Summer Research and Externship Program 2021
UCR School of Medicine- Office of Student Affairs

Careers in Medicine (CiM)
“Your Career Starts Now”
For questions, contact Christina.Rangel@medsch.ucr.edu
Summer Externship Program 2021

The UCR School of Medicine Summer Externship Program is for students who have successfully completed their first year of medical school. There are opportunities available with faculty from across campus as well as several of our affiliated clinical sites.

The Summer Externship Application can be accessed here: https://ucriverside.az1.qualtrics.com/jfe/form/SV_3gYizn7BXxvY1wi

Applicants will be notified of their placement status by in early April.

SCHEDULE

The schedule for this year’s program is listed below. Attendance is required for all dates listed.

- Summer Program Orientation Meeting: April 6th, 2021, 6pm via Zoom.
- 6 week program (M-F): June 21st- July 30th, 2021
- Externship Presentations: August (Dates TBD)

Please note, your host may have additional meetings/trainings that they require for onboarding and/or compliance. You are required to complete all trainings to participate.

ELIGIBILITY

Students must meet all criteria to be eligible for a summer opportunity:

- Must be a member of the class of 2024.
- Successful completion of 1st year of medical school (no remediation during the summer).
- Must be available to attend all scheduled events listed above.

COURSE ENROLLMENT AND STIPEND

All program participants will be enrolled in Summer Sessions Course MDCL 290. Upon verification by your sponsor that your research/externship participation has been successfully completed, your participation in the SOM Externship Orientation, and final presentation participation, you will receive a grade of “Pass”. If you do not complete the requirements
outlined by your sponsor and SOM for your assigned opportunity, a grade of “Fail” will be recorded on your transcript. You will receive a stipend for your participation in the summer program in the amount of $1,500 (approximately), and the cost of the 1 unit will be paid by the School of Medicine. The SOM Financial Aid Office will disburse stipend funds to you. If you do not complete the course requirements, you may be required to refund all or part of the stipend.

APPLICATION PROCESS

The application for this program will open on March 12th, 2021 and close March 26th, 2021. Late applications will not be accepted. You will need to complete the application and upload a CV for consideration for placement.

HEALTH ADVISORY

Due to the COVID-19 pandemic, we are following recommendations and requirements outlined by Riverside County Department of Public Health. Currently, the campus is closed until Fall 2021, with limited operation.

The clinical shadowing opportunities will require that you adhere to UCRSOM COVID-19 guidance, as well as guidance from the shadowing site. Check the UCRSOM Student Affairs website regarding Critical Student Resources: https://somsa.ucr.edu/critical-student-resources. If you have a question or concern not addressed on the website, please contact Christina.Rangel@medsch.ucr.edu.

We have requested and are encouraging hosts for teaching and research to provide remote externship opportunities. For in person opportunities, hosts will provide you with details and requirements for the COVID-19 safety protocols. Each Externship opportunity notes location (remote on onsite). Please be sure to review each externship description carefully.

All opportunities that are in person will require you to complete the COVID-19 daily wellness survey prior to coming to campus or UCRSOM affiliated site.

PROGRAM REQUIREMENTS:

- Complete the online application.
- Attend the required orientation with Student Affairs (remote).
• Schedule meeting (zoom or phone call) with host within 2 weeks of your placement (for Clinical sites, contact ASAP) to get details about any mandatory meeting, onboarding, or training requested by sponsor.
• Complete 6 weeks of participation between June 21st and July 30th. Dates can be flexible as long as your externship is 6 weeks long and ends before year 2 begins.
• Give 5 minute final presentation to Student Affairs staff and administrators in August (date TBD).

COMMUNICATION

If you are selected to participate in this program, you will receive an official notification via email with your sponsors name, location, and contact information. Your sponsor will receive a notification with your information as well. It is YOUR RESPONSIBILITY to contact your research/externship sponsor to schedule a meeting (zoom or phone call) and/or finalize onboarding requirements (onboarding for clinical externships) prior to the start date.

Should you have any trouble getting in touch with your externship sponsor, please contact Christina.Rangel@medsch.ucr.edu to help facilitate initial contact. Also, if you have any trouble or concerns regarding your externship (expectations, communication, or other) please contact Christina Rangel as soon as possible. The summer program is short, so it is important that you communicate any concerns in order to have the best experience possible.
TABLE OF CONTENTS

CLINICAL OPPORTUNITIES
RUHS Clinical Shadowing *(in person)* ................................................................. P.6
KP Riverside Clinical Shadowing *(in person)* ..................................................... P.6

TEACHING/SERVICE OPPORTUNITIES
Virtual Medical Leaders of Tomorrow Summer Program for High School Students *(remote)* ........ P.7

RESEARCH OPPORTUNITIES
Learning in Younger and Older Adults During COVID *(remote)* ............................ P.8
UCR Brain Game Center *(remote)* ......................................................................... P.9
COVID-19 in Health Disparity Populations *(remote)* ............................................. P.10
Health and Development in Diverse Communities *(remote)* ..................................... P.11
Analysis of COVID-19 Comorbidities and Correlates Using the National COVID Cohort Collaborative (N3C) Database *(remote)* ............................................................................. P.12
Evaluation of SARS CoV-2 Infection of Human Embryonic Cells *(remote)* ............. P.13
Immune Regulation in Sepsis: Impact of the Cytokine Resistin *(in person)* ............... P.14
Mechanisms of Antimaia Anti-Cancer Effects Through Analysis of Gene Expression in Treated Tumors *(remote)* .................................................................................. P.15
Assess the Performance of Bioresorbable Implants in Vivo Using Rodent and Minipig Models *(in person and remote)* ............................................................................. P.16
The Mechanisms Underlying the Pathophysiology of Fragile X Syndrome (FXS) / Gilal Control of Normal Synapse Development and Learning *(in person and remote)* ......................... P.17
Host: Nathan McLaughlin, M.D.
Project Title: Riverside University Health System Clinical Shadowing (*in person participation*)
Location: 26520 Cactus Ave. Riverside, CA 92555
Positions: 4

Summary: This summer Externship Clinical Program is a 6-week program consisting of one-week rotations such as medicine, cardiology, general surgery, orthopedics, family medicine, neurology, pediatrics, and/or other services. This program acquaints the student with the practice aspects of the various specialties in order to be in a better position to choose their eventual specialty.

Host: Joanne Witkowski, M.D.
Project Title: Kaiser Permanente Riverside Clinical Shadowing (*in person participation*)
Location: 10800 Magnolia Ave., Riverside, CA 92505
Positions: 3

Summary: This summer Externship Clinical Program is a 6-week program consisting of one-week rotations in specialties such as pain management, pediatrics, internal medicine, general surgery, psychiatry, emergency medicine and/or others. This program acquaints the student with various aspects of the various specialties in order to be in a better position to choose their eventual specialty.
Summary: Medical students will be part of development of a curriculum for the virtual Medical Leaders of Tomorrow summer program for high school students from disadvantaged backgrounds. Medical students will work collaboratively to design and facilitate career exploration activities, which are interactive and to include problem based learning exercises to be delivered in small groups of 8-10 students. High school students will be juniors attending schools in San Bernardino and Riverside counties. Summer program participants are educated on health issues and health disparities within the Inland Empire. Medical students will guide students to create a community health education project in small groups of 8-10 and present the project at the end of the program. The program seeks to increase high school students' awareness and interest in careers in the healthcare field and interest in higher education. The summer program is evaluated through an electronic pre-survey and post-survey. At the conclusion of this project, medical students will report their findings on best practices for virtual programming for high school students participating in career exploration activities.
Summary: We have several projects in the lab related to learning in younger and older adults during COVID. For some of these projects, the data have been collected, and we would need your help organizing and analyzing the data. For other projects, we would need your help collecting data, or even potentially running participants over Zoom. For the studies with data that have been collected, we are investigating how physical distancing restrictions have affected how younger and older adults have adapted to these restrictions via learning new skills. For studies that require data collection, we are investigating how motivation and learning in younger and older adulthood interact to help improve learning outcomes and interest in future learning.
Host: Aaron Seitz
Project Title: UCR Brain Game Center
Location: Psychology/Brain Game Center, Remote opportunity
Email: aseitz@ucr.edu
Phone: 9518276422

Summary: The UCR Brain Game Center for Mental Fitness and Well-being is a unique research center on the UCR campus. Our primary mission is to develop, research, and disseminate new tools to understand and train cognitive functions. We work with a variety of populations ranging from children to older adults, neurotypical functioning to those with mental health difficulties, vision and hearing loss, brain injury, etc. Our projects for the summer of 2021 will depend upon the interest of the candidates, and availability of target populations.

Additional Notes: There is a possibility of in-person work, but it will depend on the project. If this is the case then we will abide by the most up to date safety protocols at the time.
Summary: Students will have an opportunity to participate in the STOP COVID-19 CA Project (Share, Trust, Organize, Partner: The COVID-19 California Alliance). This project is funded by the NIH-NIHLB (PIs, Lo, Cheney and McMullin). As part of an NIH Community Engagement Alliance, investigators in the Center for Health Disparities Research (HDR@UCR) have been collaborating with the Riverside Chapter of the NAACP, Riverside San Bernardino County Indian Health, Inc., and Raices Culturas (a non-profit in the Eastern Coachella Valley that empowers community through artist expression and cultural inclusivity) to reduce the impact of the COVID-19 pandemic on vulnerable and underserved populations, including African American/Black, Latinx, and Native American individuals, families, and communities in inland southern California. This work is part of a California-wide effort involving 11 sites to engage stakeholders in efforts to raise COVID-19 awareness, education, research and access to vaccine trails and vaccination. Students would have the opportunity to participate in community engagement activities such as advisory board meetings and intervention development meetings, as well as analyzed already collected focus group and survey data.

Additional Notes: This project may involve community engagement and public health outreach in person. In that case, all students will wear full PPE, including face shields, gloves, and N95 masks. They will be required to socially distance and will not have direct patient contact.
Summary: The UCR Youth Health and Development Lab (https://youthdevlab.ucr.edu/), directed by Dr. Aerika Brittian Loyd, uses quantitative and qualitative methods to explore how intersections of race, ethnicity, gender, and identity inform health and development for youth and young adults of color. We have three active projects: 1) investigating risk and resilience among Black youth involved in the juvenile justice system in the Inland Empire; 2) examining how diverse youth navigate and construct their identities around race, ethnicity, and STEM in a museum science youth program in Chicago; and 3) exploring how racial/ethnic minority young adults modify or “shift” their thoughts and behaviors in different social contexts, and implications of identity shifting for their health and well-being. This summer we can support 1-2 students with interest in health disparities across one of the three projects listed. The research experience may involve assisting with literature reviews, reviewing reports from the CDC and NIH, and assisting with remote survey data collection.
Host: Adam Godzik
Project Title: Analysis of COVID-19 Comorbidities and Correlates Using the National COVID Cohort Collaborative (N3C) Database
Location: SOM Research Building, Remote opportunity
Email: adam.godzik@medsch.ucr.edu
Phone: (858) 952-4065

Summary: National COVID Cohort Collaborative (N3C) is a national data resource/database/collaborative research environment developed and maintained by the National Center for Advancing Translational Sciences (NCAT) at NIH. A group of UCR SOM faculty have been approved for a N3C project on studying comorbidities between COVID-19 and autoimmune diseases. Participants in the project would work together with postdocs and programmers already working on this project, but would be expected to define and focus on some subproject for instance on one specific disease indications, correlations with socioeconomic characteristics of the patients and/or treatment details.
Student(s) joining the project should be comfortable with computer analyses, statistical thinking and be prepared to go through several training sessions to prepare them for the work in the N3C data enclave. Prior knowledge of SQL, R or Python programming is a plus, but it not required.

The project would consist of developing precise definition of the OMOP concept definition of targeted autoimmune disorders, collecting statistics from the N3C database and their analysis, all using remote resources of the N3C data enclave. More information can be obtained at the N3C website at https://ncats.nih.gov/n3c/about.
Summary: We are investigating the infectability of early stages in human development by SARS-CoV-2 using human embryonic stem cells and their derivatives. This project would involve acquiring and reading the literature on this topic and writing a draft of a review paper that would be submitted for publication. The intern would interact remotely with a team of three other students and myself to discuss the literature and synthesize it into an interesting informative review that would help physicians understand the effects of COVID-19 on human embryos, fetuses and the placenta.
Summary: Sepsis, an often fatal disease caused by infection, is associated with severe immune dysfunction, from excessive immune activation to immune paralysis, both of which are lethal. A better understanding of the mechanisms that govern the dysregulated immune response in fatal or surviving outcomes of sepsis could lead to improved diagnostics and treatments for this disease. The cytokine resistin is strikingly elevated in sepsis, and has been proposed as a useful biomarker for sepsis severity. However, the function of resistin is unclear, with studies showing that it has both pro-inflammatory and anti-inflammatory functions dependent on the context. The goal of this study is to evaluate resistin's immune function on peripheral blood mononuclear cells (PBMC) from severe sepsis patients obtained in collaboration with the Riverside Unified Health System-Medical center. This project will specifically evaluate if resistin immune function is changed dependent on sepsis severity (surviving or fatal), and the sepsis etiology (gram negative or gram positive bacterial sepsis).

Methods: Peripheral blood monocytes and T cells sepsis will be isolated and activated with immune stimulatory ligands in the presence or absence of resistin. The cells will be collected for flow cytometry analysis of immune activation markers, and supernatants will be collected for cytokine quantification. Patient samples will be grouped based on disease severity (fatal or surviving), plasma resistin levels (high or low), sepsis etiology (gram negative or gram positive bacterial sepsis).

In conclusion, this project will test the hypothesis that resistin is a useful biomarker for sepsis and has potent immune effects dependent on disease etiology.

Required training: Human subjects Research CITI certificate (Biomedical Research, Basic course. link: https://research.ucr.edu/ori/irb-sb/citi-instruction) and lab safety training courses will be needed prior to beginning the internship. Preferred qualifications: Experience with cell culture and immune techniques (ELISA, flow cytometry)
Summary: We have previously published that treatment with Antimaia, a splice-modulating oligomer that specifically knocks down expression of the long form of the prolactin receptor, markedly inhibits metastasis in a highly aggressive, immune-competent, orthotopic model of triple negative breast cancer. Treatment also results in increased survival. While we understand quite a lot about certain mechanisms of action, there is a lot more to be discovered by analysis of RNAseq data from treated versus control primary tumors, which contain both the parenchyma and stroma of the tumor, as well as from RNAseq data from T regulatory cells isolated from those tumors. The summer project would begin by analysis of the data sets using online software that clusters gene changes, but I would like to see someone use their knowledge of biology and disease process to really pick out some interesting changes that point to mechanisms we may not currently be aware of, as well as those that may confirm other studies.

For example, the online programs tend to focus on the function of a gene from when it was first discovered or from what is considered its "most important function", and not on what may be in the current literature. To explain further, the AID gene would probably cluster with immune functions since it is very important for antibody diversification in B cells. However, more generally, it is a DNA-editing deaminase, it is fairly well expressed in untreated tumors that have very few B cells, and Antimaia almost completely inhibits its expression. So the idea is to come up with hypotheses about why expression of some genes change in response to Antimaia.

Host: Ameae Walker
Project Title: Mechanisms of Antimaia Anti-Cancer Effects Through Analysis of Gene Expression in Treated Tumors
Location: Webber Hall, Remote opportunity
Email: ameae.walker@ucr.edu
Phone: (951) 565-1339
Host: Huinan Liu

Project Title: Assess the Performance of Bioresorbable Implants in Vivo Using Rodent and Minipig Models

Location: MSE Building 205, In person and remote participation required

Email: Huinan.liu@ucr.edu
Phone: (951) 827-2944

Summary: Dr. Liu’s Biomaterials and Nanomedicine Lab research involves design, fabrication and evaluation of novel biomaterials for tissue regeneration, controlled drug delivery, and medical implant/device applications. Medical applications of nanomaterials and nanotechnology are actively explored through both fundamental studies and applied research. Materials studied in the lab include polymer, ceramic nanoparticles, polymer/ceramic nanocomposites and biodegradable metals. Students will be involved in developing novel materials and implants for neural repair, bone regeneration, etc. Students may acquire lab skills and gain experience in material synthesis, characterization, electron microscopy, x-ray spectroscopy, optical emission spectrometry, fluorescence microscopy, bacterial culture, mammalian cell culture studies, and performing surgeries for assessing novel orthopedic implants or neural implants in rat/mouse/minipig models. Previous outstanding student researchers in Liu lab have co-authored publications in scientific journals and/or presented their work at national/international scientific conferences. Specifically, for summer 2021, medical students will assist our collaborating surgeons in implanting bioresorbable metallic implants into rat and minipig models and assessing the implant performance in vivo using histology, microCT, IVIS, bitplane, etc.
Summary: Research in my lab focuses on understanding how neuronal networks are developed and maintained in the brain, with the goal of applying this knowledge to the development of therapeutics for neurodevelopmental and neurodegenerative diseases. We utilize new molecular and imaging approaches in neuroscience and mouse genetics to conduct research on the molecular basis of neurologic diseases. In particular, we are interested in molecular and cellular mechanisms that govern the synapse formation and plasticity in the brain areas that play a critical role in learning and memory.

I am accepting applications for summer research internships in my lab to work with a team of postdoctoral fellows and graduate students on one of two research projects:

(1) to study the mechanisms underlying the pathophysiology of Fragile X Syndrome (FXS), a neurodevelopmental disorder associated with intellectual disability and autism;

(2) to study glial control of synapse development in the hippocampus and how it affects learning.

Please describe how this project is relevant to a first year medical student and the typical duties they will perform:

Students will have an opportunity to learn or enhance their skills in cellular and molecular neuroscience using several techniques that are necessary for completion of the projects, such as mouse genotyping, preparation of brain slices, immunohistochemistry, primary cell cultures, various biochemical techniques, EEG recordings, mouse behaviors and confocal microscopy.

Students will also participate in bi-weekly Journal Club meetings where we discuss recent journal articles and research-in-progress. During this time we discuss the merits and faults of the paper.
and how information from the paper can apply to the project. Journal Clubs will help in developing skills at reading literature on recent advancements in brain research and clinical neuroscience.

This internship will also provide an opportunity to participate in neuroscience translational research. As a critical element for career development is environment, students’ interactions with other researchers within our FXS Research group at UCR.

Description of the Project:

1. The mechanisms underlying the pathophysiology of Fragile X Syndrome (FXS)
My lab discovered the role of MMP9 in pathophysiology of FXS and demonstrated beneficial effects of minocycline on synapse development and behavioral performance in an animal model of FXS (Bilousova et al., 2009). These findings prompted several clinical trials that tested the effects of minocycline treatment in humans with FXS. Most recently, we have uncovered key developmental defects in parvalbumin interneurons and the role of extracellular matrix in regulating electrocortical activity, in particular gamma oscillations, in Fragile X mouse model. Our ongoing studies will determine the interactions between structural and functional changes in cortical circuits in Fragile X mice and will generate therapeutic ideas by targeting multiple pathways involved in the pathophysiology of FXS. We are also investigating therapeutic effects of sound exposure.


(2) Glial control of normal synapse development and learning. Our studies suggest that ephrin-B/Eph receptor signaling is involved in synapse development and their remodeling triggered by TBI (Nikolakopoulou et al., 2016) and ALS (Wu et al., 2017). In the ongoing studies, we investigate new mechanisms of astrocyte-mediated remodeling of synaptic connections in the developing hippocampus that may underlie new memory formation and consolidation. Furthermore, these findings will establish a foundation for studies of astrocyte-mediated synaptogenesis in clinically relevant conditions such neurodevelopmental disorders associated with anxiety, repetitive behaviors and seizures. Given widespread and growing interest in the astrocyte-mediated mechanisms that regulate brain development, learning and memory, we suspect this project has potential for future clinical applications, in particular their role in inhibitory interneuron maturation.


