Mass and Angeles) and retrospectively analyze Epic to identify patients with trigger finger with PIPJ stiffness and had surgical intervention for trigger finger. Charts will be reviewed and pre-operative PIPJ stiffness, post-operative stiffness will be identified; range of motion of the joint, physical therapy orders, physical therapy notes on range of motion and length of time till resolution of symptoms would be noted. Second wing of the study is prospective with patients presenting during clinic at DCAM with any of our five hand surgeons with trigger digits to have their pre-injection and pre-surgical range of motion and post-injection and post-operative range of motion. We will determine the relief of the contracture with intervention and also follow if relief occurs with the augmentation of occupational therapy.

CONFERENCES AVAILABLE FOR PARTICIPATION
ASSH Annual Meeting

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

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PROJECT TITLE
What do Patients Think the Quality Metrics in Health Care Should Be – OPRI?

PROJECT DESCRIPTION
Improving the quality of health care is of paramount importance However, “quality” has many definitions and many metrics. Outcome measures such as Infection, re-admission, deep venous thrombosis, re-operation rates are all considered to be quality metrics. Adherence to process measures such as discontinuation of catheters, DVT prophylaxis, surgical time outs can also be considered quality metrics. Patient reported outcomes (surveys on quality of life filled out by patients) are also considered to be an important quality metric. As all stake holders in health care emphasize the importance of improving quality, it is not clear how quality is defined by the most important stake holder: the patient.

SPECIFIC AIMS
The specific aim of this project is to determine what patients consider to be important quality measures of care.

METHODS
This study is survey based. Pre-constructed and approved studies on preloaded digital tablets will be distributed among a sample population in select waiting areas in the University of Chicago Medical Center. In addition to standard demographic information, subject response to a series of queries regarding quality metrics in health care will be recorded. Queries will be posed in multiple choice, grading and modified Likert format. Multivariate analyses of responses using demographic information will be performed to determine if there are statistically significant associative factors of demographic information and response. This is an ongoing project as part of Operative Performance Research Institute (OPRI).
ORTHOPAEDIC SURGERY AND REHABILITATION MEDICINE

CONFERENCES AVAILABLE FOR PARTICIPATION
AMA; 2017 ACS NSQIP New York; ASCO Quality Care Symposium

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

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PROJECT TITLE
The Virtual Operating Room Experience – OPRI

PROJECT DESCRIPTION
Education in the operating room can take many forms. Traditionally, direct training has been the model whether it is for the surgeon, nursing or anesthesiology. While effective, there is a limitation on number trainees that can be taught per surgery. Video recording and live streaming of surgeries has also been utilized for education. These have broadened the educational audience, but limitations still persist in that only a limited window of experience can be recorded. Video generally captures the surgical site well, but not necessarily what is being done around the surgical site. Virtual reality (VR) recording has the ability to capture a 360 view of the operating room. In addition to direct video recording of the surgery, VR has the potential to capture, in real time, all aspects of the operating room flow: surgery, anesthesia, back table management, nursing. In addition, this technology can, not only capture what occurs at the surgical site, but how surgeons and assistants are positioned and exactly how they manage their instruments. The potential for VR recording to serve as an educational instrument for all personnel in the OR is tremendous.

SPECIFIC AIMS
Specific AIM: The specific aim of this study is to determine the optimal methodology of recording surgeries using Virtual Reality technology.

METHODS
Virtual reality equipment and software has been purchased and will be trialed initially using the Operative Performance Research Institute (OPRI) Laboratory. Optimizing resolution of image, line of sight challenges, positioning of cameras all while minimally impacting the flow of the operating room will need to be determined. Once a pilot methodology has been determined (position, location, resolution of hardware), this will be trialed in the operating room. After determining the optimal methodology for establishing VR recording in a simulation, we will seek to attempt this with actual surgical patients. This is an ongoing project as part of Operative Performance Research Institute (OPRI).

CONFERENCES AVAILABLE FOR PARTICIPATION
To be determined

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Medical Education
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**Project Title**  
The Costs of the Operating Room: Identifying Disparities and Mechanisms for Improvement – OPRI

**Project Description**  
Similar surgeries can be done by different surgical services. For example, a below knee amputation can be done by a vascular surgeon or an orthopaedic surgeon. Hand surgery can be done by plastic surgeon or orthopaedic surgeon. Carotid endarterectomies can be done by neurosurgeons or vascular surgeons. While the end results are likely to be similar, the differences in training among surgical services (and individual surgeons) are likely to account for differences in operating room cost. These disparities for similar procedure offer an opportunity to improve cost, and subsequently value of these surgical services provided at UCMC.

**Specific Aims**  
To identify disparities in surgical costs between similar procedures done by different surgeons and surgical services.

**Methods**  
Using the electronic medical record revenue capture system that will have been in place for almost 1 year by summer 2017, costs of surgical care will be examined. Costs stratified by surgical service, surgeon, surgical procedure will be analyzed and outliers of disparity will be identified. Mechanisms for improvement in cost will also be identified. Demographic and co-morbidity data will also be recorded and a multivariate analysis will assess for significant risk factors for elevation in operating room costs. These data can allow for enhanced communication among surgeons performing similar procedures with the goal of reducing costs. This is an ongoing project as part of Operative Performance Research Institute (OPRI).

**Conferences Available for Participation**  
To be determined

**Possible Scholarship and Discovery Track(s):** Healthcare Delivery Sciences (Quality & Safety)

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**Project Title**  
The Indications for the APTIS Total Distal Radio-Ulnar Joint Arthroplasty

**Project Description**  
Follow up patients who have received the APTIS Total Distal Radio-Ulnar Joint prosthesis and see if it has decreased their pain and improved their supination/pronation.

**Specific Aims**  
First follow up study of this prosthesis not by the developer, to determine is the prosthesis is worth using.
ORTHOPAEDIC SURGERY AND REHABILITATION MEDICINE

METHODS
Chart review and patient contact

CONFERENCES AVAILABLE FOR PARTICIPATION
American Society for Surgery of the Hand

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

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IRB/IACUC NUMBER: TBA

PROJECT TITLE
The Effect of Peripheral Nerve Stimulators on Patients with Chronic Nerve Pain

PROJECT DESCRIPTION
Review and follow-up patients that have received Peripheral Nerve Stimulators for Chronic Nerve Pain and see if there has been a significant relief of their pain and improvement in their lifestyle.

SPECIFIC AIMS
Prove that Peripheral Nerve stimulators are worth while.

METHODS
Chart review and call patients back to the office

CONFERENCES AVAILABLE FOR PARTICIPATION
American Society for Surgery of the Hand

MENTOR: Lewis Shi, MD  
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IRB/IACUC NUMBER: 16-1487

PROJECT TITLE
Overlapping and Concurrent surgeries: What do Patients Think – OPRI?

PROJECT DESCRIPTION
There has been increasing awareness of the existence of concurrent surgeries by patients due to some high profile articles in the lay press. Concurrent surgery is a practice where surgeons may have patients in two operating rooms at the same time, albeit in different phases of surgery. There is increasing scrutiny of the safety, legality, and patient concerns associated with this practice.
ORTHOPAEDIC SURGERY AND REHABILITATION MEDICINE

SPECIFIC AIMS
To better understand patient and family’s concerns with the practice of concurrent surgery.

METHODS
This is an ongoing project as part of Operative Performance Research Institute (OPRI). We have a well-established methodology to survey patients and families using mobile technology. A student would be the person primarily interacting with patients/family members in hospital waiting area to educate them and help them fill out web-based surveys.

SOFTWARE REQUIRED: Excel

CONFERENCES AVAILABLE FOR PARTICIPATION
OPRI weekly conference; Orthopaedic department educational conferences.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Social Sciences, Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Aging

MENTOR: Lewis Shi, MD
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IRB/IACUC NUMBER: Exempt

PROJECT TITLE
Knee and Shoulder Arthroscopy: Utilization Standardization and Cost Containment – OPRI

PROJECT DESCRIPTION
Arthroscopic procedures are among the most prevalent orthopaedic surgeries being done. There is wide variation of utilization of resources between surgeons, and this leads to increase in cost without necessary improvement in patient outcome.

SPECIFIC AIMS
1) To identify variations in utilization of resources during arthroscopic procedures, such as disposable supplies.
2) To standardize utilization of resources between surgeons in attempt to decrease OR cost and improve efficiency.

METHODS
This is an ongoing project as part of Operative Performance Research Institute (OPRI). Student will work with surgeons and OR staff to identify resource utilization on a case by case basis. Student will be involved in communicating with different surgeons and supply chain staff to standardize utilization.

SOFTWARE REQUIRED: Excel

CONFERENCES AVAILABLE FOR PARTICIPATION
OPRI weekly conferences. Orthopaedic department educational conferences.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Healthcare Delivery Sciences (Quality & Safety)
**ORTHOPAEDIC SURGERY AND REHABILITATION MEDICINE**

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### PROJECT TITLE
Outcomes After Shoulder Surgery

### PROJECT DESCRIPTION
There is very little information on the rate of pain improvement and functional return of patients undergoing routine shoulder surgeries. We hope to prospectively collect data on patients' postoperative subjective and objective data.

### SPECIFIC AIMS
1. The rate of pain improvement after routine shoulder surgeries.  
2. The change in range of motion after routine shoulder surgeries.  
3. The time to return to normal activities and/or work after routine shoulder surgeries.

Type of shoulder surgeries examined include: rotator cuff repair, shoulder replacement, labrum repair, biceps surgery.

### METHODS
Retrospective review of prospectively collected data on all patients undergoing shoulder surgery. Postoperative patients are routinely filling out IRB-approved questionnaires at each of their appointments. These questionnaires are stored in EPIC, and data are then collected and analyzed.

### CONFERENCES AVAILABLE FOR PARTICIPATION
Orthopaedic weekly grand rounds; orthopaedic daily morning didactics and radiology conferences; shoulder/upper extremity weekly conferences; sports medicine weekly conferences.

### POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):
Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

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**IRB/IACUC NUMBER:** 13-0806

### PROJECT TITLE
Population Based Study of Resource Utilization in Arthroscopic Rotator Cuff Repair

### PROJECT DESCRIPTION
Rotator cuff injury is very common, particularly in patients over the age of 50. Some publications cite the prevalence as high as 50% of the certain age group of the population. Literature is lacking on the cost of rotator cuff repairs to society, and we designed this project to answer this question.

### SPECIFIC AIMS
To examine the cost associated from every phase of rotator cuff injury, preoperative, intraoperative, and postoperative.
METHODS
Marketscan is a national database of private insurance company billing/claims. We will be using this database to examine all the rotator cuff surgery done in the last ten years, and collect the cost data.

CONFERENCES AVAILABLE FOR PARTICIPATION
Orthopaedic weekly grand rounds; orthopaedic daily morning didactics and radiology conferences; shoulder/upper extremity weekly conferences; sports medicine weekly conferences.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

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PROJECT TITLE
MRI Versus 3-Dimension CT Scan for Assessment of Glenoid Bone Loss

PROJECT DESCRIPTION
In the past 10-15 years shoulder surgeons have become much more aware of the significance of glenoid bone loss in the setting of shoulder instability. Burkhart and DeBeer et al demonstrated the association between much higher failure rates for arthroscopic shoulder labral repair in the setting of glenoid bone loss (1). This has lead many surgeons to consider open labral repair or bone augmentation for shoulder instability when glenoid bone loss is present (2,3). What has been less clear is determining how much glenoid bone loss is significant and what is the best modality and measurement technique for evaluation of bone loss. Multiple measuring techniques have been developed (4, 5). The majority of techniques require a 3-D reconstruction of the glenoid with humeral head subtraction for accurate measurement. The literature has shown CT scan to be more accurate than MRI for assessment of bone (6, 7). Therefore, most surgeons require both an MRI for evaluation of the torn labrum and then a subsequent CT scan if concerned for glenoid bone loss. In addition, because of the inherent challenge of trying to measuring something that isn't present, some suggest imaging of the contralateral shoulder when determining bone loss (8). Recently, Owens et al developed a predictive formula* for determining glenoid width based on the MRI scans of more than 1200 shoulders (9). Although, a similar predictive formula** has been developed for CT scans, there has yet to be a comparison between MRI and CT scan for accuracy and reliability of measuring bone loss when using this novel predictive formula (10). If MRI can demonstrate accuracy and reliability similar to CT scan this will save patients the time, cost, and radiation exposure of an undergoing an additional CT scan.

* Male: Glenoid width = (1/3 height) + 15mm; Female: Glenoid width = (1/3 height) + 13mm
** Male: Glenoid width = (2/3 height) + 5mm; Female: Glenoid width = (2/3 height) + 3mm

SPECIFIC AIMS
1) Can MRI accurately assess glenoid bone loss using a validated predictive formula in comparison to 3-D CT scan
2) Does MRI have high inter- and intrareader reliability for assessment of glenoid bone loss when using a validated predictive formula?

We aim to retrospectively evaluate the use of MR imaging in conjunction with a validated predictive formula for assessment of glenoid bone loss in comparison to the gold standard of CT with 3-D reconstruction. If MR imaging with use of a predictive formula is accurate with good inter- and intrareader reliability it may replace the need for subsequent CT with 3-D reconstruction when suspicious of bone loss. This will prevent the additional associated radiation exposure to the patient of a CT scan as well as prevent the associated increased cost and time.
METHODS
We plan to review the PACS web based Centricity radiology system for all patients having undergone a CT of the shoulder with 3-D reconstruction and associated MRI of the ipsilateral shoulder with 90 days. Those patients with implants or hardware in the area of the glenoid or humeral head will be excluded due to concern for artifact affecting the quality of the imaging study. Glenoid width and glenoid bone loss will be calculated using a validated predictive formula specific to MRI* or CT**.

The Student test will be used to test for difference in mean glenoid width measured with CT and MR imaging. The Pearson correlation will be used to examine the correlation between percentage of glenoid bone loss measured with CT and MR imaging. Inter- and intrareader reliability for the MR imaging and CT imaging assessment of glenoid bone loss will be determined with the interclass coefficient, with R <0.40 indicative of poor agreement, R>0.40 fair agreement, and R>0.75 excellent agreement. For all test, P<0.05 will be regarded as indicative of statistically significant difference.

* Male: Glenoid width = (1/3 height) + 15mm; Female: Glenoid width = (1/3 height) + 13mm
** Male: Glenoid width = (2/3 height) + 5mm; Female: Glenoid width = (2/3 height) + 3mm

Inclusion criteria:
1) CT scan of shoulder with 3-D reconstruction and humeral head subtraction
2) MRI of ipsilateral shoulder with 90 days of the CT scan
3) Age >18 and <60

Exclusion criteria include:
1) Implants or hardware in the area of the glenoid or humeral head
2) Age <18 or >60

SOFTWARE REQUIRED: SPSS, Version 17

CONFERENCES AVAILABLE FOR PARTICIPATION
American Academy of Orthopedic Surgeons (AAOS) Annual Meeting Orthopaedic weekly grand rounds; orthopaedic daily morning didactics and radiology conferences; shoulder/upper extremity weekly conferences; sports medicine weekly conferences.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

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PROJECT TITLE
Epidemiology of Shoulder Dislocation among National Collegiate Associate Athletes

PROJECT DESCRIPTION
The shoulder is the most commonly dislocated joint in the body. This injury often results from direct contact with another player, the playing surface, or equipment. A shoulder dislocation can also occur by an indirect mechanism in which the athlete falls on an elbow or outstretched hand. The injured athlete often reports immediate pain and inability to use the affected shoulder. The proper management of a shoulder dislocation after initial reduction is important to decrease pain, restore function, and prevent future recurrence.

The incidence of shoulder dislocation (primary and recurrent) in the United States has been estimated to be between 23.9 and 26.9 per 100,000 person-years. 2,3 Previous studies have been published on initial shoulder dislocation, but they are relatively
To our knowledge, no study has evaluated the epidemiology of shoulder dislocation among national collegiate athletic association (NCAA) athletes.

A population-based epidemiological study is needed to understand the injury prevalence, mechanisms of injury, and recovery patterns in NCAA student-athletes. We expect the study to find a higher rate of shoulder dislocation among high contact sports such as football, ice hockey, and wrestling. We also expect to see a high rate of recurrence in athletes participating in high contact sports who are treated conservatively (no surgery). This study will aid clinicians when discussing with athletes their risk for shoulder dislocation and their risk for potential recurrence. Hopefully this study will propel further future research to focus on identifying potential risk factors for shoulder dislocation in high risk sports in order to develop injury prevention strategies.

**SPECIFIC AIMS**

1) Determine the rates and distributions of shoulder dislocations sustained during collegiate sports.

2) Determine the distribution of injuries by mechanism of injury, examine rate of recurrence, rate of injury requiring surgery, and calculate those injuries resulting in time loss over 3 weeks.

3) Compare overall, competition, and practice shoulder dislocation rates between male and female athletes.

4) Examine sex differences in the distributions of mechanism of injury, recurrence, requiring surgery, and those resulting in participation restriction over 3 weeks.

**METHODS**

We plan to use the NCAA ISP dataset from 25 NCAA sports to evaluate the epidemiology of shoulder dislocations among high-level elite athletes.

1) Data will be analyzed to assess the rates and distributions of shoulder dislocations sustained during collegiate sports.

2) We will determine the rate of shoulder dislocation overall, by event type, and by time in season.

3) We will next determine the distribution of injuries by mechanism of injury, examine rate of recurrence, rate of injury requiring surgery, and calculate those injuries resulting in time loss over 3 weeks. Rate ratios (RRs) will be used to compare rates within sports by event type (ie, competition and practice).

4) The RRs will also be used to compare overall, competition, and practice rates between male and female athletes in sex-comparable sports.

4) For sex-comparable sports, we will also use injury proportion ratios (IPR) to examine sex differences in the distributions of mechanism of injury, recurrence, requiring surgery, and those resulting in participation restriction over 3 weeks.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Orthopaedic weekly grand rounds; orthopaedic daily morning didactics and radiology conferences; shoulder/upper extremity weekly conferences; sports medicine weekly conferences.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research
PROJECT TITLE
Impact of Vitamin D Level on Incidence of Tendinopathy

PROJECT DESCRIPTION
This study will retrospectively and prospectively evaluate Vitamin D levels in patients presenting with tendinopathy in a musculoskeletal clinic.

SPECIFIC AIMS
To evaluate the potential correlation between suboptimal Vitamin D levels and tendinopathy presentation in MSK disease.

METHODS
Part I - We will review charts for a diagnosis of epicondylitis, Achilles tendinitis, patellar tendinitis, or wrist tendinitis, and attempt correlation with Vitamin D level if available.

Part II - We will evaluate Vitamin D levels in patients presenting with tendinopathy, in the effort to discover potential correlation between Vitamin D level and tendinopathy presentation.

CONFERENCES AVAILABLE FOR PARTICIPATION
American Academy of Orthopaedic Surgeons; Association of Orthopaedic Sports Surgery and Medicine

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Aging
METHODS
We will create a cross between a floxed relaxin mouse and a tenomodulin-Cre mouse, and confirm creation of a successful transgenic cross using genotyping. We will then observe gait, behavior, and phenotype, prior to murine sacrifice for histology evaluation of the knee joint and ligament tissues.

CONFERENCES AVAILABLE FOR PARTICIPATION
Relaxin Congress; AAOS; AOA; Association of Bone and Mineral Research

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

Pathology

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PROJECT TITLE
3D Modeling of the Glomerular Capillary Network in Health and Disease

PROJECT DESCRIPTION
The glomerular capillary network (GCN) has not been well studied. Modern computing advances facilitate the 3D reconstruction of this important anatomic structure in glomerular filtration. Our preliminary data reveal some surprising findings in the normal glomerulus that we hope to confirm with additional GCN models from pediatric and adult glomeruli. We also expect the analysis of diseased glomeruli to yield additional insights into those pathologic states.

SPECIFIC AIMS
1) Map the glomerular capillary network (GCN) in normal glomeruli to understand the number of paths that are possible for a red blood cell to travel from the afferent to efferent arteriole.
2) Map GCN in diabetic glomeruli to understand how intraglomerular blood flow can deviate from normal.

METHODS
Tissue Specimen Preparation: One-micron thick serial sections that span an entire glomerulus are cut from the renal biopsy of a patient with normal or diabetic glomeruli. The serial sections are stained with Toluidine Blue and digitized at 600x using an Olympus light microscope and Jenoptik digital camera. A grey-scale 2D image stack was created using IMOD tomography utilities.

Image Registration: Images are registered using midas, an alignment utility included with IMOD. An aligned image stack will be created using the newstack utility.

Feature Segmentation: Glomerular capillary lumina are segmented into an AreaTree object using the Fast-Marching tool in TrakEM2 using the contrast-limited adaptive histogram equalized (CLAHE) image stack for reference. Luminal branching are tracked in 3D using the TreeList object in TrakEM2.

Model Rendering: Surface maps will be exported from TrakEM2 and imported into UCSF Chimera for publication quality rendering.
**PROJECT TITLE**  
HPV Knowledge and Vaccine Acceptability Amongst Low-Risk Greek Men

**PROJECT DESCRIPTION**  
Human papillomavirus (HPV) is the most common sexually transmitted infection (STI) worldwide, infecting the majority of sexually active men and women over the course of their adult lives. Fortunately, many HPV infections can be prevented through vaccination. At present, there is no data available on the acceptability of the HPV vaccine among Greek men, both for themselves or for their adolescent children.

**SPECIFIC AIMS**  
To determine the knowledge of HPV and HPV vaccine acceptability amongst Greek men.

**METHODS**  
Adult men between the ages of 18 and 55 will be recruited from the community and will complete a survey including questions on demographics, economic factors, sexual history, HPV knowledge, and HPV vaccine acceptability.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**  
HPV conference; Clinical Virology Symposium; ID Week

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Medical Education, Global Health

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**PROJECT TITLE**  
Detection of Host Response In Clostridium Difficile Infection

**PROJECT DESCRIPTION**  
The aim of this research is to develop a paradigm shift in diagnostic testing for a globally important, yet poorly diagnosed, healthcare-associated infectious disease, namely Clostridium difficile infection (CDI). CDI results from infection of the bowel by C. difficile, a Gram-positive, spore-forming, obligate anaerobic bacterium. It can cause (diarrheal) illness ranging from
moderate diarrhea to severe colitis (toxic megacolon) with a high risk of death. Current CDI diagnostics is limited to detection of the organism and/or its toxin product(s) in conjunction with clinical symptoms, and does not differentiate infected from simply colonized patients, thus leading to inaccurate diagnosis as well as antibiotic mis/overuse. To overcome these limitations novel approach for CDI diagnosis will be tested. We hypothesize that increased levels of one of major proteins in colonic epithelial cytoskeleton present in the patient’s stool will indicate a specific host response to CDI therefore can be used as a diagnostic target signifying active infection from C. difficile.

SPECIFIC AIMS

The project is focused on development and evaluation of novel concept for CDI detection with subsequent development of a prototype novel clinical laboratory test. While supported by our preliminary data on a limited number of clinical specimens, further test optimization and evaluation is necessary to verify our hypothesis by implementation of two aims:

1) Determine the feasibility of clinically appropriate fecal colonic epithelial cytoskeleton protein detection.
2) Evaluate the fecal protein as a CDI specific host response marker on specimens obtained from clinically diverse patient populations.

METHODS

Student will be able to investigate and/or optimize conditions for detection of CDI biomarker in simulated and clinical specimens as well as evaluate long storage specimen conditions for further reliable CDI biomarker detection. Different approaches and methods will be utilized including but not limited to protein extraction, protein SDS-polyacrylamide gel electrophoresis (PAGE), and Western blot.

CONFERENCES AVAILABLE FOR PARTICIPATION

Weekly: Microbiology and Infectious disease research; Pathology / Lab Medicine meetings (Microbiology/ID Scope Rounds, Heme/Oncology Conference, Hematopathology Conference, Cytopathology Conference); Clinical microbiology continuous education meetings; Pathology journal club.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Digestive Diseases

MENTOR: Y. Lynn Wang, MD, PhD
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PROJECT TITLE

Overcoming Ibrutinib Resistance in Chronic Lymphocytic Leukemia (CLL)

PROJECT DESCRIPTION

Overcoming ibrutinib resistance in Chronic lymphocytic leukemia (CLL) by dual SYK and JAK inhibition with a single agent cerdulatinib.

SPECIFIC AIMS

To compare the mechanism of action of cerdulatinib (cerd) vs. ibrutinib (ibr) and identify pathways uniquely engaged by cerdulatinib.
METHODS
The investigator will compare and contrast the profiles of pathway perturbation between cerdulatinib and ibrutinib in both ibr-sensitive AND ibr-resistant primary tumor cells and cell lines.

The student will take a targeted approach to test the effects of cerd vs. ibr on the activity of BCR and JAK-STAT pathways in stromal supported CLL co-culture. In addition, downstream signaling including AKT, ERK and NF-kB activities will be tested to determine through which of these pathways cerd’s action is transduced further downstream. Phospho-flow, Western blotting as well as assays for NF-kB nuclear translocation and transcriptional activities will be conducted. Multiple assays are normally performed in the lab to cross-validate experimental findings.

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly Lab Meeting; UCCCC Research Seminars; Pathology Pathobiology Seminars

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Blood

Pediatrics–Chronic Disease

MENTOR: Edith Chernoff, MD
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PROJECT TITLE
A Quality of Life study - Examining Stress in Families with Children with Complex Medical Disorders

PROJECT DESCRIPTION
As part of an evaluation of needs and supports within a team based medical home we will administer a validated Quality of Life Survey to family/care givers annually and assess change in stresses over time. We will also administer the tool to a healthier group of patients in order to better parse causation.

SPECIFIC AIMS
We hypothesize that having medical, developmental and mental health support from a medical home team will ameliorate some of the stress due to parenting a child with medical and developmental disorders.

METHODS
Chart review and administration of survey tool

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Social Sciences
**Pediatrics–Critical Care**

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**PROJECT TITLE**
BEYOND THE PICU: A Needs Assessment and Feasibility Study of PICU Follow Up Clinic for Neurodevelopmental and Psychosocial Concerns after Pediatric Critical Illness

**PROJECT DESCRIPTION**
Although mortality has declined among children experiencing pediatric critical illness, morbidity has increased. Identifying and addressing the long-term needs of pediatric intensive care unit (PICU) survivors is an important area of focus in the field of pediatric critical care. We propose a novel interdisciplinary approach between pediatric critical care and developmental and behavioral pediatrics to address this problem through the establishment of a PICU follow-up clinic.

**SPECIFIC AIMS**
1) To conduct a needs assessment among PICU patients and their families regarding the need for PICU follow-up clinic and to determine the feasibility of such a clinic.  
2) To describe the neurodevelopmental and psychosocial concerns of patients/families who experience pediatric critical illness.

**METHODS**
- Parents/Caregivers of pediatric patients will be recruited from the PICU if their child a) has a hospital stay of at minimum 48 hours and b) is under the age of 12.  
- Parents/Caregivers will be asked if they would like to participate in a PICU follow up clinic with a Developmental and Behavioral Pediatrics (DBP) specialist.  
- Parents/Caregivers who are interested be asked to complete a clinic intake form and follow-up will be arranged.  
- The SRP student will be expected to screen and recruit eligible parents/caregivers multiple times throughout the day and on nights/weekends.  
- The SRP student will be involved in primary data collection and analysis to identify which pediatric patients/families are interested in PICU follow-up clinic.  
- At the DBP Clinic visit, a survey will be administered involving questions about perceived need for support and services.  
- The patients will undergo standard of care treatment in DBP clinic.  
- Referral to outside services will be noted.  
- The SRP student will be expected to attend the DBP Clinic visits and participate in data collection via survey administration and chart review to identify factors associated with overall feasibility of follow-up and specific neurodevelopmental or psychosocial issues.  
- Weekly research team meetings to gauge recruitment and progress will occur.  
- Statistical analysis of data using STATA is expected.

**SOFTWARE REQUIRED:** STATA
PEDIATRICS–GENERAL PEDIATRICS

CONFERENCES AVAILABLE FOR PARTICIPATION
Pending abstract acceptance: Society of Critical Care Medicine Conference (February 24-28, 2018); Pediatric Research Day, June 2018; Society for Developmental and Behavioral Pediatrics Annual Meeting (TBD, fall 2018); Pediatric Academic Society Annual Meeting (May 5-8, 2018); Pediatric Grand Rounds (weekly)

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Neurology

Pediatrics–General Pediatrics

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PROJECT TITLE
Piloting Comics and Graphic Art Advocacy to Promote Patient Engagement with the Electronic Medical Record

PROJECT DESCRIPTION
While the benefits of electronic medical record (EMR) use are well known, studies have shown that EMR use in exam rooms can be detrimental to the patient-doctor relationship. Patients often perceive the EMR as an intrusive third party in the patient-doctor interaction. EMR use is increasingly becoming the norm and a recent Consumer Reports survey found that patients were bothered when doctors were more focused on their device than on them. We know that a provider’s communication skills are important in determining whether the EMR has a positive or negative effect on the patient-doctor interaction. Although there are specific EMR-related behaviors that can enhance this interaction, providers receive little training on these key communication skills much less patients in terms of advocacy campaigns targeted at increasing awareness of the EMR and ways in which patients can contribute to making their interaction with the EMR a more meaningful one.

We aim to conduct a study evaluating the impact of a patient-focused advocacy and educational campaign (a graphic comic) to increase awareness of the EMR and highlight ways in which patients can become engaged with their provider and their medical information in the EMR. We have received funding from the Gold Foundation to create the comics; one for providers to remind them to involve patients with the EMR, and another for patients to increase awareness of the EMR and prompt them to ask to get involved as well. We are fortunate to have received follow up funding from the Gold Foundation to additional study it’s impact on patients and providers, which will be the aim of this project.

We will initially target patients of pediatrics primary care group at Comer Children’s hospital, and are looking to expand the study to include other departments as well. Your role will be to distribute the comics to patients, and to survey them regarding their thoughts on the campaign materials and whether the materials prompted them to take certain actions with respect to their providers EMR use. You will also survey the patient’s provider to study whether the provider comic encouraged them to involve patients with the EMR, and if they noticed actions on part of the patient to increase their involvement in EMR use during the visit. We will use the findings to further inform advocacy materials to enable patients to become involved with their providers EMR use in a meaningful way that enhances communication and understanding.

Individuals with an interest in communication, public policy, social sciences and clinical research should consider applying. Also, note although based in Academic Pediatrics, our research impacts all types of specialties and is cross-cutting, and has the potential
to disseminate to fields outside of Pediatrics, and the additional group members (Dr. Wei Wei Lee and Dr. Vineet Arora) are from the Department of General Internal Medicine.

**SPECIFIC AIMS**

1) Survey pediatric faculty at the Comer Children’s Hospital Primary Care Group, University of Chicago to assess their perceptions of their patient’s involvement with the EMR during the visit, and effectiveness of our graphic art to encourage overall patient-doctor communication. Note, we are likely to add additional departments, so similar aims would carry over to that setting.

2) Survey patients at the Comer Children’s Hospital Primary Care Group, University of Chicago to assess their perceptions of the patient-focused advocacy and educational materials, and whether it affected their involvement with the EMR during the visit and overall patient-doctor communication. Note, we are likely to add additional departments, so similar aims would carry over to that setting.

3) Analyze survey findings and use findings to inform further campaign development on improving patient involvement with the EMR during outpatient visits and overall patient-centered communication.

**METHODS**

We will analyze the survey findings from University of Chicago to assess patient and faculty perceptions of the impact of our advocacy materials on improving patient involvement with the EMR during outpatient visits and overall patient-center

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**

We have had good success at presenting our work yearly at local, regional and national venues and we plan on submitting these findings as well to a number of venues including: Society for General Internal Medicine—Midwest Regional Meeting; Society for General Internal Medicine—National Meeting; Academic Internal Medicine Week; AAMC Central Group on Educational Affairs (CGEA) Annual Regional Meeting; AAMC Integrating Quality Annual National Meeting; AAMC Medical Education Annual National Meeting. We will additionally look to publish in venues that promote education through graphic art such as the Comics & Medicine Annual International Conference. Lastly, this project is part of a grant with the Gold Foundation, so we will present our results during their annual conference as well.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research, Healthcare Delivery Sciences (Quality & Safety), Medical Education

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71405

**PROJECT TITLE**
Molecular Regulation of Intercellular Communication and Cataracts

**PROJECT DESCRIPTION**

Gap junction channels provide a direct pathway linking cells in virtually all tissues of the body, facilitating the intercellular exchange of ions and small molecules. This direct intercellular communication is critical for electrical conduction by passage of ions in heart and smooth muscle, for coordination of cellular functions through sharing of second messengers or drug metabolites, and for cellular survival through sharing of nutrients and metabolites. Mutations of the subunit gap junction proteins (connexins) have been identified as a genetic basis of cataracts, arrhythmias (atrial fibrillation), Charcot-Marie-Tooth Disease,
Oculodentodigital dysplasia, deafness, and skin diseases. Our laboratory has cloned many of the connexin genes and characterized their biochemical, cellular, and physiological properties. We have established tissue culture and animal models (and when possible studied human tissues) to study the relationships of connexins to disease. A major current focus is to elucidate the molecular and cellular basis of inherited cataracts caused by mutations of Connexin46 and Connexin50.

**SPECIFIC AIMS**
There are multiple ongoing projects related to Congenital Cataracts and the consequences of the connexin mutants identified in families with inherited congenital cataracts. Depending on interests, the student might pursue studies of mice that express mutants mimicking those identified in affected people, might examine ER stress and protein degradation, or might structure-function relations between connexin sequence and channel properties and regulation.

**METHODS**
The student will work independently under the primary mentorship of Dr. Beyer with assistance from senior members of the laboratory group. Technical approaches will vary depending on the exact project. Commonly utilized procedures include confocal microscopy, tissue culture, DNA manipulation through PCR amplification, subcloning and sequence analysis; expression of recombinant mutant and wild type connexins; protein detection by immunoblotting and immunofluorescence microscopy; and analysis of connexin function by passage of microinjected dye tracers, by electrophysiological approaches, and by effects on cell growth and signaling cascades.

**CONFERENCES AVAILABLE FOR PARTICIPATION**
The students meet with Dr. Beyer regularly to discuss the progress of the project. All members of our research group participate in weekly laboratory research/data meetings and journal club. Subsets of our research group have frequent meetings with collaborating investigators. The student is also welcome to attend regular conferences of the Section of Pediatric Hematology/Oncology (such as Hematology Rounds, Tumor Board, Clinical Conference, etc.) or the Department of Pediatrics (including Grand Rounds and Morning Report).

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences

**NIH MISSION:** Aging, Diabetes, Heart
to our community to fight this cause with increased education of our families and commitment to the safety principles that we know work.

SPECIFIC AIMS

I. To examine current hospital practices regarding the implementation of the AAP-supported safe sleep guidelines
   H1.1 We do not abide by AAP safe sleep standards
   H1.a Infants are often put to sleep on the stomachs, are found co-sleeping, are kept in the bed with loose bedding and other objects in the crib

II. To examine how nurses, residents, and attendings feel about their practices regarding safe sleep guidelines, the importance of safe sleep, and their knowledge of the new recommendations (published October 2016)
   H2.1 Health care professionals do not accurately perceive their practices regarding personal accordance to safe sleep guidelines
   H2.2 Health care professionals working in the hospital do not think of safe sleep as an important hospital-related issue
   H2.3 Health care professionals working in the hospital are not aware of the specific changes to the AAP’s safe-sleep guidelines

III. To assess improvement in hospital safe-sleep practices following an educational intervention
   H3.1 Health care professionals will be able to make specific changes in personal safe sleep practices following an educational intervention
   H3.2 Knowledge about safe-sleep practice and the changes in the AAP recommendations, as well as attitudes towards safe sleep, will change following an educational intervention

IV. To explore perceived barriers to safe sleep in the hospital from attendings, residents, and nurses
   H4.1 Health care professionals do not believe safe-sleep to be an important issue in the hospital because patients are often hooked up to monitors
   H4.2 Health care professionals often perceive other health care professionals to be a barrier to safe sleep practice in the hospital
   H4.3 Health care professionals believe it is difficult, and sometimes not worth the effort, to address perceived cultural barriers to safe sleep with families.

METHODS

We will conduct a prospective cohort study with the primary aim of examining current safe sleep practices at the University of Chicago Comer Children’s Hospital as they compare to current AAP safe-sleep guidelines and comparing them to safe sleep practices in the hospital following educational intervention. Current project plan is for an SRP student to collect pre-intervention data on safe sleep habits in the hospital. Educational strategies will be rolled out mid-summer to educate practitioners on the new guidelines. Post-intervention data will be collected on safe sleep practices on the Comer wards. The secondary aim to our study will be to identify the perceived barriers of attendings, residents, and nurses to implementing safe-sleep in the hospital through a self-assessment survey. The final aim of our study will be to conduct focus groups with residents, nurses and attendings to obtain a better understanding of the barriers that exist to safe sleep in hospitals.

SOFTWARE REQUIRED: None.

CONFERENCES AVAILABLE FOR PARTICIPATION:
American Academy of Pediatrics (AAP), University of Chicago Quality Symposium, Association of Pediatric Program Directors (AAPD), Council on Medical Student Education in Pediatrics (COMSEP)

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Healthcare Delivery Sciences (Quality & Safety), Community Health, Medical Education
PROJECT TITLE
Children and Sports Participation

PROJECT DESCRIPTION
In the past few years, the American Academy of Pediatrics has put out numerous policy statements about children and concussions and sports. And yet, while it seeks safer sports, it does not seek to ban football or boxing. We will explore pediatricians’ attitudes to these policies.

SPECIFIC AIMS
To explore attitudes of pediatricians and subspecialist pediatricians regarding AAP policies.

METHODS
Redcap survey.

SOFTWARE REQUIRED: STATA, SPSS (I will obtain SPSS for the student).

CONFERENCES AVAILABLE FOR PARTICIPATION
Society of Pediatric research/pediatric academic society (SPR/PAS)

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences

NIH MISSION: Neurology

PROJECT TITLE
Exosomes and Vascular Dysfunction in Sickle Cell Disease

PROJECT DESCRIPTION
Sickle Cell Disease (SCD) is the most common monogenic disorder, affecting approximately 1 in 500 African-Americans. Many of the severe morbidities of sickle cell anemia (like Acute Chest Syndrome) involve disruption of the integrity of the blood vessel wall. The long-term goal of our research is to elucidate the pathophysiology of Sickle Cell Disease to identify patients at the highest risk of Acute Chest Syndrome and to improve treatments. The current project explores the roles of miRNA-containing
nanoparticles called exosomes in the pathophysiology of Sickle Cell Disease. We have shown that exosomes isolated from Sickle Cell patients cause disruption of endothelial barrier function. The student would work with our group to help determine mechanisms by which exosomes regulate pulmonary endothelial integrity.

**SPECIFIC AIMS**

1) To examine how different stressors that occur in Sickle Cell Disease (hypoxia, cell free hemoglobin, cytokines, etc.) affect release of exosomes by endothelial cells
2) To determine if exosomes are differentially taken up by pulmonary endothelial cells versus other cells.
3) Determine what component(s) of the cargo of exosomes influences endothelial integrity.

**METHODS**

The student will work within the lab, will learn how to isolate, quantify and identify the cellular sources of exosomes, and will perform immunohistochemistry on cultured endothelial cells. Depending on student interests and experimental results, additional experimental approaches might include informatics, PCR, Western blotting, measures of reactive oxidative species, etc.

**SOFTWARE REQUIRED:** STATA, Prism (Our lab has access when needed.)

**CONFERENCES AVAILABLE FOR PARTICIPATION**

The student would be expected to participate and present their progress in meetings of the CSCDRG (Chicago Sickle Cell Disease Research Group) on Wednesday mornings at 8 AM. During the Spring quarter, attendance is encouraged when possible. The advisors will meet with the student weekly and will be available daily as needed. There will be core readings on Sickle Cell Disease, vascular disease and the role of exosomes as paracrine effectors. The student is also welcome to attend regular conferences of the Section of Pediatric Hematology/Oncology, which include but are not limited to Hematopathology conference and our weekly clinical conference.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences

**NIH MISSION:** Blood, Lungs

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**MENTOR:** Jill de Jong, MD, PhD  
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**PROJECT TITLE**

Genetic Regulation of Hematopoietic Stem Cells and Leukemia

**PROJECT DESCRIPTION**

Hematopoietic stem cells (HSCs) precisely regulate the balance between self-renewal and differentiation to generate the appropriate number of mature blood cells required by an organism. When genes that direct these decisions are dysregulated, unchecked self-renewal can result in hematopoietic malignancy. Characterizing the decision-making processes regulating HSC function is critically important to understand leukemogenesis and also to enhance HSC transplantation strategies used to treat many human cancers and blood diseases. My laboratory is capitalizing on the zebrafish animal model to uncover new genetic regulators of HSCs. We have developed an immune-matched transgenic zebrafish model to phenocopy murine models of competitive repopulation using clonal CG2 zebrafish. This project will compare the relative engraftment potential of mutant zebrafish HSCs with wild type HSCs. Mutant marrow cells labeled with green fluorescent protein (GFP) will be transplanted along with wild type competitor marrow cells labeled with mCherry. Long term, multi-lineage engraftment will then be assessed using flow...
cytometry to determine whether the mutant marrow has an engraftment defect. Having identified mutants with engraftment defects, further work will characterize the function of those mutant genes in HSCs and leukemias.

SPECIFIC AIMS
Perform competitive hematopoietic transplant assays to identify genes that alter HSC engraftment.

METHODS
CRISPR-cas9 targeted mutagenesis will be used to generate mutants for testing in the competitive repopulating assay. Candidate genes have been selected from previously published gene lists. Molecular biology methods will be used to make CRISPR constructs. A student working on this project will also learn how to dissect marrow cells to perform hematopoietic transplantation assays. Flow cytometry will be used to assess chimerism of transplant recipients. Students will also learn zebrafish husbandry and genetics.

CONFERENCES AVAILABLE FOR PARTICIPATION
Students will have weekly individual meetings with Dr. de Jong to discuss progress on the project, and will participate in weekly lab meetings. Optional participation is available for any other conferences in the Dept of Pediatrics (such as Grand Rounds) or the Section of Hematology-Oncology (inpatient clinical rounds, hematopathology conference, and tumor board). Basic science and translational conferences are also available.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Blood

Pediatrics–Neonatology

MENTOR: Bree Andrews, MD, MPH
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PROJECT TITLE
The Preeme+You: Using Mobile Technologies to Co-create Meaningful Interactions For Families and Improve Premature Infant Growth and Development

PROJECT DESCRIPTION
A healthy newborn baby is what all families look forward to. It takes around 40 weeks to have a full-term baby. However, in the United States there are 400,000 babies each year who are born too early, before their organs have acquired the capacity for life outside their mothers’ bodies. Imagine delivering a baby at 24 weeks (around 6 months)—with skin too fragile to touch, eyes often fused shut, and under-developed lungs that are not yet functional for taking a first breath. The 16 weeks you had planned for your baby to be full-term; and for your family to practically and emotionally prepare for this infant are suddenly gone. Instead, your preemie baby is now clinging to life and must be whisked away to the Neonatal Intensive Care Unit (NICU). Feeling scared and overwhelmed is an understatement, even for families living under the luckiest of socio-economic circumstances.

Communication is the key component for families to successfully navigate and make sense of the indeterminacies and chaotic circumstances created by a premature birth. For the first few days or weeks, parents can typically stay by the bedside and take time away from work or home obligations. Yet, many of the most premature infants must remain in the NICU for fifty days or more. As one may expect, phone communication and information available on smartphones becomes a lifeline for families—both during the period of hospitalization as a way to connect to their infants and receive hourly or daily information; and after hospital discharge for a range of critical follow-up care to address disabling conditions and developmental delays.
SPECIFIC AIMS
This project seeks to bridge the communication and knowledge gap of parents visiting and caring for their infants in the NICU.
1) To provide and build consistent and long-lasting communication between the preemie’s hospital care team and their families.
2) To help families manage and organize the care of their preemies after hospital discharge.

METHODS
As faculty of the University of Chicago, Bree Andrews, MD/MPH and Larry Gray, MD want to study parents who experience enhanced communication through this project. We use a two-part methodology to do this.

Part 1: During the course of NICU hospitalization, collect baseline information about parent engagement and gaps in parental comfort at the bedsides of their fragile infants.

Part 2: Test components of a ‘maturation’ framework for premature infant care in the NICU focused on a. breathing b. sleep c. feeding d. growth and provide a post-intervention survey to assess parent’s engagement and knowledge after the ‘maturation’ framework has been implemented.

Both components of this project will be the underpinnings of creating a smartphone/tablet app that can improve the parent experience at the bedside while educating and comforting them during their NICU stay.

CONFERENCES AVAILABLE FOR PARTICIPATION
1) Weekly participation in laboratory meeting held Wednesdays 1-2pm. This is a meeting attended by Dr. Andrews, Dr. Gray, and Allison Kniola, the project RA. Every other week we meet with Yaya Ren, PhD/JD founder Preeme+You, a social benefit company dedicated to improving parent engagement and the parent experience in the NICU.
2) Data collection and analysis for the baseline survey and for the ‘maturation’ application with parents in the NICU.
3) Weekly exposure to the culture and practice of NICU medicine as well as the exposure to the developmental trajectory of infants and young children that starts with parental bonding/engagement.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Social Sciences

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IRB/IACUC NUMBER: TBA

PROJECT TITLE
The Impact of Cumulative Neonatal Morbidities on 24 Month Neurodevelopment Scores for Extremely Low Birthweight Infants

PROJECT DESCRIPTION
This project is a foundational project of a larger University of Chicago project investigating whether or not there is an adverse micro biome of poverty that impacts neurodevelopment in ELBW infants.

Each ELBW typically has had an array of neonatal morbidities that contribute to the neurodevelopment prognosis of the growing child. This project will integrate data from a national cohort of 1700 infants looking to individualize the impact of the cumulative neonatal morbidities that affect each child.

SPECIFIC AIMS
1) Build a neonatal morbidities model that matches the neurodevelopment trajectory for ELBW infants.
2) Provide this morbidities model such that the impact of the micro biome and other environmental impacts can be understood for the developing child at neurodevelopment risk.
METHODS
1) Build a research cohort from 4 national databases through the Environmental Child Health Outcomes (ECHO) NIH cohort for ELBW infants.
2) Develop a regression model that establishes the relationship between multiple neonatal morbidities and 2yr outcomes.
3) Analyze the data base to both improve diagnostic accuracy at the time of NICU discharge regarding neurodevelopment and to serve the larger environmental child health outcomes goal, which will be added to this model.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly laboratory meetings with Dr. Erika Claud to understand the micro biome; Weekly laboratory meeting with Dr. Bree Andrews to build and analyze the database. There are typically 4-10 trainees and/or attendings at this meeting; Weekly NICU rounds to appreciate NICU care and neonatal morbidities.

4) Weekly attendance at the Center for Healthy Families understanding neurodevelopment testing after discharge.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Neurology

MENTOR: Erika Claud, MD
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PROJECT TITLE
The Effect of the Gut Microbiome on Preterm Infant Outcomes

PROJECT DESCRIPTION
It is now known that the microbiome influences health as well as disease. The preterm infant faces the unique situation of being born immature and thus obligated to undergo development of all systems within the neonatal intensive care unit (NICU) environment under the influence of a developing microbiome rather than the expected sterile intrauterine environment. The microbiome thus has significant potential to influence preterm infant development and health. Our laboratory investigates the effect of the preterm infant microbiome on development by transfaunating microbial communities from human infants into germ free mice. We have found effects of the microbiome on growth, inflammation, intestinal maturation as well as brain development. An important aspect of preterm infant health is neurodevelopment. This project will specifically explore the influence of the gut microbiome on neurodevelopment.

SPECIFIC AIMS
The aim of this project will be to determine the effect of different preterm infant microbial colonization patterns on brain development and function.

METHODS
Gnotobiotic mouse models transfaunated with preterm infant microbiota will be used. Molecular biology techniques will be used to analyze neuronal development. Behavioral testing platforms will be used to investigate the functional effect of different intestinal microbial colonization patterns on neurodevelopment.
CONFERENCES AVAILABLE FOR PARTICIPATION
Students will be involved in weekly laboratory meetings and able to attend clinical neonatology conferences if interested.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Digestive Diseases

Pediatrics—Pulmonary and Sleep Medicine

MENTOR: Anna Volerman, MD
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PROJECT TITLE
Chicago Asthma School-Directed Child-Centered Assessment and Dissemination of Evidence (CASCADE)

PROJECT DESCRIPTION
Asthma is the most common chronic childhood disease in the United States. Urban youth, particularly from minority and low socioeconomic backgrounds, are disproportionately affected with regard to prevalence, severity and quality of life. Despite substantial knowledge about how to effectively manage asthma, there are multiple barriers to optimal asthma care. Children spend nearly one-third of their day in school, representing an important environment for asthma screening, management, and education. In partnership with the Chicago Asthma Consortium and the University of Chicago Charter School, we are developing a model for school-based asthma care that effectively implements evidence-based guidelines and policies.

Students can elect to work on a project focused on one or more of areas.

SPECIFIC AIMS
1) To determine stakeholders’ perspectives about asthma management at school to inform a model for asthma care
2) To implement and evaluate a pragmatic, multi-component school-based asthma program
3) To improve processes of asthma care in the school environment and outcomes for children with asthma

METHODS
Screening for asthma
Stakeholder surveys
Qualitative interviews of children and staff
Policy analysis

SOFTWARE REQUIRED: Biostatistician is part of the project team. STATA or ATLAS access will be provided as needed.

CONFERENCES AVAILABLE FOR PARTICIPATION
Students will meet weekly with the multidisciplinary project team as well as one-on-one with the primary mentor. We plan to submit our findings to the Pediatric Academic Societies Meeting, American Academy of Pediatrics National Conference, Illinois Chapter of American Academy of Pediatrics Annual Conference, and University of Chicago Department of Pediatrics Research Day. Students will have an opportunity to present their work at one or more of these meetings.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences, Community Health

NIH MISSION: Lungs
Pediatrics–Rheumatology

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PROJECT TITLE
Utility of the Pain Syndrome Assessment Questionnaire (PSAQ) in Assessing for Fibromyalgia in Patients with Juvenile Idiopathic Arthritis (JIA)

PROJECT DESCRIPTION
Children and adolescents with juvenile idiopathic arthritis (JIA) show great variability in their reported pain. Pain scores do not necessarily correlate well with JIA disease activity as assessed by pediatric rheumatologists. This project examines the usefulness of an easy-to-use pain measure (the Pain Symptom Assessment Questionnaire) among JIA patients.

SPECIFIC AIMS
1) Evaluate the utility of the PSAQ in identifying JIA patients with Juvenile Fibromyalgia (JFM) in comparison to the previous Yunus and Masi criteria.
2) Identify differences amongst JIA patients with and without JFM including demographic data, disease characteristics, functional disability, and physician and patient/parent global assessments.

METHODS
Multi-center cross-sectional study. Patients with known JIA, ages 11-17, will be evaluated at regularly scheduled pediatric rheumatology visits. The following information will be gathered: Demographics, physician and parent/patient global assessment of disease activity, active joint count, pain scores, PSAQ, functional disability index, tender points exam.

CONFERENCES AVAILABLE FOR PARTICIPATION: American College or Rheumatology; Children’s Arthritis and Rheumatology Research Alliance

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

Psychiatry and Behavioral Neuroscience

MENTOR: Joseph Cooper, MD  
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PROJECT TITLE
Neurophysiology of Catatonia

PROJECT DESCRIPTION
Catatonia is a relatively common but poorly understood neuropsychiatric syndrome. Catatonia can be seen related to psychiatric, neurologic, or general medical conditions. Very little is known about the neurobiology of catatonia. Catatonia is a state of
high anxiety, characterized by motoric “stuckness” with a difficulty terminating motor movements as well as disinhibited and environmentally-dependent symptoms, which overlap with those seen in orbitofrontal syndromes. Effective treatments exist for catatonia with the best proven being lorazepam, and in refractory or severe cases, electroconvulsive therapy (ECT). From these clinical characteristics flow hypotheses about the underlying neurobiology. We are probing the neurobiology of the catatonic state using functional magnetic resonance imaging (fMRI) and electroencephalography (EEG), and looking at clinical characteristics with a retrospective chart review. Students will have the opportunity to learn structured clinical examinations to identify and quantify catatonic symptoms, join in the treatment of catatonic patients on the ECT service, and learn about fMRI and quantitative EEG research methodologies.

**SPECIFIC AIMS**

1) Use fMRI to assess neural pathways involved motor processing and anxiety states in catatonic subjects. To examine effects of lorazepam administration on these signal patterns.

2) Analyze EEG data obtained during catatonic states using quantitative micro-state analyses.

3) Retrospectively analyze clinical characteristics of patients in catatonic states.

**METHODS**

Subjects will undergo fMRI scan including resting state, eye movement, and emotional processing tasks both before and after the administration of lorazepam. EEG data and other clinical characteristics from catatonic patients identified retrospectively has already been obtained for analysis. Analyses will involve collaboration with other experts from the Department of Psychiatry and Behavioral Neuroscience.

**SOFTWARE REQUIRED:** Excel, SPSS (Software provided for this project.)

**CONFERENCES AVAILABLE FOR PARTICIPATION**

Collaborative meetings with other faculty and staff involved in the project; Weekly conferences in Psychiatry including Grand Rounds and the Consultation-Liaison conference; Potential national conferences include: American Neuropsychiatric Association; Academy of Psychosomatic Medicine; Society of Biological Psychiatry.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research, Social Sciences

**NIH MISSION:** Neurology

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**MENTOR:** Harriet de Wit, PhD

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**PROJECT TITLE**

Effects of Oxytocin on Stress-Induced Craving

**PROJECT DESCRIPTION**

The study examines the effect of oxytocin on stress-induced cigarette smoking. Oxytocin appears to have some stress-dampening effects, and it has been considered as an adjunct in the treatment of substance abuse. This controlled, double blind study examines the effect of intranasal oxytocin on smoking elicited by stress.

**SPECIFIC AIMS**

To determine the effect of oxytocin (40 IU) vs placebo on responses to stress and stress-induced smoking, in healthy adults.
METHODS
In this between-subject, placebo-controlled, double-blind study, three groups of smokers will complete two outpatient sessions in which they will receive oxytocin or placebo and participate in a stress task (The Trier Social Stress Task; TSST) and a non-stressful control task. All subjects will participate in a stress session and a no stress control session, in randomized order. One group will receive intranasal oxytocin 50 minutes prior to the TSST, another group will receive oxytocin immediately following the TSST, and a third control group will receive intranasal placebo both prior to and following the TSST.

SOFTWARE REQUIRED: SPSS

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly lab meetings; weekly Psychiatry Grand Rounds.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Neurology

MENTOR: Jubao Duan, PhD
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PROJECT TITLE
Molecular Basis of Neuropsychiatric Disorders with Patient-specific Induced Pluripotent Stem Cells (iPSC) and Neurons as a Model

PROJECT DESCRIPTION
Recent genome-wide association studies (GWAS) of schizophrenia and other neuropsychiatric disorders have identified abundant disease susceptibility loci, providing an unprecedented opportunity for developing more effective preventive, diagnostic, and therapeutic strategies. Translating these genomic findings into medicine requires a better understanding of causal molecular mechanisms underlying the genetic associations. Human neurons derived from induced pluripotent stem cells (iPSCs) provide a disease-relevant cellular model for studying the genetic perturbation at these disease risk loci. However, due to variable individual genetic backgrounds, functional assay by directly comparing iPSC lines of different individuals requires a currently unfeasible number of iPSC lines to achieve sufficient statistical power. Genome editing (e.g., CRISPR/Cas9) technology can overcome this difficulty by creating isogenic lines that differ only at a variant site, thus enabling the comparison of allelic function on the same genetic background. The major research goals here are to derive iPSCs from both patients and healthy controls, perform CRISPR editing, differentiate the iPSCs into disease-relevant neurons and study the functional effects of the genetic perturbation at disease risk loci.

SPECIFIC AIMS
Three projects

Project 1: Develop more effective approach for generating iPSC and differentiating to neuronal subtypes that are relevant to neuropsychiatric disorders

Project 2: Determine the dynamics of epigenomic and transcriptomic changes of iPSC-neuron differentiation and identify regulatory disease risk variants.
**Project 3:** Carry out CRISPR-Cas9 genome editing to generate isogenic iPSC lines (and neurons) that carry specific disease risk alleles, and identify the functional effect of the genetic variant(s) on downstream gene pathways/networks as well as neuronal morphological and electrophysiological phenotypes.

**METHODS**
The involved methods will depend on the project selected. For wet-bench work related to iPSC generation, neuronal differentiation and CRISPR-Cas9 genome editing, the methods will include cell culture, basic molecular biology techniques, IF staining, open chromatin mapping by ATAC-seq (Assay for Transposase-Accessible Chromatin by sequencing) and RNA sequencing (RNA-seq). Computational work related to transcriptomic and epigenomic profiling will involve developing novel analytic methods and/or using commonly used computation tools.

**SOFTWARE REQUIRED:** R package (Lab will have the needed resource)

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Weekly lab meetings; journal clubs; annual meetings of the American Society of Human Genetics or World Congress of Psychiatric Genetics.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences, Clinical Research

**NIH MISSION:** Neurology

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**PROJECT TITLE**
Impulsivity in Young Adults

**PROJECT DESCRIPTION**
Psychiatric diagnosis and treatment currently relies on sets of arbitrary criteria decided largely on the basis of expert opinion rather than understanding of pathophysiology. There is a growing realization that the careful elucidation and measurement of intermediate biological characteristics is central to refining/improving existing psychiatric classification and treatment. As highlighted in the NIMH Research Domain Criteria (RDoC) strategic plan, it is necessary to identify intermediate brain-based markers, cutting across related psychiatric disorders, and continuous with relevant markers of variability in the general population (Cuthbert & Insel, 2013). The concepts of impulsivity and compulsivity represent fruitful heuristics in the search for intermediate brain-based markers of psychopathology. Impulsivity refers to behaviors or actions that are inappropriate, premature, unduly thought out, risky, and that lead to untoward longer term outcomes (Evenden, 1999). Compulsivity refers to a tendency towards repetitive, habitual actions, repeated despite adverse consequences (Robbins et al., 2012). Impulsivity and compulsivity can manifest not only at the level of a clinical yndrome or disorder, but also in terms of personality and behavioral tendencies (as measured by questionnaires; e.g. Barratt et al., 1994), and in terms of cognitive dysfunction. Our Center of Excellence examines aspects of impulsivity and compulsivity underlying multiple unhealthy behaviors in young adults - sex, smoking, alcohol use, and gambling to name only a few.

**SPECIFIC AIMS**
1) Examine the neurocognitive underpinnings of impulsive and compulsive behaviors, such as sex, gambling, drug use, in young adults.
2) Examine genetic links to the neurocognitive aspects of impulsive and compulsive behaviors in young adults.
METHODS
The study has examined 550 young adults using a range of neurocognitive, genetic, clinical, and neuroimaging measures. A range of behaviors and psychiatric disorders have been examined in this population. Subjects have been followed in a longitudinal design for up to five years.

SOFTWARE REQUIRED: SPSS (We will provide software and statistical support.)

CONFERENCES AVAILABLE FOR PARTICIPATION
Ability to show a poster at the American Psychiatric Association annual meeting.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Neurology

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PROJECT TITLE
Improving Maternal and Child Health Through Prenatal Fatty Acid Supplementation: A Randomized Controlled Study in African American Women Living in Low-income Urban Environments

PROJECT DESCRIPTION
Pregnant women living in poverty often experience chronic stress and consequently higher levels of stress hormones. In utero exposure to high levels of stress hormones can negatively affect the developing fetus and the infant’s capacity for emotion and behavioral regulation. This program of research is designed to reduce the negative impact of prenatal stress on infant health and development via nutritional supplementation of docosahexaenoic acid (DHA) during pregnancy.

SPECIFIC AIMS
The goals of the study are to test whether DHA supplementation during pregnancy is associated with 1) improved maternal health during pregnancy among African American women living in urban poverty; 2) improved infant birth and neurodevelopmental outcomes, and 3) whether the association between DHA supplementation during pregnancy and infant outcomes is partially mediated by reductions in maternal perceived stress and stress reactivity during pregnancy.

METHODS
One hundred sixty-two pregnant African American women living in urban poverty, who consume less than two servings of fish per week, will be randomly assigned to receive DHA or placebo beginning at 9-12 weeks of gestation through the end of pregnancy. Perceived stress, stressful life events, anxiety, and depression, inflammatory markers, DHA levels and response to a laboratory stressor will be assessed at baseline and three other intervals during pregnancy. Neonatal outcomes (e.g., gestational age, birth weight, delivery complications) will be collected from medical records, and infant neurodevelopmental outcomes and stress reactivity will be assessed at 1, 4 and 9 months of age.

SOFTWARE REQUIRED: SPSS (Lab computer)
Radiation and Cellular Oncology

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IRB/IACUC NUMBER: 15837A

PROJECT TITLE
Precision Radiotherapy for Women with Advanced Breast Cancer: Quantifying Uncertainties Using Surface Imaging

PROJECT DESCRIPTION
Recent clinical data demonstrates an overall survival advantage in most women with early to late stage breast cancer with the addition of radiotherapy. We have employed sophisticated 3D real-time optical imaging in order to be more precise in the delivery of radiation to potential tumor areas while decreasing radiation to the heart and lungs and eye balls. The 3D surfacing imaging is employed to position breast cancer patients for daily radiation treatments while they are at deep inspiration breath-hold (DIBH). DIBH provides an advantage in sparing critical organs such as lung, heart, and larynx. As one of the first institutions nationwide to adopt this imaging modality for positioning breast patients for radiotherapy treatment, we have accumulated a large dataset. To report on our experiences regarding setup reproducibility, we plan to aggregate the surface imaging data for 25 patients treated for 25 fractions each (i.e., 625 data points) to calculate setup margins in 3 dimensions. We will then recalculate the dose using the setup margins to understand the potential dosimetric impact of day-to-day variations in DIBH positioning for breast radiotherapy. In addition, these patients also had two separate CT scans taken on the day of simulation in the DIBH position. These datasets will be used to study dosimetric variations from breath-hold to breath-hold.

SPECIFIC AIMS
1) Calculate surface setup uncertainty throughout radiotherapy treatment in the DIBH position.
2) Determine the dosimetric impact to heart and lungs using this population-averaged setup uncertainty.
3) Use paired CT scans taken in the DIBH position to quantify the dosimetric impact to heart and lungs.

METHODS
The investigator will work with a team of 1 attending physicist, 1 attending physician, and 1 physics resident in the Department of Radiation Oncology. The investigator will learn to use Pinnacle 9.2, a commercial radiotherapy treatment planning system to recalculate dose. The investigator will learn to gather data from our radiation oncology-specific electronic medical record system related to surface imaging variations in daily setup. The investigator will analyze the data and use it to calculate setup margins to be used in recalculating dose. The research will conclude by writing 2 reports, in the format of a manuscript. These reports have the potential to become 2 publishable manuscripts. In addition to these research responsibilities, the student will gain exposure to the field of clinical radiotherapy. There is the potential to attend classes along with incoming radiation oncology residents in the month of July. This is a quantitative and computational research rotation. The candidate should be extremely organized, an effective communicator and writer, and preferably have a quantitative educational background (engineering, basic science). Software training and statistical guidance will be provided by the supervising faculty. We work closely with each student to ensure not only authorship but promotion of their work as they apply for residency.
SOFTWARE REQUIRED: WinSTAT (lab computer)

CONFERENCES AVAILABLE FOR PARTICIPATION
American Society for Radiation Oncology (ASTRO), American Association of Physicists in Medicine (AAPM), Radiological Society of North America (RSNA)

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

MENTOR: Ralph Weichselbaum, MD
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PROJECT TITLE
Molecular Genetics of Oligometasis

PROJECT DESCRIPTION
Patients with metastatic cancer with a limited number of metastases (1-5) are defined as having “oligometastasis.” My lab is investigating the molecular genetics of patients with limited metastatic disease. The goal is to define molecular signatures for patients with true oligometastasis that might benefit from aggressive local therapy versus those with microscopic polymetastatic disease that will not benefit from aggressive local therapy.

SPECIFIC AIMS
Determine molecular genetics of oligometastasis.

METHODS
Using a combination of basic science techniques, students will investigate the molecular genetics of oligometastasis.

CONFERENCES AVAILABLE FOR PARTICIPATION
Students will be expected to attend weekly laboratory meetings. In addition, students are welcome to attend radiation oncology departmental conferences, tumor boards, or other basic science or clinical conferences of interest.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences
PROJECT TITLE
Intersection of Radiotherapy and Immunotherapy

PROJECT DESCRIPTION
Immunotherapy represents an exciting recent advance in the treatment of cancer. However, our knowledge of how modulation of the immune system effects cellular effects of radiation, and vice versa, is limited. My lab is actively investigating how immunotherapy and radiation interact in the treatment of cancer.

SPECIFIC AIMS
To determine the effects of combining immunotherapy with radiation therapy.

METHODS
Students will use a combination of basic science techniques to explore the intersection of radiotherapy and immunotherapy.

CONFERENCES AVAILABLE FOR PARTICIPATION
Students will be expected to attend weekly laboratory meetings. In addition, students are welcome to attend radiation oncology departmental conferences, tumor boards, or other basic science or clinical conferences of interest.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences
**Radiology**

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Students will be expected to attend weekly laboratory meetings. In addition, students are welcome to attend radiation oncology departmental conferences, tumor boards, or other basic science or clinical conferences of interest.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences

**NIH MISSION:** Kidneys

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**Computerized Analysis of Mesothelioma Tumor Volume and Response to Therapy**

**PROJECT DESCRIPTION**
We are developing computerized methods to delineate mesothelioma tumor volume in computed tomography (CT) scans. These methods are being extended to quantify change in tumor volume as a measure of response to therapy and to quantify the reduction of tumor burden post-pleurectomy/decortication. The goal of this research is to demonstrate the clinical utility of computer-extracted mesothelioma tumor volume and validate the concept of patient-specific tumor response criteria.

**SPECIFIC AIMS**
The ultimate objective of this research is to correlate tumor change with gross tumor specimen volume and patient outcomes. This research also seeks to replace the clinical standard RECIST tumor response guidelines with response guidelines that are more mathematically and clinically relevant to the unique morphology and growth patterns of mesothelioma.

**METHODS**
Clinical CT scans from mesothelioma patients will be collected. These scans will include natural history scans (a series of scans prior to therapy), scans acquired during the course of therapy, and pre- and post-surgery scans. A semi-automated mesothelioma tumor segmentation algorithm will be applied each scan to compute tumor volume and change in tumor volume. An automated lung segmentation algorithm will be applied to compute the corresponding change in lung volume. These volumetric data will be compared with linear tumor thickness measurements acquired according to the RECIST guidelines and with patient outcomes.

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Weekly lab meetings and an opportunity for submission to a scientific conference may be possible.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences

**NIH MISSION:** Lungs
MENTOR: Maryellen Giger, PhD
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IRB/IACUC NUMBER: 9127

PROJECT TITLE
Quantitative Radiomics and Deep Learning in Medical Image Analysis for Discovery and Predictive Decision Making

PROJECT DESCRIPTION
Project involves the extension of deep learning methods, which we already have in the lab, to the assessment of various disease types as presented on medical images. For example, the classification of breast cancer subtypes and prognosis from mammography, ultrasound, and/or MRI, and the assessment of response to therapy on head & neck tumors.

SPECIFIC AIMS
The aim of the research is to demonstrate the ability of deep learning (convolutional neural networks) in the assessment of disease as compared to human interpretations and/or conventional computer-aided diagnostic methods.

METHODS
My radiology computer vision lab has been investigating methods for the quantitative analysis of medical images for the past few decades. This is now termed "radiomics", which involves the conversion of medical images to mineable data. We have developed and clinically translated various methods in breast cancer imaging and assessment, and have related these radiomic features of breast tumors to genomics in collaboration with the NCI TCGA. More recently we have implemented various deep learning algorithms using convolutional neural networks on breast, skeletal, and thoracic images that complement the traditional CAD algorithms. The student will work with my lab members and clinical collaborators in (1) identifying their specific project, i.e., clinical question, (2) collecting the database, (3) running existing computer image analysis programs to extract radiomic features, and (4) evaluate these deep learning methods relevant to the clinical question. Student will attend lab project meetings and have the opportunity to author abstracts to national meetings.

SOFTWARE REQUIRED: Lab

CONFERENCES AVAILABLE FOR PARTICIPATION
RSNA, AUR

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Lungs
PROJECT TITLE
MRI Findings after Complex Chiari Decompression Surgery: Differentiating Expected Diffusion-weighted Imaging Findings from Complications

PROJECT DESCRIPTION
Retrospective review of MRI findings, primarily diffusion-weighted imaging, after surgery for patients that have undergone recent Chiari decompression surgery. The project entails interpreting the imaging findings and operative notes in conjunction with a neuroradiologist (Dr. Ginat) and neurosurgeon (Dr. Frim).

SPECIFIC AIMS
To differentiate expected diffusion-weighted imaging findings in the brainstem and cerebellum from complications in patients who have undergone difficult chiari surgery and to correlate the imaging findings with clinical outcome. This will help better understand the significance of the changes that result after surgery.

METHODS
Imaging, operative note, and clinical note review in a case series of under 20 patients

CONFERENCES AVAILABLE FOR PARTICIPATION
ARRS, RSNA, ASNR

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Neurology

PROJECT TITLE
Texture Analysis of Lymph Nodes in Patients with Head and Neck Cancer

PROJECT DESCRIPTION
Texture analysis will be used to characterize lymph nodes on CT in patients with head and neck cancer to help differentiate benign from malignant lymph nodes and predicting treatment response.

SPECIFIC AIMS
Measure texture features of lymph nodes on CT images of the head and neck and correlate these with pathology and clinical findings.
METHODS
Retrospective review of 50 to 100 cases with neck CTs performed for head and neck squamous cell carcinoma in conjunction with Dr. Giger's lab. It is not necessary to be already familiar with the texture analysis software.

CONFERENCES AVAILABLE FOR PARTICIPATION
ASHNR, RSNA, ASNR

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Neurology

MENTOR: Daniel Ginat, MD, MS
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IRB/IAUC NUMBER: 14-0749

PROJECT TITLE
Normative Measurements for Head and Neck Structures on Radiological Imaging

PROJECT DESCRIPTION
The project involves creating a database of normal measurements of various anatomic structures in the head and neck for reference when interpreting radiological images for clinical purposes. There may be an opportunity to apply machine learning strategies and collaboration with major health care industry companies.

SPECIFIC AIMS
The aim is to generate a database of anatomic measurements for several anatomical structures in the head and neck.

METHODS
Creation of the database may involve review of the literature for existing normative data as well as review of perhaps several hundred imaging studies to acquire our own measurements. In either case, the data will undergo statistical analysis. There may also be the opportunity to help develop software for use of the database.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
RSNA; ASNR; ASHNR; ARRS; among others

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

NIH MISSION: Neurology
### 9.4 T MRI of the Temporal Bone

**PROJECT TITLE**
9.4 T MRI of the Temporal Bone

**PROJECT DESCRIPTION**
The project involves scanning temporal bone cadaver specimens in a 9.4T MRI, specifically to image the nerves.

**SPECIFIC AIMS**
To delineate the cochlear, vestibular, and facial nerves in the temporal bone on 9.4T MRI.

**METHODS**
The specimens are to be harvested by dissection of cadaver heads and prepped for MRI. The scans are performed in a 9.4T MRI on campus. DTI images of the nerves will be obtained. The imaging findings will be correlated with the gross anatomy.

**CONFERENCES AVAILABLE FOR PARTICIPATION**
ASHNR; RSNA; ASNR

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences, Clinical Research

**NIH MISSION:** Neurology

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### Comparing Treatment Response for Necrotic Versus Solid Metastatic Lymph Nodes from Head and Neck Squamous Cell Carcinoma Based on Imaging

**PROJECT TITLE**
Comparing Treatment Response for Necrotic Versus Solid Metastatic Lymph Nodes from Head and Neck Squamous Cell Carcinoma Based on Imaging

**PROJECT DESCRIPTION**
There is currently no reliable way to define extracapsular extension of tumor in lymph nodes with head and neck squamous cell carcinoma based on CT. We hypothesize that texture analysis may be able to better delineate tumor extension.

**SPECIFIC AIMS**
To compare the CT texture features of lymph nodes with and without extracapsular spread from squamous cell carcinoma.

**METHODS**
Chart review will be necessary to identify cases with lymph node that have extracapsular extension. Texture analysis will be performed on the CT scans of the neck in patients with metastatic head and neck squamous cell carcinoma, based on the

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RADIOLOGY

texture features of lymph nodes with and without extracapsular spread will be compared. The texture analysis will be performed on a dedicated program at the Giger lab.

SOFTWARE REQUIRED: STATA

CONFERENCES AVAILABLE FOR PARTICIPATION
ASNR; ASHNR; RSNA

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

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IRB/IACUC NUMBER: Exempt

PROJECT TITLE  
Neuroradiology MRI Patient Information Leaflet and Survey

PROJECT DESCRIPTION  
The project involves reviewing over 100 patient questionnaires related to MRI information leaflets distributed to patients before receiving a scan.

SPECIFIC AIMS  
To assess patient satisfaction and understanding regarding neuroradiology MRIs and to improve patient education on the subject.

METHODS  
The questionnaire data will be reviewed and the findings will be used to redesign the leaflet accordingly.

CONFERENCES AVAILABLE FOR PARTICIPATION  
ACR; ASNR; ARRS; RSNA

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety), Community Health

NIH MISSION: Neurology
RADIOLOGY

MENTOR: Daniel Ginat, MD, MS
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IRB/IACUC NUMBER: 14-0749

PROJECT TITLE
Radiographic Texture Analyses of Sinonasal Tumors

PROJECT DESCRIPTION
Texture analysis of CT and MRI images of sinonasal tumors will be performed to create a radionomic signature database that can be used to help differentiate the various types of tumor.

SPECIFIC AIMS
To use texture analysis to characterize the different types of sinonasal tumors on imaging in pathology proven cases.

METHODS
Texture analysis will be performed on a dedicated work station in the Giger lab. The list of cases will be provided by Dr. Pinto. The relevant imaging will be collected and reviewed under the supervision of Dr. Ginat.

CONFERENCES AVAILABLE FOR PARTICIPATION
ASHRN, RSNA, ASNR

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research

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MENTOR: Daniel Ginat, MD, MS
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IRB/IACUC NUMBER: 14-0749

PROJECT TITLE
T1 Mapping of Head and Neck Tumors

PROJECT DESCRIPTION
T1 mapping is a quantitative MRI technique that calculates the relaxation time of a tissue by using analytical expressions of image-based signal intensities. A fundamental principal of MR imaging is that the signal intensity of pixels is based on the relaxation of hydrogen nuclei protons in a static magnetic field. The T1 relaxation times between two tissues can vary substantially. This can be used to differentiate various pathologies.

SPECIFIC AIMS
The selection of internal reverence values and signal inversion can retrospectively quantify T1 and T2 values in head/neck tumors to quantify tumor properties for cross-sectional and longitudinal analysis.

METHODS
The project involves reviewing 30 to 50 head and neck MRI studies and correlating the T1 mapping results with the pathology of the tumors.
**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**
ASHNR, ASNR, RSNA, ARRS

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research

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**ALTERNATE CONTACT NAME:** Maryellen Giger, MD

**ALTERNATE CONTACT EMAIL:** m-giger@uchicago.edu

**IRB/IACUC NUMBER:** TBA

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**PROJECT TITLE**
Machine Learning for Detection of Urgent Abnormal Findings in CT Scans

**PROJECT DESCRIPTION**

Machine learning has until now focused on some of the most challenging task in radiology, such as distinction between benign and cancerous lung nodules. However, there is an opportunity to impact clinical care by automated detection of non-subtle abnormalities.

Routine CT scans are not reviewed by a radiologist until after several hours in many cases. In the USA, the accepted standard is to read a scan within no more than 24 hrs of acquisition, but this is not always achieved over weekends. In other countries, scans may not be read for several days. However, some of these scans will show urgent findings that require immediate treatment, such as new large pleural or pericardial effusion, pneumonia, or pulmonary embolism, which can be detected by automated systems, with appropriate training. In large medical centers, a high proportion of patients are being followed with sequential scans, so that previous scans are available for comparison, providing an opportunity to allow automated detection of interval change, in such cases. In other cases, comparison of normal cases with grossly abnormal cases, will provide a basis for automated detection.

The advantage of these approaches is that the system will not need to surpass or even approach the accuracy of a human observer in order to be clinically useful.

**SPECIFIC AIMS**
To develop an automated system for detection of potentially urgent findings in “routine” CT scans, in order to alert radiologists to review such cases immediately to determine the need for immediate intervention.

**METHODS**

One hundred cases with CT scans that show examples of potentially urgent findings, that also have a previous baseline scan, will be downloaded from existing clinical records and anonymized. Only the PI will have the key to the patient’s identity. One hundred comparable cases without significant change between scans will also be anonymized.

Existing machine learning methods will be applied in order to distinguish cases with potentially urgent new findings from those without significant interval change.

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Weekly meetings in The Giger Lab, including Deep Learning and Machine Learning Topics.
RADIOMETRY

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Lungs

MENTOR: Christopher Straus, MD
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IRB/IACUC NUMBER: Exempt

PROJECT TITLE
Radiology Reporting, How to Optimize and Bring Value to the Patient Care Team

PROJECT DESCRIPTION
Medical care is in continual flux and evolution given numerous changes and advancements but none more than from innovation resulting from technology. Patient and physician expectations expand with the desire to optimize patient care with improved outcomes yet these changes are not entirely simultaneous. Specifically medical Image reporting has not significantly changed or been advanced other than digital access to reports, raising the question of effectiveness and whether current methodology is meeting patient needs or the current needs of our referring physicians? The goal of this project is to better understand the current and evolving expectations by these two key user groups, with the belief that through better understanding we can promote measurable alterations resulting in bringing value to both the patient’s directly and their care team.

SPECIFIC AIMS
1) To identify expectations in regards to communication between radiologists, referring physicians and patients, both directly and in the published literature
2) Survey selected academic centers to determine currently unknown baseline understanding
3) Prospectively collect data from both referring physicians and patients regarding their use and expectations of their radiology reports

METHODS
Survey to be created, validated, and distributed. Post analysis for general description and current trends.

CONFERENCES AVAILABLE FOR PARTICIPATION
Weekly lab meetings and an opportunity for submission to a scientific conference may be possible; including:
Radiological Society of North America (RSNA) Annual Meeting (Chicago) Association of University Radiologists (AUR) Annual Meeting (San Diego 2016)

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Social Sciences, Healthcare Delivery Sciences (Quality & Safety)
SURGERY–GENERAL SURGERY

Surgery–General Surgery

MENTOR: John Alverdy, MD
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IRB/IACUC NUMBER: 16494B, IACUC7 1744, 72417

PROJECT TITLE
The Role of the Intestinal Microbiome in Surgical Stress and Disease

PROJECT DESCRIPTION
We study the role of the intestinal microbiome in recovery after surgical injury, stress and disease. In particular we are interested in understanding how the gut microbiome or when colonized by pathogenic bacteria (i.e. the intestinal pathobiome) drives the process of developing complications and healing following surgery. We study two areas, sepsis and anastomotic leak as the two prototype surgical complications.

SPECIFIC AIMS
1) To determine the role of the microbiome and pathobiome in surgical complication development.
2) To define the mechanisms by which intestinal bacteria shift their phenotypes to express virulence against the host leading to inflammation, impairment of recovery and poor healing responses.

METHODS
Students will learn basic microbiological methods (culture, PCR, phenotype assays, zymography, western blot, etc) and will acquire and participate in small animal surgery in mice creating anastomatic surgery, small liver resections and intestinal injections of bacteria. Students will learn microbial sequencing technology and interpretation of microbial community structure and function analysis.

CONFERENCES AVAILABLE FOR PARTICIPATION
Association of Academic Surgery, American Surgical Congress, Surgical Infection Society, American College of Surgery, Huggins Symposium

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

NIH MISSION: Digestive Diseases
### Analysis of Endocrine Surgery Patient Outcomes

**PROJECT DESCRIPTION**
The Endocrine Surgery Program at the University of Chicago has many years of large volumes of patients undergoing surgery for thyroid, parathyroid, and adrenal disorders. The goals of the project will be largely determined by student interest, but will focus on exploring outcomes of patients undergoing thyroidectomy, parathyroidectomy, and adrenalectomy.

**SPECIFIC AIMS**
To identify practice patterns that improve patient outcomes in thyroid, parathyroid, and adrenal surgery.

**METHODS**
Careful analysis of Endocrine Surgery Research Program database to identify patients who have undergone thyroidectomy, parathyroidectomy, or adrenalectomy. Examination of patient records to identify outcomes and practice patterns that lead to improved results.

**SOFTWARE REQUIRED:** STATA

**CONFERENCES AVAILABLE FOR PARTICIPATION**

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

**NIH MISSION:** Aging

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### Clinical and Ethical Implications of Practice Guidelines on Surgical Care

**PROJECT DESCRIPTION**
In recent years, it has become increasingly common for medical and surgical groups to put forth practice guidelines to help clinicians standardize the care of patients and to improve the quality of patient care. Practice guidelines raise inherent ethical conflicts in that they are general recommendations but must be applied to specific patients. This project will explore several of the ethical implications of practice guidelines related to the care of patients with endocrine surgical problems.
SPECIFIC AIMS
Assess the impact of a number of widely utilized clinical practice guidelines in endocrine surgery on the care of patients. Explore the language that the guidelines use when balancing the goal of standardization with the need to individualize treatment.

METHODS
Analysis of the literature to identify particularly influential practice guidelines in Endocrine Surgery. The guidelines will be carefully examined to identify the disclaimers and other legal protections that are built into the guidelines. Careful literature search to identify the impact of recommendations from the specific identified guidelines on the published literature. Exploration of the pros and cons of standardization for quality patient care and the impact on future innovations in care.

CONFERENCES AVAILABLE FOR PARTICIPATION

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Social Sciences, Medical Education

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IRB/IACUC NUMBER: 15-0195

PROJECT TITLE
Utility of Risk Stratification Tools and Early Warning Scores for Predicting Adverse Outcomes in Surgical Patients

PROJECT DESCRIPTION
Many hospitals have implemented tools to determine which patients are at highest risk for adverse outcomes in order to activate the rapid response team or otherwise tailor patient care. These tools, however, have either been developed using clinical consensus or using large data sets from a variety of patients. The utility of these tools for predicting adverse events specific to surgical patients is unknown.

SPECIFIC AIMS
To compare the accuracy of common risk stratification tools and early warning scores for predicting adverse outcomes in post-operative surgical patients.

METHODS
The student will utilize medical record data from all patients who had a surgery during their hospital stay to calculate a variety of common risk stratification and early warning scores post-operatively. Scores will be compared to patient outcomes in order to calculate the score’s positive predictive value in this patient population. Adverse outcomes are defined by the American College of Surgeons National Surgical Quality Improvement Program serious complications, including death, cardiac arrest, myocardial infarction, pneumonia, progressive renal insufficiency, acute renal failure, pulmonary embolism, deep vein thrombosis, return to the operating room, surgical site infection, systemic sepsis, unplanned intubation, urinary tract infection, and wound disruption.

SOFTWARE REQUIRED: STATA
CONFERENCE AVAILABLE FOR PARTICIPATION
The student will be expected to participate in weekly research group meetings and is encouraged to attend a weekly Outcomes Research Workshop. Final work will be considered for national annual conferences, such as American Thoracic Society or Academic Surgical Congress.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Healthcare Delivery Sciences (Quality & Safety)

NIH MISSION: Heart

MENTOR: Michael Ujiki, MD
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ALTERNATE CONTACT NAME: Joann Carbray
ALTERNATE CONTACT EMAIL: JCarbray@northshore.org
IRB/IACUC NUMBER: TBA

PROJECT TITLE
Defining Outcomes after Laparoscopic Cholecystectomy

PROJECT DESCRIPTION
This project is designed to assess single-center outcomes after a very commonly performed digestive surgical procedure, laparoscopic cholecystectomy. Currently, there is a national movement to improve quality and education around this procedure. The project mentor serves on the national Safe Laparoscopic Cholecystectomy Task Force sponsored by the Society of American Gastrointestinal and Endoscopic Surgeons. The student would be involved in electronic medical record chart reviews, data analysis in collaboration with biostatisticians, and presentations at National Societies. There is opportunity for first authorship on multiple publications for the student.

SPECIFIC AIMS
The aim of the project is to identify true complication rates after laparoscopic cholecystectomy in a high-volume center in an effort to ultimately lower these rates.

METHODS
Electronic medical record chart review (EPIC) will be performed over the last 10 years.

SOFTWARE REQUIRED: STATA (Our lab has three full-time statisticians as well as access to STATA)

CONFERENCE AVAILABLE FOR PARTICIPATION
SAGES, SSAT, ACS, Central Surgical Association, Western Surgical Association

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Healthcare Delivery Sciences (Quality & Safety), Medical Education

NIH MISSION: Digestive Diseases
Surgery–Neurosurgery

MENTOR: John Finan, PhD
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IRB/IACUC NUMBER: Exempt

PROJECT TITLE
Modeling Spreading Tauopathy in Chronic Traumatic Encephalopathy

PROJECT DESCRIPTION
Traumatic head injury induces tau aggregation pathology at points of elevated mechanical stress throughout the brain. Over time, this pathology appears to spread, engulfing larger and larger regions of brain until brain function is severely and irreversibly compromised. This disorder is known as chronic traumatic encephalopathy (CTE). Repeated efforts to reproduce spreading tauopathy after trauma in rodent models have failed due to species differences. However, recent innovative work with human in vitro models has shown that they can reproduce tau aggregation pathology. Our goal is to apply mechanical trauma to these innovative models to capture the spreading post-traumatic tauopathy that drives CTE morbidity.

SPECIFIC AIMS
To reproduce spreading post-traumatic tauopathy in a human in vitro model of chronic traumatic encephalopathy.

METHODS
Human neural progenitor cells and induced pluripotent stem cell derived neurons will be cultured in 3D hydrogels and transfected with mutant APP vectors to accelerate tauopathy pathology on to a practical time scale. Localized trauma will be applied using a custom-built device in the lab. Tau aggregation pathology will be visualized and measured using immunofluorescence microscopy, ELISA and other molecular biology techniques.

CONFERENCES AVAILABLE FOR PARTICIPATION
National Neurotrauma Symposium; Society for Neuroscience

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Neurology

NF-KB in Cancer and Aging

PROJECT TITLE
NF-KB in Cancer and Aging

PROJECT DESCRIPTION
Examine the role of the NF-KB pathway in the DNA damage response as it relates to the development and treatment of Cancer and mammalian aging.
SURGERY–ONCOLOGY

SPECIFIC AIMS
1) To examine the mechanism by which NF-KB proteins and co-regulators act to modulate the treatment of brain cancer.
2) To examine the involvement of NF-KB proteins in aging.

METHODS
Use cell culture, molecular biology and biochemical techniques to examine the Aims outlined.

CONFERENCES AVAILABLE FOR PARTICIPATION
Neurosurgery Grand Rounds/neuro-oncology conference and Cancer Center conferences.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences

NIH MISSION: Aging, Neurology

Surgery–Oncology

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PROJECT TITLE
Using Genetic Risk Scores to Assess the Efficacy of Mammography Screening among Women Diagnosed with Breast Cancer

PROJECT DESCRIPTION
To compare a genetic risk score utilizing a panel of breast cancer SNPS between those women who have had breast cancer detected by a mammogram versus those who have not had breast cancer but are undergoing annual screening mammography.

SPECIFIC AIMS
1) To compare a genetic risk score utilizing a panel of breast cancer SNPS between those women who have had breast cancer detected by a mammogram versus those who have not had breast cancer but are undergoing annual screening mammography.
2) To analyze the expression of a genetic risk score utilizing a panel of breast cancer SNPS stratified by several different risk factors for breast cancer.

METHODS
Blood or saliva will be collected from women undergoing screening mammogram who have and have not developed breast cancer. A database will be built of these patients including all the risk factors for breast cancer and data on tumor factors. The genetic risk score will be performed by Dr. Xianfeng Xu at the NorthShore Research Institute in his laboratory. We will compare the genetic risk score between the two cohorts of patients and correlate the genetic risk score by patient risk factors for breast cancer.

SOFTWARE REQUIRED: SPSS (I have access to SPSS in my lab and we work directly with biostatisticians at the NorthShore Research Institute)
**CONFERENCES AVAILABLE FOR PARTICIPATION**

- Breast conference—held weekly Monday mornings
- Weekly research meetings
- Monthly breast cancer seminars
- Monthly Surgical Outcomes Research Program meetings

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research

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# Surgery–Otolaryngology/Head & Neck Surgery

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## PROJECT TITLE

Epidemiology of Chronic Rhinosinusitis

## PROJECT DESCRIPTION

We are part of a U19 funded 3 center NIH grant called Chronic Rhinosinusitis Integrated Studies Project (CRISP). As part of this project, we are investigating for the first time the epidemiology of CRS in a large cohort of primary care patients.

## SPECIFIC AIMS

The goal of this project is to identify clinical risk factors for the development of CRS and associated health utilization metrics.

## METHODS

Standard epidemiological analyses (logistic regression, etc.).

## SOFTWARE REQUIRED:

STATA (Lab computers, Campus resources, Biostatistics support on the team)

## CONFERENCES AVAILABLE FOR PARTICIPATION

All education conferences in the Section of Otolaryngology (multiple weekly lectures), activities in the Center on the Economics of Aging (demography workshops, etc.), CRISP conferences (the other centers are at NU and Geisinger Health System in PA), meetings with my research team, and relevant Department of PHS conferences.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research

**NIH MISSION:** Aging, Lungs
MENTOR: Jayant Pinto, MD
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IRB/IACUC NUMBER: TBA

PROJECT TITLE
Epidemiology of Sensory Aging, Including Clinical and Environmental Risk Factors: The National Social Life, Health, and Aging Project

PROJECT DESCRIPTION
In the National Social Life, Health, and Aging Project, the Olfactory Research Group (ORG) is pursuing a better understanding of how upper airway and sensory disorders manifest in older adults. This longitudinal nationally representative cohort has a number of advantages for studying the health of older adults.

SPECIFIC AIMS
We are examining the effects of environmental, social, health, and behavioral context on a variety of outcomes. Please see my recent papers for a summary of the topics so far, which include racial disparities in olfactory loss, asthma and allergy medication use in older adults, effects of pollution on olfactory loss, global sensory decline and physical function, relationship between olfaction and mortality, among others. We also have a host of biomeasures (cytokines, hormone levels, etc.) to use in mechanistics studies.

METHODS
Cross sectional and longitudinal analyses, standard epidemiologic tools

SOFTWARE REQUIRED: STATA (Campus resources, in my lab, Biostats support is part of the team)

CONFERENCES AVAILABLE FOR PARTICIPATION
NSHAP meetings, Demography conferences, ORG lab meeting, Otolaryngology section conferences, national conferences for work output presentation, among others.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Clinical Research, Social Sciences, Community Health

NIH MISSION: Aging, Neurology
PROJECT TITLE
Image Analysis in Chronic Rhinosinusitis

PROJECT DESCRIPTION
Quantifying sinonasal inflammation is critical, but the tools we have to do so are problematic. We have developed a novel method of using software to generate 3D volumetric metrics of sinonasal disease. We plan to develop this technology into an automated system that generates a sinus severity score for use as a biomarker in clinical trials.

SPECIFIC AIMS
Analyze this tool for use in research and clinical application in Otolaryngology

METHODS
Work with our image analysis team to quantify sinonasal inflammation and correlate this parameter with clinically relevant outcome measures and environmental and patient centered risk factors (pollution, allergen, age, etc).

SOFTWARE REQUIRED: Custom software provided

CONFERENCES AVAILABLE FOR PARTICIPATION
Imaging conferences in Radiology, Dedicated training in Neuroradiology, Clinic/OR experience in sinus surgery, patient interaction, and all conferences in Section of OHNS

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences, Clinical Research

PROJECT TITLE
Thirty Million Words Initiative

PROJECT DESCRIPTION
The Thirty Million Words Initiative (TMW) develops and disseminates educational programs that are designed to empowers parents with knowledge and skills to develop their children's intellectual and educational potential using the 3T's: Tune In and respond to what their child is communicating, Talk More and build their child's vocabulary with descriptive language, and Take Turns to engage their child in conversation and foster curiosity and knowledge. TMW takes a public health approach to early childhood education by utilizing existing public health infrastructure in maternity wards, pediatrician's offices, and home visiting
programs to drive innovation and a data-driven approach to the scaling of TMW’s parent/caregiver directed interventions. This allows us to rapidly develop, test, and redesign our 0-5 interventions, implement research, informatics, and technology-based platforms to guide dissemination across cities and communities, and create scalable, cross-sector delivery models for population impact.

**SPECIFIC AIMS**

1) To assess the acceptability and feasibility of the TMW pilot intervention in parents of low SES.
2) To examine whether the TMW intervention leads to increased parental knowledge of the factors important in a child’s language development, specifically the positive role of parental linguistic input and the negative role of excessive television.
3) To examine whether the TMW intervention leads to changes in parental language input, i.e. adult word count (AWC) and conversational turns (CT), and to decreased television watching.
4) To examine whether the TMW intervention leads to changes in child vocalizations and conversational turns.

**METHODS**

**Experimental Condition: Thirty Million Words Project:** Parents who are assigned to TMW will attend eight weekly intervention sessions in their homes. The initial intervention will last approximately ninety-minutes; each of the remaining seven sessions will last approximately forty-five minutes. Intervention sessions will include background/rationale, education/knowledge transfer, role-playing, goal-setting and quantitative feedback. Interventionists will use the five components of the Coaching Method: initiation, observation, action, reflection and evaluation. The initial intervention, which will be standardized via PowerPoint, will center on the relationship of the early language milieu to a child’s development, the critical importance of parental speech in creating that milieu and an explanation of the LENA as a ‘language pedometer.’ The interventionist will discuss the LENA, including outcome measures and each parent’s baseline LENA measures. The parents will understand that all set goals are within the parents’ reach and that TMW will provide them the support, strategies, and linguistic feedback needed to enrich their child’s milieu. Strategies to ‘increase parent talk’ will be discussed, including book sharing and narrating their child’s environment. Two short, culturally-sensitive video clips of ‘real parents’ will demonstrate these strategies. These will be discussed, including the ‘intention’ for behavioral change, goal setting as it relates to AWC and CT, potential barriers to goal achievement and ways to address these barriers. After the first week, sessions will begin with a reprisal of the previous week as it relates to goals set and the LENA results. The current week’s educational focus and strategy for improvement of parental speech will be discussed. A video will be shown to illustrate the strategies discussed after which parents will ‘practice’ the specific strategy. Finally, the interventionist and parent will fill out the goal-setting worksheet and discuss strategies to address potential barriers to completing the upcoming goals. A LENA recorder will be left so that a recording can be performed two to three days post intervention to be processed to the next visit.

**Timeline and Outcome Measures:** Assessment data will be collected eleven times from control and experimental families, three baselines LENA recordings and after each intervention session. Outcome measures include the changes parental knowledge and behaviors, changes in a child’s vocalizations and developmental level and the intervention-related outcomes of acceptability and feasibility.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research, Community Health
SURGERY–PLASTIC AND RECONSTRUCTIVE SURGERY

Surgery–Plastic and Reconstructive Surgery

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PROJECT TITLE
Biomimetic Tissue Engineering of Segmental Craniofacial Defects

PROJECT DESCRIPTION
Craniofacial skeletal defects secondary to trauma (e.g., war or other ballistic injury), tumor, or congenital disease present challenging problems for reconstructive surgeons. One limitation in the repair of these defects lies in the finite supply of autologous tissue (i.e., bone) available. Engineering bone using osteoinductive scaffolds and cells capable of expansion and differentiation is a promising strategy. Two significant challenges exist: 1) in vivo induction of readily available stem cells that are effective towards craniofacial defect healing and 2) designing novel biomaterials that are amenable to such defects and provides a three-dimensional architecture for appropriate defect healing. Multidisciplinary strategies are required that combine materials science, cell biology, and Clinical Research effectively and seamlessly. Our project therefore mandates a multi-institutional approach that involves disciplines from two independent academic institutions, whose strengths are: 1) Molecular biology/animal model studies that have established the potency of BMP-9 in inducing stem cell osteogenesis both in vitro and in vivo (University of Chicago); 2) Biomaterials for tissue engineering applications, specifically novel, citric-acid based nanocomposite scaffolds (Northwestern University).

SPECIFIC AIMS
1) Synthesize and characterize poly (1,8-octanediol citrate)– tricalcium phosphate (POC-TCP) nanocomposites.
2) Assess the biocompatibility of POC-TCP nanocomposite scaffolds and bone forming capacity of human urine-derived stem cells within these scaffolds.
3) Evaluate the regenerative function of cell-laden POC-TCP composites in vivo using established murine craniofacial defect animal models.

METHODS
1) Cell culture and adenoviral infection of stem cells with BMP-2, BMP-9;
2) RT-PCR and alkaline phosphatase assays;
3) Stem cell implantation assay (ectopic bone formation);
4) Murine cranial defect model and mandibular defect model;
5) microCT analysis of new bone formation with 3D software volumetric calculations;
6) Immunohistochemistry.

CONFERENCES AVAILABLE FOR PARTICIPATION
Huggins Conference; Plastic Surgery Research Council.

POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S): Basic Sciences
PROJECT TITLE
Proteomic Craniofacial Suture Database

PROJECT DESCRIPTION
We propose to establish a human proteomic craniofacial suture database that will be a one-of-a-kind repository for such information in the world. The construction of such a database will be beneficial in several aspects: 1) To consolidate protein information on cranial and facial suture development and premature fusion that can be accessed by several worldwide institutions and craniofacial centers for research and potential treatment; 2) To further our knowledge of the critical factors necessary for suture fusion; 3) To develop genetically altered ("knock-out" or "knock-in") animals to help elucidate signaling pathways important for suture patency and suture fusion; 4) To reveal potential therapeutic approaches targeted to conditions of premature suture fusion, poor craniofacial growth (e.g., midface hypoplasia), or excessive craniofacial growth (e.g., hemifacial hyperplasia). Underlying this goal to establish a database is the hypothesis that suture morphology, development and growth can be marked by an identifiable group of activated proteins (phosphoproteins), whose balance determines normal growth at a particular suture/region of the face, and whose imbalance contributes to sutural and facial pathology.

SPECIFIC AIMS
1) To identify established and novel molecular factors that govern suture patency and suture fusion from an osteoclastic perspective.
2) To create a human craniofacial suture database via phosphoproteomic, ubiquitomic and morphometric analysis.
3) To identify molecular markers that may be specific to suture type (cranial vs. facial) and patency status. Such determinations will confirm our hypothesis that discrete, activated proteins (phosphoproteins), determine normal morphology and growth at a particular suture/region of the face, whereas imbalances of such proteins contribute to sutural dysmorphology, abnormal facial growth and facial pathology.

METHODS
Phosphoproteomic Analysis: Phosphorylation of tyrosine residues on various extracellular, transmembrane, and intracellular proteins is a necessary step for cell growth, division, activation, signal transduction, gene expression and translation. Therefore, detection of phosphorylated proteins (phosphoproteins) can provide a "snapshot" of the activated proteins and molecular pathways governing a particular site. Phosphoproteomic analysis will be conducted on human suture samples to determine which key proteins/signal transduction pathways are active in a given suture. The method of Collins et al., refined by Machida and colleagues, will be employed, which takes advantage of metallic ion affinity for phosphoproteins (ion metal affinity chromatography, IMAC). This prefractionation step has been shown to be efficacious and produce high yields of phosphoprotein. Briefly, tissue lysates from processed craniofacial sutures will be purified using Ga(III)-charged Poros MC resin as described. After incubation with the resin, phosphoproteins will be eluted with 0.2M sodium phosphate buffer (pH=8.0) at 60°C for 15 mins. Eluates will be labeled with Cy3 fluorescent probe and enriched phosphoproteins will be further characterized by two-dimensional difference gel electrophoresis (2D-DIGE). Proteins in the labeled 2-D gel spots will be subjected to enzymatic digestion (trypsin, lysylendopeptidase) and resulting peptides will be analyzed by tandem liquid chromatography/mass spectrometry. This strategy will lead to complete phosphoproteomic analysis and identification of key proteins to be registered in the database, and therefore test our hypothesis that proteins are phosphorylated and therefore...
activated, which are critical to sutural morphology, development and growth. Quantitation of corresponding mRNA of the genes identified from our protein analysis will be achieved by RT-PCR analysis.

**Ubiquitomic Analysis:** Ubiquitination is a critical step in maintenance of osteoclastic activation. Specifically, ubiquitinated TRAF-6 is the active form of this positive regulator in the RANK pathway and disconjugation of ub-TRAF-6 by the tumor suppressor and deubiquitinase CYLD leads to osteoclast apoptosis (Kovalenko et al., 2003). To this end, the following approach will be undertaken (Ponts et. Al, 2011). To prevent the degradation of ubiquitinated proteins in the suture samples, harvested tissue will be pre-treated with 400 nM proteasome inhibitor MG132 (EMD Chemicals Inc.) and maintained at -80°C. Ubiquitin moieties will be further protected by supplementing all reagents with 20 mM N-ethylmaleimide (NEM), 2 mM PMSF, and Complete mini EDTA-free protease inhibitor mixture (Roche Applied Science). Extracted proteins will be prepared for immunoprecipitation via clearance by 15 min of centrifugation at 13,000 g and 4 °C and incubation with washed agarose A beads (Invitrogen) for 1 h at 4 °C under constant agitation. After 10 minutes of centrifugation at 13,000g and 4 °C, the supernatant will be incubated with anti-conjugated ubiquitin mouse IgG1 (clone FK2 that does not react with free ubiquitin, Enzo Life Sciences) overnight at 4 °C. In parallel, negative control samples will be left without antibody (beads only). The conjugates and the negative control samples will be then incubated with washed agarose A beads for 2 h at 4 °C. The beads will be collected by 30s of centrifugation at 4000g, washed three times in immunoprecipitation buffer, and eluted with Laemmli buffer. Immunoprecipitates will be analyzed by 12% SDS-PAGE, transferred on PVDF membrane, and incubated with a rabbit antiubiquitin IgG (Millipore) followed by immunodetection with a goat anti-rabbit IgG coupled to horseradish peroxidase (Millipore) and revelation by electroluminescence (Pierce ECL Western blotting substrate). Immunoprecipitates will also be stored for mass spectrometry as described above.

**MicroWestern Array Analysis:** The power of microwestern array (MWA) analysis is the combination of the scalability of reverse-phase lysate array (RPA) with the specificity of western blot analysis for proteomic analysis (Ciaccio et al., 2010). To further dissect the osteoclast proteonome-specific pathways essential for suture homeostasis, tissue samples as processed above will be subject to spotting on a noncontact microarayer (GeSiM Nanoplotter 2.1E), gel printing, horizontal semidry electrophoresis, transferred to nitrocellulose (0.8A for 60 min at 4oC), and blotted using pan-specific and phosphospecific antibodies critical not only to the RANK signaling cascade, but to other activation pathways and proteonomic profile differences identified by mass spectrometry between fused and patent cranial sutures.

**CONFERENCES AVAILABLE FOR PARTICIPATION**
Huggins Conference; Plastic Surgery Research Council.

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Basic Sciences, Clinical Research
**Project Title**
Pediatric Urological Surgery – Factors Determining Unexpected Readmission and Emergency Room Visits in 30 Days Postoperative period

**Project Description**
All ER visits and unexpected admissions within 30 days, following Pediatric urological surgery patients will be reviewed and classified according to disease diagnosis and underlying morbidity. These rates will be compared to national standards from market scan data, and then a pathway care plan will be determined for future planning of the admission.

**Specific Aims**
Compare with national standards and predict the factors determining such events and draw a plan to prevent those.

**Methods**
Review inpatient and outpatient surgery encounters from October 2007 to December 2014 along with any emergency department encounters and readmissions, that occurred after surgery compared to MarketScan data.

**Software Required:** STATA

**Possible Scholarship and Discovery Track(s):** Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

**NIH Mission:** Kidneys
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**IRB/IACUC NUMBER:** TBA

**PROJECT TITLE**
Telemedicine in Pediatric Urology: the Direct and Indirect Expenses of Attending a Pediatric Urology Clinic and Family Attitudes Toward Telemedicine

**PROJECT DESCRIPTION**
We plan to evaluate the cost of attending a pediatric urology clinic in terms of direct and indirect expenses, while also assessing family and patient attitudes towards telemedicine. We hope that by examining patient and family attitudes towards the use of well-established communication technologies in health care, we can help initiate a transition to offering more current and cost-effective mechanisms of healthcare delivery.

**SPECIFIC AIMS**
1) Measure the burden of travel (mode of transport, time, distance, cost including parking cost).
2) Measure extraneous “out of pocket” costs.
3) Measure the amount of missed work/school.
4) Examine attitudes towards telemedicine and technological forms of communication.

**METHODS**
A previously described survey measuring family costs and attitudes towards telemedicine alternatives in patients attending outpatient urology clinics will be distributed to families attending pediatric urology clinic.

**SOFTWARE REQUIRED:** STATA

**POSSIBLE SCHOLARSHIP AND DISCOVERY TRACK(S):** Clinical Research, Healthcare Delivery Sciences (Quality & Safety)

**NIH MISSION:** Kidneys
### Project Title
Needs Analysis to determine best practices for doctor / patient / team communication during awake surgery

### Project Description
Previous Pritzker summer student work has resulted in qualitative analysis of patient and surgeon perceptions of best practices during awake surgery. Patient and Surgeon interviews identified positive and negative aspects of communication during awake surgery. This qualitative work will provide the basis of the current project. We seek to design and implement a survey to validate findings across a broad group of patients undergoing awake surgery. This needs analysis will then be utilized to create a curriculum to teach surgeons and surgical trainees best practices for awake surgery.

### Specific Aims
The goals of the project are to identify best practices to enhance the patient experience and minimize suffering during awake surgery. This information will be used to create a curriculum to teach communication skills for awake surgery to surgeons and surgical trainees.

### Methods
Standard survey development methods will be used, survey will be piloted and then implemented. Standard statistical evaluation of results.

### Software Required
Survey Monkey software available

### Possible Scholarship and Discovery Track(s)
Clinical Research, Medical Education
Prior Projects
1997-2016
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<th>MENTOR</th>
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<tr>
<td>Anitescu, Magdalena</td>
<td>Who Controls Your Pain? Health Locus of Control and Depression in Chronic Pain Patients: A Cross-Sectional Study</td>
<td>Wong, Harry</td>
<td>2013</td>
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<tr>
<td>Barach, Paul</td>
<td>Mortality and Adverse Events in Congenital Heart Disease Patients: A Retrospective Chart Review of a New Clinical Program at the University of Chicago</td>
<td>Galvin, Cynthia</td>
<td>2002</td>
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<tr>
<td>Barach, Paul</td>
<td>Sentinel Events at the University of Chicago Hospitals: Evaluation of Housestaff and Medical Student Attitudes toward Adverse</td>
<td>Vohra, Pam</td>
<td>2002</td>
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<tr>
<td>Bryon, Yvon</td>
<td>The Effects of Clinical MRI scans on the Thermoregulation of Children Under Sedation or General Anesthesia</td>
<td>Tronshaw, Napatia</td>
<td>2004</td>
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<td>Bryon, Yvon</td>
<td>Establishing the Efficacy of CGH-array in the Detection of Aneuploidies and Submicroscopic Imbalances in the Fetal Genome Resulting in Pregnancy Loss</td>
<td>Szafran, Martin</td>
<td>2003</td>
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<td>Cook, Richard</td>
<td>Characterizing the Technical Work Context of ICUs</td>
<td>Kowalsky, Julie</td>
<td>2004</td>
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<td>DeBoisblanc, Bennett</td>
<td>Effect of Airway Pressure Display on Interobserver Variability in the Assessment of Vascular Pressures in Patients with ARDS</td>
<td>Rizvi, Kamran</td>
<td>2002</td>
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<td>Dickerson, David</td>
<td>Characterizing the Postsurgical Pain Experience: A Pilot Study</td>
<td>Chung, Lindsay</td>
<td>2015</td>
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<td>Ellis, John</td>
<td>Does whole-blood platelet aggregometry demonstrate hypercoagulability in morbidly obese patients undergoing gastric bypass surgery?</td>
<td>Lanigan, Megan</td>
<td>2005</td>
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<td>Ellis, John</td>
<td>Facilitating increased perioperative beta blockade using processed electroencephalogram monitoring to titrate anesthetic administration</td>
<td>Thong, Alan</td>
<td>2005</td>
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<td>Ellis, John</td>
<td>Do Perioperative Thrombelastography and Platelet Aggregometer Study Predict Thrombotic Complications in Patients Undergoing Lower Extremity Revascularization?</td>
<td>Tucker, Iris</td>
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<td>Glick, David</td>
<td>Determining Factors that Affect Language Preference in Bilingual Patients Emerging from General Anesthesia</td>
<td>Alaka, Mariam</td>
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<td>Glick, David</td>
<td>The Effect of Time under Anesthesia on Perioperative Memory Formation</td>
<td>Palmer, Katherine</td>
<td>2015</td>
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<td>Glick, David</td>
<td>Perioperative Memory Formation and the Bispectral Index</td>
<td>Blech, Daniel</td>
<td>2014</td>
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<tr>
<td>Glick, David</td>
<td>Relationship of Awake Bispectral Index Score to Perioperative Memory Formation</td>
<td>Wagner, Robin</td>
<td>2013</td>
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<tr>
<td>Glick, David</td>
<td>The Relationship Between Bispectral Index and Memory Formation in the Perioperative Setting</td>
<td>Allain, Michael</td>
<td>2012</td>
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<td>Glick, David</td>
<td>The Incidence of Perioperative Deep Vein Thrombosis of the Lower Extremities</td>
<td>Clinite, Kimberly</td>
<td>2011</td>
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<tr>
<td>Glick, David</td>
<td>Comparison of Sedation Methods for Awake Fiberoptic Intubation</td>
<td>Zheng, Xiwen</td>
<td>2011</td>
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<td>Glick, David</td>
<td>The efficacy of dexmedetomidine as an adjunct sedative during awake fiberoptic intubation</td>
<td>Swaniker, Jasmine</td>
<td>2010</td>
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<td>Glick, David</td>
<td>Reimbursement Rates and Competitive Atmosphere for Medical and Surgical Procedures</td>
<td>Woo, Joyce</td>
<td>2010</td>
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<td>Glick, David</td>
<td>Comparing the Relative Efficacy of Sedation Regimens with and without Dexmedetomidine for Awake Fiberoptic Intubations: a Randomized, Double-Blinded, Prospective Study</td>
<td>Dilly, Laura</td>
<td>2009</td>
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<td>Glick, David</td>
<td>Relationship Between Bispectral Index Score and Recall of Travel to the OR and of Cued Words</td>
<td>Lyons, Patrick</td>
<td>2009</td>
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<tr>
<td>Glick, David</td>
<td>Correlation of Baseline Bispectral Index Score and Medical Comorbidities and Use of Pain Medicines and/or Anti-Epileptic Drugs</td>
<td>King, Michael</td>
<td>2008</td>
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<td>Glick, David</td>
<td>The Effect of a Pre-Induction De-Fasiculating Dose of Muscle Relaxant on the BIS Score</td>
<td>Maertens, Franciska</td>
<td>2008</td>
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<td>Glick, David</td>
<td>Correlation of the Bispectral Index Score With the First Episode of Recall</td>
<td>Wallace, Kaitlyn</td>
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<td>After Surgery in the PACU</td>
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<td>Glick, David</td>
<td>Comparison of Two Drug Regimens for Awake Fiberoptic Intubation: Dexametomidine</td>
<td>Dorsey, Megan</td>
<td>2007</td>
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<td>Glick, David</td>
<td>Determinants of Case Cancellations on the Day of Surgery</td>
<td>Ray, Neil</td>
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<td>Glick, David</td>
<td>Comparison of Mapleson D Circuit to Ambu Bag Ventilation for Induction</td>
<td>Walter, James</td>
<td>2007</td>
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**MACLEAN CENTER FOR CLINICAL MEDICAL ETHICS**

<p>| Orfali, Kristina    | Parents Perceptions of Decision Making in the Neonatal Intensive Care Unit                                                                    | Najim, Claire       | 2000 |
| Orfali, Kristina    | Physician’s Attitudes Towards Decision-Making in NICU’s in France and the U.S.                                                                | Patrianakos, Athena | 2000 |
| Orfali, Kristina    | Patient’s Hospital Experience: A Qualitative Approach                                                                                          | Bhatia, Preeti      | 1999 |
| Ross, Lainie Friedman | Attitudes and Practices of Pediatric Providers Regarding Concussions in Youth Sports                                                       | Fishman, Michael    | 2016 |
| Ross, Lainie Friedman | Public Attitudes and Knowledge about Youth Sports Participation                                                                             | Taranto, Nora       | 2016 |
| Ross, Lainie Friedman | Donors Becoming Recipients                                                                                                                     | Wang, Jackie        | 2014 |
| Ross, Lainie Friedman | Unintended Consequences in Kidney Allocation                                                                                                  | Grubbs, Allison     | 2013 |
| Ross, Lainie Friedman | Survey of Transplant Professionals on Their Use of Pediatric Kidneys                                                                       | Jaffee, Ethan       | 2013 |
| Ross, Lainie Friedman | Decision Making in Liver Transplantation                                                                                                | Mataya, Leslie      | 2013 |
| Ross, Lainie Friedman | Ethical and Policy Considerations of Pre-emptive Kidney and Multi-organ Transplants in a World of Scarce Organs                              | Agunbiade, Abdulkareem | 2012 |</p>
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<tr>
<td>Ross, Lainie Friedman</td>
<td>The Attitudes of Health Care Providers to Stigma in Carriers of Genetic Disorders</td>
<td>Moffett, Alexander</td>
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<td>Ross, Lainie Friedman</td>
<td>Are Illinois Pediatricians Keeping Up With Newborn Screening Expansion?</td>
<td>Stark, Alexander</td>
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<td>Kehler, Jacqueline</td>
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<td>Collecting and Reporting Ethnic and Racial Demographics in Research Published in Pediatric Journals Years July 1999-June 2000</td>
<td>Walsh, Catherine</td>
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<td>Ross, Lainie Friedman</td>
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<td>Weil, Eric</td>
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<td>Kieff, Elizabeth</td>
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### MEDICINE – CARDIOLOGY

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<th>Author</th>
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<td>Alenghat, Francis</td>
<td>CD16+ Monocytes and M1 Macrophages as Markers of Coronary Artery Disease</td>
<td>Arnold, Kathryn</td>
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<td>Archer, Stephen</td>
<td>Induction of HIF1a using Cobalt Chloride Induces Pulmonary Hypertension in vivo</td>
<td>Jain, Sushil</td>
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<td>PGC-1α is Deficient in Pulmonary Hypertension and is Associated with Decreased Anti-Proliferative Mitochondrial Protein Expression</td>
<td>Ericson, Kyle</td>
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<td>Analysis of Atrial Fibrillation Associated Gene Expression in Explanted Human Cardiac Tissue</td>
<td>Dubnow, Mara</td>
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<td>Features of an Exceptionally Narrow QRS Data Set: The Effect of Aging</td>
<td>Pariser, Joseph</td>
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<td>The Anti-thrombotic Effects of Human Platelet Glycoprotein Ib Alpha (GpIbα) Inhibition in a Novel Murine Model</td>
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<td>Tate, Steven</td>
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<td>Gastrointestinal Bleeds and Driveline Infections: Assessing the Major Drivers of Readmissions in LVAD Patients</td>
<td>Haq, Zeeshan</td>
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<td>Nathan, Sandeep</td>
<td>Antiplatelet Response, Interval Variability &amp; Events in Percutaneous Coronary Intervention (ARIVE-PCI) Registry: Incidence, Predictors and Impact of Response Variability to Oral Dual Antiplatelet Therapy, as Measured by Point-of-Care Platelet Aggregometry, Following Percutaneous Coronary Intervention</td>
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<td>A meta-analysis of the efficacy, effectiveness, and safety of novel oral</td>
<td>Liu, Linda</td>
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<td>Quaidoo, Emmanuel</td>
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<td>Shaw, James</td>
<td>Add knowledge to the pathophysiology of acne by attempting to explain the</td>
<td>Patton, Douglas</td>
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<td>differences between acne in women, typically of adult onset, and acne in men,</td>
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<td>Soltani, Keyoumars</td>
<td>Researching the attitudes of dermatologists in the Chicago area with</td>
<td>Lui, Stephen</td>
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<td>Chicago representing a microcosm of the rest of the nation</td>
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<td>Abella, Benjamin</td>
<td>Quality CPR and End-Tidal Carbon Dioxide Levels</td>
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<td>Patient Perceptions of Communication Practices during Emergency Department</td>
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<td>Assessment Oriented vs. Traditional Style Oral Case Presentations in the ED</td>
<td>Hodgson, Brennan</td>
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<td>Factors Influencing Resident Selection of Assessment Oriented vs Traditional</td>
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<td>Azurdia, Adrienne</td>
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<td>Efficiency, effectiveness, preference for use and the effects of interruptions</td>
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<td>Murphy, Adam</td>
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<td>Prabhakar, Nanduri</td>
<td>Effect of Chronic Intermittent Hypoxia (CIH) on Thioredoxin Reductase Antioxidant Enzyme</td>
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<td>The State of Medical Journals’ Social Media Editors: A Qualitative Study</td>
<td>Lopez, Melany</td>
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<td>Vision and Hearing Screening in the Elderly</td>
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**MEDICINE – ENDOCRINOLOGY, DIABETES AND METABOLISM**

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<td>Billings, Laura</td>
<td>Find MODY: Employing Electronic Health Record Technology to Identify Misdiagnosed Cases of Monogenic Diabetes in a Community Hospital Setting</td>
<td>Naik, Amol</td>
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<td>Pittman, Isaiah</td>
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<td>Better Safe Than Sorry”: Parent Perspective on Asthma Management in the School Setting</td>
<td>Dennin, Margaret</td>
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<td>Economic Analysis of an Internet-Based Adolescent Depression Prevention Intervention (CATCH-IT): A Business Case</td>
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<td>The Role of mTOR in the Translation of Preproinsulin as Mediated by elf4E and S6</td>
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<td>Differences By Age, Race, Gender, Educational Level and Socioeconomic Class in Nurse Adherence to CMS Quality of Care Indicators Among AMI and CHF Patients</td>
<td>Caballero, Nadieska</td>
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<td>Understanding the Etiology and Preventability of Upper Gastrointestinal Hemmorhage in Patients Admitted to the Hospital</td>
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**MEDICINE – GERIATRICS**

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<td>Brauner, Daniel</td>
<td>We can Cross That Horse When We Get to It: A Linguistic Analysis of Research Enrollment Conversations with Subjects with Dementia</td>
<td>Merel, Susan</td>
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<td>A Linguistic Tool for Determining Decision Making Capacity in Dementia Research</td>
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<td>Management of Pain in Community-Dwelling Patients with Dementia</td>
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**MEDICINE – HEMATOLOGY/ONCOLOGY**

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<td>Functional study of miR-126 and EGFL-7 in Core Binding Factor Acute Myeloid Leukemia associated with t(8;21)</td>
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<td>Hormonal Risk Factors and Breast Tumor Characteristics in Pre-menopausal African American and Caucasian Women: A Preliminary Analysis</td>
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<td>Building of Thoracic Oncology Database and Innovative Insights with Malignant Pleural Mesothelioma</td>
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<td>Clinical and Molecular Epidemiology of the EML4-ALK Translocation in Non-Small Cell Lung Cancer</td>
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<td>The Role of MLL Chimeric Proteins in Leukemogenesis</td>
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**MEDICINE – HOSPITAL MEDICINE**

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<td>Eye-Identifying Vision Care Needs Among Older Patients: Using the Hospital Setting to Avoid Missed Opportunities for Identifying and Reducing Barriers to Obtaining Vision Care</td>
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**MEDICINE – INFECTIOUS DISEASES**

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**MEDICINE – PULMONARY/Critical Care**

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<td>Sauk, Jenny</td>
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<td>Knutson, Kristen</td>
<td>Psychosocial Factors, Heart Rate Variability, and Obstructive Sleep Apnea: Implications for Cardiovascular Disease Risk</td>
<td>Canas, Alicia</td>
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<td>Knutson, Kristen</td>
<td>Sound and Light: Mediators of Racial Disparities in Sleep</td>
<td>Smith, Cheyenne</td>
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<td>Knutson, Kristen</td>
<td>One Week of Sleep Extension in the Laboratory: Impact on Diabetes Risk</td>
<td>Nosbusch, Laurie</td>
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<td>Knutson, Kristen</td>
<td>Associations Between Sleep, Blood Pressure and Race in a Sample of Full-Time Workers</td>
<td>Cross, Camille</td>
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<td>Sperling, Anne</td>
<td>The Role of ICOS in Initiating the Th2 Response</td>
<td>Ferschl, Marla</td>
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**MEDICINE – RHEUMATOLOGY**

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<th>Alegre, Maria-Luisa</th>
<th>The Interplay between the Gut Microbiota and Alloimmunity</th>
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<td>Alegre, Maria-Luisa</td>
<td>T Cell Receptor - Dependent NF-kB Activation is Required for Th17 Cell Differentiation</td>
<td>Cubre, Alan</td>
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<td>Alegre, Maria-Luisa</td>
<td>The Ras Activation Defect in CD4+/CD25+ Regulatory T cells</td>
<td>Sugihara, Adam Quasr</td>
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<td>Utset, Tammy</td>
<td>The Use of Comparative Genomic Hybridization to Improve the Detection of Chromosomal Abnormalities in Miscarriages</td>
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<td>Schneewind, Olaf</td>
<td>A Variant of LcrV, the Plague Protective Antigen and Needle Cap Protein of Yersinia Pestis, that Blocks Type III Secretion</td>
<td>Mitchell, Anthony</td>
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<td>IsdB NEAT Domains: Staphylococcal Iron Acquisition as a Vaccine Target</td>
<td>McAdow, Molly</td>
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| Munro, Edwin        | Dynamic Interactions among CDC42, PAR-6/PKC-3 and LGL Maintain Epithelial Polarity during Early Drosophila Development                                                                                  | Lee, Samuel                 | 2010  |
| Roizman, Bernard    | Role of a Ubiquitin-mediated Proteolysis Pathway in Herpes Simplex Virus 1 control of host cell cycle progression                                                                                       | Baron, Elinor               | 1999  |
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<p>| Dubreuil, Ron       | Drosophila Melanogaster as a Model System for the Study of Actin-Based Listeria Motility                                                                                                                   | Molden, Jaime               | 1999  |
| McClean, Jason      | Imaging in Vivo Neural activity from Large Populations in the Mouse Motor Cortex                                                                                                                        | Greene, Palmer J.           | 2016  |
| Mason, Peggy        | Pro-Social Behavior Leading to a Habit in Rats                                                                                                                                                         | Levine, Daniel              | 2016  |
| Mason, Peggy        | Mechanisms of Emotional Contagion in Rats                                                                                                                                                              | Barajas, Miguel             | 2015  |</p>
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<td>Palfrey, Clive</td>
<td>Localization of Protein Kinase C Delta in bFGF-Treated PC-12 Cells</td>
<td>Lotan, Roi</td>
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<td>Ragsdale, Clifton</td>
<td>Phox2a Misexpression in the Chick Midbrain</td>
<td>Masson, Christine</td>
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<td>Bernard, Jacqueline</td>
<td>Optical Coherence Tomography as a Biomarker for Alzheimer’s Disease and Parkinson’s Disease</td>
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<td>Measurement of Retinal Degeneration by Optical Coherence Tomography as a Potential Biomarker for Amyotrophic Lateral Sclerosis</td>
<td>Rosen, Darin</td>
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<td>Retinal Nerve Fiber Layer and Macular Thinning in Neuropsychiatric Systemic Lupus Erythematosus</td>
<td>Liu, Gabrielle</td>
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<td>Talmage, Garrick</td>
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<td>Tysabri effects on cognition and neurodegeneration in Multiple Sclerosis</td>
<td>Coppes, Oscar</td>
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<td>Eide, Fernette</td>
<td>The Construction and Testing of a Recombinant Adeno-Associated Virus Expressing the Human Apolipoprotein E Gene</td>
<td>Dau, Birgitt</td>
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<td>Hypothalamic Function in Brain Dead Patients at UCMC</td>
<td>Sanchez, Matthew</td>
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<td>Stork, Rachel</td>
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<td>Application of Organotypic Tissue Culture (OTC) of Fetal Mouse Brain (FMB) to Study Dynamic Causes of Brain Swelling (BS) from Acute Liver Failure (ALF)</td>
<td>Back, Adam</td>
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<td>Berg, Carly</td>
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<td>Synchronized Oscillations within Primary Motor Cortex: How the Brain Wiggles the Tongue</td>
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<td>Examine patterns of EcoG Coherence Recorded from Patients Undergoing Work-Up for Neurosurgery to Correct Intractible Epilepsy</td>
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<td>Chor, Julie</td>
<td>Exploring Women’s Experiences with the Affordable Care Act</td>
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<td>Chor, Julie</td>
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<td>Cohen, David</td>
<td>Comparison of Vitrification and Slow Freeze Methods of Mouse Oocyte Cryopreservation</td>
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<td>Gilliam, Melissa</td>
<td>Youth Initiated Mentorship at S.E.E.D</td>
<td>Bell, Tiffany</td>
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<td>Gilliam, Melissa</td>
<td>We Made The Lights Blink: Exploring Gendered Experiences and Obstacles Among Minority High School Students Interested in STEM</td>
<td>Oladini, Olufunmilola</td>
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<td>Impact of a Theory-Nased Video Intervention on Contraceptive Decision Making Among Postabortal Women in Chicago: A Randomized Controlled Trial</td>
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<td>Predictors of Non-Perfect Oral Contraceptive Adherence Among Students on a College Campus</td>
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<td>Preventing More Than Conception: The Effect of Contraceptives on Pelvic Pain in Healthy Women and Women with Chronic Bladder and Uterine Pain</td>
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<td>Hibbard, Judith</td>
<td>7 year retrospective chart review with the goal of understanding the success or failure of vaginal births after Caesarian sections (VBACS)</td>
<td>Te, Catherine</td>
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<td>Revising Milestones in the Fellowship for Family Planning Using the Delphi Method</td>
<td>Zhang, Cindy</td>
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<td>DeRuiter, Cynthia</td>
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<td>Plunkett, Beth</td>
<td>Exploration of Barriers Facing Physicians in Diagnosing and Treating Obesity</td>
<td>Hite, Ashley</td>
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<td>Frequency of Factors Associated with Unexplained Fetal Demise and Subsequent Pregnancy Outcomes</td>
<td>Wright, Erin</td>
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**PEDIATRICS – CRITICAL CARE**

<p>| Hoehn, Sarah | Parental Trust Scores in the Pediatric Intensive Care Unit | Chen, Minna | 2008 |</p>
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<td>Analyzing Effects of Neonatal Morbidities on Developmental Outcomes of Preterm Infants</td>
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<td>BIM BH3 Peptide Amphiphiles Induce Apoptotic Cell Death in Hematologic Malignancies Bellairs, Joseph</td>
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**PEDIATRICS – INFECTIOUS DISEASE**

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<th>Mentor</th>
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<tr>
<td>Bubeck Wardenburg, Julie</td>
<td>Characterization of the Pediatric Humoral Response to S. aureus</td>
<td>Covington, Morgan</td>
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| Kohrman, Michael | The Effects of Anticonvulsants on Sleep in Children with Epilepsy Willcox, Maureen | 2009               |      |
| Kohrman, Michael | Quantification of Sleep Micro-architecture Using Multiple Tools of Analysis Garza, Veronica | 2008               |      |
| Kohrman, Michael | Behavioral Problems in Pediatric Epilepsy Patients Vanderbilt, Timothy | 2006               |      |
| Kohrman, Michael | Use of Non-linear Time Series Analysis to Assess Sleep-Wake Transition Lankford, Jeremy | 2004               |      |
| Kohrman, Michael | Qualitative Characterization of Sleep Disorders in Children with Headaches Luc, Michael | 2004               |      |
| Kohrman, Michael | Non-linear Systems Analysis of Micro-Sleep State Transitions Orloff, Larissa | 2004               |      |
| Kohrman, Michael | Non-linear Analysis of Polysomnographic Data in Children: Entropy as a Tool to Characterize Sleep Stages Cook, Katie | 2002               |      |
| Kohrman, Michael | Pediatric Sleep Disorders Gupta, Anu | 2002               |      |
| Kohrman, Michael | Pediatric Sleep Disorders and Neurology Reddick, Darian | 2001               |      |
| VanDrongelen, Wim | Neural Network Modeling with Synaptic Plasticity Harris, Dominic | 2011               |      |

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| Onel, Karen | Relationship of Functional Health Literacy, Self-Efficacy and Quality of Life for Patients with Juvenile Idiopathic Arthritis Erlich, Jonathan | 2008               |      |
| Tesher, Melissa | Moving On From Juvenile Arthritis and SLE: Transitions in Pediatric Rheumatology Seidensticker, Brittany | 2012               |      |

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<p>| Baroody, Fuad | Local and Systemic Cytokine Profiles in Children with Obstructive Sleep Apnea and Controls Paro, John | 2007               |      |</p>
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<td>Local and Systemic Cytokine Profiles in Children with Sleep Apnea and Controls</td>
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<td>The Effect of High Molecular Weight Polyethylene Glycol on the Development of Necrotizing Enterocolitis in Rats</td>
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<td>Minimally Invasive Surgery In Children with Solid Neoplasms</td>
<td>Kang, Seong Moon</td>
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<td>The Effect of Antibiotic Use on Modulation of Intestinal Inflammation by Preterm Infant Microbiota</td>
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<td>Wood, L.D.H. &amp; Rubin, David</td>
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<td>Hunter, Scott</td>
<td>Executive Functioning, Frequency of Marijuana Use, and HIV Risk Reduction in Urban Black Men Who Have Sex With Men</td>
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<td>The Effect of Youth Homelessness on Risk Taking Behavior</td>
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<td>Psychiatric Disorders, High Risk Behaviors, and Chronicity of Homelessness in Chicago Youth</td>
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<td>Keenan, Kate</td>
<td>Relations between maternal emotional and physical health and infant outcomes</td>
<td>Sheffield, Rebecca</td>
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<td>Gender Differences in Youth Who Present with Eating Disorders</td>
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**RADIATION & CELLULAR ONCOLOGY**

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<td>Al-Hallaq, Hania</td>
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<td>Feng, Huiting</td>
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<td>Quantitative Analysis of Tumor Signatures in Breast MRI</td>
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**SURGERY – NEUROSURGERY**

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| Awad, Issam         | Correlating Peripheral Leukocyte Rho Kinase Activity with Clinical Manifestation of Cerebral Cavernous Malformations | Gangal, Anupriya     | 2014  |
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| Langerman, Alexander| Waste Reduction in the OR: Surgeon Preoperative Planning                      | Christianson, Laura  | 2014  |
| Langerman, Alexander| Validating Commercial Point-of-View Cameras for Video Recording in the Operating Room | Graves, Steven       | 2014  |</p>
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<td>Langerman, Alexander</td>
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<td>Pinto, Jayant</td>
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<td>Sternal Plating and it’s Effect on Post-Operative Mediastinitis</td>
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<td>Goss, Kathleen</td>
<td>Loss of the APC Tumor Suppressor Alters Breast Cancer Cell Migration and Invasion</td>
<td>Odenwald, Matthew</td>
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<td>Impact of Adenomatous Polyposis Coli (APC) Loss on the Therapeutic Response of Colon and Breast Cancer Cells</td>
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<td>Controlling Epithelial Morphogenesis With Laminins: Polarization Cues From Adhesive Interactions</td>
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<td>Collins, Megan</td>
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<td>Parker, William</td>
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<td>“Factors Affecting Delirium in Older Patients Undergoing Cystectomy: A Pilot Study”</td>
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<td>Post Prostatectomy Incontinence: Variations in the Use of an Artificial Urinary Sphincter</td>
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**Please note that this list is intended to be a cumulative record of the research experience held by our students illustrating the many types of research opportunities offered. Thus, not all mentors or research projects are available this year. Please check active projects listed in the book.**
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“At the University of Chicago, in an atmosphere of interdisciplinary scholarship and discovery, the Pritzker School of Medicine is dedicated to inspiring diverse students of exceptional promise to become leaders and innovators in science and medicine for the betterment of humanity.”