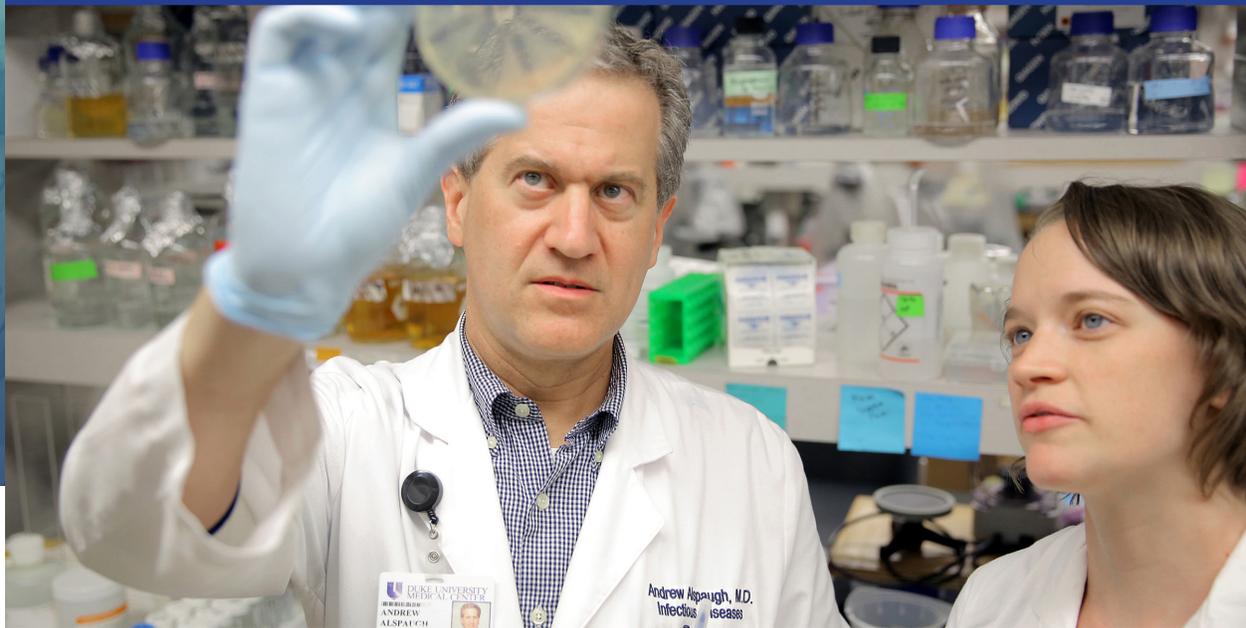


# RESEARCH OPPORTUNITIES FOR MEDICAL STUDENTS



## Research that is stimulating and rewarding

The Department of Medicine at Duke is made up of a diverse group of talented faculty, residents and fellows. We are committed to providing first rate patient care, an innovative educational experience, and biomedical research advances. These efforts take place daily in the Department's 14 divisions, ranging from cardiology, palliative care, microbiology, immunology, and nephrology to clinical research, bioinformatics, and basic science research.

As you plan your scholarly experience, be sure to explore the many options available within the Department of Medicine. We hope you will consider joining us during your Third Year. We want to help you find a research experience that is stimulating, productive, rewarding, and most of all the right fit for you. Department of Medicine faculty members are program directors in 5 different Third Year study programs and are a wonderful source of information regarding potential mentors and research projects.

The Department also facilitates the Academic Medicine Research Series, held 3 times a year in conjunction with the Duke Careers in Internal Medicine Interest Group (CIMI Gro), to explore academic career options and review research literature with faculty in the Department of Medicine. This is a fantastic opportunity to interact with potential mentors and hear more about research projects.

These pages provide a list of potential mentors and the projects they have designed just for medical students, as well as stories from students themselves. Don't hesitate to contact us to learn more. We hope your time in the Department of Medicine will provide the foundation for a rich and rewarding career in academic medicine.

**Matthew A. Sparks, MD**  
Director  
Undergraduate Medical Research

**Saumil Chudgar, MD**  
Director  
Undergraduate Medical Education

# 2017 DoM 3rd year medical student research experiences

## Phillip Tseng – student

The bottleneck of U.S. health care in the 21st century is not in the science or technology of medicine, but in its delivery. Given this reality, and armed with some foundational MBA coursework that I took at Fuqua, I was interested in a research project that would allow me to better characterize the economic challenges of U.S. health care at an organizational level. My project with Dr. Schulman allowed me to dive into the intricacies of the billing process at the Duke PRMO and gave me the opportunity to interview two dozen health system executives at a one-on-one level. The one-year project yielded a manuscript that is, as of October 2017, undergoing a second round of edits with JAMA.

Our project involved studying the revenue cycle (billing) process at Duke, assigning costs to each step of the process, and then analyzing our findings for system inefficiencies. Data procurement involved constant communication with multiple functions at the PRMO, and occasionally with Duke Performance Services. We studied five different types of common patient encounters at Duke, and through a very detailed spreadsheet, were able to trace and model different costs for each type of encounter. We used a specific cost accounting technique called time-driven, activity-based costing, and partnered with accounting expert Robert Kaplan at the Harvard Business School to complete this project. Barak Richman, a Duke Law professor with an interest in health care, served as yet another mentor and collaborator.

Dr. Schulman allowed me complete autonomy to drive this project forward, yet also provided me all the necessary support whenever I needed it. It was a privilege to be involved in such high-impact work!



## Neha Kayastha – student

During my third year, I worked with Dr. Thomas LeBlanc looking at various palliative care issues in cancer patients. I did both qualitative and quantitative work, which made for a year of a lot of learning! When I first met with Tom, he asked for my vision and goals for the year. We structured my research around these goals, and he helped me pick projects where I was able to experience all phases of research, from the brainstorming and development of a project to the data collection to the analysis and reporting of results.

I worked on a few projects. I assessed various quality of life measures in AML patients who receive induction chemotherapy, looking at patient reported outcomes data. I also worked on a project where I interviewed patients with cancer who read their oncology notes on MyChart. This was a project where Tom pitched an idea to me, and he let me run with it. I was able to develop the project design, create the interview guide, conduct the interviews, and qualitatively analyze the interview transcripts. This was my first time doing any kind of qualitative research, and Tom supported me the whole way through. I was also able to dabble in several other projects Tom has been working on, including developing a decision aid for patients with a new diagnosis of AML.

Tom was very flexible with my step 1 study time, and encouraged me to participate in as many extracurricular activities as I wanted to pursue. He met with me weekly and was always available via email for more questions. He struck the perfect balance between supporting me in my work and giving me autonomy to learn the process of research. I had a great third year, and could not have asked for a better mentor!



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## Study programs and selected research faculty

### Cardiovascular Study Program (CVS)

Neil Freedman, MD  
neil.freedman@duke.edu



#### Neil J. Freedman – Cardiology

The Freedman lab focuses on the cell biology of atherosclerosis and vascular inflammation, using a combination of mouse models and primary cell lines derived from mice. Students will engage in mouse atherosclerosis studies including aorta and brachiocephalic artery histology and image analysis, as well as signaling assays in endothelial cells, smooth muscle cells, and macrophages. Current projects include the effects of the dual RhoGEF Kalirin on macrophage cytokine secretion, the regulation of TNF receptor signaling by the deubiquitinase USP20, and molecular mechanisms by which chronic kidney disease exacerbates vascular inflammation.

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#### Matthew Sparks – Nephrology

The Sparks lab is interested in understanding how both the renin angiotensin and prostanoid systems regulate blood pressure by altering blood flow to the kidney. My lab utilizes a combination of physiologic and molecular techniques in genetically modified mice to probe questions about how changes in the micro circulation in the kidney alter sodium excretion. The overarching goal of this research is to identify novel mechanisms to target drug therapy for patients with hypertension. The lab is also exploring how chronic kidney disease modulates pulmonary hypertension. Lastly, we are exploring the mechanism of how activation of the renin angiotensin system promotes diabetic nephropathy.

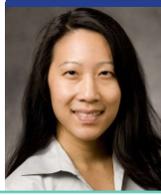
#### Howard Rockman, MD – Cardiology

In the Rockman lab you will dissect mechanisms of biased G protein-coupled receptor signaling in cardiac hypertrophy and failure with a focus on stretch-mediated angiotensin receptor and ligand activated beta-adrenergic receptor structure and function.

# Study programs and selected research faculty *continued*

## Clinical Research Study Program (CRSP)

Vivian Chu, MD  
vivian.chu@duke.edu



**Tom LeBlanc** – Hematologic Malignancies and Cellular Therapy

My program of research investigates the lived experiences of illness of those facing cancer. It aims to yield a better understanding of patients' experiences, and to inform the development of interventions that systematically improve upon them. We use a diverse array of methods to do this, including large retrospective datasets, qualitative interviews, chart reviews, and even more traditional randomized trials.

**James Daubert** – Cardiology

Daubert Clinical EP Research Program: Research opportunities for 3rd year Duke Medical Students include exploring clinical arrhythmias and their treatment in single and multi-center registries and clinical trial databases. Specific entities include Durham Sudden Cardiac Death Registry, His bundle pacing and long QT. Prior 3rd year students have published and/or been recognized with internal Duke awards

## Dual Degree (JD, MPP)

David Edelman, MD  
dedelman@duke.edu



**John Williams** – General Internal Medicine

Medical students working with Dr. Williams will perform systematic reviews with the DVAMC Evidence Synthesis Center. 2016 Topics: Health coaching for chronic disease, non-pharmacological treatments for menopause, and risk-benefits of metformin in DM with CKD.

**Kelli Allen** – General Internal Medicine

Dr. Kelli Allen's research focuses on behavioral and health services interventions for patients with osteoarthritis and other musculoskeletal conditions. Students working with Dr. Allen will have opportunities to participate in various aspects of conducting large pragmatic clinical trials focusing on musculoskeletal conditions, as well as opportunities to utilize data from these trials for secondary analyses leading to manuscript submissions.

## Dual Degree (MBA)

Jennifer Perkins, MD, MBA  
jennifer.perkins@duke.edu



**Peter Ubel** – General Internal Medicine

Dr. Ubel studies how people make decisions about health and healthcare. A general internist, his research draws upon insights and methodologies from behavioral economics, decision psychology, and bioethics. Over the past several years, medical students working with Dr. Ubel have published empirical research papers that have quantified: the influence that physician recommendations exert on patients' treatment decisions; the willingness of people living with HIV to risk death to get a cure; the frequency and content of how patients and doctors discuss healthcare costs during outpatient interactions; the quality of information consumers can obtain on-line about the cost of healthcare interventions; the reasons women with unilateral breast cancer decide to receive a double mastectomy; and the variation in how physicians describe the risks and benefits of robotic surgery to their patients.

**Kevin Shah** – General Internal Medicine

Medical students working with Dr. Shah, Duke Primary Care and the Division of General Internal Medicine are involved in evaluating and implementing ongoing improvement initiatives. In the past year MS3's working with Dr. Shah have worked on evaluating completion rates and wait times of primary care referrals to specialists, implementation of an electronic (E) Consult program in Nephrology, the implementation of a primary care based prostate cancer screening algorithm, and the implementation of a quality improvement framework for high risk diabetics. This work has led to several first author publications and several national presentation and poster acceptances.

**Alex Cho** – General Internal Medicine

The Duke Outpatient Clinic (DOC) is a hospital-based safety net internal medicine primary care practice in north Durham. Its history dates back to the opening of Duke University Hospital in 1930, and it serves as the principal continuity clinic site for the Duke Internal Medicine Residency program. Driven by a tightly-knit, interprofessional culture, the Duke Outpatient Clinic (DOC) offers a range of opportunities to study the intersection of social determinants, population health, and interventions to improve care for a vulnerable adult population. Prior student projects have ranged from quantitative evaluations of care redesign, to mixed-methods analyses of drivers of ED use, to the creation of a student-led "hotspotting" program. Specific project possibilities could include examining drivers of hospital readmissions for DOC patients, the impact of housing status on healthcare utilization, or the evaluation of a second phase of care redesign, among others.

## Study programs and selected research faculty *continued*

### Health Disparities Research - REACH Equity

Kimberly Johnson, MD  
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#### Kim Johnson – Geriatrics

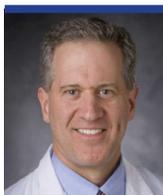
We are testing the hypothesis that implicit bias training for healthcare providers will reduce racial/ethnic disparities in patient-centered care. The project includes patient focus groups to garner a deeper understanding of perceptions of implicit bias in the clinical encounter; provider and health system stakeholder semi-structured interviews to inform refinement of the existing implicit bias training at Duke; and a study of implicit bias training for providers to determine the feasibility of a definitive trial.

#### Laura Svetkey, MD, MHS – Clinical Research

Nutrition and lifestyle research aimed at preventing and treating hypertension and obesity, and at eliminating racial disparities in these conditions.

### Microbiology, Infectious Diseases, and Immunology (MIDIP)

Andrew Alspaugh, MD  
andrew.alspaugh@duke.edu



#### Vance Fowler – Infectious Diseases

Third year medical students in the Fowler Lab utilize a variety of clinical, translational and basic science approaches to pursue projects that address the fundamental question, “Why do patients with the same bacterial infection have different outcomes?” Recent published studies led by 3rd year medical students have evaluated associations between clinical severity of infection in patients to the genetic and phenotypic characteristics of the bacteria that infected them. All of the last five 3rd year medical students in the Fowler lab have produced 1st author peer-reviewed publications.

#### Ephraim Tsalik, Micah McClain, Chris Woods, and Geoff Ginsburg – Infectious Diseases

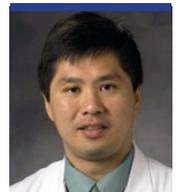
The Duke Center for Applied Genomics & Precision Medicine (CAGPM) houses a number of interdisciplinary research scientists who work collaboratively across a spectrum of diseases, most notably Infectious Diseases. Third year medical students who work in the CAGPM will be exposed to systems biology approaches that address how patients respond to external stressors, specifically infection. We use these approaches to understand how the host responds to different pathogens (e.g., viruses, bacteria, fungi, and parasites). This provides biological insights and can also be used

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to develop new diagnostic tests. Therefore, research in our lab runs the entire spectrum from basic science discovery to clinical trials that evaluate those discoveries. Examples include the use of transcriptomic data to discriminate bacterial, viral, and fungal infection; exploring how the immunocompromised host responds to infection; differentiating infection from rejection among CF transplant patients; and using the host response to predict contagion and disease.

### Molecular Medicine Study Program (MolMed)

David Hsu, MD, PhD  
shiaowen.hsu@duke.edu



#### Diego Bohoquez – Gastroenterology

There is a significant interest in gut-brain signaling. The idea of alleviating behavioral disorders by modulating gut function brings hope to patients who would otherwise have no alternatives. Some patients go as far as ingesting other people’s feces, politely known as fecal matter transplant, to alleviate gut disturbances or brain maladies. Yet, safe and effective therapies will only emerge when the gut-brain signaling mechanisms that control specific behaviors are dissected. The Bohórquez laboratory was built around this premise ([www.gutbrains.com](http://www.gutbrains.com)). Our projects encompass the study of gut-brain neural circuits, from the function of the first synapse in the gut to the encoding of behavior at the brain.

#### Gerry Blobel – Medical Oncology

The Blobel lab focuses on TGF- $\beta$  superfamily signaling with two long-term research objectives: (1) to define mechanisms for the dichotomous tumor suppressor/tumor promoter role of these pathways in human cancers and (2) to establish novel paradigms for signaling co-receptor function in physiology and human disease. As model systems, our laboratory investigates two related TGF- $\beta$  superfamily co-receptors, the type III TGF- $\beta$  receptor, T $\beta$ RIII, and endoglin. The lab’s prior studies have defined T $\beta$ RIII and endoglin as critical mediators/regulators of TGF- $\beta$  superfamily signaling and have further defined a novel role for T $\beta$ RIII as a suppressor of cancer progression in a broad spectrum of human cancers. The long-term goal of these studies is to improve our ability to target co-receptors and their signaling pathways as diagnostic markers and therapeutic targets in human cancers. Recent studies have focused on the role of TGF- $\beta$  superfamily signaling in the tumor microenvironment (TME). An example of a student project would be examining the role of proteins we have already identified in the TME (e.g. fibulin 3,  $\beta$ IHG3, sT $\beta$ RIII) and determining how they regulate TGF- $\beta$  superfamily signaling, the immune system and cancer progression.