

Faculty Research Projects for Student Involvement

UC Davis College credit opportunities are available for students interested in pre-med, pre-vet, or scientific medical research. Faculty in the Department of Pathology and Laboratory Medicine at UC Davis School of Medicine invite qualified undergraduate students to enroll in the **PMD 199** course, which provides credit for participating in scientific research. This course allows students to gain valuable research or pre-medical experience with state-of-the-art equipment and techniques while receiving course credit. Additionally, if you are not interested in receiving course credit, **volunteering is an option as well**. Time contributed by volunteers can sometimes be used as internship credits by some programs. Additionally, medical students interested in research can enroll in **PMD 499**. All students, both undergrad and medical students, must contact the faculty mentor in advance and obtain their consent to register for the appropriate course. A list of interested faculty and their research areas are:

- **Verónica Martínez-Cerdeño, Ph.D.** Contact: vmartinezcerdeno@health.ucdavis.edu
The goal of Martínez-Cerdeño's laboratory is to determine the etiology and pathology of certain forms of autism. In addition, her lab studies the role of stem cells in the development, evolution, and pathogenesis of the mammalian cerebral cortex. The anatomy and pathology of autism and related diseases in postmortem brains are studied and based on the findings, animal models are developed for autism research. Laboratory website: www.ventricular.org
- **Ralph Green, M.D., Ph.D., FRC PATH** Contact: rgreen@heath.ucdavis.edu
Green studies the roles of micronutrients in the maintenance of normal health and how nutrients and their pathways contribute to the pathogenesis and manifestations of disease. A major focus has been the characterization of B vitamin status in acquired and genetic diseases. Recently, his laboratory has performed studies on sickle cell anemia, cancer and degenerative neurological disorders, including Parkinson's Disease and Alzheimer Disease and population studies on declining cognitive status in the elderly. Methods used in the laboratory include hplc, enzyme immunoassays (ELISA) and multiplex proteomic assays.
- **Konstantinos Zarbalis, Ph.D.** Contact: kzarbalis@health.ucdavis.edu
The Zarbalis laboratory focuses on uncovering the genetic and environmental causes of neurodevelopmental disorders. Both in vivo and in vitro models are used to reveal the effects of gene mutation and environmental influences on pathological processes leading to congenital abnormalities. In the process, a wide variety of techniques is employed, including methods in molecular biology, molecular histology, protein biology, biochemistry, and bioinformatics.
- **Yu-Jui Yvonne Wan, Ph.D.** Contact: yjywan@heath.ucdavis.edu
Study the role of gut microbiota in contributing to and preventing obesity and metabolism-associated health issues including fatty liver, systemic inflammation, skin disease, mental and neurological issues, and cancer aiming to uncover means for treatment.
- **Kristin Grimsrud, D.V.M., Ph.D., C.V.A.** Contact: kngrimsrud@health.ucdavis.edu
Grimsrud's research focuses on pharmacokinetics and pharmacogenetics in pediatric special populations, particularly burn patients, with a larger focus on anesthetics and analgesic drugs. Additionally, she is focusing on utilizing extracellular vesicles as functional biomarkers and developing rapid sequencing assays. She also is a translational clinician and specializes in laboratory animal medicine, translational animal models and rare diseases.
- **Richard Levenson, M.D.** Contact: rmlevenson@health.ucdavis.edu
Levenson's Lab: Advanced Microscopy Research: Our lab develops novel microscopy methods, including FIBI, which enables slide-free histology for rapid pathology diagnosis from fresh, unsectioned tissue specimens. Current projects include:
 1. Alternative Staining Techniques: Investigating stains beyond hematoxylin and eosin to improve image content and detect additional tissue components (e.g., collagen, elastin, amyloid).
 2. Immunofluorescence in FIBI: Developing approaches to capture molecular data alongside histology images, exploring new contrast agents and non-antibody-based probes.
 3. Digital FIBI Atlas: Creating a comprehensive image collection of normal and diseased tissues from various species (working with the vet school). Disease could include those involving parasites.Useful skills and interests include imaging experience, software and coding expertise for image processing, histology knowledge, interest in

AI applications

- **Izumi Maezawa, Ph.D.** Contact: imaezawa@health.ucdavis.edu
Maezawa's lab investigates the biology and pathology of microglia and astrocytes using primary murine cultures, iPS cell models, and mouse models. The goal is to identify addressable therapeutic targets in glia for neurological disorders. Currently the laboratory has identified therapeutic targets for Alzheimer's disease, Rett syndrome, and neonatal brain injury. These novel targets include potassium channels, lipid mediators, and simple and complex sugars. A potassium channel blocker identified by Maezawa and collaborators has been advanced to a clinical trial for early stage Alzheimer's disease.
- **Kuang-Yu Jen, M.D., Ph.D.** Contact: kyjen@health.ucdavis.edu
Jen's research focuses on using histopathologic data to predict clinical outcome, focusing on native kidney disease and renal transplants. Histopathologic data consists of morphologic findings obtained from traditional microscopic examination as well as developing and using state of the art deep learning-based image analysis on digital images. Currently, Jen is a multiple-PI for an NIH R01 grant titled Computational Image Analysis of Renal Transplant Biopsies to Predict Graft Outcome. He is looking for motivated undergraduate students who would like to contribute to the development of a digital archive for kidney transplant biopsies.
- **Kenneth Iczkowski, M.D.** Contact: kaiczkowski@health.ucdavis.edu
Our translational research concerns the role of loss of DACH1, a tumor suppressor, in prostate cancer. Working with Richard G Pestell (at Baruch S Blumberg Institute), we are studying sets of tissue microarrays with our multiplex fluorescence immunostain and correlating this with clinical outcomes;

A second project is ongoing, under the auspices of a Mentored Resident Grant. It is about the use of Folate Receptor Beta (FRB) reactivity in the prostatic stroma to predict the detection of prostate cancer. It is possible that, even in prostatic biopsies negative for tumor, FRB predicts a subsequent detection of cancer.

A third project involves harvesting prostate tumor (confirmed by frozen section at gross examination) for Chris Lucchesi who is growing tumoroids (spheroids) that are tested for therapy susceptibility as well as antigen presentation to the patient's own blood cells. The involved cases are also having H&E images scanned for AI predictive analysis working with Hang Chang of Lawrence Berkeley National Lab.

Fourth, I am collaborating with Paramita Ghosh on Prohibitin as an AR co-repressor in prostate cancer.
- **Ashna Aggarwal, M.D.** Contact: axaggarwal@health.ucdavis.edu
Aggarwal is an AP/CP Board certified pathologist with specialty training in gastrointestinal and liver pathology. Aggarwal is willing to serve as a mentor.
- **Denis Dwyre, M.D.** Contact: dmdwyre@health.ucdavis.edu
Dwyre focuses on clinical research in the areas of coagulation, apheresis, and hematology.
- **Farnoush Moen, M.D.** Contact: fmmoen@health.ucdavis.edu
Moen is involved in clinical research including case reports and review articles on interesting cases of lymphoma/leukemia and is willing to serve as a mentor.
- **Swikrity U Baskota, M.D., M.B.B.S.** Contact: subaskota@health.ucdavis.edu
Baskota's clinical research focuses on hormone receptor positive breast carcinomas. Her research is targeted to better understand the hormone receptors expression on treatment response of breast carcinomas.
Baskota also works on various clinical research of cytopathology and lung carcinoma and to correlate with molecular findings. Useful skills and interests: Data gathering, biostatistics application, application of digital and AI algorithms.
- **Lee-Way Jin, M.D., Ph.D.** Contact: lwjin@health.ucdavis.edu
Jin's laboratory is affiliated with UC Davis Alzheimer's Disease Research Center (ADRC) and MIND Institute. He is a neuropathologist working on biochemical and molecular biological analyses of brain pathologies in human samples and mouse models. Recently he has taken the leadership of the biomarker efforts of the ADRC and has assembled teams to investigate established and candidate blood biomarkers using SiMoA, lipidomics, glycomics, and glycoproteomics technologies. Jin also collaborates closely with Izumi Maezawa to identify therapeutic targets for Alzheimer's disease, Rett syndrome, and neonatal brain injury using cell culture and mouse models.

- **Xiao-Jing Wang, M.D., Ph.D., Robert E. Stowell Endowed Chair in Experimental Pathology** Contact: drxwang@health.ucdavis.edu
Research activities in the XJ Wang Lab include the following: 1) Mechanisms of immune evasion of cancer and cancer immunotherapy; 2) Role of tumor microenvironment in cancer progression and metastasis; 3) the properties of cancer stem cells; 4) How radiation therapy affects DNA damage-induced neoantigen production in tumor cells, microenvironment, and systemic effects; 5) Therapeutic interventions in chronic wounds, radiation toxicities, inflammatory disease and fibrosis in oral cavity and skin.

If you are interested in working with any of these faculty members on research, please contact them through email. For PMD 199, two or three hours per week correspond to one unit. Most of the professors are located at the School of Medicine and UC Davis Health campus in Sacramento; however, busing for students is available between the two campuses.

Please contact Soledad Sanchez, solsanchez@health.ucdavis.edu, or [916-734-4146](tel:916-734-4146), if there are any questions.