

Potential trainee research projects

This list contains just a sample of potential short-medium term pediatric research projects. The list is not comprehensive. Visit <https://www.pedsresearch.org/people/faculty/> to learn about more pediatric faculty interests
 Trainees may contact faculty directly to inquire about any specific projects on this list.

Clinical Research Projects

| Faculty Researcher | Research Discipline | More Information |
|----------------------|--|---|
| Evan Anderson, MD | Infectious Disease | We have ongoing clinical trials in vaccinology and the epidemiology of vaccine preventable diseases. A trainee/student could be involved with a subset analysis of existing datasets that we have about infectious diseases. We also are actively enrolling into a study of older adults and pregnant women in which we are determining the burden of acute respiratory tract infection due to RSV, influenza, and COVID-19. The medical student could be involved with approaching and enrolling subjects and data analysis of a substudy. |
| Jinbing Bai, PhD, RN | Nursing | Trainees can help with patients consents, data collection, and manuscript preparation and other collaborations Dr. Bai's major research interest is cancer treatment toxicities, gut microbiome and the microbiome-gut-brain axis in children. He has several ongoing projects and welcomes trainees to join. His two child-health focused projects are: --Exploring the microbiome-gut-brain axis in psychoneurological symptoms in children with solid tumors (NIH K99/R00 through 7/31/2023) --Gut Microbiome, Obesity/Adiposity and Quality of Life in Survivors of Childhood Brain Tumors (Woodruff Scholar Early Independence Award - through 7/30/2021) |
| Nitya Bakshi, MD | Cancer/Blood Disorders | Sickle Cell disease, chronic SCD pain and outcomes, using databases for research. It could also include a qualitative research project if interested. Data collection, analysis, writing of manuscript. Opportunities include being primary author on the manuscript. Additionally, if students would like to do so- there is potential for being involved in other research projects in the group based on student interest. |
| Laura Blackwell, PhD | Critical Care Neurology including autism Neuropsychology | Our lab focuses primarily on diagnostic biomarker discovery within the spectrum of traumatic brain injury (mild to severe) as well as the role in biomarkers in predicting functional outcomes in children. We have several ongoing research projects that the student could be involved in, including enrollment, data collection, entry, and analysis. We would expect a poster presentation and manuscript at the end of the time period. (With Dr. Andrew Reisner) |
| Tobey MacDonald, MD | Cancer/Blood Disorders | Clinical/translational research of patient outcomes after treatment for childhood brain cancer Perform clinical research in pediatric brain tumor population using questionnaires and/or clinical data to link genetic testing and/or clinical data obtained from medical record to outcomes (e.g. neurocognitive, survival, response to treatment and treatment-related toxicity) |
| Tamara Miller, MD | Cancer/Blood Disorders | My research focuses on understanding adverse events of pediatric cancer therapy and improving the current system of adverse event reporting on oncology clinical trials. My goals are 1) to improve the current system of adverse event reporting in order to enhance how clinical trials are performed, and 2) to perform research in supportive care that will improve daily clinical care of and guidance for children with cancer. My primary research aims to develop a novel approach to adverse event ascertainment that will be more accurate and efficient than the current system used on cooperative oncology group clinical trials. This new approach uses electronic medical record data to capture adverse events of therapy. I have developed a method that successfully and accurately identifies laboratory-based AEs, and am currently using electronic medical record data to ascertain complex adverse events. The results of this work provide clinicians with a more accurate understanding of adverse events during chemotherapy that can be used to guide clinical decisions and discussions with patients and families and can be used as baseline comparisons during testing of novel experimental agents. Using these data and other datasets identified through chart abstraction, we are answering clinical questions in pediatric oncology. A trainee/student will be involved in performing chart abstraction to identify the type of the development of side effects, such as hyperglycemia, infections, and thrombosis, and impact on treatment choices and outcome. The student will also expand the cohort of leukemia patients that will be used for the analyses. The student will be involved in analyzing the data in the cohort to answer these clinically relevant in pediatric oncology. |

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| Sampath Prahalad, MD | Rheumatology | <p>Investigation of joint acoustic emissions as digital biomarkers of enthesitis and juvenile idiopathic arthritis. Juvenile idiopathic arthritis (JIA) is the most common chronic arthritis of childhood and causes substantial morbidity. JIA is characterized by inflammation of synovial joints, most common among them being the knee. The diagnosis and long-term monitoring of JIA is primarily clinical. Imaging modalities play a limited role in long term monitoring of JIA. Radiographs are not sensitive. Although MRI imaging is superior, the time and expense of MRI, as well as the need for intravenous contrast and sedation in some cases limits the utility. In collaboration with Dr. Omer Inan from the Georgia Institute of Technology, we are interested in using joint sounds (Joint acoustic emissions) as digital biomarkers of joint health in JIA. We have already demonstrated that joint acoustic emissions can differentiate an active knee with JIA from a healthy joint, as well as differentiate pre and post treatment joints. As part of the discovery project for 2022, we are looking for students interested in recording joint sounds from children with JIA. We are also interested in using sound to interrogate the characteristics of entheses (tendon/ligament attachments) in children with enthesitis and those without. This will involve interactions with children with JIA in our pediatric rheumatology clinics at the Center for Advanced Pediatrics. As the largest pediatric rheumatology program in the Southeast, we follow a large cohort of children with JIA. In addition to getting trained in recording joint sounds, discovery students will have opportunities to observe the informed consenting process, shadow preceptor to understand the phenotypes of the diseases they are studying and attend rheumatology grand rounds, research meetings and journal clubs. All six previous discovery students who rotated through our program were encouraged to submit a medical student research award application to the American College of Rheumatology which supports travel to the annual meeting. All of them have been successful. Three of the students have had first author publications in peer reviewed journals and one other manuscript is in progress.</p> |

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Outcomes Research Projects

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| Matt Oster, MD, MPH | Cardiology | Pediatric cardiologist at Children's Healthcare of Atlanta as well as a medical officer at the CDC's National Center on Birth Defects and Developmental Disabilities. When not seeing patients, I direct outcomes research activities using big data in a variety of domains among children and young adults with heart disease, including newborn screening using pulse oximetry, neurocognitive outcomes, long-term outcomes / quality of life across the lifespan, and heart disease associated with COVID-19, MIS-C, or COVID-19 vaccines. |

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Basic Science and Translational Research Projects

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| David Archer, PhD | Cancer/Blood Disorders | Research interests are focused on the pathogenesis of sickle cell disease in respect to the generation, prevention and treatment of organ dysfunction. Our studies on the pathogenesis of sickle cell nephropathy are likely to examine the role of endothelial cells in the generation of both the proteinuria and the concentrating defects associated with renal dysfunction. In particular my lab employs hematopoietic stem cell transplantation to correct the hematological defect in murine models of sickle cell disease. We have considerable experience in the maintenance of sickle mouse colonies, transplantation, hematological and functional analysis of the outcomes. In our collaborative projects, these skills will enable us to generate the sickle phenotype in the models of oxidant stress included in this project and therefore allow us to investigate the role of various oxidant response genes in the pathogenesis of sickle |
| Ann Chahroudi, MD, PhD | Infectious Disease | HIV Cure Project--Role: sample processing, data acquisition and analysis Deliverables: co-authorship on a manuscript. Studies of SIV persistence in infant rhesus macaques. |
| Satheesh Chonat, MD | Cancer/Blood Disorders | Chonat lab has several ongoing basic science, clinical and translational projects related to sickle cell disease, hemolytic anemias, complement disorders and thrombotic microangiopathies. See the link for additional details. https://www.pedsresearch.org/research-group/chonat-laboratory . The student is welcome to discuss their interest and find the most suitable project based on their interests and timelines. Dr. Chonat currently mentors several trainees (medical student, resident, fellow and nurse practitioner) in their basic and clinical projects, including a national mentored award project through American Society of Hematology. |
| Erik Dreaden, PhD | Cancer/Blood Disorders Cardiac/Cardiology Rheumatology | Chemical modification of recombinant proteins. Immune cell culture and immunophenotyping. Flow cytometry. Engineered Cytokines for CAR T-Cell Manufacturing |
| Erik Dreaden, PhD | Cancer/Blood Disorders Cardiac/Cardiology Rheumatology | Optical Control of Immune Cell Chemotaxis Chemical modification of chemokine proteins. In vitro immune cell chemotaxis assays. Protein characterization. Live cell microscopy. Flow cytometry. |
| Grace Gombolay, MD | Neurology | Evaluating inflammation in refractory epilepsy, including efficacy of the ketogenic diet. |
| Grace Gombolay, MD | Neurology including Autism | The clinical course and risk factors for relapses in pediatric neuroimmunological diseases are often unknown. This project would examine those features in any of the neuroimmunological diseases including multiple sclerosis, optic neuritis, anti-MOG antibody demyelinating diseases and anti-NMDA receptor autoimmune encephalitis. |
| Steven Goudy, MD | Surgery | Identifying regenerative approaches to improving oral cavity wound repair in a cleft palate model The discovery student will be able to identify critical regulators of the oral cavity wound healing pathway and test regenerative strategies to repair the oral cavity. |
| Steven Goudy, MD | Surgery | Develop immunoregenerative strategy to improve oral cavity wound healing in a cleft palate model. Determine the role and requirement of macrophages, neutrophils and T cells during oral cavity wound healing and helping identify drugable targets. |
| Steven Goudy, MD | Surgery | Develop bone regenerative strategies to repair bone loss in children. Perform surgical repair of bone loss with delivery of bone inductive agents and identify down stream targets. |
| Andrew L. Hong, MD | Hematology/Oncology | Research is focused on high risk solid tumors (e.g. kidney cancers, soft tissue sarcomas and brain tumors). These cancers represent the areas of greatest need in Pediatric Oncology. His work uses functional genomic techniques (e.g. RNAi, CRISPR-Cas9) and the latest sequencing technologies (e.g. long range phased sequencing, scRNAseq, ATACseq) to identify new therapeutics and mechanisms in pediatric cancers. |

| Basic Science and Translational Research Projects | | |
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| Andrew L. Hong, MD | Hematology/Oncology | Diversity, Equity and Inclusion related efforts. Specifically, we wish to understand if there are unexpected disparities in the care of our children with brain or solid tumors at Aflac over the past decade of electronic medical records. |
| David Ku, MD, PhD | Cardiac/Cardiology | Determine the potential for heart attack and stroke by testing patient blood in a microfluidic system. Guides anti-platelet therapy. IRB approved. Plan to start study at Grady in the next few months. Collect patient blood samples. Test blood using microfluidics. Analyze for statistical significance. |
| | Surgery | |
| Tobey MacDonald, MD | Cancer/Blood Disorders | Preclinical testing of novel anti-cancer drugs against brain cancer and cancer metastasis Perform standard assays of drug testing for efficacy against pediatric brain tumors with goal of development of drug to clinical trial |
| Tobey MacDonald, MD | Cancer/Blood Disorders | Link genomic/proteomic/metabolomic biomarkers to regulation of metastasis of childhood brain tumors Collaborate with investigators at Emory and/or GA Tech to profile patient-derived tumor specimens from pediatric brain tumors with respect to genomic/proteomic and metabolic markers associated with metastasis |
| Greg Melikian, PhD | Infectious Disease | "Studies of SARS-CoV-2 entry pathways into cells" Learn relevant cell biology and virology techniques, perform experiments and analyze data. |
| Greg Melikian, PhD | Infectious Disease | Control of antiviral activity of interferon-induced transmembrane proteins Learn cell biology, virology and biochemistry techniques, perform experiments and analyze data. |
| Greg Melikian, PhD | Infectious Disease | Testing and validation of Ebola virus entry inhibitors using a pseudovirus system Learn relevant techniques, perform experiments and analyze data. |
| CK Qu, PhD | Cancer/Blood Disorders | Anti-tumor immunity in Noonan syndrome. Addressing this knowledge gap will lead to a better understanding of the mechanisms underlying the malignant progression in Noonan syndrome, which may ultimately benefit the rational design of a more effective therapeutic strategy for the malignancies developed in Noonan syndrome. The student will examine developmental and functional changes in the mouse model of Noonan syndrome and potentially patient specimens. |
| Eric Sorscher, MD | Cancer/Blood Disorders/Cystic Fibrosis | Identifying genes that mediate escape of malignant tumor cells from chemotherapy. Studies of genes responsible for healthy aging. A review of literature concerning genes that mediate stress response in cancer cells, and experiments to determine significance of these pathways in growing tumors and healthy aging. The project will include opportunities to learn standard molecular techniques (tumor cell culture, evaluation of mRNA levels, Western blot analysis; development of high throughput drug screening is also possible) -- with a goal to better understand tumorigenesis and its relationship to cellular senescence. |
| Eric Sorscher, MD | Cancer/Blood Disorders/Cystic Fibrosis | Study effectiveness of common therapies given to patients with cystic fibrosis, COVID-19, or other illnesses. We will mine the "All of Us" or similar databases to perform in silico experiments. Our studies will be directed towards determining whether FDA-approved drugs influence clinical outcomes for "off-label" or experimental indications. We expect to work closely with colleagues in bioinformatics. |
| Dan Wechsler, MD, PhD | Cancer/Blood Disorders | Our lab is investigating the role of the CRM1 nuclear export protein in infant and childhood leukemias. We use state-of-the-art cell and molecular biology techniques to study protein-protein interactions and the role of different genes/proteins in leukemogenesis. The student will work on one of the subprojects that identify and characterize candidate proteins that interact with CRM1 and proleukemic HOXA genes, using mouse and human cell lines. |
| Bill Wuest, PhD | Infectious Disease | We utilize organic chemistry to make new antibiotics with unique modes of action. Student would synthesize compounds and perform antibiotic assays. |