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<td>Novel Mechanisms of Antibiotic Tolerance in Cystic Fibrosis Lung Infections</td>
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<td>Birth equity across Asian Americans, Native Hawaiians, and Pacific Islanders</td>
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<td>Dr Thomas Robinson</td>
<td>Wise Social Psychological Interventions to Improve Outcomes of Behavioral Weight Control in Children with Obesity</td>
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<td>Dr Thomas Robinson</td>
<td>Discovering Adolescents' Smartphone Food Environments</td>
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<td>Dr Michael Rosen</td>
<td>Epithelial Dysfunction in Pediatric Ulcerative Colitis</td>
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<td>Dr Vittorio Sebastiano</td>
<td>Dissecting the role of TBX1 during pharyngeal apparatus development</td>
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<td>Dr Laura Simons</td>
<td>Signature for Pain Recovery In Teens and Journey in Pain Care</td>
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<td><strong>Dr David Stevenson</strong></td>
<td>Predicting Preterm Birth using AI and Machine Learning approaches</td>
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<td><strong>Dr Sean Wu</strong></td>
<td>Donor-derived cell free DNA in heart transplant rejection</td>
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<td><strong>Dr Jiangbin Ye</strong></td>
<td>Targeting the pediatric cancer epigenome with metabolic therapy</td>
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<td>Email:</td>
<td><a href="mailto:jannes@stanford.edu">jannes@stanford.edu</a></td>
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<tr>
<td>Keywords:</td>
<td>drug discovery, cancer biology, therapeutic screening</td>
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**Project Description:**
Pheochromocytomas and paragangliomas are rare neuroendocrine tumors. In ~35% of affected individuals, tumors are a result of an inherited gene mutation that causes a tumor syndrome. Among the different genetic causes, inherited mutations in the SDHB gene are considered to be the most concerning because it is associated with metastatic disease in up to 50% of affected individuals. Currently, there is no effective treatment for metastatic SDHB-deficient disease. The goal of this project is identify effective treatments for this rare but lethal condition.

To discover a novel treatment, we have generated SDHB-deficient cell lines and mice to model this condition. The Summer Student will learn how to perform cell culture, chemical screening and hit validation. Additionally, they will perform experiments to identify synergistic compound treatments. A successful outcome would be the identification of a promising therapeutic strategy for treating SDHB-deficient tumors. These compounds will be tested in our mouse model and, serve as the starting point for uncovering an effective treatment for this cancer.

**Additional Information:**
http://med.stanford.edu/annes-lab.html
### DRIVE Faculty Mentor Project List

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<td>Dr. Paul Bollyky</td>
<td><strong>Novel Mechanisms of Antibiotic Tolerance in Cystic Fibrosis Lung Infections</strong></td>
<td>microbiology, biophysics, bioengineering</td>
</tr>
</tbody>
</table>

**Email: pollyky@stanford.edu**

**Project Description:**

Multi-drugs resistant (MDR) P. aeruginosa (Pa) infections are a scourge on patients with cystic fibrosis (CF), an autosomal recessive genetic disease caused by mutations in the CFTR gene. These mutations compromise CFTR function leading to thick, tenacious airway secretions. This facilitates the attachment and growth of a variety of respiratory pathogens, including Pa. Managing these infections (which are rarely cleared after being fully established) typically requires long-term use of one or more inhaled antibiotics like tobramycin.

Pa is problematic in part because of antibiotic tolerance (the ability to persist in the face of antibiotics). Pa forms robust biofilms, bacterial aggregates enclosed in a matrix of exopolysaccharides (EPS), nucleic acids and proteins, that protect Pa from antibiotics. Over time, this leads to antibiotic resistance (the ability to grow despite the presence of therapeutic levels of antibiotics) Hence, there is an urgent need to develop novel therapies and therapeutic targets against antibiotic tolerance in Pa infections.

Our lab previously discovered novel roles for filamentous bacteriophages in Pa biofilm formation. We reported that Pf phages assemble biofilm polymers into liquid crystals. This crystalline architecture enhances biofilm function by increasing mucus viscosity and bacterial colonization and reducing penetration of inhaled antibiotics, thereby contributing to antibiotic tolerance. We also reported that Pf phages are associated with crystalline sputum, more extensive antibiotic resistance and worse clinical outcomes in CF patients. However, the mechanisms underlying Pf phage mediated antibiotic sequestration remain poorly understood.

We propose to elucidate how Pf phages contribute to antibiotic tolerance. I hypothesize that Pf phages promote antibiotic tolerance through charge and size-based effects on antibiotic diffusion and that over time this leads to antibiotic resistance in CF patients.

**Additional Information:**

www.bollykylab.com
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<tr>
<td>Dr. Valerie Chock</td>
<td><strong>Tissue oxygenation in the newborn at risk for brain injury</strong></td>
</tr>
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</table>

*Email:* vchock@stanford.edu

**Keywords:** neonate, brain injury, neuromonitoring

**Project Description:**
Monitoring of brain oxygen levels in a newborn provides important information about critically ill babies in the neonatal intensive care unit. The NeuroNICU at Stanford coordinates non-invasive monitoring of brain and somatic tissue with a goal of utilizing this information to improve neurodevelopmental outcomes in babies. We have several ongoing projects in the area of neuromonitoring including assessment of babies after birth asphyxia undergoing therapeutic hypothermia, babies with congenital heart disease, and premature infants.

Analyzing the brain and somatic tissue oxygen levels in these critically ill babies along with risk factors and outcomes from their medical records will help with development of care guidelines. Learning objectives and skill/training from this project include:
1. Develop knowledge of tissue oxygenation monitoring and its use in the newborn
2. Understand acquisition of data from the medical record
3. Develop database management skills
4. Develop data processing and validation skills
5. Develop basic statistical summary skills
6. Project presentation and written summarization of data with potential for inclusion as an author in a scientific manuscript.

**Additional Information:**
https://profiles.stanford.edu/intranet/valerie-chock
https://neonatology.stanford.edu/Clinical-Care/NeuroNICU.html
**DRIVE Faculty Mentor Project List**

**Faculty Mentor:**
Dr. Heike Daldrup-Link

**Email:** heiked@stanford.edu

**Project Title:**
Imaging Senescent Cells in Arthritic Joints

**Keywords:** radiotracer imaging, molecular imaging, radiology

**Project Description:**
Senescent cells play a key role in the pathogenesis of major musculoskeletal diseases, such as chronic inflammatory joint disorders and rheumatoid arthritis (RA). Cellular senescence in articular joints represents a response of local cells to persistent stress that leads to cell-cycle arrest and enhanced production of inflammatory cytokines, which in turn perpetuates joint damage and leads to significant morbidities of afflicted patients. It has been recently discovered that clearance of senescent cells by novel “senolytic” therapies can attenuate the chronic inflammatory microenvironment of RA, and thereby, prevent further disease progression and support healing processes. In order to identify patients who might benefit from these new senolytic therapies and to monitor therapy response, there is a significant unmet need in identifying and mapping of senescent cells in articular joints and related musculoskeletal tissues. To fill this gap, we are developing a new imaging biomarker that will significantly improve our capabilities to identify and characterize senescent cells in human musculoskeletal tissues. In the initial phase of our project, we will demonstrate proof-of-principle of this new imaging technology in a mouse model of RA. In the subsequent translational phase, we will scale, optimize and validate the new imaging technique for mapping human tissues, first in human joint specimen and second in a first-in-human phase I clinical trial.

**Additional Information:**
https://daldrup-link-lab.stanford.edu/
https://profiles.stanford.edu/heike-daldrup-link
http://monasteria-press.com/
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<td><strong>Use of system dynamics to improve low-dose aspirin uptake and adherence among women in California at high risk for preeclampsia and preterm birth</strong></td>
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</tbody>
</table>

**Email:** gdarmsta@stanford.edu

**Keywords:** Maternal health, public health, community

**Project Description:**

Preeclampsia is characterized by hypertension and systemic inflammation arising after 20 weeks of gestation, and is a leading cause of maternal mortality, morbidity, and preterm birth, accounting for 8% of maternal deaths in the USA. In California, the prevalence of preeclampsia has increased in recent years, particularly among non-Latina Black, non-Latina Pacific Islander, and Latina U.S. born women. Low-dose aspirin taken during pregnancy is effective in preventing pre-eclampsia and is recommended by the American College of Obstetrics and Gynecology, but use appears to be low, particularly among high-risk women. We are working with the California Maternal Quality Care Collaborative to improve low-dose aspirin uptake and adherence among women at high risk for preeclampsia, using system dynamics. Our research involves literature review to identify healthcare provider, patient, system and community-level factors which influence women’s decisions to take aspirin, leading to a causal map and simulation model to gain insights into interventions which will most effectively improve aspirin use. We will improve the simulation model this summer through a participatory modeling approach called Group Model Building (GMB) to further understand factors that influence the decision of women at high risk of preeclampsia to take aspirin. GMB facilitates the inclusion of diverse knowledge and perspectives (e.g., patients, community groups, healthcare providers). We hypothesize that system dynamics methods will increase program effectiveness in preventing preeclampsia and preterm birth among high-risk women in California. The DRIVE student will assist with and develop skills in literature review, GMB sessions, development of intervention strategy, and manuscript preparation.

**Additional Information:**

My Stanford CAP profile provides information on my background and areas of research focus: https://profiles.stanford.edu/gary-darmstadt

The diversity of research that I conduct and publish on can be seen at PubMed: https://pubmed.ncbi.nlm.nih.gov/?term=darmstadt+g&sort=date
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<tr>
<td>Dr. Elizabeth Egan</td>
<td><strong>Host-pathogen interactions in malaria</strong></td>
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**Email: esegan@gmail.com**

**Keywords:** malaria, stem cells, genetics

**Project Description:**
Malaria is one of the leading causes of childhood morbidity and mortality in the world. The disease is caused by eukaryotic parasites from the genus Plasmodium, with Plasmodium falciparum causing most cases of severe disease. P. falciparum exclusively infects red blood cells during the blood stage of its life cycle. Population genetic and experimental studies have shown that this parasite depends on host red cell blood factors for its biology and pathogenesis. The importance of these host-pathogen interactions raises the possibility that critical red cell factors could serve as targets for new, host-directed therapeutics for malaria. However, our understanding of host determinants for malaria is limited because red cells are enucleated and lack DNA, hindering genetic manipulation.

In the Egan laboratory we have surmounted this hurdle by adapting advances from stem cell biology and genetic approaches like CRISPR-Cas9 to the study of malaria host factors. We are using these methods to develop forward genetic screens to identify novel host factors for malaria, as well as for reverse genetic experiments to understand the specific functions of critical host factors during the developmental cycle of malaria parasites. The proposed project will involve experiments aimed at understanding the function of several red blood cell factors that we have found to be important for parasite infection. We will use advanced microscopy techniques to study their localization in red blood cells that are infected with P. falciparum. We also plan to use live cell imaging to determine how the specific stages of P. falciparum invasion that are impacted by these host factors. Through this project the student will gain experience in experimental design and data analysis, as well as a variety of techniques spanning cell biology and molecular genetics.

**Additional Information:**
eganlab.stanford.edu
https://profiles.stanford.edu/elizabeth-egan
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<tr>
<td>Dr. Heidi Feldman</td>
<td>PRELUDES: Predicting language development in preterm children</td>
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</table>

**Email:** hfeldman@stanford.edu

**Keywords:** Prematurity, language development, brain structure

**Project Description:**
Each year in the U.S., more than 1 in 10 children are born preterm (PT). Long-term adverse consequences of prematurity, especially for those born <32 weeks’ gestation, include language-based learning impairments. Standardized measures are insensitive to specific weaknesses that may accumulate to cause these language-based learning impairments. We previously demonstrated that early language processing efficiency, assessed in an eye-tracking paradigm was more predictive of outcomes than standardized tests; 18-month-old children who had faster processing speeds showed advantages in short- and long-term language development and in non-verbal skills at preschool age.

We are now conducting a prospective, longitudinal study of PT children to determine the extent to which social-environmental and neurobiological factors converge to impact language processing efficiency. We are enrolling PT children from primarily English-speaking families, who in this region tend to be higher SES, and primarily Spanish-speaking families, who tend to be lower SES. The social-environmental predictor variables include the amount of child-directed speech and quality of caregiver-child interactions, assessed using day-long audio recordings and laboratory observations. The neurobiological predictor variables include properties of white matter pathways in the brain, assessed using diffusion magnetic resonance imaging (dMRI) obtained before the child’s hospital discharge (neonatal scans) and at 12 months (infant scans).

Participating in this study will provide trainees with opportunities to learn how to evaluate language development and parent-child interactions in young children. Trainees will also learn how to collect and analyze dMRI scans in young children.

**Additional Information:**
2) https://profiles.stanford.edu/heidi-feldman
3) Spanish-speakers appreciated
**DRIVE Faculty Mentor Project List**

**Faculty Mentor:**
Dr. Jennifer Frankovich

**Email:** jfranko@stanford.edu

**Project Title:**
Neurobiologic and Immunologic Markers in Youth with Pediatric Acute-Onset Neuropsychiatric Syndrome (PANS)

**Keywords:** psychiatric illness, autoimmune conditions, post-infection

**Project Description:**
Our research program uses clinical data and specimens obtained longitudinally in our Immune Behavioral Health Clinic to investigate inflammatory and autoimmune diseases that co-occur with psychiatric symptoms. We collaborate with a number of basic scientists to understand the immunological underpinnings which may contribute to post-infectious neuropsychiatric conditions. Students and trainees in our 'dry' lab can expect to gain experience in patient chart review, database population, clinical course mapping, and medical history synthesis/analysis which ultimately helps identify trends in a unique, unmet patient population. Many of our students and interns continue working on projects started in undergrad studies and stay on during their gap year before postgrad/medical studies.

**Additional Information:**
1) https://med.stanford.edu/pans.html for information about our program and research
2) https://profiles.stanford.edu/jennifer-frankovich
3) kindly contact our Program Manager, Jackie Horgan jhorgan@stanford.edu
4) I think students, especially those hoping to pursue patient care/medical, really enjoy working with our research program. While it isn't a wet lab experience, you certainly gain insight to a complex patient population and learn the foundations of doing clinical research. We often have a few students (PEDS-199 and otherwise) with us at any given time and the feedback is that its great experience for medical school and other health/science professions.
Faculty Mentor:  
Dr. William Giardino  

Email: willgiar@stanford.edu

Project Title:  
Neurobiological Mechanisms of Maternal Separation Stress Effects on Anxiety Behavior and Binge Alcohol Drinking

Keywords: Neuroscience, Stress, Amygdala

Project Description:  
Women are disproportionately at risk for co-morbid diagnosis of alcohol use disorder together with an anxiety disorder, and childhood neglect is linked to increased risk for alcohol dependence—particularly among women. Despite these correlations, demonstration of causality requires controlled studies that can precisely untangle biobehavioral relationships between early life stress and adult mental health. However, the brain mechanisms underlying sex differences in the effects of childhood stress on emotional regulation and motivated behaviors remain mostly unknown. For these reasons, our project explores a mouse model of early life stress to causally determine the sex-specific impacts of early life adversity on the stress response and reward-seeking behavior in adulthood. Our experiments will use rigorously controlled animal models of anxiety and addiction with a focus on sexually dimorphic emotional brain circuits of the extended amygdala to identify the neural basis of psychiatric conditions resulting from a deleterious maternal environment.

Student’s learning objectives and training/skills development include:

- Hands-on experience collecting data from mouse behavioral experiments aimed at understanding anxiety and addiction
- Immunohistochemical staining and confocal microscopy of mouse brain samples
- Develop programming skills (Python & MATLAB)
- Gain proficiency of the scientific literature on the topics of: neurobiology of stress, developmental influences on addiction, and sex difference
- Utilize fully-automated pipelines for quantifying fluorescent microscopy images, behavioral assays, and neurophysiological recordings

Additional Information:
https://giardinolab.org  
https://profiles.stanford.edu/william-giardino
Students can contact me directly: willgiar@stanford.edu
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<tr>
<td>Dr. Bonnie Halpern-Felsher</td>
<td><strong>Understanding and Reducing Adolescent Vaping: From Research to Prevention to Policy</strong></td>
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</table>

**Email:** bonnie.halpern-felsher@stanford.edu

**Keywords:** Vaping prevention, adolescent decision-making, risk behavior

**Project Description:**
Our REACH Lab (Research to Empower Adolescents and Young Adults to Choose Health) focuses on understanding and preventing adolescent and young adult risk behaviors, with a particular focus on vaping. Students will learn:
- how to develop a research question
- how to create and administer surveys and interviews
- participate in surveying and analyzing data
- inform the development and evaluation of school-based and clinic-based prevention curriculums
- Learn how to translate research to interventions and policies

**Additional Information:**
https://profiles.stanford.edu/bonnie-halpern-felsher
https://med.stanford.edu/adolescent/research/Research.html
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<td><strong>Molecular identification of lung glial progenitors</strong></td>
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*Email: ckuo@stanford.edu*

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<td>Lung development, glial cells, inflammation</td>
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**Project Description:**
A growing body of literature points to peripheral glia as important regulators of diverse physiologic functions. For example, classic myelinating glial cells associated with myelinated axons carry out homeostatic supportive functions, but also regulate post-injury inflammatory responses. Beyond the supportive and neuroimmune functions attributed to peripheral myelinating glial cells closely associated with nerve bundles, the functions of peripheral non-myelinating glial cells are largely unknown. While non-myelinating glial (Schwann) cells have been identified in the lung by immunohistochemical detection of the classic glial markers, glial fibrillary acidic protein (GFAP) and S100B, relatively little is known about their cellular and molecular diversity, distribution, and progenitor cells during development. We used in vivo genetic cell lineage tracing to show the origin of pulmonary glia from neural-crest derived progenitor cells in mouse, their anatomic distribution along airways and pulmonary veins in mice, and terminal glial cells associated with airway sensory cells. We obtained molecular markers for non-myelinating glial cells in the lung by enriching for glial progenitors and profiling by single cell RNA sequencing. This project uses single cell in vivo labeling strategies to molecularly define developmental stages, which will have implications for studying lung injury responses within the neural compartment.

**Additional Information:**
Lab website:
https://kuo.stanford.edu/
CAP profile:
https://profiles.stanford.edu/christin-kuo?tab=publications
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<td>Dr. Ruth Lathi</td>
<td><strong>A Randomized Controlled Trial of Frozen Embryo Transfers performed in Modified Natural versus Programmed Cycles (NatPro)</strong></td>
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</table>

**Email:** rlathi@stanford.edu

**Keywords:** Women's Health, Fertility, Pregnancy and clinical research

**Project Description:**
Patients undergoing IVF and Frozen Embryo transfer are at increased risk of hypertensive disorders of pregnancy but we do not know why. Stanford is participating in a multisite national trial to help us understand why.

Participants in the study will be randomly assigned to one of 2 treatment groups and followed throughout their pregnancies.
Study activities include collection of medical data and blood and urine samples for research.

**Additional Information:**
https://www.natprostudy.org/natpromain.asp
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<tr>
<td>Dr. Bruce McCandliss</td>
<td>Inclusive Summer Brainwave Research Pre-k to 2nd Grade</td>
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</table>

**Email:** bruce.mccandliss@gmail.com

**Keywords:** Neuroscience, Developmental Psychology, Education

**Project Description:**
Come join our team for the summer to learn about how we use electrophysiological "brainwave" technology with children (age 4 to 8) to better understand how the brain basis for math and reading change with learning and education. Summer of 2023 will provide new opportunities to bring wireless EEG to diverse communities surrounding Stanford University via a mobile brainlab van. Over the course of 10 weeks you will learn the theory behind how we measure objective real-time neural activity with a wireless device that looks like a bike helmet, the protocol for data collection, and toward the end be given a chance to design your very own pilot study.

**Additional Information:**
https://edneuroinitiative.stanford.edu/
https://www.synapseschool.org/innovation/blc
Please contact Leslie Dinan ldinan@stanford.edu directly.
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<td>Dr. Sruti Nadimpalli</td>
<td>Durability of immune response to SARS-CoV-2 vaccine in pediatric solid-organ transplant recipients</td>
<td>Pediatrics, infectious diseases, immunology</td>
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Project Description:
Pediatric solid-organ transplant recipients (pSOTR) have abrogated responses to vaccines due to the immunosuppressive medications that are necessary to prevent allograft rejection. Our study team has assessed the immunogenicity of 2- and 3-dose regimens of SARS-CoV-2 vaccines in pSOTR, confirming that a minimum of 3 doses are necessary in this population to achieve adequate B- and T-cell responses. This study, which is unique in its provision of T-cell response data, was published in the American Journal of Transplantation (impact factor 8.086) in September 2022 (Bratic et al). I was the primary mentor for Dr. Bratic, now a third-year General Pediatrics resident on the research track. Dr. Bratic was able to fulfill her research track requirements well ahead of the prescribed schedule.

At this juncture, we are interested in examining how long SARS-CoV-2-specific immune responses endure, as well as the impact of bivalent boosters. The student's responsibilities would include, but not be limited to: study design, data entry, analysis, and manuscript preparation.

Additional Information:
https://profiles.stanford.edu/sruti-nadimpalli?tab=publications
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<td>Dr. Anca Pasca</td>
<td><strong>Identification of neuroprotective compounds for hypoxic brain injury</strong></td>
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*Email: apasca@stanford.edu*

**Keywords:** brain, stem cells, organoids

**Project Description:**
We are growing brain organoids from stem cells, we expose them to hypoxia in the presence of specific drugs to identify new neuroprotective strategies that can be used in the clinical setting.

**Additional Information:**
[www.neopascalab.org](http://www.neopascalab.org)
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<tr>
<td>Dr. Anisha Patel</td>
<td>Healthy Drinks, Healthy Futures</td>
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**Email:** anipatel@stanford.edu

**Keywords:** Health equity, community-based participatory research, nutrition

**Project Description:**
Sugar-sweetened beverages (SSBs) are a major source of added sugar and calories, and promote obesity and poor cardiometabolic health, especially when consumed during early childhood. Childcare centers, which serve 12.5 million children per year, provide an efficient way to intervene early by engaging childcare providers and parents to make resonant, mutually reinforcing changes in both the home and childcare environment. Interventions that promote water consumption in place of SSBs have shown promise for preventing childhood obesity in schoolchildren. Yet, no studies have examined whether interventions to promote intake of water instead of SSBs in childcare could prevent childhood obesity at an even earlier stage of development. The proposed cluster-randomized controlled trial will test the efficacy of an intervention called Healthy Drinks, Healthy Futures (Bebidas Saludables, Futuros Saludables) that is culturally adapted for Latino children and families. The intervention supports complementary changes in the childcare and home food environments that promote water consumption while reducing SSB availability. This is combined with education for childcare providers and children, and a one-on-one brief motivational counseling intervention with parents to reduce SSB intake and encourage water consumption in the home. Fourteen childcare centers serving low-income, predominately Latino children (n=420) will participate in this trial. The primary outcome is child BMI z-score (BMI standard deviation score). Key secondary outcomes are intake of water and beverage calories at centers and at home. If shown to be effective, the Healthy Drinks, Healthy Futures intervention will offer a strategy for intervening early to prevent obesity for millions of low-income children attending childcare centers.

Students in the DRIVE program will learn about participatory research, child nutrition, public health and a clinician-scientist path. The student will also gain skills in literature review, data collection, data entry, data cleaning, data analysis, and dissemination of research for impact.

**Additional Information:**
Please visit our website Partnerships for Research in Child Health to learn more about our team and this project: https://researchinchildhealth.org/healthydrinks
### DRIVE Faculty Mentor Project List

**Faculty Mentor:**
**Dr. Jochen Profit**

**Email:** Profit@stanford.edu

**Project Title:**
**Birth equity across Asian Americans, Native Hawaiians, and Pacific Islanders**

**Keywords:** Qualitative analysis, equity, birth

**Project Description:**
Student will participate in qualitative research interviewing and analyzing interviews of AANHPI women. These interviews will detail across group experiences during pregnancy, labor and delivery, and after birth for infants of health children and those that required neonatal intensive care. The idea is to disaggregate AANHPI experiences and identify opportunities for improving health services to this culturally heterogeneous group. The students learning objective will include content expertise around the study question as well as exposure to the conduct of qualitative analysis, a key technique of scientific inquiry.

**Additional Information:**
https://med.stanford.edu/profiles/jochen-profit
https://med.stanford.edu/profitlab.html
**Faculty Mentor:**
Dr. Thomas Robinson

**Email:** tom.robinson@stanford.edu

**Project Title:**
Wise Social Psychological Interventions to Improve Outcomes of Behavioral Weight Control in Children with Obesity

**Keywords:** clinical trial, childhood obesity, nutrition behavior

**Project Description:**
A randomized controlled trial to test the efficacy of adding two innovative “wise” social psychological interventions—growth mindset and self-affirmation—to a behavioral weight control program for children with obesity. Up to 200 10-14 year old children with obesity will be recruited nationally and randomized to the two conditions. All children will receive a usual care online behavioral weight control program. In addition, families randomized to the wise intervention condition will receive the growth mindset and self-affirmation interventions.

The student will receive hands-on learning about research design and conducting clinical trials -- recruiting participants, randomization, masking, measurement science, reliability and validity, quality control, data management and analysis. All elements will be covered but emphases can vary from direct interaction with research participants to data management and analytics to social media marketing depending on the skills and interests of the student. Familiarity with and/or interest in learning to use Qualtrics, REDCap and/or R, are a plus but not required.

**Additional Information:**
http://med.stanford.edu/solutions.html
https://profiles.stanford.edu/thomas-robinson

We desire a highly motivated student eager to expand their knowledge and skill set. The summer project can be tailored to the specific skills and interests of the student. Opportunities (and encouragement) for continuing research after the summer.
### DRIVE Faculty Mentor Project List

<table>
<thead>
<tr>
<th>Faculty Mentor:</th>
<th>Project Title:</th>
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<tbody>
<tr>
<td>Dr. Thomas Robinson</td>
<td>Discovering Adolescents' Smartphone Food Environments</td>
</tr>
</tbody>
</table>

**Email:** tom.robinson@stanford.edu

**Keywords:** digital media, data science, nutrition and eating

**Project Description:**
More and more of an adolescent's life is experienced on their smartphone. This project will provide the first-ever comprehensive characterization of the food- and beverage-related environments that adolescents experience on their smartphones, and relationships with their dietary intake and preferences. We have developed a novel method to capture everything that appears on teens’ smartphone screens – a fully encrypted record of digital life – by unobtrusively taking a snapshot of those screens every 5 seconds the devices are on. The resulting sequence of screenshots, constitute an individual’s “screenome,” the unique, detailed structure of which can inform precision interventions and policy initiatives to improve nutrition and health. We are collecting smartphone screenshots and food frequency measures from a national sample of 163 adolescents (13-17 years, approximately 50% low-income and/or racial/ethnic minority).

The student will help develop a new taxonomy for the food environment on adolescents’ smartphone screens (in text and images), drawing from descriptions of the food environments in other media (television, movies, print) and from inductive analysis of screenomes. Roles can vary from data management and statistical analysis to machine learning, based on the student’s specific skills and interests. Opportunities to also learn from a team of graduate students, postdocs and additional faculty. Computational skills (e.g., python, R, json, cloud computing) are a plus but not required.

**Additional Information:**
https://profiles.stanford.edu/thomas-robinson
https://screenomics.stanford.edu

Desire a highly motivated student eager to expand their knowledge and skill set. The summer project can be tailored to the specific skills and interests of the student. Opportunities (and encouragement) for continuing research after the summer.
<table>
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<tbody>
<tr>
<td>Dr. Michael Rosen</td>
<td>Epithelial Dysfunction in Pediatric Ulcerative Colitis</td>
</tr>
</tbody>
</table>

*Email: rosenm@stanford.edu*

**Keywords:** Inflammatory bowel disease; digestive health; epithelial biology; organoids

**Project Description:**
The student will use in vitro (organoid) and murine models to understand abnormalities in the intestinal epithelium that contribute to pediatric ulcerative colitis. They will most likely be participating in experiments and data analysis to determine the function of Ror-gamma in the intestinal epithelium and how Ror-gamma depression contributes to intestinal inflammation and epithelial repair.

**Additional Information:**
Please contact Ashley Dunn <adunn2@stanford.edu> if interested.
CAP Profile: https://profiles.stanford.edu/266447
<table>
<thead>
<tr>
<th>Faculty Mentor: Dr. Vittorio Sebastiano</th>
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<tr>
<td>Email: <a href="mailto:vsebast@stanford.edu">vsebast@stanford.edu</a></td>
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</table>

**Project Title:** Dissecting the role of TBX1 during pharyngeal apparatus development

**Keywords:** Epigenetics, Stem Cell Biology, Embryonic Development

**Project Description:**
22q11.2 Deletion Syndrome (22q11.2DS), the most common of the microdeletion syndromes, is caused by hemizygous loss of 0.7-3 Mb of DNA on chromosome 22 and results in a constellation of clinical phenotypes. The core phenotype originates from the disrupted development of the pharyngeal apparatus. Particularly affected are the second heart field-dependent heart structures, great vessels, parathyroids, thymus, and lower craniofacial and face muscles. Although approximately 50 genes may be deleted, it is the haploinsufficiency of the transcription factor TBX1 that recapitulates most of the critical phenotype associated with 22q11.2DS. The proposed work is expected to identify the molecular mechanism at the basis of TBX1 haploinsufficiency and identify pathways which could be rescued through pharmacological intervention. Dissection of the epigenetic and molecular machinery responsible for pharyngeal endoderm formation will be instrumental in informing the generation of cell therapies for 22q11.2DS.

**Additional Information:**
Feel free to contact my instructor that will be the supervisor of the student at this email address: andcip91@stanford.edu
**DRIVE Faculty Mentor Project List**

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<tr>
<td>Dr. Laura Simons</td>
<td><strong>Signature for Pain Recovery In Teens and Journey in Pain Care</strong></td>
</tr>
</tbody>
</table>

*Email:* lesimons@stanford.edu  

**Keywords:** chronic pain, pediatrics, biomarker study

**Project Description:**
- **Signature for Pain Recovery In Teens (NIH Heal Initiative R61/R33):** SPRINT is a multisite, international effort to uncover a biological signature predicting pain recovery and persistence in teens with musculoskeletal pain. In collaboration with the University of Toronto, Hospital for Sick Children (SickKids), and Cincinnati Children's Hospital, we will use a novel machine learning technique to generate and test a model, opening doors for new screening and treatment approaches. SPRINT participation consists of a small blood draw, an hour-long MRI, sensory testing, and parent and child questionnaires in person, and biweekly surveys for three months at home. Students will help with final data collection, cleaning of data, and data analysis during the summer of 2023.

- **Journey in Pain Care (NIH K24):** Participants in SPRINT are invited to participate in our Journey in Pain Care study where we aim to deepen our understanding of the lived experiences of youth and their caregivers as they navigate pain care. Through qualitative, semi-structured, interviews we ask youth and their caregivers to reflect on their experiences seeking, receiving, and engaging in pain care. Patients and caregivers are asked to engage in 60-minute interviews that include drawing a visual timeline of their pain care journey, and discussing their experiences including pain diagnoses, pain treatments, care teams, and barriers/facilitators to pain care engagement. Students will help with interview transcriptions, participate in weekly meetings, and work on data analysis.

**Additional Information:**
- [https://bpp.stanford.edu](https://bpp.stanford.edu)
- [https://med.stanford.edu/profiles/laura-simons](https://med.stanford.edu/profiles/laura-simons)
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<tr>
<td>Dr. David Stevenson</td>
<td>Predicting Preterm Birth using AI and Machine Learning approaches</td>
<td>machine learning, artificial intelligence, pregnancy</td>
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</table>

**Email:** dks750@stanford.edu

**Project Description:**
Preterm birth, defined as birth before 37 weeks of gestation, affects an estimated 15 million newborns each year and is the largest cause of infant mortality and morbidity worldwide. Early prediction of preterm birth could provide a signature of preterm birth and identify pregnancies at risk. The student will be introduced to machine learning and AI approaches to build predictive models for preterm birth based on maternal data during pregnancy. The student will learn different machine learning models and how to evaluate their performance. The starting point will be linear regression models with sparsity that can successfully cope with high-dimensional data such as omics data (e.g. proteome, metabolome). The student will learn how to use existing programming packages in R to train and evaluate models.

**Additional Information:**
Information that may be useful:
- [https://www.marchofdimes.org/stanford-university-prematurity-research-center](https://www.marchofdimes.org/stanford-university-prematurity-research-center)
- My profile: [https://profiles.stanford.edu/david-stevenson](https://profiles.stanford.edu/david-stevenson)
- Profile of Ivana Maric who will co-supervise the student: [https://profiles.stanford.edu/ivana-maric](https://profiles.stanford.edu/ivana-maric)
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<tr>
<td>Dr. Sean Wu</td>
<td>Donor-derived cell free DNA in heart transplant rejection</td>
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</table>

**Email:** smwu@stanford.edu

**Keywords:** Heart transplant surgery, immune rejection, inflammation

**Project Description:**
Heart transplant is the only treatment option for children' with terminal heart failure or congenital heart disease. However, the long term outcomes remain suboptimal with 50% of the children survive past 20 yrs after transplant. While many studies have tried to address the mechanism of transplant heart rejection, there remains much to be learned about how the immune system attack donor heart. One promising area of research is the recent finding that donor heart cells release its DNA to the circulation when it is undergoing attack by the immune system. This so called donor-derived cell free DNA (dd-cfDNA) is now being measured in the blood stream to determine whether a heart transplant recipient is having rejection of their transplanted heart. We are interested in determine whether this dd-cfDNA is also responsible for immune/inflammatory response that drives transplanted heart rejection. Our project will use a rodent (mouse/rat) model of heart transplant to assess the level and timing of dd-cfDNA after heart transplant in mice. We will also assess the immune-triggering activity of the dd-cfDNA to determine whether the DNA from donor heart can activate the immune system of the recipient. Finally, we will determine whether the immune system of the recipient can recognize the differences between DNA from the donor heart vs itself. The MCHRI DRIVE summer student will be involved in developing assays to measure dd-cfDNA and also to perform bench top experiments to measure the immune-triggering activity of dd-cfDNA. Students who are interested in animal research will also be encourage to observe and potentially participate in the animal heart transplant surgery experiment.

**Additional Information:**
Lab website - seanwulab.stanford.edu
**DRIVE Faculty Mentor Project List**

**Faculty Mentor:**
Dr. Jiangbin Ye

**Email:** yej1@stanford.edu

**Project Title:**
Targeting the pediatric cancer epigenome with metabolic therapy

**Keywords:** Cancer metabolism, epigenetic, differentiation

**Project Description:**
Compared to the adult cancer genome, the pediatric cancer genome has a much lower mutation rate. More and more evidence suggest that some of the pediatric cancers are consequences of a developmental disorder due to dysregulation of epigenetics. Despite these fundamental differences being discovered, many pediatric cancer patients are still treated with the same therapeutic methods as adult patients, including surgery, radiation and chemotherapy. Many pediatric cancer survivors suffer from the side effects of these traditional therapies, including secondary cancer, organ toxicity and mental disabilities. To improve quality of life and long-term survival rates of pediatric cancer patients, it is necessary to investigate the other potential causes of pediatric cancer in addition to genetic mutations and to develop less damaging and more specific therapeutic strategies. Here we propose to use metabolic therapy to reprogram pediatric cancer epigenome, reduce the repressive histone and DNA methylation markers and activate normal differentiation pathways. It is expected that metabolic therapy will be more effective and specific, and less toxic in targeting pediatric cancers than traditional therapy.

Learning objectives: Hypothesis-driven research design, critical thinking, cancer metabolism, epigenetics, differentiation therapy.

Training/skills development: operating basic wet lab instruments, cell culture, cell proliferation/survival assay, immunoblot, RT-q-PCR, Mass spectrometry, FACS. Journal club discussion, powerpoint presentation, Proposal writing.

**Additional Information:**
https://med.stanford.edu/yelab/home.html
https://scholar.google.com/citations?user=84eeuQ0AAAAJ&hl=en
https://twitter.com/Warburg_Ye