

Department of Medicine research opportunities for medical students



HOW TO FIND A MATCH

Find a research lab in the Department of Medicine any of these ways:

- 1. Find a faculty investigator whose lab focus matches your interests.** We've listed some in these pages. Others are in the directory at medicine.duke.edu. Contact the person directly.
- 2. Find a study program area that covers your interests.** Contact the study program director.
- 3. Talk with the director of undergraduate medical research to explore your interests** and opportunities in internal medicine. Contact Dr. Sparks at matthew.sparks@duke.edu

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 (CIMIGro), 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

Study programs and selected research faculty

Cardiovascular

Neil Freedman, MD
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Robert Lefkowitz, MD - Cardiology

The Lefkowitz Lab is interested on understanding the molecular basis for GPCR function. In particular we are studying “biased agonism” the newly appreciated mechanism by which drugs can stimulate receptor signaling through either G proteins or beta arrestins rather than both. This permits the development of more selective drugs with fewer side effects. Several such drugs are now in clinical trials. An example of a student project is to develop antibodies which can be used to probe the receptor conformations that are involved in different functions as a basis for drug development.

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.

Sudha Shenoy, PhD - Cardiology

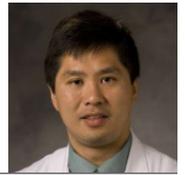
Our research focuses on the regulation of 7-transmembrane receptor (7TMR) trafficking and signaling by deubiquitination. We investigate how the adaptor proteins called beta arrestins partner with specific deubiquitinases to promote 7TMR signaling. The in vivo roles of specific deubiquitinases are being elucidated using transgenic and knockout mouse models developed in the lab.

Steven Crowley, MD - Nephrology

Students will investigate the contribution of an inflammatory mediator to the pathogenesis of hypertension and related end-organ damage by subjecting mice with cell-specific deletion of this mediator or its receptor to a model of hypertension. The student will learn basic immunology related to the pathogenesis of cardiovascular disease, in vivo study design, state-of-the-art methods of intra-arterial blood pressure monitoring, strategies for scoring tissue pathology in injury models, molecular biology including RNA harvest and PCR methods, and flow cytometry approaches for phenotyping the immune cells that instigate damage to the kidney and heart.

Molecular Medicine Program

David Hsu, MD
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Katherine Garman, MD - Gastroenterology

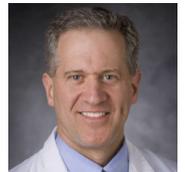
The Garman lab performs translational research on esophageal injury, repair and carcinogenesis. We use human samples from our active GI tissue repository, a robust clinical and pathologic database as well as porcine models or esophageal repair (both in vivo and in vitro). A potential project relates to organotypic culture models of human esophagus to determine the role of specific growth factors in normal and abnormal regeneration.

Brent Hanks, MD, PhD - Medical Oncology

In the Hanks lab MS3 students would work on the Isolation and characterization of immunomodulatory properties of melanoma exosomes and their impact on immunotherapy resistance in a transgenic melanoma model.

Microbiology, Infectious Diseases, and Immunology

Andrew Alspaugh, MD
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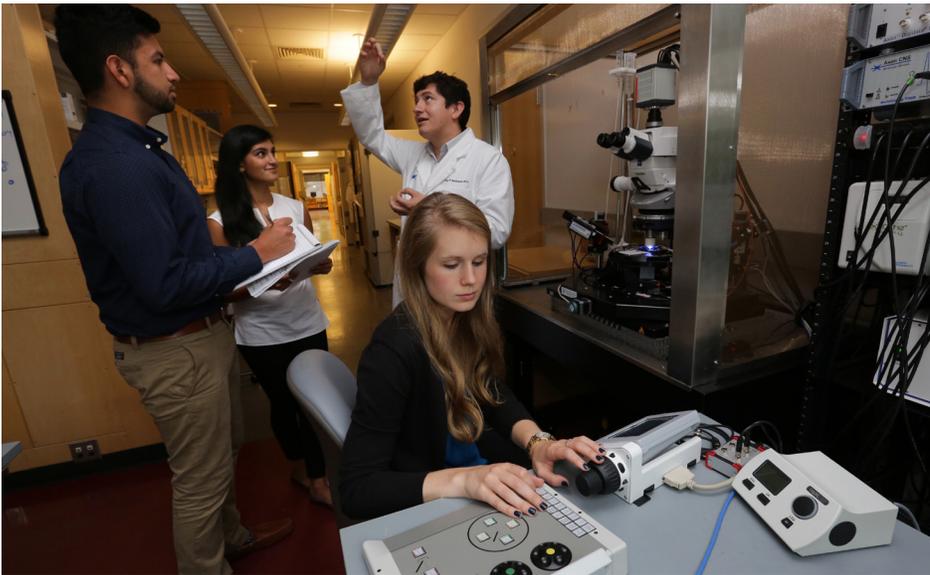


Vance Fowler, MD - Infectious Diseases

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.

Michael Gunn, MD - Cardiology

The Gunn lab has an active MS3 research program that has been very successful in terms of research accomplishments, scholarships obtained, and residency placements. We have a wide variety of potential MS3 projects that include the development and testing of a novel cellular tumor vaccine, the development of recombinant antibodies for use in novel diagnostic assays, and small/large animal testing of novel therapeutics for acute lung injury.



*Diego Bohorquez, PhD, assistant professor of medicine in the Division of Gastroenterology, discusses a lab experiment with N.C. State University students **Mashkurul Haque** (Chemical Engineering) and **Trisha Slehria** (Biochemistry) as Duke medical student **Megan Para** continues her work for the lab, which studies gut-brain neuroscience.*

Reflections from Duke Medical Students

Lowell Nicholson

Mentor: Michael Gunn, MD

I am helping to develop a novel monocyte-based tumor immunotherapeutic. Our lab has previously shown that antigen-loaded monocyte injection leads to a robust expansion of antigen-specific CD8+ T cells and a significant antitumor response in mouse models. In our preliminary experiments, OVA protein was used as a model antigen, but vaccination with an endogenous tumor antigen had never been evaluated.

My project entails: (1) determining the optimum method of monocyte antigen loading, (2) exploring the mechanism of antigen presentation, and (3) determining if vaccination with monocytes loaded with the tumor antigen IDH1 can reduce tumor size and improve survival in mice with glioma.

I have had a wonderful time in the Gunn Lab thus far and have elected to stay on for an additional year. I have learned a wide variety of laboratory techniques applicable to both immunology and cancer biology, and learned a great deal about experimental design, data analysis, and scientific writing. Dr. Gunn is always available for questions, and he was very flexible in allowing for Step 1 study time and weekly continuity clinic.

Denise Pong

Mentor: David Edelman, MD

I was interested in conducting research in behavioral interventions in chronic disease and was connected with Dr. Edelman, who conducts health systems intervention research to improve outcomes in diabetes and hypertension.

My project was a secondary analysis of two of his randomized controlled trials for patients with comorbid diabetes and hypertension: 1) evaluating the impact of group visits on quality of life and b) exploring the role of stage-of-change theory in predicting response to a nurse-delivered telephone intervention.

During my 3rd year, I was able to build my quantitative data analysis skills, gain more experience in scientific writing, and learn about the design, implementation and analysis of behavioral intervention research.

Dr. Edelman allowed me to take the project in the direction I was interested in and encouraged independent work but was always available for routine check-ins and/or troubleshooting. I had a great experience and felt Dr. Edelman was a great mentor who provided a wealth of advice on research, career, and life.

William Yang

Mentor: Ephraim Tsalik, MD, PhD

I spent the majority of my time on a project helping to characterize the host transcriptional response to Enterotoxigenic E. coli (ETEC) infection in humans. While the data collection had been completed prior to when I joined the project, it had yet to be analyzed. The Infectious Diseases Genomics group had previously identified a bacterial vs. viral gene expression signature in subjects with acute respiratory symptoms, and so we took a similar approach with ETEC. Our analysis offered novel insight into changes in host biology that occurred with ETEC infection, and it also identified a set of genes that implied an innate resilience to developing symptoms with ETEC infection, with implications for developing novel diagnostics and therapeutics.

I thoroughly enjoyed working with Dr. Tsalik and the entire ID Genomics team. I learned a great deal about the research process in addition to content specific to the field in which our group works. I had the opportunity to produce a first author paper which is currently under review.

Even though Dr. Tsalik had not previously worked with 3rd-year medical students, he was an enthusiastic and wonderful mentor, and very accessible both. He was also very flexible in allowing me to be self-directed.

John Perfect, MD - Infectious Diseases

In Dr Perfect's lab there is the ability to be immersed in projects on mycology. Primarily, this will be with molecular pathogenesis, epidemiology, bioinformatics, experimental pathology and/or therapeutics. In most projects this will be wet lab experience, but there is the ability for clinical research projects. The primary model organism for study is *Cryptococcus* but other fungal pathogens may be studied. The lab includes several levels of expertise including undergraduates, graduate students, post-docs and senior research scientists which have significant capacity and skill to teach and help mentor. The goal would be a completed manuscript from this year of experience.

Clinical Research

David Edelman, MD
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John Williams, MD - 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.



John Perfect, MD, professor of medicine and chief of the Division of Infectious Diseases, reviews experiment results with his lab members.

Clinical Research and MBA dual degree

Vivian Chu, MD
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Megan Clowse, MD - Rheumatology & Immunology

The Duke Autoimmunity in Pregnancy Clinic sees women with a variety of rheumatologic disease who are, or who want to be, pregnant. A registry based in this clinic includes over 325 pregnancies collected since 2007. Medical students can develop and participate in a range of studies based in this clinic and registry, including analysis of previously collected data, translational studies of stored blood samples, or generation of new survey-based data from patients in clinic. Medical students would attend the clinic each week and have the opportunity to see the impact of their research on the women themselves.

Anna Mae Diehl, MD - Gastroenterology

Our lab investigates how the liver recovers from damage. This is important for improving approaches to diagnose, prevent, and treat liver cirrhosis because cirrhosis results when liver repair is defective. We have several projects that are determining how pathways that regulate stem cells respond to adult liver damage in order to orchestrate repair. Typically, these studies involve analysis of human liver biopsy samples, liver samples from mouse models, and cell culture studies. We welcome help with any (and all) of this work and can tailor projects to meet a student's level of expertise.

Greg Gray, MD - Infectious Diseases

Prof. Gray has opportunities for medical students to help in conducting epidemiological research studies of emerging infectious diseases in China, Mongolia, Romania, and Romania. See short video clip at: <https://youtu.be/WNpuipGzwlo>