HEALS Curriculum

Discovery

Areas of Concentration

Research Opportunities Catalog - 2023

UCLA David Geffen School of Medicine

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Dear Students:

Welcome to Discovery! The UCLA Discovery Year is a mentorship driven scholarly experience for medical students. Whether you choose to complete an advanced degree or one of UCLA's Areas of Concentration, Discovery will provide you with dedicated time, training and community in an area of interest to deepen and enhance your medical school experience and equip you for a fulfilling medical career. Through this program and with the assistance of our outstanding faculty mentors, you will be able to create and communicate new knowledge by addressing questions in your field of interest utilizing a range of scientific approaches. You will have the opportunity to work both individually and collaboratively, utilizing a variety of analytic tools to help you accomplish your goals. Additionally, throughout Discovery, you will acquire attitudes and skills for self-directed, life-long learning and scholarship. The Discovery Year culminates in a scholarly project that you will be able to share with our academic community. Throughout Discovery, we aim to inspire curiosity and develop critical thinking skills that will serve you well in medical school and beyond.

Regards,

Jaime Jordan, MD, MAEd
Discovery Course Director

DGSOM Discovery is a required component of the M.D. curriculum to provide third-year medical students with a nearly year-long period of protected time for a deep and substantive creative and scholarly experience in an area of their interest. Discovery is one of the pillars of the new curriculum. It delivers on the school's mission to "create world leaders in health and science" by leveraging and engaging our faculty to guide and mentor students into areas of creative inquiry. It is our collective vision that these experiences will instill in all of our students an inquisitive mind and life-long habits of rigorous inquiry that will become the hallmark of the DGSOM MD graduate. The program encourages the acquisition of attitudes and skills for self-directed, lifelong learning and scholarship. DGSOM Discovery can include enrollment in a concurrent master's degree program offered at UCLA or participation in the DGSOM Discovery Area of Concentration (AoC) Program.

Discovery Concurrent Degree offerings allow students interested in pursuing a dual degree at UCLA with the following programs: MD/MPH, MD/MBA, MD/MPP, and other master's degree program that are being developed for alignment with the Heals curriculum. Students typically begin their master's program at the start of the Discovery year with two-year programs running through the MS4 year and completing at graduation.

The Discovery AoC program is a faculty-mentored, scholarly experience. There are eight DGSOM Discovery AoCs, developed by the DGSOM Discovery curriculum redesign planning committee which included 31 faculty, staff, and student members. Areas of concentration include a broad range of disciplines to align with student interests and better prepare students to impact the future of healthcare. Opportunities unique to Los Angeles and specific strengths of UCLA were also taken in consideration during planning. Key points include:

- Students will participate in Discovery from September through June (10 months)
- During Discovery, students will have four (4) days per week available to devote to their scholarly project. One day per week will be reserved for "Longitudinal Clinical Experience (LCE)," a continuation of clinical training in a specialty of the student's choice. The day of the week for LCE shall be flexible.
- Students will select their projects from a catalog compiled from successful faculty submission to this RFS process; these selections will be made by the mid-point of the second year.

DGSOM Discovery will occur in three phases:

- *Explore*: series of introductory sessions in the first year designed to expose students to the breadth of opportunities and experiences available in the Discovery year.
- *Plan*: series of foundational sessions in the second year, based on Area of Concentration to introduce students to core knowledge and skills that will be needed in the next phase.
- *Discovery*: the third-year experience.

Basic, Clinical, & Translational Research

Students work with UCLA faculty to design and implement a project from multiple areas to frame clinically relevant questions, develop strategies for answering the questions, analyze their findings, and present their results.

Basic, Clinical, & Translational Research

ID:	Title:	AoC:
21-001	Neuroscience Research: from cells to behavior	☒ Basic, Clinical, & Translational Research
	Brief Description: Research is a cornerstone of advances in medicine. Students will actively engage in a research project tailored to yield tangible results in the timeframe of the program. Opportunities range from computational approaches to benchwork in a wet-lab. Read more below	**Faculty Lead:** Felix E. Schweizer, PhD **Number of faculty mentors:** 17 **Capacity:** Several Students

ID:	Title:	AoC:
21-002	Sex and Gender Differences Research: The Iris Cantor-UCLA Women's Health Center Leichtman-Levine-Tarlow-Eisner-Moss Mentorship Program	☒ Basic, Clinical, & Translational Research
	Brief Description: We will provide structured research mentorship experiences across the continuum of women's health research for a total of up to 3 students, one in each of the following projects: a) Basic science/Dr. Hevener Lab: One student will design, implement, and prepare for presentation a research project on the effects of estrogen receptor expression on cellular function, specifically in one of the following areas: the role of ER alpha in the control of mitochondrial function and metabolism in immune cells OR the impact of mitochondrial remodeling on metabolism in skeletal muscle. b) Clinical Epidemiology/Drs. Seeman, McCreath, and Greendale: One student will design, implement, and prepare for presentation an analysis using already-collected data from large, US-nationally based research studies. Prior students have worked with data from the Study of Women's Health Across the Nation (SWAN), a large, multi-site, multiethnic study of midlife, menopause, and aging. Current students are using the multi[1]site, multi-ethnic Study of Midlife in the US (MIDUS), focusing on gender and healthcare access OR chronic disease burden OR inflammation. These, or other large and well-established data sets will be used by the 2023 student. Faculty Lead: Janet Pregler Number of faculty mentors: c) Health Disparities/ Dr. Narain: One student will design, implement, and prepare for presentation a research project studying factors underlying disparities in women's risk factors for disease and/or health outcomes. Examples of current projects include: Examining the Relationship Between Self-Employment and Risk Factors for Cardiovascular Disease Among Women and State Earned Income Tax Credit Policy and Dietary Quality among Single Mother with Low Education.	**Faculty Lead:** Janet Pregler **Number of faculty mentors: 6** **Capacity:** 3

ID: 21-003	Title: Laryngeal physiology and voice function	AoC: ☒ Basic, Clinical, & Translational Research
	Brief Description: This group of laryngeal and voice researchers offers a unique research and education opportunity for students interested in head and neck surgery or communication disorders more broadly. We have years of joint collaborations, shared laboratory facilities, and numerous previous trainees (medical students, residents, and post-doctoral fellows). Many of those research trainees have continued to academic careers. All projects include developing deep understanding of laryngeal physiology and voice production, which is foundational to research in voice disorders. Specific projects currently underway include: biomechanical modeling of vocal fold vibration, neurologic control of laryngeal motion, ex vivo laryngeal phonation to study laryngeal dynamics, tissue engineering for laryngeal restoration, clinical regenerative medicine for vocal fold scars, voice perception and objective analysis of voice, and clinical treatments for laryngeal papillomatosis. This broad list demonstrates this group's intense commitment to research, and ensures that ample projects will be in place at the time of Discovery Year launch. Our expectation is that Discovery Year students will actively take responsibility for a primary project. The scope should be similar to a master's thesis, and should result in at least one first-authored publication on this research topic. Additionally, there will be opportunities for more publications on clinical topics and additional basic research problems. The student should also present their work at a national meeting in order to increase their visibility and networking for residency matching. Past medical students who have committed a year to work with PI's in this group have emerged with outstanding productivity, typically several publications.	**Faculty Lead:** Jennifer Long, MD, PhD. **Number of faculty mentors:** 6 **Capacity**: 2

ID: 21-004	Title: Identifying Biological Markers of Persistent Post-concussive Symptoms (PPCS) in Children	AoC: ☒ Basic, Clinical, & Translational Research
	Brief Description: The student will participate in a project supported by a grant (U54) from the National Institute of Neurological Disorders and Stroke that is a multi-institutional project (in which UCLA is the lead and administrative site) exploring predictive markers of longitudinal recovery in children after concussion. We will be launching this project in the fall 2021, with support for 5 years, and expect to have multiple accessory grants submitted to fund additional projects. We will be recruiting subjects into our development cohort in the initial phase. These children will have sustained a concussion, and will be longitudinally tracked through their recovery. We will then validate endophenotype biomarkers from the development phase in a broad group of children with concussion. The overarching goal of the project is to develop a predictive algorithm for PPCS endophenotypes in children to inform clinical screening, management and future research. Read more below	**Faculty Lead:** Meeryo Choe, MD **Number of faculty mentors:** 6 **Capacity:** 3

ID:	Title:	AoC:
21-005	Nervous System Control of Cardiac Function in Health and Disease	☒ Basic, Clinical, & Translational Research ☒ Innovation & Entrepreneurship
	Brief Description: The student will be integrated into ongoing clinical and/or preclinical studies to evaluate remodeling of the cardiac nervous system and heart in ischemic heart disease. This will involve hands on surgical training, experience with data acquisition and subsequent analysis. With appropriate levels of engagement in such work, the student can expect authorship on one or more papers. Read more below	**Faculty Lead:** Olu Ajijola, MD, Ph.D. **Number of faculty mentors:** 5 **Capacity:** 5

ID:	Title:	AoC:
21-006	Uncovering Gaps in Dermatologic Care	☒ Clinical, Basic, Translational Research ☒ Bioinformatics & Data Science
	Brief Description: Skin concerns are a common complaint seen by both dermatologists and non-dermatologists. This discovery year opportunity will involve exploring the factors involved in management of dermatology concerns by a dermatologist versus other specialty providers. The first project will focus on identifying challenges for pediatric patients to being evaluated by a dermatologist. This will comprise of utilizing national databases to study factors associated with specialist care, including analyzing differences in age, race, insurance status, and location. Future projects may involve investigating the concordance between ENT residents' and dermatology residents' diagnoses of common skin complaints on the head and neck. Patients with dermatologic pathology in the head and neck may present initially to either a dermatologist or an otolaryngologist, as these conditions lie at the intersection between the two specialties. It is unclear if otolaryngology residency adequately prepares its trainees and graduates to appropriately diagnose these cutaneous conditions on par with a dermatologist. This study will provide greater clarity on the training of different specialties in management of skin complaints. This is an important to distinguish as providers are often uncertain which specialty to send referrals to.	**Faculty Lead:** Carol Cheng, MD **Number of faculty mentors: 2** **Capacity: 1**

	Other additional opportunities for scholarly work (review article, case reports) proposed by the student during the discovery year are encouraged and welcomed. The student will also be encouraged to shadow in dermatology clinics to further enrich the student's learning experience.	

ID: 21-007	**Title:** ▪ Examination of variation in clinical and financial outcomes of various surgical/interventional procedures ▪ Development of smart sensors to detect oxygen and metabolites ▪ Design of biocompatible surfaces for blood pumps/circuits	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Innovation & Entrepreneurship ☒ Bioinformatics & Data Science ☒ Health Delivery Improvement Science
	Brief Description: CORELAB website: http://surgery.ucla.edu/corelab Established in 2013, the UCLA CORELAB represents a cooperative research space that facilitates research activities with the goals of developing the next generation of physician scientists, inventors, and leaders. The lab has trained over 45 medical students, and 8 postdoctoral students to date and has been extremely productive with 180 publications. The group has several collaborators from various disciplines and a wide breadth of projects that can be described in 2 categories: 1. Health Services Research The researchers use sophisticated statistical methods including Bayesian analysis and machine learning to identify disparities in the utilization of outcomes of various surgical and interventional procedures. While most projects are in the cardiovascular space, they cover a wide spectrum from pediatrics to liver transplantation and trauma surgery. The students learn to perform their own statistical analyses which can prepare them for a successful career in this domain. 2. Device and Sensor Design In collaboration with groups in Engineering, we actively develop body sensors for real time measurements of metabolites and oxygen. Our group developed ventilator parts and splitters during the COVID-19 pandemic and has disclosed the inventions to the UCLA Technology Development Office. Circuit development, 3D printing and computer programs for interfacing are all built by the laboratory. Several of the projects have received provisional patents with some being acquired for further commercialization.	**Faculty Lead:** Peyman Benharash MD, MS **Number of faculty mentors:** 5 **Capacity:**

ID: 21-008	**Title:** Generation and analysis of functional human organoids from pluripotent stem cells	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Bioinformatics & Data Science
	Brief Description: The overarching goal of the Yoshihara Lab is to understand the origins of life and physiology through utilizing state-of-the-art biomedical technologies. We have established exclusive unique human organoids technology, generated from pluripotent stem cells. The student will be participated in the ongoing research projects relate to human islet organogenesis, functional genomics and animal physiology to investigate molecular mechanism of the pathogenesis of type 1 and type 2 diabetes and find the way for functional cure of these disease. Yoshihara lab homepage: https://eijiyoshiharalab.com/	**Faculty Lead:** Eiji Yoshihara, Ph.D. **Number of faculty mentors:** 1 **Capacity:** 2-3

ID: 21-009	**Title:** Using Artificial Intelligence to Improve Screening Mammography Interpretation and Efficiency in a Real-World Clinical Setting.	**AoC:** ☒ Clinical, Basic, Translational Research ☒ Bioinformatics & Data Science
	Brief Description: The student will participate in a project that is supported by the Department of Radiology at UCLA exploring the real-world clinical effectiveness of using artificial intelligence (AI) to aid in interpretation of screening mammograms. Retrospective reader studies have demonstrated that AI algorithms may improve mammography screening accuracy beyond radiologist interpretation alone. However, the effectiveness of AI in screening mammography in a real-world clinical setting remains unknown. The above team of faculty at UCLA are preparing a prospective clinical trial in collaboration with the company ScreenPoint Medical using their FDA-approved Transpara AI software to aid in interpretation of screening mammograms. The breast imaging service at UCLA performs approximately 200 screening mammograms per day, and we anticipate a minimum interpretation of 1,000 screening exams using AI per radiologist participating in the study. In addition to the primary clinical question (does AI improve accuracy and efficiency of a mammography interpretation?), several additional clinical questions and associated side projects are anticipated. For example: how is the use of AI accepted by radiologists and patients? Does AI reduce the need to compare to prior mammograms? Does AI preferentially help certain patient demographic groups? Therefore, students will have the opportunity to participate in multiple aspects of this study depending on their areas of interest: study design/data organization, survey design and administration to assess radiologist acceptance of AI, data analysis, abstract and manuscript preparation for main and/or side projects.	**Faculty Lead:** Hannah Milch MD Melissa Joines MD **Number of faculty mentors:** 8 **Capacity:** 2

ID: 21-010	**Title:** Innovation in Heart Research & Training (The IHEART Program)	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Bioinformatics & Data Science ☒ Health Delivery Improvement Science
	Brief Description: Cardiovascular disease is the leading cause of disability and death in developed countries. The Smidt Heart Institute at Cedars-Sinai Medical Center has been a pioneer in innovative research resulting in the development of novel diagnostic tools and therapeutics for the prevention and treatment of cardiovascular disease, notably the Swan-Ganz catheter, thrombolytic therapy for acute myocardial infarction, laser atherectomy and percutaneous replacement of cardiac valves. Cedars-Sinai also has the largest adult cardiac transplant program in the United States. Students will have an opportunity to perform research broadly related to Cardiovascular disease. We offer research in the following areas: 1) Basic, Translational and Clinical Research, 2) Bioinformatics and Data Science, and 3) Health Delivery Improvement Science. Read more below	**Faculty Lead:** Joshua I. Goldhaber, MD, FACC, FISHR Natalie Bellow, MD, MPH **Number of faculty mentors:** 16 **Capacity:**

ID: 21-011	**Title:** Head and Neck Cancer: From molecular basis to survivorship	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Bioinformatics & Data Science
	Brief Description: This group of cancer researchers offers a unique research and education opportunity for students interested in head and neck surgery or cancer more broadly. Specific projects currently underway include: novel imaging diagnostics, molecular and salivary biomarkers, microbiome interactions, curcumin therapy for treatment of oral cancers, cell-based therapies for functional restoration of voice and swallowing, and long-term quality of life in head and neck cancer survivors. The breadth of projects and faculty ensures that ample projects will be in place at the time of Discovery Year launch. Our expectation is that Discovery Year students will actively take responsibility for a primary project. The scope should be similar to a master's thesis, and should result in at least one first-authored publication on this research topic. Additionally, there will be opportunities for more publications on clinical topics and additional basic research problems. The student should also present their work at a national meeting in order to increase their visibility and networking for residency matching.	**Faculty Lead:** Jennifer Long, MD, PhD Maie St. John, MD, PhD **Number of faculty mentors:** 7 **Capacity**: 2

ID: 21-012	Title: (A) Experimental and theoretical studies on ion channelopathies of skeletal muscle: the causes and opportunities for intervention in myotonia and periodic paralysis.	AoC: ☒ Basic, Clinical, & Translational Research ☒Medical Education & Leadership
	Brief Description: (A) Students will have an opportunity to gain a greater understanding of how fundamentals of basic science are applied in a translational context to the development and pre-clinical testing of disease-modifying therapies. This project is focused on inherited ion channel disorders of skeletal muscle. Students may choose from several active areas of research: (i) functional testing of muscle performance in mouse models of disease, (ii) adapting gene editing technologies to treat channelopathies of skeletal muscle, (iii) computational approaches to understanding mechanisms by which disrupted cellular excitability impacts muscle performance and to identify opportunities for intervention.	**Faculty Lead:** Steve Cannon, MD Ph.D. **Number of faculty mentors:** 1 **Capacity: 2**

ID: 21-013	Title: Fetal and Newborn Origins of Obesity: Mechanisms and Prevention	AoC: ☒ Basic, Clinical, & Translational Research
	Brief Description: Clinical Studies: Examine the role of breast milk and formula feeding on the growth of infants. Translational Studies: Using cell culture and mice studies, examine how maternal nutrition influences fetal growth and the development of the appetite/satiety system and breast milk composition and volume.	**Faculty Lead:** Michael Ross, MD, MPH **Number of faculty mentors:** 2 **Capacity:**

ID: 21-014	Title: Understanding Autoimmunity	AoC: ☒ Basic, Clinical, & Translational Research
	Brief Description: We have multiple projects that would be appropriate for a Discovery year by a medical student. Our lab is focused on understanding autoimmunity and anti-cancer immunity with the goal of modulating the immune response for therapeutic purpose. Our studies are mechanistic in nature and utilize patient samples and animal models for basic and translational studies.	**Faculty Lead:** Maureen Su, MD **Number of faculty mentors:** 1 **Capacity:**

ID: 21-017	**Title:** Epilepsy Neuroimaging	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: This project or area of concentration will focus on clinical and research topics relating to neuroimaging in epilepsy and seizure disorders. The students will be involved in shadowing a neuroradiologist as they review diagnostic cases, will help neuroradiology faculty and fellows prepare cases for weekly epilepsy meetings, and will work within the UCLA Center for Computer Vision and Imaging Biomarkers on a number of possible research projects relating to advanced imaging in epilepsy including seizure foci localization using multiparametric imaging, advanced sodium MRI, MR elastography, PET imaging biomarkers, and other technologies.	**Faculty Lead:** Benjamin M. Ellingson, Ph.D. **Number of faculty mentors:** 2 **Capacity:** 2

ID: 21-018	**Title:** Neuro-Oncology Neuroimaging	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: This project or area of concentration will focus on clinical and research topics related to brain tumor imaging. The student will be involved in shadowing a neuroradiologist as they review diagnostic cases, will help neuroradiology fellows and attending physicians prepare cases for weekly brain tumor board, and will work within the UCLA Brain Tumor Imaging Laboratory on one of many possible research projects relating to translational advanced imaging (e.g. MRI or PET imaging) for diagnosis, therapeutic monitoring, and/or metabolic or physiological characterization of brain tumors. We have accumulated a large database of MRI and PET scans from brain tumor patients on a number of therapeutic clinical trial and have a number of prospective research projects ongoing relating to brain tumor imaging. Students will be exposed to research involving both brain tumor patients as well as preclinical studies. Students will be responsible for a specific project during their training and in the end will complete a scientific manuscript and a conference abstract related to their research work.	**Faculty Lead:** Benjamin M. Ellingson, Ph.D. **Number of faculty mentors:** 3 **Capacity:** 2

ID: 21-020	**Title:** Clinical-Translational Studies of Prevention, Acute Treatment, and Recovery from Stroke	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Health Delivery Improvement Science

	Brief Description: The student will perform a mentored research study of already-collected data from UCLA and international stroke patients on a topic related to the prevention, acute treatment, or recovery from stroke. The exact project will be selected by the student from among 3 options available at the time of the start of the research period. The student will perform literature review, data abstraction, biostatistics data analysis, patient assessment, manuscript writing, and journal submission.	**Faculty Lead:** Jeffrey Saver, MD **Number of faculty mentors:** 1 **Capacity:** 1

ID: 21-022	**Title:** Transcriptomic Profiling of Extracellular Vesicles as a Prognostic Biomarker in Hepatocellular Carcinoma	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Bioinformatics & Data Science
	Brief Description: Drs. Tseng, Agopian, Zhu and You are the co-investigators of a collaborative, multidisciplinary team dedicated to the development and application of novel biomarkers for the diagnosis and prognostication of hepatocellular carcinoma (HCC). Over the past few years, the group has established liquid biopsy approaches, including isolation of extracellular vesicles (EVs) and circulating tumor cells (CTCs), as noninvasive diagnostic solutions in hepatocellular carcinoma (HCC) that have the potential to improve on the standard of care radiologic assessments for detection and prognostication of HCC and ultimately push the frontline of personalized treatment decisions. UCLA and Cedars-Sinai both have a robust liver cancer translational program, and annually evaluate and manage hundreds of early-stage HCC patients who are undergoing evaluation for surgical treatments, advanced-stage patients undergoing systemic and targeted therapy, as well as patients with chronic liver diseases undergoing HCC surveillance. The goals of the group includes: 1) conduct a phase 1 and phase 2 biomarker studies to establish and validate a diagnostic model of HCC EV digital scoring assay for detecting early-stage HCC, 2) determine a biomarker panel comprised of HCC EV-derived mRNA signatures for the prognostication of HCC, 3) validate a biomarker panel comprised of HCC EV-derived mRNA signatures to detect minimal residual disease (MRD) following surgical resection/liver transplantation and detect recurrence. Learn more below	**Faculty Lead:** Hsian-Rong Tseng, Ph.D. Vatche G. Agopian, M.D. **Number of faculty mentors:** 4 **Capacity:** 2

ID: 21-024	**Title:** Glial Biology in Medicine	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Bioinformatics & Data Science

	Brief Description: There is increasing recognition that the brain is not just a collection of neuronal circuits and needs to be studied as an organ. The major cell types of the brain are neurons, microglia, oligodendrocytes, and astrocytes. Glia may represent as much as 50% of the cells in the human brain (although consistent numbers are hard to find). Yet, historically, glial cells were considered merely the glue that held the brain together. With recent advances, however, far from being a homogenous glue, astrocytes, oligodendrocytes, and microglia are emerging as specialized contributors of brain physiology and disease. They influence the progression and outcome of virtually all CNS diseases, injuries, and disorders. In the case of neurodegenerative disease and psychiatric illness, dysfunction in glial cells may even be causative. Nonetheless, glia have not been exploited to treat brain disorders and have not been studied in depth for numerous brain diseases. The ability to investigate glia comprehensively at a fundamental level as part of Glia Biology in Medicine is expected to identify therapeutic targets within glia for neurological and psychiatric disorders and also enrich our understanding of basic brain biology.	**Faculty Lead:** Baljit S. Khakh, Ph.D. Ye Zhang, Ph.D. Lindsay De Biase, Ph.D. Michael Sofroniew, MD, Ph.D. **Number of faculty mentors:** 11 **Capacity:** 9-10

ID:		
21-025	**Title:** Understanding the epigenetic regulation of cell fate transitions in development and disease and exploiting findings for developing new treatment approaches	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: We have two project suggestions. The goal of the first project is to better understand human development, implantation and how these processes can go wrong. Infertility is a disease that affects around 1 in 8 couples of reproductive age in the United States (CDC). One of the major treatments for infertility involves in vitro fertilization (IVF), with ~2% of children born today using this technology. Despite the number of couples embarking on IVF, around 60-70% of IVF cycles fail due to problems with embryo development. Even for normal pregnancies, it is estimated that up to 70% of pregnancy result in miscarriage in early post-implantation stages. About half of early pregnancy loss cases are due to embryo aneuploidy; yet little is known about the pathophysiological processes in the remaining cases. Moreover, most estimates of pregnancy successes may not be applicable to the general pregnant population due to biases in who enters in pregnancy studies and utilizes assisted reproductive technologies, and recent studies begin to suggest different success rates for some ethnicities. To improve pregnancy success rates for normal and IVF embryos across contemporary populations, a better understanding of blastocyst development and events associated with embryo implantation and early lineage specification across diverse genetic backgrounds is required. We will obtain this information by studying stem cell-derived embryo models and developing new implantation models. The goal of the second project is to understand causes of female-biased auto immune diseases through studies of the X-inactivation process. The long non-coding RNA Xist is a key component of the X inactivation process. The RNA spreads over the entire X chromosome to initiate inactivation of one X chromosome early in development and remains associated with the Xi to maintain the inactive state throughout lifetime of the organism. Lymphocytes are unique among somatic cells in that Xist is instead dispersed throughout the nucleus. Dispersion of Xist does not affect expression of most genes of the Xi because redundant mechanisms maintain their inactive state; however, the expression of escapee's is	**Faculty Lead:** Kathrin Plath, Ph.D. **Number of faculty mentors:** 1 **Capacity:** 2

	dramatically increased in the absence of Xist RNA on the Xi. Thus, lymphocytes from women and from Klinefelter Syndrome patients display much higher expression of Xi escapee's compared to those from normal men. Among the escapee's are several regulators of critical immune response pathways such as *TLR7* and it has been proposed that the increased expression of Xi escapee's in lymphocytes is responsible for the increased immune response and autoimmune disease risk in women. The physiological role and mechanisms of the dissociation of Xist RNA from the Xi are not known. Here, we propose to elucidate the mechanism responsible for dissociating Xist from the Xi in lymphocytes. We anticipate that this will provide the foundation for a better understanding of the sexual dimorphism of the immune system and for novel strategies to treat autoimmune diseases.	

ID: 21-026	**Title:** Answering the Call to Action- Accurate diagnosis of antibody mediated rejection in renal transplant patients.	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: The UCLA Renal Transplant program is one of the largest transplant programs in the United States performing ~400 living and deceased donor kidney transplants per year. Post-transplant clinical management of renal transplant patients involves a range of diagnostic laboratory services from both anatomic and clinical pathology. A 2020 Banff Antibody Mediated Injury Working Group (AM-IWG) published a call to action to the immunogenetics and histocompatibility community to improve the accessibility of DSA information for the multidisciplinary care team (Schinstock 2021), and found significant discrepancy between pathologist and clinician interpretation of Banff criteria in diagnosis of allograft rejection (Schinstock 2019). In response to the call to action, our group will assess clinical and diagnostic data to determine UCLA's adherence to Banff criteria in the diagnosis of rejection. This project will provide the student a rich environment for learning about pre- and post- transplant risk factors for renal allograft rejection. Read more below	**Faculty Lead:** Michelle Hickey, PhD, D(ABHI), Jonathan Zuckerman, MD PhD, Erik Lum, MD **Number of faculty mentors:** 3 **Capacity:** 1

ID: 21-027	**Title:** Cellular and molecular pathology of the human ear	**AoC:** ☒ Basic, Clinical, & Translational Research

	Brief Description: The project will be concentrated in the study of contemporary concepts in Oto-Neurology. Specifically, the student will develop research and clinical skills to apply to understand in deep the normal and pathology human ear (auditory and equilibrium portion). The project will be focused in the inner (ear) internal ear pathology. Our laboratory house one of the largest collections (1200+) in the world of human temporal bones acquired for 60 years. This collection includes normal and pathological ear specimens. Each temporal bone as a hematoxylin and eosin collection and unstained sections suited for cellular and molecular biology experimentation. The student will be able to lead in deep the pathology of the human ear and the clinical and surgical approaches used to treat inner ear diseases. There will also opportunity to investigate the molecular basis of ear disease using state of the art imaging techniques (transmission electron microscopy and laser confocal microscopy), as well as shadow Dr Ishiyama lead ear surgeon. The clinical basis of vestibular disorders (pathology and pharmacology) will be tough by Dr Gail Ishiyama.	**Faculty Lead:** Ivan A. Lopez, Ph.D., M.S. **Number of faculty mentors:** 3 **Capacity:** 5-6

ID: 21-028	**Title:** A real-time compliance monitoring system for the management of pediatric orthopaedic patients.	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: My laboratory has focused on the development of wearable sensors and devices for the past several years. After establishing a 3D printer facility in our lab, the second largest on campus, we have started developing stretchable and textile integrated sensors for activity monitoring. Applications vary from compliance to motion and gait analysis. Our goal has always been to transfer technologies into the clinic and outside the specialized lab. We have established competence in sensor fusion, sensor networking, gait analysis, motion analysis, algorithm development, supporting app development, data mining, artificial intelligence, and machine learning. Moreover, we have refined and perfected medical device design and engineering. A student will participate in developing an intelligent system to monitor children's compliance and adherence to clubfoot treatment. However, the sensor system being developed has applications well beyond clubfoot pathology. The student will be exposed to all of these possible applications, including cast wear, post-operative weight-bearing, and gait training, by interacting with the clinical collaborator and mentor. Through this dedicated mentorship, the student will deepen their understanding of clubfoot pathology, the associated treatment, and the need for dedicated monitoring of patient adherence to treatment protocols. The importance of treatment compliance and monitoring extends to other clinical conditions in this population. Through clinical mentorship, the student will be encouraged to explore other clinically relevant diagnoses and develop alternative strategies to improve patient engagement and satisfaction in a multitude of pediatric orthopaedic conditions. This is a unique opportunity to develop skills in device development and application to unmet clinical needs. Learn more below	**Faculty Lead:** Fabrizio Billi, PhD **Number of faculty mentors:** **Capacity:** 1

ID: 21-029	**Title:** Interferon signatures of antibody-mediated rejection	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: Organ transplant rejection is a serious complication arising from immune recognition of genetic mismatches between recipients and donors, called alloimmunity. Rejection is a complex process involving recipient immune activation concurrent with donor vascular inflammation. Mainstay immunosuppression impairs the adaptive immune compartment, profoundly impacting protective immunity, but does not target the donor organ, which would provide more local and specific prevention of rejection, and is inadequate to suppress B cell immunity and prevent production of donor specific antibodies. Antibodies activate complement, which triggers vascular inflammation through direct effects on the endothelium in multiple antibody-mediated diseases, including autoimmunity and organ transplant rejection. Antibody-mediated rejection (AMR) is a predominantly vascular disease and is a significant cause of post-transplant morbidity and graft loss. Endothelial cell (EC) activation and immune cell infiltration in the tissue are signatures of numerous vascular inflammatory diseases, including cardiac transplant rejection. EC centrally regulate leukocyte access to peripheral tissue and immune cell activation, and exhibit remarkable tissue-specific transcriptomic, phenotypic and functional diversity. Others have reported and we have confirmed that endothelial cells stimulated with antibodies and human serum complement upregulate an extensive repertoire of adhesion molecules and chemokines, with an early noncanonical NFκB signature. However, this is disconnected from the predominantly interferon (IFN)-related clinical signatures of antibody-mediated autoimmune diseases and alloimmune rejection. Not knowing the signaling and phenotypic changes downstream of complement activation, especially those specific to tissue endothelial cells, represents a major gap in knowledge. Dissecting the differential endothelial inflammation across organs and vascular beds will reveal intrinsic protective and detrimental mechanisms and enable development of more targeted therapies for AMR. Our results also show that long-term stimulation of EC with complement promotes an IFN-like response. Therefore, this project will explore the long-term inflammatory effects of anti-donor MHC antibodies on endothelial cell activation, including pro-inflammatory and costimulatory phenotypes, effects on leukocyte recruitment and potential therapeutic avenues for ameliorating AMR. The student will perform laboratory experiments using human endothelial and immune cells, and a mouse model of MHC antibody-induced organ injury, with inhibitors of JAK/STAT signaling, to determine whether the IFN signature of complement-mediated vascular inflammation can be suppressed with Jakinibs or STAT inhibitors.	**Faculty Lead:** Nicole M Valenzuela, Ph.D. **Number of faculty mentors:** 1 **Capacity:** 1

ID: 21-030	**Title:** Multidisciplinary Oncologic Care Through the Lens of Hepatobiliary Cancers	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: Successful oncologic care of patients requires multidisciplinary care. Tumor boards allow real time collaboration between several departments for oncologic care of an individual patient and to discuss	**Faculty Lead:** Anthony Bejjani, MD

	evolving evidence and developments applicable to their care. An understanding of this model, either for the aspiring oncologist or any leader in healthcare delivery, is essential to advance the student's growth. This model would be applied to hepatobiliary cancers, particularly HCC, and the many divisions involved in their care. The project would first involve the students' learning about screening modalities, defining high risk populations, and guideline creation. The second part would involve attendance of tumor board sessions at the VA Greater Los Angeles Health system from 12-1pm on Tuesdays to witness the contribution of each department. The final would involve a health delivery improvement project, aimed at first defining whether the impact of a new advance in HCC care, the approval of atezolizumab and bevacizumab, led to increased EGD's as standard of care for variceal surveillance, which was mandatory prior to receiving bevacizumab. Some basic Requirements would be: The seminar describing levels of evidence and interpreting guidelines may fit as either preparation for year 3 or within the scope of starting for year 3. This would also be when the student attends the Tuesday tumor boards to understand the goals of multidisciplinary care.	**Number of faculty mentors:** 1 **Capacity:** 2

ID: 21-031	**Title:** Developing tumor organoid models for biology interrogations and precision medicine applications	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: My laboratory has two major and overlapping areas of interest. Our two NIH-funded, translational research programs are both focused on improving cancer patient outcomes by developing innovative therapeutic strategies. Firstly, we investigate how protein aggregation affects cancer development and progression in order to identify novel therapeutic targets and develop peptide drugs with anti-cancer capabilities. In particular, we focus on p53 aggregation in ovarian cancer and pursue ReACp53 as a therapy for ovarian cancer and other solid malignancies **(a, b)**. In parallel, we have pioneered high-throughput methods to establish, grow and screen patient-derived tumor organoids **(c, d, e)**. Presently, we are using our approach to model and study rare cancers and sarcomas in particular. Over the past 2.5 years, we have established sarcoma models from over 110 patients and more than 30 different histologies. The student will broadly work on developing tumor organoid models of disease, and sarcoma in particular **(c, d, e)**. Among the possible directions is the investigation of how the molecular and pharmacologic behavior of sarcomas varies both in time, due to the selective pressure of therapy, as well as in space, during the transition from primary to lethal metastatic disease. In addition, the student can participate to translational research focused on the clinical implementation of our organoid screening	**Faculty Lead:** Alice Soragni, MD **Number of faculty mentors:** **Capacity:**

	platform results to identify effective personalized therapies for sarcoma patients.	

ID: 21-032	**Title:** Research opportunities in non-malignant kidney, urology and hematology (KUH)	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Bioinformatics & Data Science ☒ Health Delivery Improvement Science
	Brief Description: A recently funded NIH program aims to promote research training in benign nephrology, urology and hematology. We have assembled a strong leadership team and a group of experienced mentors with active research programs covering the spectrum from basic to translational, health services and computational research. Work sites are located on Westwood campus of UCLA, at the Cedars-Sinai Medical Center and at the Lundquist Research Institute at Harbor-UCLA Medical Center. Depending on their specific interests, students will be matched with suitable mentors.	**Faculty Lead:** Isidro Salusky, MD, Tomas Ganz, PhD, MD and Jennifer Anger, MD **Number of faculty mentors:** 20+ **Capacity:** 5

ID: 21-033	**Title:** Function of histone proteins in biology and disease	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: The projects in our lab are based on our newly discovered function of histones as enzymes (Attar et al. *Science* 2020). Histones were initially assumed to mainly enable the packaging of large amounts of eukaryotic DNA into the confines of the nucleus. Pioneering experiments in the 1980s and 1990s revealed that histones also function in regulating gene expression and essentially all other DNA-based processes (recognized in 2018 by Lasker Awards to Grunstein and Allis). However, ancestral histones were present in organisms with small genomes, no nucleus and little ability for epigenetic regulation, suggesting that histones may have an additional, unknown function that served as the original impetus for their evolution. We have indeed discovered a novel function for the histone H3-H4 tetramer, the structure most similar to ancestral histone complexes. We have shown that the H3-H4 tetramer binds a Cu2+ ion in a pocket formed by the two opposing histone H3 proteins, and catalyzes its reduction to Cu1+. Learn more below	**Faculty Lead:** Siavash Kurdistani, MD **Number of faculty mentors:** 1 **Capacity:** 2

ID: 21-034	**Title:** Development of novel mRNA vaccines capable of inducing strong T cell-mediated immunity against viruses and cancer	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: Our team has developed a platform to produce and test novel mRNA vaccines for both infectious diseases and cancer. We have demonstrated that these mRNA vaccines lead to the production of very high titers of neutralizing antibodies against SARS-CoV-2 and are also effective against a contemporary, heterologous influenza A strain. Moving forward, we aim to further determine the breadth of neutralization against a panel of influenza virus strains. The team also plans to develop improved mRNA vaccines that better engage T-cells for stronger T-cell immunity against viruses and tumors by decoupling the antigen from adjuvant aspects of mRNA constructs. The development of these novel mRNA vaccines will be guided by state-of-the-art Positron Emission Tomography and mass spectrometry approaches developed by our group to monitor immune responses and discover novel functional links between metabolic networks and the immune system. Students will receive guidance directly from their mentors as well as graduate students, post-doctoral fellows, research resident physicians, and well experienced laboratory technicians. They will learn to critically evaluate literature to design and run appropriate *in vitro* and *in vivo* experiments for mechanistic studies and preclinical evaluation of novel mRNA vaccine for their efficacy. Students will also have the unique opportunites to acquire hands-on experience with various mass spectrometry techniquies, including metabolomics, proteomics, phosphoproteomics and immunopeptidomics which are performed routinely in our group. They will also have the opportunity to learn molecular imaging techniques such as Positron Emission Tomography. They will acquire expertise in key immunological techniques and they will become familiar with animal models of viral infection and cancer.	**Faculty Lead:** Caius G Radu M.D. **Number of faculty mentors:** 2 **Capacity:**

ID: 21-035	**Title:** Computational EEG Analysis in Pediatric Epilepsy	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: With guidance, the student will choose a project focused on a specific form of pediatric epilepsy, with application of novel computational electroencephalography (EEG) techniques. The student will gain a basic familiarity with clinical epilepsy and EEG interpretation, with substantial exposure to computational analysis. The student will periodically attend patient encounters in a supervised fashion—including intraoperative EEG—to see first-hand how raw data is collected and to gain perspective as to how the research project specifically addresses a relevant question in patient care.	**Faculty Lead:** Shaun Hussain MD, MS **Number of faculty mentors:** 3 **Capacity:**

ID: 21-036	**Title:** Therapeutic approaches to prevent blindness by targeting metabolic pathways in the retinal pigment epithelium	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: Our laboratory aims to address an urgent unmet need of new experimental models for macular degenerations for which no therapies are currently available. We use genetic, biochemical, cellular, and molecular advances to elucidate the underlying mechanisms of photoreceptor cell loss in recessive Stargardt (STGD1), a juvenile maculopathy, and in a related disease called age-dependent macular degeneration (AMD). In particular, we explore the retinal pigment epithelium (RPE) as a cell-autonomous driver of pathology with an emphasis on retinaldehyde toxicity and innate immunity dysregulation. My group has developed both mouse and human iPSC-derived RPE disease cell-based models to identify fundamental biological processes at the intersection between the complement system, retinoid metabolism, mitochondria, and endolysosomal pathways in normal and immune-compromised RPE cells. Students will be actively involved in preclinical studies directed towards: (1) dissecting the intercellular organelle dynamics in the RPE cells with a focus on endolysosomes and mitochondria molecular connections; (2) identifying cell membrane-mediated signaling pathways responsible for the loss of RPE homeostasis in disease models; (3) exploring novel therapeutic strategies to promote RPE cellular homeostasis and prevent blindness. Learn more below	**Faculty Lead:** Roxana Radu, MD **Number of faculty mentors:** 1 **Capacity:** 2

ID: 21-037	**Title:** In depth evaluation of immune-related adverse events (irAEs) in cancer patients treated with immune checkpoint inhibitors (ICIs)	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Bioinformatics & Data Science
	Brief Description: The emergence of immune checkpoint inhibitors (ICI) has revolutionized treatment of cancer. However, with the increased use of ICIs in cancer, a new class of adverse events has emerged, termed immune related adverse events (irAEs). This project will immerse interested medical students in a team of researchers committed to the improved understanding of the off-target effects of immunotherapy. Specifically, our translational research group, led by Dr. Edward Garon, consists of individuals from a variety of different training levels that meet on a weekly basis to discuss and pursue research questions aimed at improving the care of patients with advanced malignancies. Importantly interested students will have an excellent opportunity to co-author peer-reviewed publications as a result of involvement with this project, as the second author of the *Cancer Immunology Research* publication cited below performed his analysis during a gap year between undergraduate studies and eventual medical school matriculation, while the first author of our *Lung Cancer* publication is currently a third-year DGSOM student. See more information below.	**Faculty Lead:** Aaron Lisberg, MD **Number of faculty mentors:** 2 **Capacity:** 2

ID: 21-038	**Title:** Studies in the pathobiology of iron	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: Iron is an essential trace element. Both iron deficiency and iron excess are common in the US and worldwide and cause substantial morbidity. Iron and iron-containing proteins participate in the pathogenesis of many diseases, so iron is a target for diagnostics and new treatments. Students with prior experience in biomedical laboratory research are invited to participate in a mentored laboratory research project focused in understanding the role of iron in health and disease.	**Faculty Lead:** Tomas Ganz, PhD, MD Elizabeta Nemeth, PhD **Number of faculty mentors:** 2+ **Capacity:** 1

ID: 21-039	**Title:** Exploring interactions of metabolic pathways in pancreatic ductal adenocarcinoma as potential therapeutic targets	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: The laboratory has multiple projects elucidating the interplay of various metabolic pathways in pancreatic ductal adenocarcinoma (PDAC) with the goal of designing efficacious treatment combinations. One of the main pathways on our focus currently is Stimulator of Interferon Genes (STING) signaling, which is activated by cytoplasmic DNA, and results in an induction of Type I Interferon (IFN) and NFκB-linked cytokine production. Pharmacologic activation of STING, which is highly expressed in PDAC, leads to inflammatory changes in the tumor microenvironment that enhance tumor cell antigen presentation and recruitment of CD8+ cytotoxic T-cells. Students will be actively involved in preclinical exploration of the effects of STING agonism on improving the efficacy of immune checkpoint blockade in PDAC. They will focus on the effects of STING activation in malignant or nonmalignant compartments of the tumor microenvironment comprising of fibroblasts, endothelial cells, macrophages, and lymphocytes. Another potential opportunity will be exploring the interplay between STING activation and MAPK pathway blockade with MEK or mutant KRAS specific inhibitors in the malignant compartment of PDAC. Students will receive guidance directly from their mentors as well as graduate students, postdoctoral fellows, research resident physicians, and well experienced laboratory technicians. They will learn to critically evaluate literature to design and run appropriate *in vitro* and *in vivo* experiments for mechanistic	**Faculty Lead:** Timothy Donahue M.D. **Number of faculty mentors:** 2 **Capacity:** 1-2

	studies and preclinical evaluation of treatment combinations for their efficacy. Students will also have the unique opportunity to witness the translation of novel treatments combinations in clinical trials.	

ID: 21-040	**Title:** Immunobiology of preterm labor and pathogenesis of fetal inflammation	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: With active and long-standing NIH and other funding support, our lab has created models of intrauterine infection and inflammation in the Rhesus macaque to model human preterm labor due to chorioamnionitis. This is a leading cause of prematurity. We have a rich bio-bank of Rhesus macaque tissues and human placenta from controls vs. intrauterine infection/inflammation cases. We will assist the student to do a project on placenta immunology or investigation of fetal organ inflammation. All necessary methods and education will be given during the duration of the project.	**Faculty Lead:** Suhas G. Kallapur MD **Number of faculty mentors:** 2 **Capacity:** 1

ID: 21-041	**Title:** STIs and Contraception Among Adolescent and Young Adult Women	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: We will discuss the student's interests and learning goals to decide which research project(s) would be the best fit. The following are some examples of our current projects as of this writing (May 2023). Our team's current R01-funded project is titled, "Biological Vulnerability to Chlamydia trachomatis in Adolescents and Young Women: the Complex Intersection of Cervicovaginal Microbiome, Cervical Maturation, and Mucosal Immunity". This project uses stored specimens (cervical and vaginal) already collected from a 25-year prospective cohort. To examine the biological risks for acquisition of Chlamydia infection, we are studying the cervical microbiome, metabolome, proteome, inflammatory immune factors, and cervical ectopy. The rich dataset also includes extensive behavioral data. The student could participate in the larger study and/or create sub-studies involving new research questions. Additional examples include projects regarding Intrauterine Devices (IUDs) and also Human Papillomavirus Infection in Mothers and Newborns. For these clinical studies, students would gain experience in patient interaction, patient enrollment at both UCLA Westwood campus and UCLA-Harbor campus.	**Faculty Lead:** Loris Y Hwang MD **Number of faculty mentors:** 2 **Capacity**: 1-2

	Another option is for the student to work with Dr. Hwang to create their own smaller project in the area of adolescent reproductive health that would be feasible for the student to lead directly from start to finish.	

ID: 21-043	**Title:** Immune responses and host defense mechanisms in the skin	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: My lab focused on the investigation of immune responses and host defense mechanisms in the skin, using common skin disease as a model. My lab is also engaging in translational research, taking bench findings to pre-clinical to develop novel therapeutics that could be used for treatment of human skin diseases. Students will study the literature, define a project, develop a hypothesis, design experiments, learn basic research techniques, analyze data, and present their results. My team has the expertise, leadership, and proven history to successfully mentor students on a research project.	**Faculty Lead:** Jenny Kim, MD, Ph.D. **Number of faculty mentors:** 1 **Capacity:** 1

ID: 21-044	**Title:** Portal hypertension and interventional theragnostics	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Global Health ☒ Innovation & Entrepreneurship ☒ Bioinformatics & Data Science
	Brief Description: The student will be able to participate in a wide range of projects including multi-centered retrospective studies, randomized control clinical trials to pre-clinical research projects. We have several on-going databases for interventional procedures including TIPS, CARTO/PARTO and variceal embolization which will be utilized for retrospectives studies. In addition, we have a grant funded clinical trial which can be an excellent opportunity for student researchers. In addition, we have a dedicated pre-clinical imaging and interventional research facility which can be utilized for new device testing and development, and hypothesis-driven translational research projects. The student will be involved in data collection and analysis, statistical analysis, pre-clinical interventional procedures, imaging interpretation and data analysis and manuscript and presentation preparation. We strongly encourage students to participate in national and international conferences.	**Faculty Lead:** Edward Wolfgang Lee M.D., Ph.D., M.Sc., DABR, FSIR Sammy Saab, MD Frank Hao, MD **Number of faculty mentors:** 3 **Capacity: 5-6**

ID: 21-045	**Title:** Physiology and Pathophysiology of Pulmonary Diseases	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: If you cannot breathe, nothing else matters! Obstructive respiratory diseases, such as COPD and asthma, are costly and pose an inordinate amount of health burden to the patient and on health care systems. Pulmonary infections are life-threatening and often difficult to treat given the delicate immune environment within the lung. This Discovery Area of Concentration will expose students to basic and clinical research tools in pulmonary disease and immunology that aim to address these concerns with the overarching aim of improving patient outcomes and quality of life. The team has long experience in investigating mechanisms and therapies for those with chronic respiratory diseases and exercise limitation. These include basic science studies in asthma (PMID 30279412), pneumonia (PMID 29461970), or emphysema (PMID 15208295) and clinical studies of COPD (PMID 31633896), interstitial lung disease (PMID 21388308) or CHF (PMID 29588313). The fellow will have the flexibility to choose from projects that have a basic science or clinical focus. Recent examples of projects students would have the opportunity to be involved with include: 1. The role of antioxidants, iron and mitochondrial function in COPD cachexia. 2. Wearable biosensors to monitor exacerbation risk in COPD. 3. Changes in dynamic airway function during exercise in health and chronic lung disease. 4. Sex-differences of c-fiber neural mediated cytokine release and immune cell trafficking in fungal asthma and bacterial pneumonia. Clinical scientific methods include, but are not limited to, cardiopulmonary exercise testing, pulmonary function testing, physical function assessments, and non-invasive assessment of muscle oxidative capacity (using near infrared spectroscopy). Basic scientific methods include cell culture, high-resolution tissue respirometry, perfused organ preparations and *in vivo* rodent models employing physiological techniques to replicate clinical methods as well as immunological (e.g. flow cytometry, intravital imaging) and electrophysiological (e.g. patch-clamp, calcium imaging) methods. Trainees are expected to master one or more of these techniques, and apply this to conduct experiments and collect quality data to address a specific research question. It is expected that students will be involved in initial discussions of the experimental design and protocol, the submission of necessary approvals (e.g. IRB/IACUC) and all aspects of conducting the research study e.g. subject recruitment/animal husbandry, data collection, analysis and preparing reports for scientific communication. This would be guided by the lead faculty supervisor, and supported by the faculty team.	**Faculty Lead:** Harry Rossiter, Ph.D. **Number of faculty mentors:** 8 **Capacity:** 2

ID: 21-046	**Title:** Medical Mycology: Fungal Pathogenicity, Antifungal Immunity, and Immunotherapy	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: Life expectancy in the Western Civilization is the highest it has ever been, due to the introduction of better hygiene practices and sophisticated medical interventions for cancer, autoimmunity and infectious disease. With these modern medical advances, a rise in the prevalence of opportunistic fungal infections has been observed, which present a particular clinical challenge due to the lack of fungal vaccines, limited rapid diagnostics, and increasing antifungal drug resistance. The mission of the Division of Infectious Diseases at Harbor-UCLA Medical Center is to advance excellence in medicine and research supporting outstanding patient care, and innovation in the discipline of infectious diseases, in particular Medical Mycology. The Medical Mycology Basic Research DGSOM Discovery program has 4 research-active faculty members, whose scholarship extends across all major areas of fungal pathogenesis (PMID: 27841851; 33720927), novel anti-infectives (PMID: 27447865; 31206021; 29697768), and antifungal immunity (PMID: 29133884; 33193324). The goal of the Medical Mycology Basic Research experience is to instruct the student in the process of developing rational hypotheses, and designing experiments to test these hypotheses. The Medical Mycology Program will provide instruction in the cognitive aspects of the following: □ Identification of a clinically significant project in the field of Medical Mycology with direct translational impact including mechanism of immunopathology, discovery of novel immunotherapeutics, vaccines, drugs/drug targets and the mechanism of action □ Cutting edge bench science and instruction by rising stars and world leaders in Medical Mycology, all under one roof □ Focus on a hypothesis-driven context for research, based upon existing literature, clinical and experimental observation, and preclinical studies. In addition, use of various approaches available to test the proposed hypothesis (including *in vitro* and *in vivo* testing, statistical power, technical limitations, etc.)	**Faculty Lead:** Marc Swidergall, Ph.D. **Number of faculty mentors:** 4 **Capacity:** 4

ID: 21-047	**Title:** Mechanisms of Cardiac Arrythmias	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Innovation & Entrepreneurship
	Brief Description: Cardiac arrhythmias are a major cause of morbidity and mortality in the U.S. and world-wide. Our laboratory is interested in delineating mechanisms of atrial and ventricular arrhythmias, and using neuromodulatory approaches for treatment of arrythmias and heart failure. Students will work on projects related to mechanisms and treatment of arrhythmias utilizing small and large animal models and human studies. Ongoing projects will include delineating neural, inflammatory, and aging related factors in addition to cardiac injury that lead to arrythmias utilizing a variety of tools ranging from high density mapping, neural recordings, optogenetic, tissue clearing, and next generation sequencing techniques.	**Faculty Lead:** Marmar Vaseghi, MD PhD **Number of faculty mentors:** 1 **Capacity:** 2

ID: 21-048	**Title:** Investigation of the dynamics of diversity-generating retroelements in the gastrointestinal microbiome	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Bioinformatics & Data Science
	Brief Description: The student will participate in a project that aims to understand the role of accelerated evolution mediated through diversity generating retroelements (DGRs) by investigating the dynamics of functional diversity of bacterial microbiome constituents in response to perturbation (i.e. antibiotic administration, changes in diet, disease mediated dysbiosis). Students will participate in experimental design and execution of laboratory work with model systems and computational genomic analysis with the goal of elucidating novel mechanisms of functional bacterial adaptation. Students are expected to have some level of experience or familiarity with both laboratory work and computational analysis methods and will be expected to take active responsibility for an independent project.	**Faculty Lead:** Jeff Miller, PhD **Number of faculty mentors:** 2 **Capacity:** 1

ID: 21-049	**Title:** Innovations in Neonatal Health and Development	**AoC:** ☒ Basic, Clinical, & Translational Research

	Brief Description: The Division of Neonatology at UCLA boasts an impressive cadre of accomplished physician scientists whose interests span all aspects of neonatal care and research. The division offers a neonatal research consortium via the Neonatal Research Council (NRC) that is committed to mentoring research trainees to prepare them for academic success. Through this consortium/council, medical students can choose from amongst multiple qualified mentors with appropriate resources needed to complete meaningful research. Students will participate in an inclusive environment that promotes multidisciplinary research, innovation, and collaboration. Opportunities for medical students are individually tailored towards those with interests in clinical, basic, or translational research. Faculty included in this proposal have expertise and R01 funding in the following fields: fetal/neonatal/pediatric nutrition and growth (in premature infants and infants and children with gastrointestinal disorders), retinopathy of prematurity/pediatric eye disorders, neonatal and pediatric liver disorders, chronic lung disease and neonatal lung injury, intrauterine infections/inflammation, and placental and fetal immunology. Under close mentorship, students will be involved in all aspects of the research project including conceptual design, regulatory approvals, data collection and experimentation, statistical analysis, and scientific dissemination (presentation at regional and national conferences and peer reviewed publications). Through their projects, each medical student will become an "expert" in a specific area of neonatal-perinatal medicine/research, and also gain tangible foundational research skills that can be applied to future research. As a complement to their individual projects, students would have opportunities to attend neonatal-specific educational and research-specific conferences with other researchers which will cover a broad range of topics such as common approaches to statistical analyses, abstract/grant/manuscript writing, and career development, as well as exposure to other neonatal research opportunities (presentations given by neonatal fellows and faculty conducting original science research) via our Neonatal Research Council.	**Faculty Lead:** Kara Calkins, MD Alison Chu, MD **Number of faculty mentors:** 3 **Capacity:** 2

ID: 21-050	**Tile:** (Several Proposed Projects Available)	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Innovation & Entrepreneurship ☒ Bioinformatics & Data Science ☒ Health Delivery Improvement Science
	Brief Description: The andrology division within the UCLA Department of Urology has a robust research program that straddles basic science, translational innovation, clinical trials, outcomes and database work, computational and data science studies, and more. We have collaborations with other clinical departments (family medicine, ob/gyn, endocrinology, and more), engineering departments at UCLA and UC Irvine, molecular biology at UCLA, among others. Early in the experience, students identify a longitudinal, primary "A"	**Faculty Lead:** Sriram Eleswarapu, MD, PhD **Number of faculty mentors:** 2 **Capacity:** 2

	project, as well as smaller secondary "B" projects. Students will participate in IRB design and maintenance, weekly (and sometimes daily) updates with Dr. Eleswarapu and/or Dr. Mills, learning in the men's health clinic (shadowing Dr. Eleswarapu, Dr. Mills, and the andrology fellows especially in patient encounters that relate to the research project), presenting research at our monthly large group meeting, and other responsibilities. Students are expected to have at least one first-author paper from the experience, and at least one co-authorship. Students will also have the opportunity to attend conferences depending on abstract submission. Students interested in urology residency will be paired with resident mentors and senior medical students. There is also an opportunity to present research at UCLA Urology Grand Rounds. Students are encouraged to practice grantsmanship and apply for awards such as research scholarship from the Urology Care Foundation, the Sexual Medicine Society, and others.	

ID: 21-051	**Tile:** Influence of Cooling Duration on Efficacy in Cardiac Arrest Patients (ICECAP) clinical trial	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: The Influence of Cooling Duration on Efficacy in Cardiac Arrest Patients (ICECAP) clinical trial (ClinicalTrials.gov registration #NCT04217551, NIH Project #UH3HL145269) is a multicenter, randomized, adaptive allocation clinical trial to determine if increasing durations of induced hypothermia are associated with an increasing rate of good neurological outcomes and to identify the optimal duration of induced hypothermia for neuroprotection in comatose survivors of cardiac arrest. The Harbor-UCLA Department of Emergency Medicine is a participating site for the trial and is actively enrolling patients, with a specific focus on engagement and enrollment of populations underrepresented in clinical trials. The goals and objectives of the study are to: 1) Enroll comatose adult survivors of out of hospital cardiac arrest that have already been rapidly cooled using a definitive temperature control method; 2) Study patients with and without initial shockable rhythms as distinct populations; and 3) Determine if identifying an optimal duration of cooling can improve outcomes, and if development of a duration response curve can substantiate efficacy in a wider patient population.	**Faculty Lead:** Kabir Yadav, MD **Number of faculty mentors:** 2 **Capacity: 1-4**

ID: 21-052	**Tile:** Randomized Placebo Controlled Trial of Intravenous N-Acetylcysteine for the Treatment of Acute Ischemic Stroke	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: The Influence of Cooling Duration on Efficacy in Cardiac Arrest Patients (ICECAP) clinical trial (ClinicalTrials.gov registration #NCT04217551, NIH Project #UH3HL145269) is a multicenter, randomized, adaptive allocation clinical trial to determine if increasing durations of induced hypothermia are associated with an increasing rate of good neurological outcomes and to identify the optimal duration of induced hypothermia for neuroprotection in comatose survivors of cardiac arrest. The Harbor-UCLA Department of Emergency Medicine is a participating site for the trial and is actively enrolling patients, with a specific focus on engagement and enrollment of populations underrepresented in clinical trials. The goals and objectives of the study are to: 1) Enroll comatose adult survivors of out of hospital cardiac arrest that have already been rapidly cooled using a definitive temperature control method; 2) Study patients with and without initial shockable rhythms as distinct populations; and 3) Determine if identifying an optimal duration of cooling can improve outcomes, and if development of a duration response curve can substantiate efficacy in a wider patient population.	**Faculty Lead:** David Tanen, MD **Number of faculty mentors:** 1 **Capacity: 1-2**
ID: 21-053	Tile: Working towards a substitute for extraocular muscle tissue using polymer hydrogel	AoC: ☒ Basic, Clinical, & Translational Research
	Brief Description: Cranial nerve palsies are a rare but very severe cause of strabismus (eye misalignment) and amblyopia (vision loss) in children. The level of vision loss from amblyopia due to a congenital oculomotor palsy is typically at the level of legal blindness. Due to the complexity of these disorders, *there are no gold standard treatments to improve eye alignment and prevent vision loss.*[4] In the presence of nerve or muscle damage, various surgical maneuvers have been proposed to realign the eye but at the cost of minimizing eye movement and creating a very narrow field of single binocular vision. **Here, we propose to create a breakthrough treatment for oculomotor nerve palsies with synthetic hydrogels as muscle substitutes, by combining the unique expertise from Engineering and Medical schools at UCLA:** (1) novel synthesis methods to create muscle-like hydrogel materials, with unprecedented tunability of mechanical properties to resemble individual patient's extraocular muscle (PI He) and (2) Implantation of the hydrogel in the orbit to function as a muscle substitute in patients with extraocular muscle denervation (PIs: Pineles and Velez). Specifically, **we will develop a new material as extraocular muscle substitutes to realign the eyes of children and adults with extraocular muscle palsies while allowing movement, to increase their field of single binocular vision.**	**Faculty Lead:** Stacy Pineles, MD Federico, M.D. **Number of faculty mentors:** 3 **Capacity: 1**

ID: 21-054	**Tile: The Role of EMP2 in diabetic retinopathy**	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: Description of project(s), opportunity, or creative/ scholarly direction, including description of the students' role in the work**.** The focus of the lab is examining the role of EMP-2 in the pathway of retinopathy of prematurity and diabetic retinopathy. The mice models are oxygen induced retinopathy, streptozocin induced-diabetic retinopathy, and EMP-2 knock-out mice. Students will participate in all aspects of the project including treating mice, mouse eye dissection, sectioning, antibody staining, and data analysis. The project has room for 2 students.	**Faculty Lead:** Irena Tsui, MD, PhD **Number of faculty mentors:** 3 **Capacity:** 2

ID: 21-055	**Title:** New approaches for treating mental disorders	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: This Discovery activity will introduce students to clinical trials that focus on new approaches for treating psychiatric disorders. Examples include medications that facilitate psychotherapy for impaired social cognition and motivational disturbances in schizophrenia, ketamine for major depression, and psychedelics for PTSD and other disorders. Our research group is involved in studies in each of these approaches. Students will be trained in skills that will permit them to actively participate in ongoing studies including ethical issues in clinical research, the informed consent process, clinical rating of psychopathology, and interpretation of study data. In addition, students will have the opportunity to learn about methods for monitoring the effects of intervention on brain targets. These are likely to include functional neuroimaging and EEG. During the initial months students will receive training in clinical trials methods. They will also develop an individual research project that can embedded in an ongoing trial. An alternative project could be a scholarly review of a research area.	**Faculty Lead:** Stephen R. Marder, MD **Number of faculty mentors:** 2 **Capacity:** 2

ID: 21-056	**Title:** Brain Tumor Immunotherapy	**AoC:** ☒ Basic, Clinical, & Translational Research

	Brief Description: Glioblastoma is a malignant brain tumor with an extremely low 5-year survival rate, with current treatments only serving to slow down its progression rather than provide a curative solution. Our current research focuses on CAR T-cells that respond to soluble ligands, which have the capacity to transform immunosuppressive cytokines into T-cell stimulants. One such T cell includes a bispecific IL-13R/TGF-beta CART, designed by Dr. Yvonne Chen. The goal of this project is to perform IND enabling studies to move this innovative CAR-T to first-in-human clinical trials. **Student's role:** Students are expected to learn and perform the above laboratory techniques and analytical methods. In addition, the student will need to be actively engaged with lab members through regular lab meetings and 1:1 sessions, ensuring they keep an open line of communication throughout their commitment. The student must ensure that they meet all deadlines, including abstract deadlines for conferences and grants, and be able to present during meetings and write manuscripts as necessary.	**Faculty Lead:** Linda Liau, MD, Phd, MBA **Number of faculty mentors:** 2 **Capacity:** 2

ID: 21-057	**Title:** Exploring novel technologies and host immunology in the setting of orthopedic implant infections	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: Our lab focuses on studying various preventative and therapeutic modalities to treat chronic implant-associated infections. Some research foci include the development of actively eluting antimicrobial implant coatings, the study of novel therapeutics to circumvent antibiotic resistance, and host immune modulation/optimization. The student will have an opportunity to gain an increased understanding of how fundamentals of basic science are applied in a translational context toward the development of therapeutics in the field of orthopaedic surgery. There are multiple projects that would be appropriate for a medical student in their Discovery Year, and there will be additional opportunities to be involved with other clinical research in conjunction with the student's main project in the lab.	**Faculty Lead:** Nicholas Bernthal, MD **Number of faculty mentors:** 2 **Capacity:** 2

ID: 21-058	**Title:** Imaging biomarkers of infectious and inflammatory ocular diseases	**AoC:** ☒ Basic, Clinical, & Translational Research

	Brief Description: The student will work closely with NIH-funded faculty in the Cornea and Uveitis Division at the Stein Eye Institute in a clinical research project. The student will lead a project of their choosing that centers around ocular imaging of infectious and inflammatory ocular diseases. Imaging devices include optical coherence tomography (anterior and posterior segment of the eye), corneal topography, confocal microscopy, laser flare photometry, and slit lamp photography. There will also be the opportunity to work with new investigational imaging devices that have not yet undergone FDA-approval. With support of faculty and post-doctoral fellows, students will obtain skills in image acquisition, processing, and analysis, and receive statistical support to carry out their project. As a member of our research team, we will provide support for students for project conception, abstract preparation, and conference attendance with funding support should the research project be accepted for presentation. Students will also receive formal mentorship in residency application and career development. In addition to the primary project, there will be opportunities to write case reports and/or clinical case series. Students who have an interest in clinical trials will have the opportunity to observe clinical trial procedures and planning.	**Faculty Lead:** Edmund Tsui, MD Simon Fung, MD **Number of faculty mentors:** 2 **Capacity:** 2

ID: 21-059	**Title:** Computational analysis of adult cancers	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Bioinformatics & Data Science
	Brief Description: Most tumors arise from a single ancestral cell. The genome of this cell acquires one or more somatic driver mutations, which in turn gives it a fitness advantage over other cells. Over time, this ancestral cell and its decedents proliferate to give rise to all cancerous cells within the tumor. These sequential tumorigenesis mutational events can be incremental or catastrophic and can lead to a selection advantage within the tumor. Previous work sequencing multiple regions of a single tumor suggested that this mutational process leads to most solid tumors being comprised of multiple clones. Clones can contain both mutations common to all cells within the tumor (called clonal or trunk mutations) and mutations specific to one evolutionary branch of the tumor (called subclonal or branch mutations). This clonal evolution amongst cells within the same tumor has not been clearly defined across a wide variety of cancer types, because the majority of patients do not (yet) receive spatio-genomic profiling at biopsy.	**Faculty Lead:** Paul Boutros, MD **Number of faculty mentors:** 2 **Capacity: 1**

	Our group has standardized and validated computational pipelines for subclonal reconstruction, evaluating features of both the nuclear and mitochondrial genomes. Subclonal reconstruction involves estimating many attributes of the tumor including its purity, number of lineages, lineage genotypes, and the phylogenetic relationships among lineages. To optimize methods for assessing subclonal reconstruction, we structured evaluation of these attributes into three categories: global characteristics of tumor composition, assigning individual mutations to a specific lineage, and the phylogenetic relationships between subclonal lineages.	

ID: 21-060	**Title:** Socioeconomic Determinants in Retinopathy of Prematurity Outcomes	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: Retinopathy of Prematurity (ROP) is a leading cause of blindness and long-term visual impairment in children with a history of prematurity. There are many factors that can impact a baby's potential to develop ROP: prenatal, perinatal, and postnatal. As with other medical conditions, there is a growing understanding that socioeconomic status of the patient and family may impact risk of ROP as well as outcomes. The focus of this study would be to evaluate patient outcomes including follow-up, treatments, visual outcomes as they relate to markers of socioeconomic status. Students will participate in all aspects of the project including data collection from chart review and statistical analyses.	**Faculty Lead:** Monica Khitri, MD Irena Tsui, MD **Number of faculty mentors:** 2 **Capacity: 1**

ID: 21-061	**Title:** Heterogeneity of Metabolic Profiling of Hepatocellular	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: Hepatocellular carcinoma (HCC) is caused by multifactorial genetic and epigenetic alterations, including chronic infections (HCV and HBV, attributed to 75% of all causes), alcohol use, etc. As a result, despite advances in interventional modalities in recent years, the overall 5-year survival rate remains poor—less than 10%. This prompts the importance of understanding the metabolic resistance mechanisms of HCC pre- and post-interventional modalities. This project is meant to help decipher the metabolic heterogeneity of HCC, which can in turn be leveraged to improving the clinical outcomes for patients who require an interventional modality for HCC management. By working on this project, the student(s) will have the opportunity to learn more about basic and translational research. Additionally, the student(s) will work	**Faculty Lead:** Jason Chiang, MD **Number of faculty mentors:** 2 **Capacity: 1-2**

	directly with experts in the fields of metabolomics and proteiomics by which they will use to understand the metabolic profiling of HCC in various patient populations.	

ID: 21-062	**Title:** Brain Correlates of Pain and Addiction using Human Neuronal Recording and Neuroimaging	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: Dr. Bari's Surgical Neuromodulation and Brain Mapping Lab focuses on elucidating the role of the cortical and subcortical brain circuits in mediating reward, motivation, and affect. The ultimate goal of the lab is to leverage direct human neuronal recordings and rodent models to better understand these circuits and to advance neuromodulation for the treatment of disorders such as addiction, depression, anxiety, and pain. The lab utilizes task-based human neuronal recordings both intra- and extra-operatively and research using animal self-administration models. In addition to awake brain mapping, the laboratory uses functional and structural neuroimaging techniques such as diffusion tensor imaging (DTI) and fMRI to analyze the connectivity within and between brain structures involved in these disorders. The lab also utilizes rodent models to test novel neuromodulation techniques and develop new uses for currently FDA-approved devices.	**Faculty Lead:** Dr. Ausaf Bari **Number of faculty mentors:** 2 **Capacity: 2**

ID: 21-063	**Title:** Neuromodulation and neuroimaging approaches to improving Women's Health	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: The Translational Neuroimaging Lab at UCLA uses neuroimaging techniques to study and improve neuromodulation, which we believe to be an underutilized tool for treating neuropsychiatric problems. We have a particular interest in how neuroendocrine factors, such as the menstrual cycle and hormonal contraceptive use, might influence brain health and responses to neuromodulation. Our lab offers opportunities for trainees to learn more and develop novel projects involving neuromodulation, neuroendocrinology, and the intersection of the two, using neuroimaging as a tool to explore these fields. We believe that by investigating sex as a biological variable in neuromodulation studies, we can improve responses to neuromodulation treatment for	**Faculty Lead:** Nicole Petersen, PhD **Number of faculty mentors:** 2 **Capacity: 2**

	neuropsychiatric problems such as substance use disorders and depression, and develop neuromodulation as a tool for female-specific conditions, such as premenstrual dysphoric disorder.	

ID: 21-064	**Title:** Development of a short-form patient reported outcome measure to assess cystic fibrosis-chronic rhinosinusitis	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: The sinonasal outcome test (SNOT22) is the main patient reported outcome measure used for sinusitis. People with cystic fibrosis (PwCF) often have chronic rhinosinusitis that needs to be evaluated and treated to minimize adverse effects of upper airway disease. Survey burden has been identified as a challenge to treatment and is especially important in the CF population. This project focuses on creating an abbreviated form of SNOT22 that will evaluate sinusitis disease burden and quality of life PwCF reliably while minimizing survey burden. Using item response theory, we aim to refine the SNOT22 specifically for the CF patient population to retain the most discriminating items and create a shorter test that will be comparably as reliable and valid as the original SNOT22. In this project, the student will develop a strong foundation in understanding sinusitis in PwCF, knowledge of its clinical presentations and patient outcomes, and skills in statistical analysis. Under the guidance of Dr. Beswick, the student will have the opportunity to pursue an independent project and scholarly works, which we anticipate will yield a peer-reviewed manuscript as well as a conference presentation. The student will also seek out and develop a relationship with a statistician for the more complex portions of the analysis.	**Faculty Lead:** Daniel Beswick, MD **Number of faculty mentors:** 2 **Capacity: 1**

ID: 21-065	**Title:** UCARE Afib Pathway: Implementing and Evaluating a Standardized Order Set and Follow up Pathway for the Management of Atrial Fibrillation in the Emergency Department	**AoC:** ☒ Basic, Clinical, & Translational Research

	Brief Description: Atrial fibrillation (AF) is the most common arrhythmia among adults, and commonly presents with a rapid irregular rhythm that can be highly symptomatic with chest pain, shortness of breath, or palpitations. AF also significantly increases the risk of stroke in affected patients. However, physician practices vary significantly. The UCARE Afib pathway is a multidepartmental collaboration to improve the timely and appropriate care of AF patients in the emergency department (ED) specifically. We have developed a standardized order set that clinicians can use to streamline correct medication dosing for heart rate control and anticoagulation, and have partnered the ED with outpatient cardiology clinics to facilitate expedited outpatient cardiology follow ups for patients discharged directly from the ED. This pathway has been recently implemented and will require evaluation of efficacy and outcomes. We now seek to evaluate the effects of the order set on clinician adherence to guideline recommended practices, provider attitudes toward the standardized pathway, hospital admission rates, and patient outcomes including stroke and hospital readmissions. Partnered medical students will be responsible for ongoing chart review of all patients who presented to the emergency department with primary diagnosis of AF during the study period, data extraction and database building via Redcap. They will learn concepts of implementation science as well as become familiar with the presentation and standard of care for AF. Medical students will assist with the implementation process with the cycle of feedback to providers about metrics, and be invited to participate in the multidisciplinary QI meetings. After data collection, the medical student will assist in analyzing the effects of the pathway on the outcomes listed above and presenting the results as a scientific abstract and have the opportunity to participate in any developed manuscript. The medical student will be mentored in appropriate statistical analysis, abstract and manuscript writing, and will be able to co-author submissions.	**Faculty Lead:** Dr. Rochelle Cooper Dr. Lynell Mccullough Dr. Duc Do Dr. Noel Boyle **Number of faculty mentors:** 4 **Capacity: 2**

ID: 21-066	**Title:** Longitudinal analysis of the development of expertise in pathology residents	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Bioinformatics & Data Science
	Brief Description: The Elmore Research Group (https://elmore.dgsom.ucla.edu) offers several unique opportunities for involvement in established projects encompassing diagnostic accuracy, artificial intelligence/machine learning, and statistical modeling for cancer screening (skin and breast). Student(s) from a range of backgrounds with different research interests can gain comprehensive experience by leading their own project from conception to publication (with ample help and mentorship from a senior Principal Investigator and a network of experts from various specialties both locally and nationally) and actively participating in several ongoing, multi-site projects supported by grants from the National Institutes of Health (NIH),	**Faculty Lead:** Dr. Joann G. Elmore **Number of faculty mentors:** 5+ **Capacity: 1**

	National Cancer Institute (NCI), the Department of Defense (DoD), and other private foundations such as the Melanoma Research Alliance (MRA). Current projects explore and encompass, but are not limited to, the intersection of cancer screening (skin and breast), diagnostic accuracy and reproducibility of pathology diagnosis, the impact of computer aided techniques and applications of machine learning on complex medical images, artificial intelligence (AI), natural language processing (NLP), eye-tracking, and computer aided diagnosis (CAD) tools for specialists (pathologists and radiologists) in the identification, assessment, and diagnosis of biopsy specimens and medical images. Students can use data from these projects to assess the influence and impact of the technology and tools at both the clinical and human user level, including improvements for the detection and quality of clinical diagnoses. Research opportunities involving mammography, including imaging, clinical screening guidelines and related policies, as well as outcomes and disparities are also available. Access to UCLA Health data in addition to existing data from the PI's lab is possible. Students will benefit from involvement and expanded interaction with personnel in the Department of Medicine and the Division of General Internal Medicine & Health Services Research.	

ID: 21-067	**Title:** Superior Semicircular Canal Dehiscence Research	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: The primary focus of this research is the clinical evaluation of patients with superior semicircular canal dehiscence. UCLA is the world's largest center for treating this condition and we operate on over 50 patients a year with this diagnosis. This gives UCLA a unique opportunity to study the condition and gain important insights into the disease. Projects available include measurements on CT scans in both normal and pathologic cases, clinical data review for correlation with symptoms, and prospective bone analysis studies among others. Responsibilities for Discovery Year include taking on research projects as the primary lead. The scope should be similar to a master's thesis which will result in at least three first author original research studies presented at conferences and published as full original research articles. The student is also expected to support other team members with their projects.	**Faculty Lead:** Quinten Gopen, MD **Number of faculty mentors:** 2 **Capacity: 1**

ID: 21-068	**Title:** Quantitative motor phenotyping in neurodevelopment disorders	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: My lab is focused on using multi-modal techniques to evaluate motor function in individuals with neurodevelopmental disorders. There are three projects in which Harika will engage hands on in clinical research development, implementation, and interpretation. The first will be our gait analysis projects focusing on locomotive and behavioral development in autism and early childhood. She will learn quantitative motor data acquisition, processing, and interpretation. The second is a randomized controlled clinical trial studying the effects of a dance intervention for individuals with autism. She will apply the quantitative gait analysis and standardized motor and behavioral assessments as part of the pre and post intervention data collection. Lastly, Harika will be involved in our longitudinal study of infants at high familial risk for ASD. The goals of being engaged with this project are to learn other methods of quantitative motor analysis and to gain a deeper understanding of how early infant motor skills drive the development of language, cognition, and social communication.	**Faculty Lead:** Rujuta B. Wilson, MD, MS **Number of faculty mentors:** 2 **Capacity: 1**

ID: 21-069	**Title:** Nasal MOHS Reconstruction	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: The goal of the Roostaeian lab is to explore the new approaches of facial aesthetics and reconstruction. The student will aid in projects that are focused on topics such as rhinoplasty, MOHS reconstruction, aesthetic surgery, and breast reconstruction. Our expectation is that the student will take responsibility for at least one primary project and assist in other projects as fit. The current project the student will be working on is Nasal MOHS Reconstruction: A unilobed technique. This project is a retrospective case series describing the primary authors novel technique and its favorable aesthetic results. It also includes a literature review of various flap techniques and a comparison of aesthetic results, including both patient and physician observed perspectives. The student will participate in chart reviewing, organizing data, administering surveys, and writing the abstract and manuscript of the paper. Future projects, which the student will take lead on, will be discussed and executed within the Discovery Year.	**Faculty Lead:** Jason Roostaeian, MD **Number of faculty mentors:** 2 **Capacity: 1-2**

ID: 21-070	**Title:** Exploring Clinical Outcomes for Prostate Artery Embolization	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: This project/area of concentration will focus on clinical and research topics related to Interventional radiology and Prostate Artery Embolization. The student will be involved in collecting and analyzing data regarding clinical outcomes from prostate artery embolization procedures and shadowing Interventional radiologists as they review and address clinical cases. We have accumulated a large database of patient data from PAE cases at UCLA and have several prospective research projects ongoing relating to various clinical outcomes. Students will be exposed to research involving both BPH patients as well as other pathologies addressed in IR. Students will be responsible for a specific project during their training and in the end, will aim to complete a scientific manuscript and conference abstract related to their research work.	**Faculty Lead:** Justin McWilliams, MD **Number of faculty mentors:** 2 **Capacity: 1**

ID: 21-071	**Title:** The COVID-19 Chronicles: Investigating the Long-Term Effects of COVID-19	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: The goal of the Roostaeian lab is to explore the new approaches of facial aesthetics and reconstruction. The student will aid in projects that are focused on topics such as rhinoplasty, MOHS reconstruction, aesthetic surgery, and breast reconstruction. Our expectation is that the student will take responsibility for at least one primary project and assist in other projects as fit. The current project the student will be working on is Nasal MOHS Reconstruction: A unilobed technique. This project is a retrospective case series describing the primary authors novel technique and its favorable aesthetic results. It also includes a literature review of various flap techniques and a comparison of aesthetic results, including both patient and physician observed perspectives. The student will participate in chart reviewing, organizing data, administering surveys, and writing the abstract and manuscript of the paper. Future projects, which the student will take lead on, will be discussed and executed within the Discovery Year.	**Faculty Lead:** Joann Elmore, MD Michelle L'Hommedieu, PhD **Number of faculty mentors:** 2 **Capacity: 1**

ID: 21-072	**Title:** Integrated Network for Bipolar Disorder Research and Care	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: The Integrated Network for Bipolar Disorder Research and Care is a pioneering initiative funded by Breakthrough Discoveries for Thriving with Bipolar Disorder (BD2). UCLA has been selected as one of the six inaugural sites participating in a large-scale study that aims to enroll 4,000 participants diagnosed with bipolar 1 disorder. This multi-site endeavor involves deep phenotyping and offers immense opportunities for data analysis and discovery. The project focuses on advancing our understanding of bipolar disorder and improving care for individuals living with this condition. By collecting comprehensive clinical and biological data from a diverse participant cohort, we will create a robust data ecosystem that will inform personalized treatment approaches and interventions. As part of the larger project, UCLA is also actively engaged in the Learning Health Network, a collaborative effort that connects multiple sites to share knowledge, data, and best practices. This network promotes collaborative learning and enhances the translation of research findings into clinical care. This exceptional opportunity allows medical students to actively participate in data collection and analysis, participate in the Learning Health Network, contribute to research publications, and engage in interdisciplinary collaborations. The deep phenotyping approach adopted in this study will provide students with valuable insights into the complexities of bipolar disorder and equip them with essential research skills and knowledge.	**Faculty Lead:** Jennifer Kruse, MD Michael Gitlin, MD David Miklowitz, MD **Number of faculty mentors:** 3 **Capacity: 4**

ID: 21-073	**Title:** Identifying Mechanisms of Cardiovascular Sequelae of Long COVID	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: While cardiovascular complications, such as myocarditis and pericarditis, are now well known to occur in patients infected with SARS-CoV-2 and in patients suffering from Post-Acute Sequelae of SARS-CoV-2 infection (or Long COVID). However, the mechanisms that lead to these complications remain unknown. Our research group hypothesizes that fragments of the SARS-CoV-2 virus may contribute to these cardiovascular complications by causing inflammation of vascular cells. In this project, we aim to characterize the pro-inflammatory effects of SARS-CoV-2 viral fragments on vascular cells. Additionally, we aim to determine whether these viral fragments are present in patients suffering from cardiovascular	**Faculty Lead:** Jeffrey Hsu, MD, PhD **Number of faculty mentors:** 1 **Capacity: 1-2**

	symptoms with Long COVID. The project will involve working in a basic science laboratory, performing experiments with human vascular cells. Additionally, it will involve interfacing with patients with Long COVID, helping to obtain survey data from these patients as well as collecting clinical samples (i.e., saliva samples, nasal swabs). This project is funded by a grant from the American Heart Association, and the goal is to make a meaningful contribution to better understand the mechanisms behind the cardiovascular complications of COVID-19.	

ID: 21-074	**Title: Development and Clinical Validation of Fair Pulse Oximeter**	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Innovation & Entrepreneurship
	Brief Description: Pulse oximeters are widely used to obtain an indirect measure (SpO2) of arterial blood oxygen saturation (SaO2). However, questions about pulse oximeter accuracy have been raised, given its initial development on healthy and not racially diverse populations. In a 2020 New England Journal of Medicine paper, Sjoding et al analyzed paired pulse oximetry measurements of oxygen saturation and measures of arterial oxygen saturation in arterial blood gas. They demonstrated an increased incidence of undetected hypoxemia among patients who identified their race as Black and were critically ill. Subsequent clinical studies have shown that commercially available pulse oximeter measurements systematically overestimate true arterial oxygen saturation measurements for persons with dark skin pigmentation at low concentrations of O2 in the blood. This bias results in respiratory compromised persons with dark skin not meeting criteria for hospitalization, medical therapy, or the initiation of ventilator support, thereby putting specific populations (Black, Latinx, and Native American) at disproportionately greater risk for higher mortality or morbidity than those with light skin. In this proposal, we hypothesize that bias in pulse oximeters arises as a result of poor signal to noise ratio (SNR) for darker skin tones because of increased melanin pigmentation. To address this, we have developed a novel pulse oximeter which incorporates two classes of solutions: a software solution that adjusts LED on-time based on skin tone, and a hardware solution that uses multi-modal sensing to mitigate this SNR bias across skin tone. We will clinically validate this design on two distinct patient populations with hypoxemia, critically ill ICU patients with desaturation events, and patients with congenital cardiac disease who are cyanotic at baseline who are undergoing operative procedures. Interested students will be involved in data collection and manuscript preparation amongst other things.	**Faculty Lead:** Laleh Jalilian, MD Achuta Kadambi, PhD **Number of faculty mentors:** 2 **Capacity: 2**

ID: 21-075	**Title:** Molecular mechanisms underlying Fibroid Pathogenesis	**AoC:** ☒ Basic, Clinical, & Translational Research
	Brief Description: My research is focused on identifying the mechanisms underlying fibroid pathogenesis and repurposing existing drugs that are FDA approved to target these dysregulated pathways. We use fibroid tumors obtained from hysterectomies for molecular studies and cell cultures. We also use a mouse model transplanted with fibroid xenografts for in vivo drug studies and gene therapy. One major project involves understanding the role of noncoding RNAs and how their dysregulation contributes to aberrant expression of coding genes which drive tumorigenesis. The second project involves the role of tryptophan metabolism and its dysregulation in fibroid as a pathogenic mechanism in fibroid development and progression. The lab is funded by two NIH R01 grants and includes two Ph.D. students, a senior research scientist and two technicians.	**Faculty Lead:** Omid Khorram, M.D., Ph.D. **Number of faculty mentors:** 2 **Capacity: 1-2**

ID: 21-076	**Title:** Developmental Genomics of Congenital Heart Defects	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Bioinformatics & Data Science
	Brief Description: Clinical utilization of scientific discoveries provides a path for prevention, diagnosis, and treatment of many diseases, both rare and common. In our program, we study developmental genomics of congenital heart defects using whole exome sequencing, genomics, transcriptomics, epigenetics, and molecular genetics. In our laboratories, we employ human-induced pluripotent stem cells, Zebrafish, and mouse model systems to elucidate the underlying mechanisms [1-5]. To enhance the translational value of our research, we have established the UCLA-Congenital Heart Defect-BioCore, as a research platform for scientific discovery and clinical translation [1]. We welcome the DGSOM medical student to have their discovery experience in our program. Students will have the opportunity to learn and perform genomic data analysis and interpretation of genomic variants in human patients with congenital heart defects. They will acquire the basic molecular genetics tools to examine the causality of the variants they discover in our collaborating labs and complementary core structures. We supplement our application with an example of a first-authored paper by one of our DGSOM medical students. She joined Dr. Touma's lab during her fourth year (before the discovery program initiatives) and	**Faculty Lead:** Marlin Touma, MD, Ph.D. Jau-Nian Chen, PhD Ming-Sing Si, MD Thomas Vondriska, PhD **Number of faculty mentors:** 4 **Capacity: 1-2**

	completed her project with a successful publication (Yang, GO *et al*. 2022) [4]. Currently, she is completing her residency program (Internal Medicine) at UCLA.	

Medical Education & Leadership

Prepares students for engagement, leadership, and scholarship in the field of medical education through training in education theory, curricular design and delivery, evaluation and assessment, implementation of novel tools and techniques, and education research.

Medical Education & Leadership

ID:	Title:	AoC:
21-200	Health Meets Food: Culinary Medicine & Nutrition	☒Medical Education & Leadership
	Brief Description: With 69% of adults identified as overweight or obese and the prevalence of childhood obesity in the United States nearing 20%, addressing the obesity epidemic remains imperative in healthcare. Nutrition education is a cost-effective and impactful intervention. Yet, most healthcare professionals do not have the skills to adequately manage the burden of lifestyle-based chronic diseases. The need for healthcare practitioners to actively engage, counsel and manage these patients is greater than ever. As culinary medicine is increasingly integrated into medical and professional school curricula around the nation, there remains a tremendous need for academic leadership to catalyze its inclusion into health profession education and clinical and translational research. Building on pilot projects in DGSOM, *Health Meets Food* is designed for medical students passionate about integrating dietary counseling into their clinical care, and will equip students with the nutritional knowledge and culinary skills to optimize health management for their patients. Medical students will engage in online education, live conference learning, and hands-on teaching kitchen experiences to meet the curriculum objectives.	**Faculty Lead:** Elizabeth Ko, MD, FACP Wendelin Slusser, MD, MS, FAAP Zhaoping Li, MD, PhD, FACP, PNS **Number of faculty mentors:** 12 **Capacity:** 3

ID:	Title:	AoC:
21-201	Training In Medical Education: Developing into Peer Educators in Basic Sciences and Clinical Application (POCUS)	☒Medical Education & Leadership
	Brief Description: A combined basic sciences and POCUS area of concentration will prepare students with unique skills to become excellent clinicians and educators. Students will be able to reinforce their clinical training with a clinically oriented anatomical sciences component involving didactics centering around anatomy and physiology, as well as dissection/prosection preparation. This training and their training in the POCUS component will be complementary and have a synergistic effect on their ability as clinicians and educators. In addition, students will receive training in curricular development and peer-to-peer teaching. They will be expected to contribute to the SFM/FoP curricula as peer educators, question bank writers, and in other scholarly pursuits. Each month will feature a topic that will be synchronized with the SFM/FoP curriculum. For example, November features multiple musculoskeletal topics in SFM/FoP, and that month in the AoC will similarly devoted to MSK teaching. The monthly logistics will be approximately: • One week of anatomical sciences training (see below) • One week of POCUS training (see below) • One week of independent study, research or scholarly work	**Faculty Lead:** Elena Stark, MD, Ph.D. Alan Chiem, MD, MPH **Number of faculty mentors:** 13 **Capacity:** 15

	• Research does not have to be related to anatomy or POCUS; students may spend on average 25% of their Discovery time on a research project with a PI who is affiliated with the Applied Anatomy, Academic Medicine, or Acute Care College • One week of peer education, leading small groups of students in SFM, FoP, Intersessions, and potentially Clerkship activities. This AoC is a combination of the Training in Medical Education: Bridging Basic Science and Clinical Application and the Ultrasound Peer Education Program. This combined AoC will replace the two existing AoCs. This AoC is based on two highly successful peer education programs, the Anatomy TA program as well as the USPEP program. Collectively, both programs have trained several hundred DGSOM students as peer educators over the past decade.	

ID:	Title:	AoC:
21-202	Medical Education within Emergency Medicine	☒Medical Education & Leadership
	Brief Description: Our medical education working group is constantly generating new projects, assessments, and curricula. Students will be welcomed throughout year 1 to participate in our working meetings and medical education journal clubs. If students identify separate projects or generate their own, we are willing and ready to provide every necessary resource to make their time with us educational and productive. If students have shown an interest in the department but are unable to identify a specific project as the end of year 1 approaches, they will be invited to participate in structured sessions with the medical education group specifically designed to generate a project idea, goal, and deliverable to be prepared for a successful year 2.	**Faculty Lead:** Stephen Villa, MD **Number of faculty mentors:** 5 **Capacity:**

ID:	Title:	AoC:
21-203	Surgical Education Research	☒Medical Education & Leadership

	Brief Description:
	Our focus is on implementing novel tools and techniques to optimize surgical education for residents and medical students. Students will have the opportunity to participate in weekly working meetings that cover all facets of surgical education. Students may assist in data collection, data analysis, manuscript presentation, and if applicable, poster or oral presentations.
	Our current ongoing and recently completed projects include:
	• Development of multi-institutional virtual mock oral board exam in general surgery
	  o New collaboration with the Association for Surgical Education
	  o Investigating a novel asynchronous exam format
	• Teleconferencing variables and faculty impression of mock residency applicants
	• Implementing a framework for deliberate practice for development of operative skill
		Faculty Lead:
		Formosa Chen, MD, MPH
		Justin Wagner, MD
		James Wu, MD
		Areti Tillou, MD
		
		Number of faculty mentors: 4
		
		Capacity: 2

	○ New system of blinded, video-based assessment of operative skill ○ Enhancing mental representation through routine journaling of operative steps ○ Intraoperative auditing of entrustable behaviors by residents and faculty	

ID: 21-204	**Title:** Simulation, Medical Education and JEDI Innovations	**AoC:** ☒Medical Education & Leadership ☒ Social Science & Medical Humanities ☒ Health Justice & Advocacy
	Brief Description: A number of projects related to medical education and simulation-based teaching innovations will be made available to students to choose from, depending on their interest. They include: 1. The Virtual Batting Cage: Deliberate Practice to Combat Microaggressions – developing virtual and in-person simulations to train people on strategies to respond to various types of microaggressions and learn how to be an effective upstander/bystander and ally. [Medical Education & Leadership; Health Justice & Advocacy] 2. Sims for Skills Training – creating low-budget task trainers for students to practice various clinical skills (e.g., creating and testing suturing and IV placement kits) [Medical Education & Leadership] 3. VR Sim Library Development – creating a library of virtual reality clinical simulations with VR authoring tools [Medical Education & Leadership] 4. Communications Course Development – supporting faculty in the development of a communication skills training program, including piloting a selective/elective course for medical students [Medical Education & Leadership] 5. Interactive Humanism E-Learning Program (iHELP) – developing challenging scenarios to practice humanistic skills based on evolutionary medicine [Medical Education & Leadership; Social Science & Medical Humanities] 6. Theater Clinics Community Festival – participating in the development and implementation of theater arts integration into mobile clinics in underserved communities [Medical Education & Leadership; Health Justice & Advocacy; Social Science & Medical Humanities] Students will assist clinical faculty and simulation center staff in developing clinical scenarios, creating teaching innovations, and conducting educational research. They may play a role in interprofessional simulations and could help draft abstracts for conference presentations and publication.	**Faculty Lead:** Yue Ming Huang, EdD, MHS **Number of faculty mentors: 3** **Capacity:** 3

ID: 21-205	**Title:** Software and Instructional Manual development for teaching principles of electrophysiology to medical and dental students.	**AoC:** ☒ Basic, Clinical, & Translational Research ☒Medical Education & Leadership
	Brief Description: Students will participate in a project to improve instruction of principles of electrophysiology through either software development or the design of self-learning modules. This activity builds upon existing simulation packages in the Windows environment. Software development to port this package to a web-based application is desired and would require prior experience from the student.	**Faculty Lead:** Steve Cannon, MD, PhD **Number of faculty mentors:** 2 **Capacity:** 2

ID: 21-206	**Title:** Training in UME Curricular Design	**AoC:** ☒Medical Education & Leadership
	Brief Description: An Area of Concentration (AoC) that will prepare students to become excellent clinical educators. Students will work with medical educators at both UCLA and CDU to help create enhance the curriculums through various means including creating simulations, developing self-assessment questions, planning case-based learning sessions, and participating in the creation of Foundations of Practice sessions. The student will devote half of their time to DGSOM and half of their time to new Charles R. Drew University medical school, working with both directors of medical education at the respective schools.	**Faculty Lead:** Dr. Jason Napolitano Dr. Arthur Gomez **Number of faculty mentors:** 2 **Capacity: 1**

ID: 21-207	**Title:** A Different Kind of Brain Mapping: Developing a Curriculum Map for he Neurology Residency Academic Half-Day	**AoC:** ☒Medical Education & Leadership
	Brief Description: This project aims to develop a curriculum map for the UCLA Neurology residency program academic half-day curriculum. The goals in creating such a curriculum map include informing the development of a well-structured 2-year curriculum for the neurology residency that aligns with the Neurology Milestones, American Board of Neurology and Psychiatry (ABPN) core competencies, and Residency In-service Training Examination topics in preparation for the ABPN Board exam. This curriculum map will also identify gaps in the current curriculum that will help prioritize future curriculum development projects based on areas of need.	**Faculty Lead:** Katherine Fu, MD **Number of faculty mentors:** 2 **Capacity: 1**

	Students will play a key role in IRB submission as well as the development of this curriculum map. By the end of the experience, those who participate will be able to 1) describe the primary goals of a curriculum map, 2) organize current curricular content into a curriculum map, and 3) identify areas of need in the current curriculum, and 4) assist with the design of a 2-year academic half-day curriculum that aligns with the expected core competencies of a neurology residency program. Students will also become familiar with milestones and core competencies of a residency program, both of which are relevant to a clinician-educator career. Although this project is not directly a curriculum development project, if the student has interest in learning more about curriculum development, mentorship can also be provided in this area as well.	

Health Delivery Improvement Science

Combines didactic, seminar, clinical, and research components with the goal of providing students with skills to function more effectively in any healthcare setting. This quality improvement work involves not only individual patients, but also health systems and institutions.

Health Delivery Improvement Science

ID: 21-300	**Title:** Quality Improvement in the Department of Medicine at UCLA Health	**AoC:** ☒ Health Delivery Improvement Science
	Brief Description: The student will participate in quality improvement projects within the Quality Program of the Department of Medicine. Specific examples of projects for student participation include the creation of clinical care pathways. Clinical care pathways may be created for patient populations with a chronic disease or an acute presentation of a new disease. Pathways are optimized to facilitate the use of patient-centric operations and evidence-based guidelines. Analysis of the pathways will provide opportunities to understand the effectiveness of standard pathways in improving health equity. The creation and implementation of pathways depend on leveraging the power of quality improvement methodology to understand the current state and areas of opportunity, as well as the power of technology to create standardization.	**Faculty Lead:** Maria Han, MD, MBA **Number of faculty mentors:** 5 **Capacity:** 2

ID: 21-301	**Title:** UCLA Health Delivery Improvement Scholars	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Social Science & Medical Humanities ☒ Innovation & Entrepreneurship ☒ Health Justice & Advocacy ☒ Bioinformatics & Data Science ☒ Medical Education & Leadership
	Brief Description: Clinicians use improvement methods (including quality improvement) change structures and processes of health systems in ways that improve health care outcomes and reduce disparities and inequities. Students who elect this program will join discovery teams that apply these methods to a specific health care problem in UCLA Health. They will be a full member of a team in a specialty of their choosing, with mentorship throughout their Discovery Year. Opportunities in primary care, specialty care, hospital medicine, and public health (through our partnership with the Los Angeles County Department of Public Health) will be available. Through the team science experience and an accompanying curriculum, students will have exposure to analytic methods from a range of areas, including the humanities, improvement science, and evidence-based medicine. They will see how clinicians can use these methods to identify problems, develop	**Faculty Lead:** Chris Saigal, MD, MPH Moira Inkelas, PhD, MPH Vladimir Manuel, MD, MS Tony Kuo, MD, MSHS **Number of faculty mentors:** 5 **Capacity:** 10

	deep insight into them, and generate knowledge about how to fix them that leads to effective and sustainable improvement. Students will gain the following research and practical skills: (1) skills in organizational learning that prepare them for clinical careers; (2) exposure to research and clinical career pathways that involve improvement; (3) proficiency in communicating about patient and system issues to various stakeholders (e.g. attending physicians, team members, administrators and leaders); (4) understanding discovery as an iterative scientific process, studying variation in a system to ask new questions, and (5) appreciation of how design, innovation, improvement, research, and leadership can drive change in healthcare. This Scholars opportunity is associated with the UCLA Health Quality Measurement Improvement Committee (QMIC), which has representation from all clinical departments at UCLA, and undertakes projects aligned with UCLA medical and operational leaders.	

ID: 21-302	**Title:** Department of Medicine Health Services Scholars	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Global Health ☒ Social Science & Medical Humanities ☒ Innovation & Entrepreneurship ☒ Health Justice & Advocacy ☒ Bioinformatics & Data Science ☒ Health Delivery Improvement Science
	Brief Description: The health services research faculty in the Dept of Medicine offer to host up to 10 students per year who are interested a Discovery Year to address health systems change. This experience will focus on a wide range of themes related to systems change, including: 1) social determinants of health and communities; 2) systems improvement within public health and health care organizations; 3) global health including climate change and disaster preparedness; 4) quality of care; and 5) health equity, health disparities and structural racism. Students will partner with a faculty mentor and a community advisor in designing a Discovery Project, which the students will lead. The HSR faculty will provide regular seminars to provide students basic skills that complement their hands-on Discovery project. Please Contact: Gena Serna for more information: gserna@mednet.ucla.edu	**Faculty Lead:** Carol Mangione, MD MSPH FACP; Mitchell Wong, MD PhD **Number of faculty mentors:** 13 **Capacity:** 10

ID: 21-303	**Title:** Leading Implementation of Clinical Care Innovations to Address Childhood Adversity, Promote Resilience, and Improve Health Equity in the Medical Safety Net	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Social Science & Medical Humanities ☒ Health Justice & Advocacy ☒ Health Delivery Improvement Science
	Brief Description: Los Angeles County is in the midst of a renaissance of care innovation to address the social and structural determinants of health. From clinically-integrated programs addressing the root causes of adversity, such as poverty and historical trauma, to serving as hubs for networks of care designed to specifically address the health consequences of adverse childhood experiences (ACEs), pediatrics practices have been at the cutting edge of upstream care delivery model development, implementation, and evaluation. A growing number of projects and programs to address childhood adversity are being embedded in safety net practices in the Los Angeles County Department of Health Services system and are being led by UCLA researchers, including Dr. Schickedanz in Pediatrics, with opportunities for medical students to learn implementation science, community-partnered clinical research methods, and health systems change strategies toward upstream health through direct, hands on Area of Concentration activities. Students will have the opportunity to develop and carry out projects evaluating the need for and impact of social, structural, economic, and other adversity-related risks and clinical interventions as part of an interdisciplinary research team while receiving in-depth mentorship and training in quantitative, qualitative, and implementation science research methods that will lead to academic products such as poster abstracts and peer-reviewed publications. Projects will be tailored to students' interests and learning goals, and readily-available projects could focus on 1) examining the impact of health care delivery models in the Los Angeles Department of Health Services clinics to address childhood poverty and adversity and 2) the longitudinal and intergenerational impacts of adverse childhood experiences. This opportunity is paired with a longitudinal didactic research seminar series that students will participate in to learn principles of sound research design, research methods (including advanced statistical training in Stata, grounded theory, community partnered participatory research, implementation science, health services research), and consideration of how to translate research evidence into real world clinical impact and policy.	**Faculty Lead:** Adam Schickedanz, MD, Ph.D. **Number of faculty mentors:** 1 **Capacity:** 2

ID: 21-306	**Title:** Clinical and outcomes-based research in thyroid, parathyroid, and adrenal disease.	**AoC:** ☒ Health Delivery Improvement Science ☒ Bioinformatics & Data Science ☒ Basic, Clinical, & Translational Research
	Brief Description: We use a team-based approach to carry out high-impact clinical and outcomes research. Our research focus is on thyroid, parathyroid, and adrenal disease. However, the research skills we teach are translatable to any field, and our previous medical students have entered radiation oncology, dermatology, general surgery, and internal medicine (cardiology). Projects range from randomized clinical trials, population level studies using large databases (California Cancer Registry, NSQIP, Marketscan), informatic interventions via EMR, and retrospective clinical studies. As a member of our team, students will be supported by our faculty members from endocrine surgery and endocrinology, biostatisticians, endocrine surgery clinical fellow, resident research fellow, and lab manager. We expect students in their discovery phase to be able to lead a project from conception to publication (with ample help). **Partial List of Ongoing Projects:** • Impact of an automated electronic "best practice advisory" to enhance diagnosis and treatment of primary hyperparathyroidism • Outcomes of adjuvant radioactive iodine therapy in thyroid cancer • Racial disparities in treatment and outcomes of thyroid cancer in California • Decision-making and influence of patient preference in thyroid cancer • Patient reported outcomes after parathyroidectomy for subtypes of primary hyperparathyroidism • Prospective database of adrenal incidentaloma • Characterization and isolation of extracellular vesicles in patients with thyroid cancer	**Faculty Lead:** Michael Yeh, MD, FACS, FACE Masha Livhits, MD, FACH Kyle Zanocco, MD, MS, FACS James Wu, MD Angela Leung, MD, MSc Melissa Lechner MD, Ph.D. **Number of faculty mentors:** 8 **Capacity:**

ID: 21-307	**Title:** Peripherally-restricted cannabinoids for cancer and neuropathic pain treatment	**AoC:** ☒ Innovation & Entrepreneurship ☒ Clinical, Basic, Translational Research
	Brief Description: Students have the option of getting involved with: a) Chemical synthesis and/or liquid chromatography/mass spectroscopy (LC/MS) evaluation of analogs. (Spokoyny and Faull) b) *In vitro* (cell lines and tissue) assays of specificity, efficacy, blood-brain barrier permeability, and metabolic stability. (O'Neill and Spigelman) c) *In vivo* (rodent) efficacy (chemotherapy-induced neuropathy), side effects (tetrad), and/or pharmacokinetic assays. (Spigelman) d) In vivo (rodent) addiction liability assays. (Cahill) e) Innovation & Entrepreneurship. (All faculty mentors)	**Faculty Lead:** Igor Spigelman, Ph.D. **Number of faculty mentors:** 5 **Capacity:** 1

ID: 21-308	**Title:** Implementation Science Research in Infectious Diseases	**AoC:** ☒ Clinical, Basic, Translational Research ☒ Global Health ☒ Social Science & Medical Humanities ☒ Health Justice & Advocacy ☒ Bioinformatics & Data Science ☒Medical Education & Leadership ☒ (PREDOMINANT) Health Delivery Improvement Science
	Brief Description: Students interested in this area will be given the opportunity to engage in scholarly work in one of multiple domains related to infectious diseases. <u>Antimicrobial Stewardship/Hospital Epidemiology/Diagnostics</u>: Potential projects include providing feedback to individual attending hospitalists based on electronic attribution of antimicrobial use, a multihospital electronic assessment of quality of antimicrobial use, VA-wide antibiogram tool visualization development, work with the Institute for Health Metrics and Evaluation (IHME) on global projects related to antimicrobial resistance, developing interventions to reduce unnecessary antibiotic use at end-of-life, de-labeling penicillin allergies, developing educational curriculums for medical students on antimicrobial stewardship, and projects related to rapid diagnostic test development and implementation.	**Faculty Lead:** Christopher Graber, MD, MPH **Number of faculty mentors:** 17 **Capacity:** 3-5

	Transplant Infectious Diseases: Potential projects include improving and standardizing treatment protocols according to type of transplant and patient-specific factors, with a particular focus on aging and frailty. HIV prevention and management: Students will be able to devise projects that evaluate implementation and scaling of therapeutics (such as injectable antiretrovirals) to prevent and treat HIV. Substance use disorders and infectious diseases: Themes to explore include improving transitions of care among hospitalized patients with substance use disorder and infectious diseases, improving access to outpatient parenteral antibiotic therapies, prevention of HIV, viral hepatitis, and sexually transmitted diseases among persons with substance use disorders, and linking patients to substance use programs and street medicine services. Covid and other emerging infectious diseases: Themes include improving access to vaccines, understanding risk factors (such as food insecurity, housing density, etc) for community spread, and exploring health disparities using geospatial mapping and other modalities. Implementation of infection prevention protocols for screening for emerging pathogens can also fall under this domain.	

ID: 21-309	**Title:** Outcome Tracking and Precision Wellness Program (OTPW) in Mental Health	**AoC:** ☒ Clinical, Basic, Translational Research ☒ Bioinformatics & Data Science ☒ Health Delivery Improvement Science
	Brief Description: The Outcome Tracking and Precision Wellness Program (OTPW) is a new initiative at the Greater Los Angeles VA that combines emerging digital health technologies with care management to establish an innovative model of mental health care. The program enables Care Manager-Provider teams to integrate remotely acquired clinical assessments into their clinical decision-making with the goals of: getting patients better faster with fewer adverse outcomes; preventing relapse and maintaining wellness; increasing access to outpatient mental health treatment; and building infrastructure for digital health innovations. An integral part in this program is creating mental health treatment algorithms for various disorders that incorporate the use of digital health technologies. Students will have the unique opportunity to help construct these new treatment algorithms, which will then be used as updated practice guidelines for the mental health department at the VA.	**Faculty Lead:** Scott Fears, MD, PhD **Number of faculty mentors:** 3 **Capacity:** 2-3

ID: 21-310	**Title: proposed project:** Preventative Medicine & Public Health Track	**AoC:** ☒ Social Sciences & Medical Humanities ☒ Bioinformatics & Data Science ☒ Health Delivery Improvement Science ☒ Innovation & Entrepreneurship ☒ Medical Education & Leadership
	Brief Description: The student will be able to choose and participate from a variety of clinical, research, educational or advocacy projects related to prevention and public health that, ultimately, will create a lasting footprint on clinical care and outcomes. The projects available to students to participate in are supported by a diverse range of grants, Los Angeles Department of Public Health, HRSA, CDC, and the California Department of Public Health. Students can choose to focus on one project or participate in all of them depending on their interest and goals. Specific research projects students can choose from include (but not limited to): Adverse Childhood Experiences (UCAAN), Climate change and health impacts, maternal and child health, lifestyle medicine, nutrition medicine and youth addiction prevention.	**Faculty Lead:** **Alice Kuo, MD, Med, MBA** **Denise Nunez, MD, MPH** **Number of faculty mentors: 4** **Capacity: 5**

ID: 21-311	**Title: proposed project:** Medicine-Pediatrics Track	**AoC:** ☒ Social Sciences & Medical Humanities ☒ Bioinformatics & Data Science ☒ Health Delivery Improvement Science ☒ Innovation & Entrepreneurship ☒ Medical Education & Leadership
	Brief Description: The student will be able to choose and participate from a variety of clinical, research, educational or advocacy projects related to life course health in the framework of medicine-pediatrics, which provides care that covers the transitional periods of development and health. The experience will provide opportunities to develop work supporting our marginalized populations, and pediatric to adult transition clinic for medically complex patients, which include services at the following care centers: LGBTQ+/Gender health clinic, adolescent health, and Sickle cell clinic among others.	**Faculty Lead:** **Susan Duan, MD** **Janet Ma, MD** **Number of faculty mentors: 4** **Capacity: 5**

ID: 21-312	**Title: proposed project: Artificial Intelligence approaches to diagnose, monitor, and help treat glaucoma**	**AoC:** ☒ Clinical, Basic, Translational Research ☒ Bioinformatics & Data Science ☒ Global Health ☒ Innovation & Entrepreneurship ☒ Medical Education & Leadership
	Brief Description: This opportunity encompasses several projects relating to the use of artificial intelligence in the diagnosis, management, and treatment of glaucoma. Examples of proposed or ongoing projects include: (1) tracking and predicting the trajectory of glaucoma patients with optic disc photos, visual fields, and EHR data to suggest direction of treatment; (2) detecting the earliest signs of glaucomatous optic nerve damage on routinely performed imaging using trained machine learning or convolutional neural network techniques; (3) launching a pilot study to develop a convolutional neural network to identify optic nerves likely to have glaucomatous damage based on non-mydriatic fundus photos, with the goal of developing a population screening tool to reduce the burden of blindness from glaucoma. The student will be involved in the full spectrum of clinical	**Faculty Lead:** **Joseph Caprioli, MD** **Number of faculty mentors: 4** **Capacity: 5**

	research, including study design, hypothesis development, IRB submission, data collection, statistical analysis, algorithm & model development, and manuscript and/or poster preparation and presentation Students will have the opportunity to attend our weekly research meetings to gain exposure to ongoing clinical research in the division. Interested students should also reach out to Dr. Caprioli and his research coordinator via email (caprioli@jsei.ucla.edu, ebouris@mednet.ucla.edu) to request relevant literature and related research.	

ID: 21-313	**Title: Improving Care for Underserved Patients in the Safety Net**	**AoC:** ☒ Health Delivery Improvement Science
	Brief Description: The UCLA-Olive View Department of Internal Medicine has appointed a Director of Quality Improvement for the department; this individual pursues projects that directly or indirectly improve health outcomes for underserved patients seeking medical care in our medical center's hospital and ambulatory clinics. The Director of Quality Improvement also oversees eight ongoing resident-driven quality improvement projects that also aim to enhance ambulatory and inpatient care and enhance the quality of medical education provided within the residency. Medical students involved in this opportunity will do the following: • Assist in ongoing departmental projects by collaborating with medical center EHR data analysts and physician liaisons to create, critique, and validate reports that include baseline and pre-intervention / post-intervention data needed to evaluate baseline system performance and the success of implemented interventions, respectively. • Manual data collection through chart review or on-site observation of the "system" that produces the unfavorable outcome being targeted for improvement. Students will present these findings to the Director of Quality Improvement or resident groups and will collaborate with them to produce driver diagrams / process maps / cause-and-effect diagrams that adequately characterize system limitations. Please note that in many cases, these on-site observations will allow students to implement important additional Lean tools such as the administration of Time Observation Studies, System and Traffic Flow Mapping leading to the creation of spaghetti diagrams and workspace optimization. • Participate and even independently conduct stakeholder consultations that engage hospital / departmental / residency personnel and patients that have knowledge of and interest in the system	**Faculty Lead:** **Paul Salama, MD, MPH** **Number of faculty mentors: 2** **Capacity: 2**

	requiring modification. These discussions will elicit stakeholder expertise regarding reasons why system output is not optimal, changes needed to optimize the system, and unintended consequences that proposed adjustments might produce. • Take ownership of two quality improvement projects and executing both pre-cycle planning phase and PDSA cycle phase, completing as many iterations of the improvement process as time allows; projects would be chosen as follows: o A departmental priority project (UCLA Department of Medicine at Olive View) that is most consistent with student interests o Independent project identified and designed by student that aligns with student interest that will be of benefit to patients or operations of the Olive-UCLA Medical Center at large, the UCLA Department of Medicine at Olive View specifically, or the UCLA Internal Medicine Residency at Olive View.	

ID: 21-314	**Title:** "Choosing Wisely: Making it Easier to Order the Right Test for the Right Patient at the Right Time"	**AoC:** ☒ Health Delivery and Improvement Science ☒ Bioinformatics & Data Science
	Brief Description: Clinical laboratory test menus are increasingly expanding in available tests, test complexities, and costs. It can be difficult for physicians to keep up with the appropriate lab tests to order, or to not order, in each clinical scenario while also striving to provide high-value care. Potential causes of patient harm related to laboratory services include ordering the wrong test, failing to retrieve a test result, and misinterpreting test results. The American Board of Internal Medicine's "Choosing Wisely" campaign has partnered with the American Society for Clinical Pathology (ASCP) to provide a list of "Thirty Five Things Physicians and Patients Should Question" related to laboratory test ordering. For this project, the student will review this list of 35 lab test recommendations and choose at least one, with guidance from the faculty mentors, to focus on implementing within the UCLA Health system. The student will first gather and analyze baseline data regarding current test ordering and utilization practices for the laboratory test(s) of interest and will engage with key clinician stakeholders in the specialty area, as applicable. The student will then design, implement, and monitor the effect of an intervention intended to enhance compliance with the Choosing Wisely recommendation. The student will learn laboratory stewardship and quality improvement principles to take back to clinical practice to contribute to a culture of high-value patient care and optimal use of healthcare resources, with the overarching	**Faculty Lead:** Allison Chambliss, PhD, DABCC Michelle Hickey, PhD **Number of faculty mentors: 2** **Capacity: 1-2**

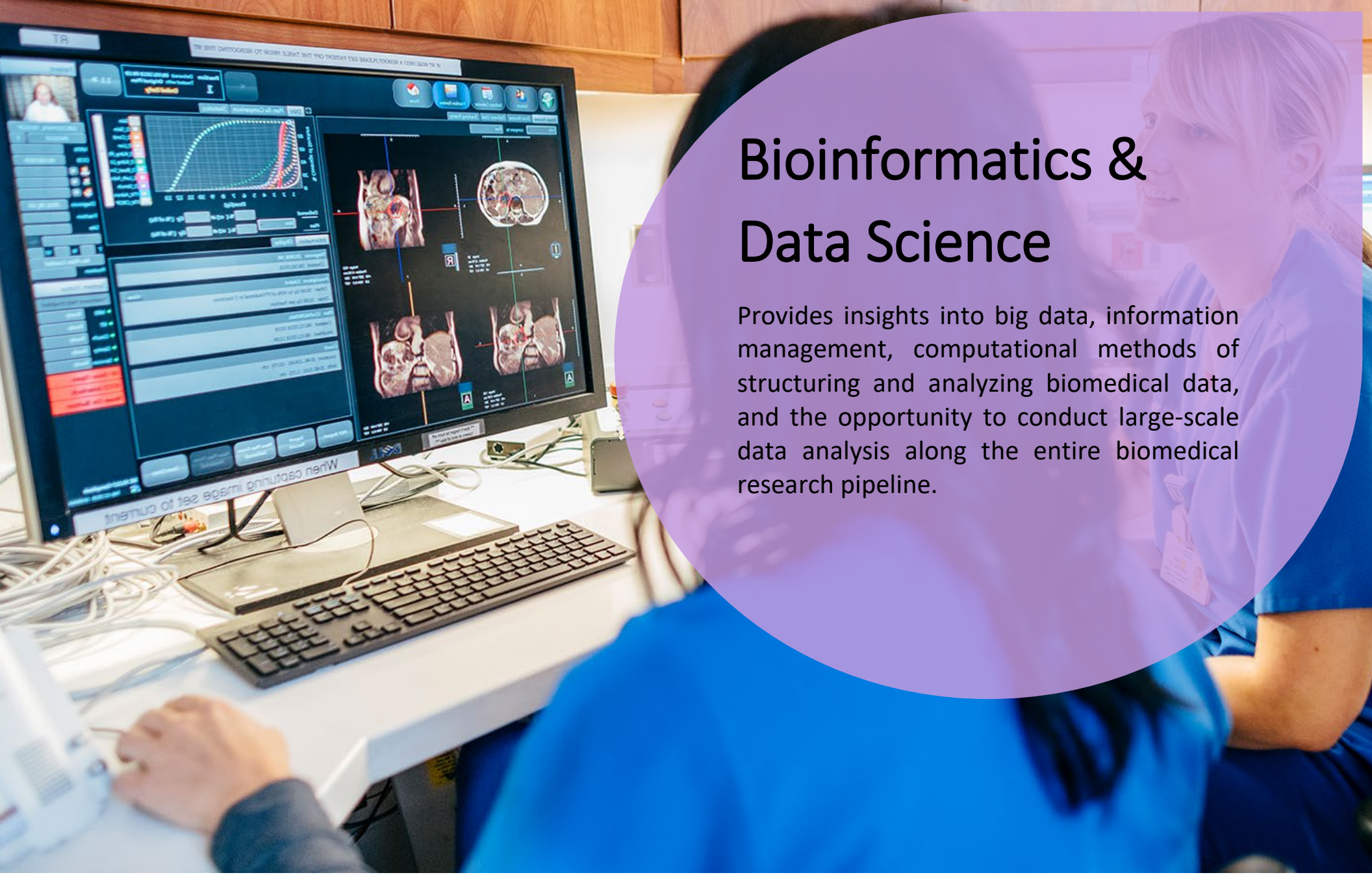
	goal of getting the right test to the right patient at the right time (also referred to as "laboratory stewardship.")	

ID: 21-315	**Title:** Harbor-UCLA Prehospital Care Health Scholars	**AoC:** ☒ Health Delivery and Improvement Science ☒ Medical Education & Leadership ☒ Clinical, Basic, Translational Research
	Brief Description: The EMS Faculty of the Harbor-UCLA Department of Emergency Medicine, in collaboration with the Los Angeles County Emergency Medical Services (EMS) Agency, may host up to 2 students per year with a desire to learn more about EMS care and to contribute to the improvement of prehospital and emergency care in Los Angeles County. The experience may include participation in quality improvement and research projects with the Harbor-UCLA Medical Center Office of Prehospital Care and/or Los Angeles County EMS Agency. Students will learn about the process for development, implementation, and evaluation of prehospital policies and protocols that direct EMS care. They will learn about the translation of EMS research into practice through policy development and education of prehospital and hospital clinicians. In addition, there are opportunities to lead targeted community-based educational initiatives regarding bystander first aid, to maximize the health outcomes of LA County residents experiencing medical or trauma emergencies. Students will participate in didactic seminars together with Emergency Medicine Residents and EMS Fellows, and in LA County and hospital-based meetings where decisions impacting prehospital care are made and/or reviewed. Students will work with their primary faculty mentor to design a project that they will lead, including generation of a clinical question, background research to evaluate existing published literature on the topic, development of a method to answer their question, oversight of project development including obtainment, analysis and/or interpretation of data, and presentation of the results in a public forum, such as through publication or at a local or national conference.	**Faculty Lead:** Shira A. Schlesinger, MD, MPH **Number of faculty mentors: 6** **Capacity: 1**

ID: 21-316	**Title:** Anesthesiology Education Research and Perioperative Leadership Development	**AoC:** ☒ Health Delivery and Improvement Science

		☒ Medical Education & Leadership ☒ Clinical, Basic, Translational Research ☒ Global Health
	Brief Description: The student will have the opportunity to participate in the following aspects of anesthesia education research and perioperative medicine based on their interests and career goals: - Clinical research - Medical education - Simulation - Quality Improvement - Global Health - Community outreach The scholarly work in this Discovery experience will be tailored to the individual interests and needs of the student(s). Some examples are listed below. A clinical project focusing on the liver transplant division within our department would involve: - Quality improvement focusing on our recent liver transplant enhanced recovery protocol and early extubation. We would collect and track metrics determining how well we are able to adhere to this protocol. We are also hoping to get them involved in developing a protocol for our donor hepatectomies - Set up opportunities to shadow a liver transplant case - Begin skill development by having students participate in US guided IV workshop in addition to the airway practice Examples of current medical education projects include: - Investigating the utilization of Perceptive and Adaptive Learning Modules for training interns with hemodynamic monitoring - Investigating the effect of anesthesiology clerkships on selecting anesthesiology as a career - Anesthesiology curriculum and didactic development for residents and medical students	**Faculty Lead:** Jason Lee, MD Christine Nguyen-Buckley, MD Mansi Sheth, MD Sophia Poorsatar, MD **Number of faculty mentors: 5** **Capacity: 2-3**

	Participation in quality improvement (QI) would include: - Developing a quality improvement project including but not limited to - medication safety, perioperative communication, residual neuromuscular blockade, infection prevention, sustainability in the OR, emergency preparedness, massive casualty response preparation, and/or decreasing blood product wastage and transfusions. - The student would attend systems improvement committee meetings and other related meetings to the project. - The student would utilize quality improvement methodology to conduct the above product such as PDSA methodology. - The student would develop educational materials for anesthesiologists, trainees and staff related to the project. - The student would be expected to present an abstract at the department scientific evening and submit to a scientific meeting such as International Anesthesia Research Society or the American Society of Anesthesiologists meeting. - The student would have opportunities to shadow in the operating room along with the QI project. A medical simulation project would involve: - Attending anesthesiology critical events simulation sessions. - Developing and writing simulation scenarios with the faculty mentor. - Meeting with simulation center staff to plan out the scenario. - Piloting the simulation scenario and modifying based on the pilot. - Submitting simulation scenario for publication and adding to library of simulation scenarios.	



Bioinformatics & Data Science

Provides insights into big data, information management, computational methods of structuring and analyzing biomedical data, and the opportunity to conduct large-scale data analysis along the entire biomedical research pipeline.

Bioinformatics & Data Science

ID: 21-400	**Title:** Machine learning applications to clinical care	**AoC:** ☒ Bioinformatics & Data Science
	Brief Description: Computational Medicine is engaged in a variety of collaborations with clinical divisions across UCLA Health. While the specific topics being studied are broad, the general approach involves using the electronic health record to define, identify and predict negative outcomes. These projects generally take advantage of a combination of medical record data, imaging data, and genomic data and result in the identification of risk factors or development of risk scores. Students working on these projects will be involved in all stages of these projects, from data extraction, to analysis, to reporting, all with supervision from Computational Medicine personnel.	**Faculty Lead:** Eleazar Eskin, PhD **Number of faculty mentors:** 10 **Capacity:** 5

ID: 21-401	**Title:** Observational Health Data Science and Informatics	**AoC:** ☒ Bioinformatics & Data Science
	Brief Description: Work with the Observational Health Data Science and Informatics (OHDSI) community to execute the world's largest comparativeness effectiveness and safety trial of treatments for type 2 diabetes mellitus.	**Faculty Lead:** Marc A. Suchard, MD, PhD **Number of faculty mentors:** 1 **Capacity**: 1-2

ID: 21-403	**Title:** Artificial intelligence in medicine	**AoC:** ☒ Bioinformatics & Data Science
	Brief Description: Participating students will work in the Computational Diagnostics lab (https://cdx.seas.ucla.edu) on research projects that utilize machine learning technologies to solve medical problems. The lab's work spans several domains, including radiology image analysis, pathology image analysis, mobile health, and data mining. Based on their interests, students may be paired with an existing project, or as appropriate, initiate a new project. Participating students will be provided desk space, access to high-performance compute resources, and will work as part of a team, having regular interactions with the lab's graduate students, faculty, and clinical collaborators.	**Faculty Lead:** Corey Arnold, PhD **Number of faculty mentors:** 2 **Capacity:** 5

ID: 21-405	**Title:** Cardiovascular Genetics and Genomics	**AoC:** ☒ Bioinformatics & Data Science ☒ Clinical, Basic, Translational Research ☒ Health Delivery Improvement Science
	Brief Description: Discovery AoC student(s) will be responsible for a project among an integrated program in cardiovascular genetics and genomics. In each project, they will have hands-on opportunity to work with genomic data, attend subspecialty clinic, participate in clinical and translational research projects.	**Faculty Lead:** Jessica Wang, MD, PhD **Number of faculty mentors:** 3 **Capacity:** 1

ID: 21-406	**Title:** AI-assisted identification of biomarkers and targets for ovarian cancer prevention, detection, and treatment	**AoC:** ☒ Bioinformatics & Data Science ☒ Clinical, Basic, Translational Research
	Brief Description: The overall goal of this project is to reveal new clinically-relevant biomarkers and targets for ovarian cancer prevention, detection, and treatment. This will be accomplished by the systematic integration of digital histomorphometric features with underlying molecular pathways in different stages of ovarian cancer progression, including normal fallopian tubes and fallopian tubes with premalignant lesions as well as patient-matched primary ovarian carcinoma, synchronous pre-chemotherapy metastases, and metachronous post-chemotherapy metastases. Learn more below	**Faculty Lead:** Sandra Orsulic, Ph.D. **Number of faculty mentors:** 2 **Capacity:** 1

ID: 21-407	**Title:** Discovery areas in human genetics and genomics	**AoC:** ☒ Bioinformatics & Data Science ☒ Clinical, Basic, Translational Research
	Brief Description: The projects within this Discovery area involve a wide variety of wet lab (functional genomics/omics experiments), dry lab (computational biology), and combined wet and try lab research projects by multiple faculty members in the Department of Human Genetics. Thus, the individual projects will comprise genetics and genomics projects that are broadly targeted to further our understanding of how DNA variants and genes affect health and disease in humans using new and state of the art genetics and genomics methods and tools. The students will be given a specific, well-defined research project within each Faculty member's research laboratory that can be accomplished within the 9-months period.	**Faculty Lead:** Paivi Pajukanta, MD,Ph.D. **Number of faculty mentors:** 7 **Capacity:** 6

ID: 21-408	**Title:** **Clinical/Epidemiology Research Covering a Wide Range of Topics**	**AoC:** ☒ Bioinformatics & Data Science ☒ Clinical, Basic, Translational Research
	Brief Description: We offer involvement in a large number of discovery projects spanning a uniquely broad range of topics including the domains of diagnostic accuracy, transparency in physician-patient communication, artificial intelligence/machine learning, and statistical modeling for cancer screening, to name a few (https://elmore.dgsom.ucla.edu).	**Faculty Lead:** Joann Elmore MD, MPH **Number of faculty mentors:** 5+ **Capacity:** 1- 2

	The student will have the opportunity to take the lead in their own project from conception to publication (with ample help) and also actively participate in several multi-site ongoing projects supported by grants from the Centers for Disease Control and Prevention (CDC), National Institutes of Health (NIH), National Cancer Institute (NCI), the Department of Defense (DoD) and other private foundations, such as the Melanoma Research Alliance (MRA). Example projects explore and encompass the intersection of cancer screening (breast and skin), diagnostic accuracy and reproducibility of pathology diagnosis, the impact of computer aided techniques and applications of machine learning on complex medical images, artificial intelligence (AI), natural language processing (NLP), e-scooter injuries, longCOVID, eye-tracking, and computer aided diagnosis (CAD) tools for specialists (pathologists and radiologists) in the identification, assessment, and diagnosis of biopsy specimens and medical images. These projects have captured and generated data that can be used to assess the influence and impact of the technology and tools at both the clinical and human user level, including improvements for the detection and quality of clinical diagnoses. Access to UCLA Health data in addition to existing data from the PI's lab possible. Students will be part of the Department of Medicine Health Services Scholars group (ID 21-302) and able to join seminars to complement hands-on Discovery projects.	

ID: 21-409	**Title:** How cell-cell interactions, particularly in metabolism, lead to clinically distinct phenotypes in health and disease	**AoC:** ☒ Bioinformatics & Data Science ☒ Clinical, Basic, Translational Research
	Brief Description: Research in the SIML focuses on striving to understand how complex measurements across multiple spatial scales with disparate data measurements of organs, tissues, and cells are related to one another. We construct mathematical models and carry out various computational analyses for simulation and analysis of biological processes in order to 1) characterize cellular metabolic phenotypes and 2) understand how they relate to clinical imaging, pathological, & laboratory data, in order to ultimately enable non-invasive and minimally invasive measurements for prognostic and disease management applications. A wide range of disease processes are analyzed, with a significant focus on oncologic diseases, infectious diseases, drug-treatment responses, and cellular aging. Prior students have successfully contributed to projects resulting in first and co-author publications in topics involving, radiogenomics, metabolic systems biology, imaging segmentation, and natural language processing of clinical imaging reports.	**Faculty Lead:** Neema Jamshidi MD, MPH **Number of faculty mentors:** 5+ **Capacity: 2-3**

	Depending on a student's interest level, pre-existing background, and topics that they would like to learn, current projects include, 1) Integration of (transcript-, prote-, and metabol-) omics data for metabolic systems biology and network analysis of cellular systems 2) Integration of omics data with histopathology, clinical imaging, and clinical lab data for 'radiogenomic' analyses 3) Image segmentation and quantitative analysis (involving clinical cross-sectional imaging such as CT and MRI as well as 3D microscopy imaging from cells/tissues in culture)	

Innovation & Entrepreneurship

Learn entrepreneurship approaches and how to move a health innovation idea from concept to reality. Design meaningful solutions to the current pressing needs in health care.

Innovation & Entrepreneurship

ID: 21-500	**Title:** Venture Innovation for New Entrepreneurs (VINE)	**AoC:** ☒ Innovation & Entrepreneurship
	Brief Description: Advancements in digital health, medical technology, and big data have ushered in a new era of health care entrepreneurship. Rapid advances in technology have facilitated the global reach of products and services that would have been confined to a single institution or office just a few years ago. These innovations have been supported with unprecedented amounts of venture capital both through private enterprise and the federal government; the federal government alone distributes billions of dollars annually in non-dilutive capital to fund early-stage research and technology. Physicians who communicate their vision to non-clinicians and investors position themselves to be successful healthcare change agent or entrepreneurs over the next decade. VINE will provide the coursework and training necessary for a motivated medical student to successfully ideate, research, and pitch a product to early-stage investors, both within the government and private sector, and learn about entrepreneurial and innovation ecosystems. Students will work in teams to learn the art of compelling storytelling to support the business case necessary to be a successful entrepreneur.	**Faculty Lead:** Smitta Patel, MD, MBA **Number of faculty mentors:** 8 **Capacity:** 10

ID: 21-502	**Title:** A 3D tumor map for the surgical management of bladder cancer	**AoC:** ☒ Innovation & Entrepreneurship ☒ Clinical, Basic, Translational Research
	Brief Description: The student will participate in a project (NIBIB R21 grant currently submitted) to develop and test novel technology to create 3-dimensional, virtual reality tumor maps for patients with bladder cancer, generated from patient's MRIs. Previously, we have developed advanced imaging technology using artificial intelligence and machine learning that creates 3D models for use in surgical planning. These models are delivered to the surgeon's mobile phone and used for surgical planning. The technology has been commercialized (Ceevra, Inc) and is in use with many robotic systems and in many US institutions. This project expands on the current capabilities, addressing a major area of need (bladder cancer) with new technology. Students could participate in one of two parts of the project, depending on the stage when they start the curriculum: 1) development of algorithms to segment and create models from MRI images, or (more likely) (2) clinical trial to assess accuracy and efficacy of the models in real word OR conditions.	**Faculty Lead:** Joseph Shirk, MD **Number of faculty mentors:** 4 **Capacity: 1**

ID: 21-503	Title: UCLA Biodesign Innovation and Entrepreneurship Concentration	AoC: ☒ Innovation & Entrepreneurship
	Brief Description: "The UCLA Biodesign Medical Innovation Concentration is a foundational program for medical students to learn about healthcare innovation and entrepreneurship. Our goal is to provide a comprehensive overview of the medical technology landscape, a framework for developing and implementing meaningful healthcare solutions, and exposure to leadership principles and career path opportunities. This Area of Concentration (AoC) is offered to medical students over a ten-month period during their year of study or as a part of the UCLA Biodesign Business Creation Option field study for MD/MBA dual degree students. Courses at DGSOM and Anderson will highlight topics including the identification of entrepreneurial opportunities, medical technology development, and business plan fundamentals and financials. Student will partake in a longitudinal entrepreneurial experience alongside UCLA Biodesign fellows as they work to commercialize their unique technologies"	**Faculty Lead:** Jennifer McCaney, Ph.D. **Number of faculty mentors:** 5 **Capacity:** 4-6

ID: 21-504	Title: Medical Innovation and Clinical Needs Identification	AoC: ☒ Innovation & Entrepreneurship
	Brief Description: This project/curriculum is designed to teach DGSOM medical students the fundamental skills of healthcare system improvement, viewed through the lens of biodesign, innovation, and entrepreneurship. Skillsets taught in this program are broadly divided into three stages. The first stage is focused on clinical needs finding, during which students will learn how to identify unmet clinical needs and areas for improvement within the healthcare system through specialized modes of observation and ethnographic interviewing of relevant stakeholders (i.e. patients, physicians, ancillary staff, etc.). The second stage teaches strategies for iterative solution design, allowing students to rigorously test a wide range of user/patient/customercentric design concepts while perfecting physical or systems-based solutions to specific clinical needs. The third and final stage of the training program is focused on entrepreneurial development and implementation, and teaches students how to navigate the healthcare innovation landscape in order to disseminate their solutions to a broader audience and design appropriate business plans to bring their solutions to market. Learn more below	**Faculty Lead:** Li Zhou, MD **Number of faculty mentors:** 18 **Capacity:** 15

ID: 21-505	**Title:** Designing Novel Therapeutic Delivery Paradigms	**AoC:** ☒ Innovation & Entrepreneurship ☒ Clinical, Basic, Translational Research
	Brief Description: This translational research group investigates novel methods of drug delivery with a team spanning Head and Neck surgery, Bioengineering, Neurobiology, and Dentistry. We offer an educational research opportunity for students interested in designing and validating new ways of targeting pharmacologic interventions for a wide array of conditions. Areas of focus: • Tuning drug delivery from microparticles, electrospun scaffolds, or 3D printed materials (including the incorporation of stem cells as biogenic pumps) • Assessing novel drug-delivery mechanisms efficacy in *in vitro* cell culture models • In vivo preclinical studies to evaluate therapeutic efficacy Ongoing projects: • Topical drug delivery to the inner ear • Topical drug delivery to the recurrent laryngeal nerve • Topical drug delivery to the facial nerve • Topical drug delivery to the oral cavity	**Faculty Lead:** Ashley Kita, MD **Number of faculty mentors:** 4 **Capacity:** 2

ID: 21-506	**Title:** Development and testing of liquid biopsy technologies for childhood cancers	**AoC:** ☒ Innovation & Entrepreneurship ☒ Clinical, Basic, Translational Research
	Brief Description: The student will participate in a multidisciplinary translational research effort that targets the development and clinical testing of new diagnostic tools for childhood cancers that leverage microfluidic liquid biopsy technologies. In solid tumors, circulating tumor cells and/or extracellular fragments often break away from primary/and or metastatic tumor sites and enter the bloodstream. These circulating tumor products can be selectively captured and released using nanotechnology-enabled-microfluidic devices being developed by our research team and molecularly profiled to track and better understand the progression of the patient's cancer. We are using Ewing sarcoma, an aggressive bone and soft tissue cancer with high propensity for metastasis that particularly impacts the adolescent and young adult population, for our initial tests and plan to expand this effort into other childhood malignancies moving forward. Students would participate in one of two parts of the project: (1) helping to curate the growing patient cohort by consenting patients coordinating sample collection, and/or (2) sample processing and digital droplet PCR-based analysis to molecularly profile the captured circulating tumor products. Students will have the opportunity to join Dr.	**Faculty Lead:** Steven J. Jonas MD/PhD **Number of faculty mentors:** 3 **Capacity:** 2

	Federman during his weekly Pediatric sarcoma clinic and with either Drs. Jonas and Federman when they attend on the inpatient pediatric hematology/oncology service.	

ID: 21-507	**Title:** Leveraging nanotechnologies to improve children's health	**AoC:** ☒ Innovation & Entrepreneurship ☒ Clinical, Basic, Translational Research
	Brief Description: The student will join a multidisciplinary research team tasked with the development and application of new technologies and broadly applicable methods to support the children's health and regenerative medicine research communities in accelerating the discovery and implementation of innovative gene and cellular therapeutic approaches and diagnostic strategies. This work is supported in part by the NIH's High-Risk High-Reward Program. In their interdisciplinary project, students will be exposed to concepts in microfluidics, nanofabrication, and gene editing approaches to explore the ultimate limits of miniaturization *via* nanomedicine. Projects will primarily focus on the design and application of nanotechnologies that enable rapid, safe, cost-effective, and efficient delivery of genes and genome-editing machinery to immune and stem cells for manufacturing new gene and stem cell-based therapies directed at pediatric cancers, hematologic disorders, and/or primary immunodeficiencies. Dr. Jonas' team is now extending this work to address disease targets and issues across the spectrum of children's health, including nanotechnology-enabled approaches for cystic fibrosis gene therapies. Our goal is to create new sets of tools that enable stem cell biologists to probe and to interact with stem cells more precisely and empower clinician scientists to apply this knowledge to design and implement new therapies more rapidly and broadly. Students will have the opportunity to participate in either the basic science and technology development aspects of the research or direct their focus to projects exploring clinical translation of the technologies.	**Faculty Lead:** Steven J. Jonas MD/PhD **Number of faculty mentors:** 1 **Capacity:** 2

ID: 21-508	**Title:** Biodesign and Innovation in Cardiology	**AoC:** ☒ Innovation & Entrepreneurship
	Brief Description: that empowers medical students to dive into medical technology innovation. This immersive AoC takes students on a comprehensive journey through every stage of the innovation process, from ideation to implementation through both structured curriculum and hands-on experience. Through this AoC, each medical student engages in a core innovation curriculum and is paired with an experienced cardiology faculty member who guides and mentors them on a current or novel project tailored to the student's clinical interest. This personalized approach ensures that the student receives focused and relevant instruction, enabling them to develop a deep	**Faculty Lead:** Marwah Shahid, MD David Cho, MD Ali Nasair, MD **Number of faculty mentors:** 1 **Capacity:** 2

	understanding of the specific challenges and opportunities within cardiology and cardiothoracic surgery. The Biodesign and Innovation in Cardiology curriculum covers a wide range of essential topics related to innovation in Cardiology. Students gain expertise in developing a strategic focus, analyzing key stakeholders, and selecting target markets for their medical technology solutions. Students will learn about intellectual property and FDA regulatory basics. Page | 6 Throughout this iterative experience, students will have access to various research and development tools at UCLA from data banks, 3D printers, electronic fabrication tools, and stimulation centers to help prototype and refine their innovation. Students will learn about business strategy through developing pitch decks, participating in pitch competitions, and getting direct mentorship for UCLA Anderson faculty and MBA candidates. By the end of the Biodesign and Innovation AoC year, students develop an appreciation and deep understating of the process of innovating medical technologies from a napkin idea to an elevator pitch. After this transformative year, students leave with a new toolkit to help create and implement medical innovations in the future.	

ID: 21-509	**Title:** Development of Highly Elastic Biomaterials for Lower Urinary Tract Application	**AoC:** ☒ Innovation & Entrepreneurship ☒ Clinical, Basic, Translational Research
	Brief Description: Children with lower urinary tract conditions such as bladder exstrophy, neurogenic bladder, or hypospadias often require tissue replacement as part of surgical reconstructive strategies. Current tissue options such as bowel, foreskin, or buccal mucosa are inadequate to restore function, have graft site limitations, and result in procedures with high risk of short- and long-term complications. The Sturm lab has partnered with engineering colleagues to create novel highly elastic scaffolds that both support cell proliferation and mimic the natural viscoelasticity of healthy lower urinary tract tissue. The student in this project would be engaged in a truly multidisciplinary translational innovations team, addressing these concerns through development of surgical closure devices and scaffolds that restore early lower urinary tract function and minimize perioperative complications. The specific roles for a student in our lab will vary by student interest, but can include materials evaluation/tensile testing, cell and tissue culture, proteomics analysis, reconstructive surgery in animal models, and development of surgical computational models to optimize clinical application. Applying one aspect of this work, the team has recently formed a start-up company based on a biodegradable, implantable device (Bio-Zipper) that supports	Faculty Lead: **Renea Sturm, MD** **Number of faculty mentors**: 1 **Capacity:** 1-3

	suture lines in the lower urinary tract. There is opportunity for a student to work with surgeons to test and optimize surgical application in open and robotic environments, learning critical components of needs-based innovation and customer discovery for surgical innovation.	

Health Justice & Advocacy

Empowers student physicians to be advocates for justice through instruction in human rights and social determinants of health, opportunities for mentorship, and applied advocacy and research experiences.

Health Justice & Advocacy

ID: 21-600	**Title:** Family Medicine and Community Health Discovery Fellowship	**AoC:** ☒ Global Health ☒ Social Science & Medical Humanities ☒ Health Justice & Advocacy (Primary) ☒ Health Delivery Improvement Science
	Brief Description: Through this Discovery, students will be engaged in 1) Capacity and skill building, 2) Experiential learning and 3) Scholarly activity culminating in a 4) Capstone experience. Students will be equipped with skills in key competencies in health justice and community advocacy through seminars, faculty tutorials and workshops. Additionally, experiential learning will be offered through clinical exposures in under-resourced settings, as well as community engagement and outreach through health fairs and health educational opportunities. They will be required to complete a health/social justice advocacy scholarly project, with the option to work with faculty mentors on an existing health justice research projects, or to develop their own scholarly research project under the guidance of assigned faculty mentors at DGSOM and Harbor-UCLA. Students will learn about their research area of interest in addition to the fundamentals of Community Based Participatory research. The required experiences and training will be centered on **advocacy domains and learning competencies** and will be contextualized in the setting of structural systems (federal, state, and local community) and health equity and justice.	**Faculty Lead:** Gerardo Moreno MD, MSHS, Jyoti Puvvula MD, MPH, **Number of faculty mentors:** 10 **Capacity:** 10-18

ID: 21-601	**Title:** Injury Prevention for Underserved and Marginalized Populations- Domestic Offering	**AoC:** ☒ Health Justice & Advocacy ☒ Global Health
	Brief Description: The Program for the Advancement of Surgical Equity (PASE) is a nascent program within the Department of Surgery that seeks to promote collaborative research and education aimed at reducing surgical disparity both globally and locally. Surgery is an integral component of a healthcare system, yet 5 billion people around the world lack adequate access to basic surgical care. Through rigorous research, training, and advocacy, PASE supports academic collaborations and community partnerships to strengthen surgical systems in low- and middle-income countries (LMICs). PASE also works to address structural racism and the social determinants of health that contribute to violence in the United States. Under PASE,	**Faculty Lead:** Catherine Juillard, MD, MPH **Number of faculty mentors: 4** **Capacity:** 2

	multidisciplinary core faculty provide an array of research and mentorship opportunities to trainees in the following areas: Trauma Quality Improvement (QI), Violence Prevention, Injury Surveillance, Cancer Screening, Surgical Training, and Equity in Surgical Care. Learn more below	

ID: 21-602	**Title:** Interdisciplinary Teams for Gender Justice in Medicine	**AoC:** ☒ Clinical, Basic, Translational Research ☒ Health Justice & Advocacy ☒ Health Delivery Improvement Science
	Brief Description: The UCLA Gender Health Program (GHP; uclahealth.org/gender-health) comprises a multidisciplinary team dedicated to the provision of world-class care to transgender and gender expansive individuals through their practice and scholarship. This is a flexible opportunity for students to participate in clinical, research, and community engagement with a unique and underserved population. It includes shadowing opportunities in primary care and specialty services, assessment and resource provision with our case management team, attendance of meetings with our Community Advisory Board (CAB), and a research project tailored to the student's individual interests. Students may choose to focus their clinical training on primary care, gender-affirming surgeries, hormone therapy, reproductive medicine, or case management.	**Faculty Lead:** Mark S. Litwin, MD, MPH **Number of faculty mentors:** 8 **Capacity:**

ID: 21-603	**Title:** Serving the Underserved in Eyecare: A Multifaceted Approach to Disparities in Ophthalmology	**AoC:** ☒ Clinical, Basic, Translational Research ☒ Health Justice & Advocacy ☒ Global Health
	Brief Description: This DGSOM Discovery AoC Program will provide the student with a multidisciplinary experience in understanding, identifying, and reducing health and healthcare disparities in ophthalmology specifically within the underserved and safety-net populations in Los Angeles. The student will work closely with faculty and mentors from the UCLA Stein Eye Center for Community Outreach and Policy to gain understanding of health and healthcare disparities in ophthalmology from the clinical, community, and research perspectives. In the first half of the Discovery period, students will gain research experience by participating in ongoing ophthalmic disparities research with the Center utilizing large databases such as the administrative Medicare database, and clinical and community experience by rotating with the UCLA Mobile Eye Clinic (UMEC) and at the Olive View UCLA Medical Center (OVMC) Ophthalmology Clinic.	**Faculty Lead:** Anne L. Coleman, MD, PhD Victoria Tseng, MD **Number of faculty mentors:** 3 **Capacity:**

	Based on the student's multifaceted exposure to eyecare delivery and disparities in the underserved population in the first half of the Discovery period, the student will spend the second half of the period designing an initiative aimed at reducing disparities in eyecare tailored to their specific interest. Examples of such initiatives would include novel screening strategies for chronic eye disease in the community, database research to further understand a specific aspect of an eyecare disparity, and community outreach in ophthalmology through UMEC.	

ID: 21-604	**Title:** SOLASTALGIA: Exploring the impacts of Climate Change on Human Health, the Psyche, and Social Determinants of Health in Greater Los Angeles County	**AoC:** ☒ Clinical, Basic, Translational Research ☒ Health Justice & Advocacy ☒ Global Health
	Brief Description: "Solastalgia," a concept that alludes to the "cumulative impacts of climatic and environmental change on mental, emotional, and spiritual health[1]," is a relatively new framework for broadening our understanding of the profound interplay between human and ecosystem health, particularly in light of increasing environmental disaster and displacement accelerated by climate change. This project seeks to explore how climate change is impacting physical, social, and mental health in marginalized communities of Greater Los Angeles County through community-engaged research, participatory art-making, and structural needs assessment of climate health inequity in collaboration with relevant community based organizations and frontline Emergency Medicine departments participating in California's statewide Syndromic Surveillance System Program for climate and disaster related illness monitoring. The student's role in this project will be to (1) learn about individual, systemic, and cross-cultural and cross-site strategies for augmenting human resilience and healing in the setting of postdisaster environmental trauma, (2) conduct mixed methods and interview-based research with patients, affected communities, and healthcare workers in frontline clinical settings regarding their experiences with "Solastalgia," and (3) produce documentary storytelling and artistic works about diverse experiences with "Solastalgia" in Greater Los Angeles County while investigating how participatory-art making can play a role in healing trauma at the individual and collective level for marginalized communities. Finally, if time permits, the student will also reflect upon how findings from this project can be used to support relevant local and state-wide policy advocacy efforts, such as using collected data and community narratives to increase accessibility of cooling systems for low-income households through the Los Angeles Housing Department or California habitability laws.	**Faculty Lead:** Denese Shervington, M.D., M.P.H. **Number of faculty mentors: 1** **Capacity: 1**

ID: 21-605	**Title:** Testing the impact of a school-wide college preparatory program on adolescent and young adult health	**AoC:** ☒ Health Justice & Advocacy ☒ Clinical, Basic, Translational Research
	Brief Description: This is a community-partnered project with 10-15 high schools to understand how the AVID college readiness program addresses structural racism in schools by increasing access to educational opportunities for Black and Latinx students. Medical students involved in this project can participate in all aspects of the study from participant recruitment, retention, data collection, data cleaning, analysis, and dissemination of findings to academic, school, and community audiences. Medical students will also participate in the weekly Discovery Seminar Series for students engaged in pediatric research.	**Faculty Lead:** Rebecca Dudovitz, MD, MPH **Number of faculty mentors: 1-3** **Capacity: 1-3**

ID: 21-606	**Title:** Exploring the Impacts of Reconstructive Plastic Surgery on the Psychosocial Functioning, Self-Image, and Substance Use of Wounded Post-9/11-Era Veterans	**AoC:** ☒ Health Justice & Advocacy ☒ Clinical, Basic, Translational Research
	Brief Description: U.S. military veterans, a population 1.5 times more likely to die by suicide than nonveteran adults, comprise nearly a quarter of suicide deaths in the U.S. (1) Many of them suffer from post-traumatic stress disorder from deployment and substance use disorder. About 20% of veterans have a service-related disability, many of whom are physically deformed from combat. This project seeks to explore how plastic and reconstructive surgery can improve the psychosocial functioning of wounded post-9/11-era military veterans through retrospective analysis of UCLA's Operation Mend patients. Operation Mend is a partnership between UCLA Health and the U.S. military that provides free advanced reconstructive surgical treatment to military veterans injured during combat operations or while training for service. Through collaboration with Operation Mend, the student researcher will conduct a retrospective chart analysis of patients who participated in the Operation Mend program and survey the patients to explore the effect of plastic surgery on their self-esteem, feelings of sadness and anger, self-loathing, suicidal ideation, substance use, satisfaction in marital and familial relationships, financial management, and self-confidence in applying for jobs. The student's role in this project will be to (1) submit a research project proposal to the UCLA Institutional Board Review, (2) review electronic medical records of Operation Mend plastic surgery patients, (3) contact the patients and conduct a survey to investigate the impact of reconstructive surgery on their psychosocial functioning, and (4) perform a statistical analysis and produce a paper with the results.	**Faculty Lead:** Ginger Slack, MD **Number of faculty mentors: 1-3** **Capacity: 1**

	Finally, the student will determine ways to use the research findings to support larger efforts to improve the lives of military veterans. https://americanaddictioncenters.org/veterans/suicide-among-veterans https://www.bls.gov/opub/ted/2016/43-point-3-percent-of-veterans-with-a-service-connected-disability-were-employed-in-august-2015.htm	

ID: 21-607	**Title:** LGBTQ+ Rural Health in the Eastern Sierras	**AoC:** ☒ Health Justice & Advocacy ☒ Social Science & Medical Humanities ☒ Global Health ☒ Innovation & Entrepreneurship ☒ Health Delivery Improvement Science
	Brief Description: There are an estimated 3-4 million lesbian, gay bisexual, transgender and queer (LGBTQ+) people living in rural America.[1] However, little is known regarding these communities. Research regarding LGBTQ people is largely focused on urban areas and coastal communities, which may have vastly different experiences compared to rural America.[2] Historically, research has confirmed that there are health disparities in the rural LGBT population.[3] Recent research has uncovered that rural LGBTQ+ people face higher rates of chronic illness and LGB folks face higher rates of mental illness, which may further be compounded by poor access to care in rural areas.[1] Rural LGB adults were also noted to be more likely to report fair or poor self-rated health versus rural heterosexual adults.[4] Commonly cited barriers for LGBTQ+ people included lack of resources and lack of cultural competency and even extend to financial and practical barriers concerning the need to travel to providers.[5,6] The Eastern Sierras of California encompass the least populated areas of the state but an expansive geographical area with a diverse population, multifaceted economy and complex intersectional health needs. Inyo County is the second largest county in California covering over 10,000 square miles but only 18,144 people[7]. Another 13,195 people live in Mono County[8] and both are separated from urban centers by the Sierra Nevada mountains. The distance alone presents challenges to health care delivery. However, with the recent establishment of the Eastern Sierra Pride non-profit, community-based organization, we have an opportunity to connect with the sexual and gender minorities of the region to understand their current health	**Faculty Lead:** Emery H. Chang, MD, AAHIVS Gifty Maria Ntim, MD Alice Kuo, MD, PhD **Number of faculty mentors: 1-3** **Capacity: 1 Student**

	care access, their needs and assess the health care, and the local providers' comfort and capacity for caring for the LGBTQ+ people and their families. The first phase of the project (needs assessment of the LBTQ+ community and current health care workers in the region) is expected to launch July 2023, as funded by the California Department of Public Health with additional funding sources are being pursued. The student would join the project team when available. Students will have deliverables throughout the project timeline and be expected to be self-directed. Limited travel to the region is likely to occur and housing in Mammoth will be available as needed with Dr Chang.	

Social Science & Medical Humanities

Using cross-disciplinary methods such as those from philosophy, social science, film, literature, art, and law, students examine the meaning and implications of medicine and medical research. Explores the moral, social, and humanistic dimensions of medicine and biomedical science.

Social Science & Medical Humanities

ID:		
21-701	**Title:** Ethical issues in invasive human neuroscience research	**AoC:** ☒ Social Science & Medical Humanities ☒ Health Justice & Advocacy
	Brief Description: The student will participate in an interdisciplinary project (neurosurgeons, neuroscientists, ethicists, and psychologists) supported by a grant from the NIH BRAIN Initiative that explores the perspectives of patients, investigators, and the public concerning the ethics of invasive human neuroscience research. We are concluding the first year of this grant, and by year three, we will have 45 patients interviews, 40 investigator interviews, three published papers, and initial public surveys for analysis. Students could participate in one of three parts of the project: (1) qualitative analysis of the audio recordings to compare perspectives across different patient populations and diagnoses, (2) comparative analysis of patient values and concerns with investigator values and concerns to identity potential areas for improved consent practices, patient engagement, and post-trial care, or (3) implementation of an intervention to improve participant understanding of the benefits of the research.	**Faculty Lead:** Ashley Feinsinger Phd **Number of faculty mentors:** 2+ **Capacity: 1**

ID:		
21-702	**Title:** Discoveries in Addiction Psychiatry	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Social Science & Medical Humanities ☒ Innovation & Entrepreneurship ☒ Health Justice & Advocacy ☒ Bioinformatics & Data Science ☒Medical Education & Leadership ☒ Health Delivery Improvement Science
	Brief Description: The student will be able to choose and participate from a variety of clinical, research, educational or advocacy projects related to experiencing discoveries in addiction psychiatry that, ultimately, will create a lasting footprint on clinical care and outcomes. The projects available to students to participate in are supported by a diverse range of grants, contracts and gifts including the National Institute for Drug Abuse, the Bureau of Cannabis Control, the California Highway Patrol, Beit	**Faculty Lead:** Timothy Fong MD **Number of faculty mentors:** 2 **Capacity**: 5

	T'Shuvah and the California Department of Public Health. Students can choose to focus on one project or participate in all of them depending on their interest and goals. Specific research projects students can choose from include (but not limited to): **Sex-dependent effects of cannabis: Assessing abuse-related and pharmacokinetic differences between men and women. –** This study will compare smoked cannabis's dose-dependent, abuserelated effects between men and women and variables that underlie sex-dependent differences, including pharmacokinetics of THC and menstrual cycle effects. **The Impact of Social Prescription on Treatment Outcomes of Addictive Disorders ---** This study will examine the treatment efficacy of a social prescription program in persons with substance use disorders and co-occurring psychiatric conditions who are entered a residential drug treatment program. **Physical, Mental and Social Impact of Digital Gaming and Gambling---** This study characterizes the clinical course and characteristics of individuals meeting criteria for gambling disorder and Internet Gaming Disorder, emphasizing exactly how excessive participation in digital behaviors impact physical, mental and social functioning. In each of these projects, students will participate in all phases of the project from design, screening conducting and running portions of the protocol, data collection and analysis. Students will work directly with research participants conducting interviews, physical exams, reviewing lab results, collating and interpreting data and are expected to contribute to the production of scientific products (papers, posters, presentation) associated with the projects.	

ID: 21-703	**Title:** Examining best practices for physical activity promotion among individuals with illnesses and injuries resulting in impairment	**AoC:** ☒ Social Science & Medical Humanities ☒ Global Health ☒ Health Delivery Improvement Science
	Brief Description: My lab specializes in qualitative and mixed methods research that seeks to promote health equity and community participation for people with disabilities and/or mental health conditions, with a particular focus on health promotion and behavior change. Sample projects include: • How to optimize delivery of physical activity programs for cancer survivors to promote adherence • Value of international mega-sport events in promoting physical and psychosocial rehabilitation for military service members and Veterans with illnesses and injuries (international research including 23 nations) • Esports for people with disabilities • Active esports to promote health and well-being for people with mental health conditions	**Faculty Lead:** Celina H. Shirazipour, PhD **Number of faculty mentors:** 1 **Capacity:** 2

	• How to optimize the well-being of families of individuals with acquired disabilities through physical activity programming • Exploring the impact of the LA2028 Paralympic Games on the experiences of Angelenos with disabilities	

ID: 21-704	**Title:** Bringing Culturally Appropriate Integrative Health Programs into Resource-Limited Community Health Settings	**AoC:** ☒ Basic, Clinical, & Translational Research ☒ Social Science & Medical Humanities ☒ Global Health
	Brief Description: This program aims to provide students in-depth knowledge and skills in integrative health and culturally sensitive care for Asian American in resource-limited community health settings. Students will learn integrative health concepts and approaches, including treatment and prevention for commonly seen conditions (e.g. obesity, hypertension, diabetes, chronic pain, and mental health) using integrative medical modalities such as acupuncture, acupressure, therapeutic massage, heathy eating, herbal medicine, and mind-body exercises. In addition, students will also learn medical Chinese and health-related culture practice to improve patient-provider communication. Based on their interests, students can choose to participate in one or two of the four major components listed below: • Clinical program development in managing obesity, hypertension, diabetes, chronic pain, and mental health through incorporating integrative health approaches • Culturally sensitive patient care for Asian/Chinese Americans • Implementation research on adapting culturally appropriate integrative health approaches for underserved Asian American patients • Global health option (4-6 weeks): observation and analysis of application of nonpharmacological approaches to chronic conditions in community health settings in Shanghai, China.	**Faculty Lead:** Weijun Zhang, DrPH, BMed Ka-Kit Hui, MD **Number of faculty mentors:** 6 **Capacity:** 6

ID: 21-705	**Title:** UC Leadership Education in Neurodevelopmental Disabilities (UC-LEND) Clinical and Research Exploration	**AoC:** ☒ Social Science & Medical Humanities
	Brief Description: The student will participate in a project supported by a grant from the Health Resources and Services Administration (HRSA), the University of California Leadership Education in Neurodevelopmental Disabilities (UC-LEND). UC-LEND is a graduate- and clinician-level training program established to improve the health of individuals who are	**Faculty Lead:** Alice Kuo, MD, PhD, MBA **Number of faculty mentors:** 3

	diagnosed with, or are suspected of having, autism or other neurodevelopmental and related disabilities (DD). The UC-LEND clinic is an interdisciplinary team of professionals (primary care, social work, psychology, neurology, occupational therapy, and public health) who work with families and individuals with ADHD, autism, and related neurodevelopmental disabilities. The clinical team works together with patients and families in a collaborative manner to create a care plan that includes short- and long-term goals to meet the unique and individual needs of each patient. We are collecting mental health, care coordination, and additional social and adverse experiences data on LEND patients at baseline and again 3- and 6-months post visit. Students could participate in one of two parts of the project: (1) mixed methods analysis of LEND Clinic patient data, especially related to care coordination and baseline patient data, and/or (2) multivariate analysis to identify predictors of patient outcomes.	**Capacity: 4**

ID: 21-706	**Title:** My Life, My Story Program	**AoC:** ☒ Social Science & Medical Humanities
	Brief Description: Students will work with the "My Life, My Story" (MLMS) program at the West Los Angeles VA hospital. Studies have shown the importance of patient narratives in humanizing clinical encounters, aiding in diagnosis, and encouraging shared decision-making that prioritizes patient values. Through the MLMS program (https://www.va.gov/WHOLEHEALTH/mylifemystory/index.asp), clinical trainees and others interview patients to gather their life narratives and, after patient approval of the narratives, input them into the medical record. Students will aid in the gathering of patient narratives, both as interviewers and writers, and they will work with the project team on research related to the role and impact of patient narratives in patient care. Patient interviewees will primarily be Emergency Department high utilizers who have expressed interest in the MLMS program. In addition to working with the PIs, students will work with Emergency Department staff and the Patient Experience Office at the West Los Angeles VA hospital.	**Faculty Lead:** Whitney Arnold, Phd Mackensie Yore **Number of faculty mentors:** 1 **Capacity: 10**

Global Health

Gives students an understanding of the spectrum of challenges—from political, to sociological, to biomedical—that limit provision of health care to the world's poorest people. Provides students with the skill-set to function effectively in any global healthcare setting, often within resource-limited environments.

Global Health

Students interested in a global health Discovery Year should strongly consider joining the Global Health Equity Pathway that combines numerous DGSOM Global Health Program opportunities into cohesively mentored experiences for students and longitudinal engagement with community partner organizations (with both local and global opportunities). The Pathway culminates in a Discovery Year mentored by UCLA Faculty and leaders from our partner organizations (see figure below).

ID: 21-800	**Title:** Strengthening Global Surgical Systems and Injury Prevention for Underserved and Marginalized Populations	**AoC:** ☒ Health Justice & Advocacy ☒ Global Health
	Brief Description: The Program for the Advancement of Surgical Equity (PASE) is a nascent program within the Department of Surgery that seeks to promote collaborative research and education aimed at reducing surgical disparity both globally and locally. Surgery is an integral component of a healthcare system, yet 5 billion people around the world lack adequate access to basic surgical care. Through rigorous research, training, and advocacy, PASE supports academic collaborations and community partnerships to strengthen surgical systems in low- and middle-income countries (LMICs). PASE also works to address structural racism and the social determinants of health that contribute to violence in the United States. Under PASE, multidisciplinary core faculty provide an array of research and mentorship opportunities to trainees in the following areas: Trauma Quality Improvement (QI), Violence Prevention, Injury Surveillance, Policy development, Cancer Screening, Surgical Training, and Equity in Surgical Care. Learn more below.	**Faculty Lead:** Catherine Juillard, MD, MPH; Shant Shekherdimian, MD **Number of faculty mentors: 5** **Capacity:** 4-5

ID: 21-801	**Title:** South American Program in HIV Prevention Research	**AoC:** ☒ Global Health
	Brief Description: The South American Program in HIV Prevention Research (SAPHIR) program offers an intensive, structured program of education and practical research training on comprehensive HIV prevention in Lima, Peru, Rio de Janeiro, or Porto Alegre, Brazil. Trainees are paired with research mentors from UCLA and collaborating institutions in Peru and Brazil to develop an independent research program incorporating both secondary analysis of existing data and design of an original research study protocol. Potential research topics include behavioral, epidemiological, clinical and laboratory issues related to HIV prevention within specific Latin American contexts. The training program includes a weekly series of lectures and seminars on key areas of global HIV prevention, including lectures, journal clubs, research presentations, and ethics case conferences. Graduates of the program accomplish the following goals: 1) Acquire a foundation of knowledge in the four core areas of comprehensive HIV prevention (epidemiology, diagnosis, treatment, and prevention); 2) Complete a secondary data analysis and prepare a corresponding abstract for submission to an international scientific conference; 3) Design an independent research sub-study; and 4) Submit a funding proposal for peer review. In order to accommodate the timeline and requirements of the Discovery program, we have developed a modified version of the SAPHIR program with a shorter timeline and fewer requirements than the traditional, full-year SAPHIR training program.	**Faculty Lead:** Jesse Clark, MD, MSc Cherie Blair, MD, PhD, Mary Cambou, MD, PhD Jordan Lake, MD, MSc **Number of faculty mentors: 4** **Capacity: 1-2**

Additional Information on Research Opportunities

ID	Additional Information on Proposal
21-001	• The **Bhaduri** lab studies cell fate specification in the developing human brain and glioblastoma, using the mutual information between these contexts to improve our understanding of basic processes and identify new areas of therapeutic intervention. • **Bisley**: Our lab studies the neural mechanisms underlying the cognitive processing of visual information. • Nicholas **Brecha**'s program is focused on understanding visual image processing in the retina using genetic and cell biological approaches, including immunohistochemistry, intracellular labeling, retrograde and trans-synaptic labeling using viruses, and patch-clamp electrophysiology. His main projects currently focus on 1) The neurobiology of visual image processing in the retina from molecules to functional connectivity, and 2) The Regulation of photoreceptor and ganglion cell synapses in normal and injured retinas. • **Cooper**: The UCLA Cannabis and Cannabinoid Research Laboratory focuses on understanding variables that influence both the therapeutic potential and adverse effects of cannabis and cannabis constituents (cannabinoids) using placebo-controlled human drug-administration studies. Current projects include understanding the potential for cannabis constituents to reduce reliance on opioids, differences between men and women in their response to the pain-relieving effects of cannabis, and therapeutic effects of cannabinoids in patient populations. • The **Donlea** lab uses fruit flies as a model system to study the basic regulation and functions of sleep. Core projects in the lab are characterizing the organization and connectivity of sleep control circuits and examining the functional roles for sleep in neural plasticity. • **Faull:** The Pasarow Mass Spectrometry Laboratory offers opportunities for research projects involving metabolomics, lipidomics, drug metabolism, both bottom-up and top-down proteomics, etc. The Laboratory has a suite of instruments and the expertise to guide and train students who wish to master these technologies and apply them to research projects of their choice and/or in collaboration with other campus laboratories. Brent Fogel, Neurology and Human Genetics • The **Gupta** laboratory investigates the interaction between brain and gut microbiome in humans and how this axis is modified by socio-cultural and environmental factors. • The **Harris** In Vivo Imaging Neurotrauma Labworks on projects relating to functional and structural circuit changes after traumatic brain injury in experimental models of TBI. We are also interested in imaging, blood and behavioral biomarkers of recovery. We use multiscale imaging: from functional and structural MRI, functional ultrasound to cellular level 2-photon microscopy as well as behavioral outcome measures. We are especially interested in students with some computational background to carry out individual projects. • The **Rexach** lab seeks to uncover mechanism by which glia and immune factors influence disease pathology in dementia to inform novel therapeutic strategies. We integrate single cell and tissue transcriptomics, epigenetic profiling, and human genetics to identify cell-specific and multicellular neuroimmune signaling networks in human dementias by applying systems biology and functional genomics. • **Samarasinghe**: We utilize human stem cell derived brain organoids to model brain development and function. We are also developing the human brain organoid platform for drug testing and validation in neurological disease. • **Sternini:** We use a combination of high resolution imaging and multilabeling approaches to identify 1) Neuronal circuits regulating colonic functions in health and disease states and 2) Neuronal intracellular adaptations in patients treated with opioids for chronic pain to understand the mechanisms underlying gastrointestinal complications induced by these analgesic drugs, a major health burden in the USA and the world. • White: The basal ganglia are key brain structures necessary for refining complex motor patterns in a variety of learned behaviors. Execution of these skills, especially during developmental critical periods, causes gene expression changes that support their learning; however, the changes that are key to this process are entirely unmapped in the basal ganglia microcircuitry. The long-term goal of our work is to identify how physical and

	behavioral therapies alter basal ganglia gene expression patterns, which has important implications for remediating sensorimotor impairments in children with neurodevelopmental disorders and in adults following stroke. • Xian-Jie **Yang:** a) We study neural retinal degeneration and repair mechanisms using molecular genetic tools, including neuronal cell type-specific gene deletion/activation and viral vector-mediated gene delivery. B) We used pluripotent stem cell derived 3D human retinal organoids to study neuronal fate specification and establish retinal disease models. • The X. William **Yang** Lab has a comprehensive research program that integrates mouse genetics and systems biology to study pathogenesis and therapeutics of neurodegenerative disorders including Huntington's disease and Alzheimer's disease. Our lab also develops novel BRAIN Initiative neurotechnology to sparsely label and illuminate the complete morphology of genetically-defined neurons and glial cells in the mouse brain to study their connectivity and changes during development, aging and diseases. • The **Zeiger** lab investigates circuit dysfunction in neurological disorders. Our current research focuses on stroke and Parkinson disease, using mouse models, in vivo imaging of neuronal structure and function, activity-dependent circuit labeling, and head-fixed behavioral assays.
21-004	Students could participate in different aspects of the project, but will largely be focused on autonomic and imaging predictive markers. Initially students may participate in data collection and analysis for the autonomic and imaging cores. They will learn different diagnostic testing for autonomic dysfunction after concussion, including provocative measures with challenging cognitive testing. The students will work closely with our neuropsychologists and autonomic core team to collect and analyze this data. The imaging for this project is multi-modal MRI, and the students can work with our neuroimagers in collection and analysis of this data. Once the data is collected, we expect to utilize multivariate analyses to identify endophenotypes associated with PPCS and/or differential recovery trajectories. We will encourage our students to develop hypotheses predicting which objective biomarkers will correlate with specific recovery patterns. We will work together on the analyses, and create clinically useful risk stratification algorithms using the validated biomarkers to predict the development of PPCS.
21-005	The cardiac nervous system, composed of the intracardiac ganglia, intrathoracic extracardiac ganglia, spinal cord, brainstem, and higher centers, coordinates regional cardiac function on a beat-to-beat basis. Globally, the cardiac nervous system is optimized to handle physiological stressors (e.g. orthostatic changes). However, it has not evolved a mechanism to adequately deal with catastrophic events such as myocardial infarction and the longer-term evolution of congestive heart failure. Imbalances within this neural network lead to excessive and stochastic activity, and underlie the mechanisms responsible for arrhythmias and heart failure. Recent work from our research team has demonstrated that targeting select elements within this neural network can lead to efficacious results in select cardiac disease states, including atrial arrhythmias, myocardial infarction, and congestive heart failure. With appropriate neuromodulation therapy, myocytes are rendered stress resistance, autonomic responsiveness for control of the heart is preserved, and the potential for fatal arrhythmias is reduced.
21-008	Antimicrobial Stewardship/Hospital Epidemiology/Diagnostics [crossover with Bioinformatics & Data Science] (Drs. Graber, Goetz, Ikuta, Vijayan, de St. Maurice, Kaur, Yang) Projects available through the antimicrobial stewardship research core at the VA Greater Los Angeles Healthcare System) include a novel approach to provide feedback to individual attending hospitalists based on electronic attribution of antimicrobial use (VA-funded project), a multihospital electronic assessment of quality of antimicrobial use (CDC-funded project), and system-wide antibiogram tool visualization development. Opportunities will also be available to work with the Institute for Health Metrics and Evaluation (IHME) on global projects related to antimicrobial resistance. Potential stewardship projects at other sites could include developing interventions to reduce unnecessary antibiotic use at end-of-life, de-labeling penicillin allergies, and developing educational curriculums for medical students on antimicrobial stewardship. Students can also work with the UCLA Clinical Microbiology Laboratory on projects related to rapid diagnostic test development and implementation. Transplant Infectious Diseases [crossover with Clinical, Basic, Translational Research] (Dr. Schaenman) Students with an interest in this fast-moving field will have the opportunity to work on improving and standardizing treatment protocols according to type of transplant and patient specific factors, with a particular focus on aging and frailty.

	HIV prevention and management [crossover with Clinical, Basic, Translational Research] (Drs. Landovitz, Currier, Hoffman, Chew, Goetz) Students will be able to devise projects that evaluate implementation and scaling of therapeutics (such as injectable antiretrovirals) to prevent and treat HIV. Substance use disorders and infectious diseases [crossover with Social Science & Medical Humanities; Health Justice & Advocacy] (Drs. Goodman, Blair, Bhattacharya, Adamson) Themes to explore include improving transitions of care among hospitalized patients with substance use disorder and infectious diseases, improving access to outpatient parenteral antibiotic therapies, prevention of HIV, viral hepatitis, and sexually transmitted diseases among persons with substance use disorders, and linking patients to substance use programs and street medicine services. Covid and other emerging infectious diseases [crossover with Clinical, Basic, Translational Research; Social Science & Medical Humanities; Health Justice & Advocacy] (Drs. Adamson, de St Maurice, Goodman, Nielsen, Chew, Ikuta) We have extensive experience in mentoring trainees in fast changing areas of infectious diseases; themes include improving access to vaccines, understanding risk factors (such as food insecurity, housing density, etc) for community spread, and exploring health disparities using geospatial mapping and other modalities. Implementation of infection prevention protocols for screening for emerging pathogens can also fall under this domain. **NOTE**: Students with specific interests in Global Health are encouraged to join the Global Health Equity pathway (led by Dr. Hoffman) for optimal planning and mentoring, though cross-over mentorship will be encouraged based on the student's interests.
21-010	Our diverse faculty mentors are NIH-funded investigators, and most of these are physician-scientists with experience training undergraduates, Masters and PhD candidates, and postdocs. Our philosophy is that the only way to truly understand the world of the physician-scientist is mentored hands-on research experience beginning in most cases with reading, hypothesis generation, primary data gathering, analysis, interpretation and presentation. Projects by Mentor: **Goldhaber**: animal models to study disorders of contractility and rhythm in heart failure and ischemia related to abnormal intracellular calcium regulation by transporters and ion channels **Marban**: strategies directed at improvement of cardiac and skeletal muscle performance using exosomes and cardiosphere derived cells in animal models and human trials **Albert**: epidemiological investigations into the origins and prevention of atrial fibrillation and sudden cardiac death **Chikwe**: outcomes research on surgical repair of cardiac structural diseases using population level clinical registries and administrative datasets **Bairey-Merz**: using non-invasive and invasive imaging to study sex-specific differences in cardiovascular physiology as well as strategies for prevention and therapies for coronary artery disease, heart failure and other cardiovascular diseases impacting women. **Chen**: animal models and clinical studies in humans into mechanisms of ventricular fibrillation including interaction of the heart with the autonomic nervous system **Cheng**: Studying age and racial disparities through phenotyping (molecular and imaging) using established epidemiologic cohorts including Multi-Ethnic Study of Atherosclerosis and Hispanic Communities Health Study / Study of Latinos **Chugh**: using artificial intelligence, advanced biostatistics and unique community databases to predict and prevent sudden cardiac death. **Cingolani**: animal models and clinical studies in humans into arrhythmia mechanisms and novel therapies to treat cardiac rhythm disorders including biological pacemaker. **Ebinger**: Implementation science using electronic health record interventions and effect on quality of cardiovascular care. **Gottlieb**: role of mitochondria, autophagy, mitophagy and mitochondrial biogenesis in the systemic response of myocardial ischemic stress **Karlstaedt**: in cell models and with the aid of systems biology techniques and biomarkers, investigating the molecular mechanisms underlying cardiac metabolic and structural remodeling in response to cancers (cardio-oncology). **Li**: development and clinical application of novel medical imaging techniques to assist the diagnosis and treatment of cardiovascular disease and cancer

	Ouyang: machine (deep) learning applied to large cardiovascular imaging datasets to phenotype cardiovascular disease, identify etiologies and make prognostications **Van Eyk**: leading edge proteomic approaches to understanding molecular mechanisms underlying cardiovascular disease in order to develop precision diagnostic biomarkers and therapies **Wei**: large datasets and cardiac MRI core labs to explore relationships between invasively determined coronary function and advanced cardiac magnetic resonance tissue characterization and perfusion in women with angina, heart failure with preserved ejection fraction and other cardiac diseases.
21-303	These project opportunities include working as an integral member of teams implementing and evaluating the following initiatives: 1. Medical-Financial Partnerships (MFPs): embedding anti-poverty, financial capability services and programs directly into pediatric primary care as a life course health intervention. This suite of projects and programs offers opportunities for implementation assessment of MFPs, experience with randomized clinical trial methods and analyses, cross-sector partnership development and program building, and policy influence locally and nationally through networks of other professionals developing similar models. 2. Adverse Childhood Experiences Intervention Networks of Care: bridging clinical identification of ACEs (histories of abuse, neglect, and household challenges) and social risks (such as food and housing insecurity) with a therapeutic response through patient and family connections to community-based agencies, services, and resources that expand the scope of the medical home and build resilience. Networks of care are in ongoing, iterative development at various Los Angeles County Department of Health Services clinics serving children and families. Opportunities abound to explore, research, and refine implementation in clinical-community care delivery to address a host of social risks, with direct health system improvement and policy implications for the field. 3. Evaluation of outcomes and implementation of a longitudinal prenatal social risk identification, case management, and mitigation program in Los Angeles County hospital-based clinics. 4. Evaluation of the behavioral health and health care utilization outcomes of housing unstable adult Veterans Administration patients among those receiving financial supports and coaching, compared to controls. 5. Examination of longitudinal and intergenerational associations between ACEs, various other social risks, and health outcomes through analyses of the longest-running longitudinal family survey in the world, the Panel Study of Income Dynamics. Analyses in our group using this data set have led to students presenting oral abstracts at the American Academy of Pediatrics Plenary at a national research conference and receiving the national Society for Pediatric Research's annual Student Research Award. 6. Development of additional, novel research projects through local and national research networks, including the Life Course Intervention Research Network (https://lcirn.ucla.edu/), Prosperity Now (https://prosperitynow.org/), and the Social Interventions Research & Evaluation Network (https://sirenetwork.ucsf.edu/). All student roles would involve substantive basic and advanced training in research methodology, particularly in health services research, community partnered participatory research, and implementation and dissemination science. Formal didactics and workshops on research methods are offered as an integrated part of this experience through the Pediatrics Health Services Research group's student research seminars and Pediatrics Department-wide Area of Concentration enrichment activities and curricula. At the end of the experience, my goal is to ensure that each student has the opportunity to design and lead at least one substantive research study that is aligned with that student's career interests and can result in a peer-reviewed publication.
21-502	UCLA Biodesign Medical Innovation Concentration is a foundational program for medical student trainees in innovation and entrepreneurship. The UCLA Biodesign Medical Innovation Concentration for medical students provides trainees with a comprehensive overview of the medical technology landscape and a framework for healthcare innovation and entrepreneurship, including a strong emphasis on leadership principles and career path opportunities. This Area of Concentration (AoC) is part of the UCLA David Geffen School of Medicine (DGSOM) Discovery AoC

	Program offered to medical students during a ten-month period of their third year of study or as part of the UCLA Biodesign Business Creation Option field study for MD / MBA dual degree students. UCLA Biodesign Medical Innovation Concentration Goals & Objectives » Introduce and define the physician innovator archetype / phenotype » Illustrate the current trends in medical innovation and entrepreneurship and the disruptive impact of new technology, tools, and processes » Cover three pillars of the Biodesign framework in depth: Identify, Invent, Implement » Provide an overview of career paths within medicine that engage in innovation and entrepreneurship across clinical medicine, academic research, and industry » Engage in experiential learning across the entrepreneurship process from idea to invention » Actively work with a multidisciplinary venture team and faculty project mentor Medical student trainees work alongside fellows and faculty in the UCLA Biodesign Program, a one-year fellowship for emerging leaders in medical technology. The UCLA Biodesign Fellowship unites a team of entrepreneurially-minded clinicians, nurses, engineers, developers, and designers to tackle some of today's most pressing challenges in healthcare. UCLA Biodesign Fellows master a repeatable and scalable framework for technology innovation across two different tracks: Discovery and Accelerator. In the Discovery track, postgraduates from clinical residency and fellowship graduate are matched in interdisciplinary teams with experts in engineering and business development. The Discovery Fellows engage in a clinical need finding expedition following the patient journey across the continuum of the care in a designated specialty. The three-month clinical immersion is followed by nine months of dedicated product development time. In the Accelerator track, UCLA faculty and staff with early-stage concepts validate the unmet clinical need and market opportunity through bi-monthly meetings. Over the course of the year, Accelerator Fellows are paired with venture teams of students in the UCLA Biodesign Medical Innovation Concentration at DGSOM and the UCLA Biodesign Business Creation Option at the Anderson School of Management. Following an intensive bootcamp led by UCLA Biodesign faculty and domain experts across the healthcare and medical technology industry, trainees are mentored by leading clinical and industry experts. The year is bookended by interactions with industry partners, from project mentorship to workshops, culminating in the UCLA Biodesign Innovation Showcase at the conclusion of their training in June. UCLA Biodesign Medical Innovation Concentration Deliverables At the conclusion of the Biodesign Medical Innovation Concentration, trainees will conduct a platform/podium presentation surrounding a researched innovation opportunity at UCLA Biodesign Demo Day, as well as develop fundamental hypotheses for bench testing or other proof of concept studies that may lead to abstract or publication opportunities. As part of their venture team projects, trainees will contribute to the composition of a written business plan detailing the unmet clinical need, market research analysis, competitive landscape matrix, value proposition, product development roadmap, healthcare economics and reimbursement mechanics, regulatory pathway, business model, and capital valuation. Furthermore, through the Biodesign process, trainees are encouraged to keep a laboratory notebook documenting their clinical observations, concepts, primary and secondary research, and intellectual property in preparation for the submission of technology disclosures, provisional patents, and full patent applications. Interim deliverables for both professional development and project-related deliverables are assigned as part of the required coursework in Biodesign I, Biodesign II, and Biodesign III.
21-503	The innovation projects that students spearhead under the supervision of their physician mentors vary depending on each student's interests. Some examples of clinical problems currently being investigated by students in our pilot program include: the inefficiency of medication reconciliation in electronic medical records, a lack of devices to organize IV wires in the OR, and the lack of effective treatments for drug resistant epilepsy. The process of identifying clinical needs and designing effective solutions taught by our program encourages students to be highly creative and multidisciplinary in their approaches. Our students work closely with their direct mentors on developing their independent projects, but also receive guidance through our curriculum and have access to feedback and assistance from other

	students during our interactive workshops and design sessions. Our program then advises students on how to turn their unique project solutions into scholarly works (posters and publications), system-based changes, as well as business opportunities.
21-406	**Background:** Recent discoveries in computational imaging and the availability of digitized histopathology slides provide an opportunity to transform conventional approaches to diagnosis and the prediction of clinical outcomes. Applications of methods, such as artificial intelligence- and deep learning-assisted image analyses, allow for the identification of thousands of image features and the unbiased generation of continuous quantifiable measurement data that can be readily integrated with other -omic platforms. Moreover, such analyses allow for the identification of features that are invisible to the human eye and beyond human comprehension. Another commonly used method to characterize cancers is molecular profiling (i.e. transcriptome, proteome, metabolome, and methylome). Molecular profiles have been used to classify tumors into subtypes that are associated with clinical outcomes as well as to identify biomarkers and therapeutic targets. Molecular profiles and pathology images provide complementary information for tumor characterization. We will test the hypothesis that the molecular profile of cancer encodes its histomorphometric features. Our innovative strategy to integrate histomorphometric features with molecular data using deep Convolutional Neural Networks (CNN) and Deep Feature Synthesis will not only add another dimension to computational pathology but also define molecular pathways that drive cancer progression from an entirely different perspective. **Task 1. Digital image analysis.** Students will receive digitized pathology slides of patient samples with detailed demographic and clinical data, including age and weight at diagnosis, race, parity, menopause status, BRCA status, debulking surgery status, progression-free survival and overall survival. Under supervision, students will use AI- and deep learning-assisted image analysis software to perform nuclear segmentation and annotation of patient slides. They will then use CNN and Deep Feature Synthesis for automated feature extraction, quantification, and selection of most informative features. **Task 2. Multidimensional database construction.** Histomorphometric features, clinical parameters, and molecular data will be linked to generate a multidimensional database. Analyses will include public and in-house-developed pipelines and decision-making workflows. Students will primarily observe the analyses but may participate directly in individual tasks in the construction of the database. **Task 3. Data integration and identification of biomarkers and potential therapeutic targets.** Under the supervision of a consultant from the UCLA Office of Information Technology, students will use several statistical procedures, including Canonical Correlation Analysis (CCA) and discriminant function analysis (DFA), to identify differentially expressed molecular features associated with histomorphometric features and clinical/demographic data. Bayesian Network Analysis will be used to identify potential causal relationships as well as mediators in the causal cascade from molecular features to visual or subvisual phenotypes. **Impact:** Although relatively new, computational pathology has already shown marked success in assisting with diagnosis, tumor classification, and predicting patient prognosis in a variety of cancer types. The proposed project will result in the identification of salient image features related to clinically relevant phenotypes and biological processes. We anticipate that future validation and clinical application of such features associated with the underlying molecular pathways will assist pathologists in diagnosis and guide patient treatment and management decisions. Importantly, the project will result in a multi-dimensional database of histomorphometric, molecular, and clinical data that will allow for future investigations of genes and pathways that can be used as biomarkers and/or targets for prevention and individualized treatment of ovarian cancer patients.
21-022	The student will be exposed to the three major arms of this multidisciplinary translational research project associated with the following respective investigators primary area of expertise **C) Dr. Tseng and Dr. Zhu**: Laboratory techniques and technological applications of in-vitro molecular diagnostics In the setting of the Tseng/Zhu Lab, the student will gain experience and knowledge in basic laboratory skills and technologies including human blood and tissue processing, isolation and purification of Evs and CTCs utilizing microfluidic devices and Click-Chip technology, RNA extraction and PCR techniques including digital droplet PCR (ddPCR). Under the supervision of Drs. Tseng and Zhu and the numerous members of the labs,

	which includes UCLA post-docs, residents, and research technicians, the student will develop skills and proficiency in these lab techniques as well as in the development of experiments and analysis of results. **B) Dr. Agopian**: Clinical enrollment and management of prospectively maintained clinical databases The student will develop a strong foundation and understanding in HCC and liver disease, from the pathophysiology, patient population, current diagnostic tools, medical and surgical treatments, and prognosis. While there are dedicated staff charged with enrolling patients in this translational study in order to collect human blood samples, there will be opportunities for the student to participate in patient interactions, perform consents, and observe the management and care of HCC patients in clinical and operative/procedural settings. The student will also participate in prospective clinical data management under the supervision of Dr. Agopian and the dedicated research staff. **C) Dr. You:** Development of biomarker panel through bioinformatic analysis. The student will be exposed to the biostatistics and bioinformatic approach and analysis that is the end result of the clinical and laboratory steps illustrated above. Dependent on the student's interest and prior experience/statistical knowledge, there is opportunity under the mentorship of Dr. You to assist in the development of the novel gene expression panels.
21-026	Aim I: Significantly improve discrete reporting of Banff criteria used to score posttransplant allograft biopsy specimens for rejection (champion: Anatomic Pathology, Dr. Zuckerman), and donor specific antibody (DSA) data (champion: Clinical Pathology, Dr. Hickey) to EPIC/Beaker. A Tableau dashboard will then be developed to aid in visualization and analysis of laboratory and clinical data (clinical data element design championed by Medicine, Transplant Nephrology, Dr. Lum). Development of this tool is instrumental in quickly answering clinical and quality assurance questions about transplant outcomes and patient management. *Design and validation will be managed by the project team (already assembled), and will occur during the students' years of Exploration and Planning. The student is welcomed and encouraged to join in on the design and execution of the validation during the Planning year.* Aim II: Using the Tableau Dashboard designed in Aim 1 above, determine UCLA's adherence to Banff criteria in the diagnosis of allograft rejection, and effects on patient management. Specifically, the goals of this aim are to publish a response to the Banff Antibody Mediated Injury Working Group showing that 1) at UCLA, immunogenetics data are readily accessible to the multidisciplinary care team and reported in advance of, or concurrent with evaluation of renal transplant biopsy specimens for accurate and timely diagnosis of antibody mediated rejection. In a second manuscript, we will also determine 2) the instance of concordance and discordance with interpretation of Banff criteria in our renal transplant population, and determine the effects on patient management and transplant outcomes. *The goals of this aim will be pursued during the student's Discovery year.* IRB#20-001734 covers the proposed work.
21-028	With technical personnel support and assistance, the student will perform sensor integration, including but not limited to, selection of specific components, point of interest and sensor placement, selection of best parameters to monitor, design integration, sensor embedding into a garment, prosthesis, or corrective device, analysis of data, and development of predictive algorithms through neural networks. Resultantly, the student will develop an understanding of machine learning and AI algorithms that will prepare them for the imminent widespread adoption of these methodologies. Moreover, as some of these devices will hopefully lead to proprietary invention, the student will be exposed to the steps involved in developing a proprietary technology/device, allowing them to understand what the process entails, possibly inspiring them to become future clinician entrepreneurs. The student will work with Dr. Thompson and orthoapedic surgery residents on clinical integration and testing of the sensors in the pediatric population. This relationship will enable the medical student to have robust clinical and research interaction with Dr. Thompson and potentially assist orthopaedic surgery residents with their independent projects. The training activities will include opportunities to interact with interested clinical faculty and other students.

	I have over 20 years of experience working on materials, design, and underlying biological and clinical failure of orthopaedic implants and devices. In the past decade, I have concentrated my research work on developing devices and technologies to diagnose, monitor, and treat musculoskeletal diseases. Dr. Thompson is an orthopaedic surgeon with a busy pediatric clinical practice and has conducted extensive research in muscular pathology, gait analysis related to surgical decision-making and surgical outcomes, hip surveillance in cerebral palsy, pediatric trauma, and musculoskeletal infections. She will undoubtedly provide the clinical context necessary to understand the problematic nature of monitoring activity and compliance in pediatric patients.
21-033	This activity is important because it is the reduced form of copper (Cu1+) that is trafficked intracellularly and delivered to copper-dependent enzymes and proteins such as cytochrome c oxidase in the mitochondrial electron transport chain and Cu, Zn-superoxide dismutase 1 (Sod1), a copper-dependent enzyme involved in oxidation defense. Altogether, we have provided extensive evidence that the histone H3-H4 tetramer is the first known nucleocytoplasmic copper reductase in any organism, establishing a new paradigm for understanding chromatin structure and function as an enzyme. As the emergence of eukaryotes coincided with the Great Oxidation Event and decreased biousability of metals, we have proposed that the H3 enzymatic function may have facilitated eukaryogenesis by contributing vital Cu1+ to protomitochondria. Our future aims are to understand the mechanisms and regulation underlying the biology of this new enzymatic activity, and how its alteration may contribute to human diseases such as cancer and certain neurodegenerative disorders in which copper dysfunction has been implicated; investigate the effects of histone cancer mutations on enzyme activity; and identify and develop small molecules inhibitors of histone enzyme activity to establish proof-of principle therapeutic approaches based on specifically thwarting toxicity of Cu1+. Our findings hold great potential to reveal an entirely unexplored but fundamental molecular regulatory axis with major therapeutic implications for a large class of human diseases.
21-036	Translational studies involve the use of iPSC-derived RPE cells from patients with various mutations and complex mouse genetic lines to correlate longitudinally genotypes and phenotypes along with key molecular markers responsible for altering the RPE homeostasis. Team of collaborators, both at UCLA and other academic institutions, to complement the lab expertise such as proteomics, lipidomics, mitochondria metabolism, and single cell RNA sequencing analyses are already established. Students will receive guidance directly from the mentor/collaborators as well as graduate students, postdoctoral fellow and experienced laboratory technicians. Students will be trained in specific lab techniques and protocols and expect to optimize and develop new technologies. They will have the opportunity to actively engage in weekly scientific discussions in one-on-one setting with their mentor and also during the lab meetings. They will learn how to critically evaluate the literature to design and perform suitable *in vitro* and *in vivo* experiments relevant to the human disease. Students will have the opportunity to explore new therapeutic venues in preclinical models.
21-037	**Analytical Approach and Student Role** Leveraging our group's unique expertise in cancer immunotherapy, and prior substantiative contributions to this field, the proposed project will immerse interested medical students in a team of researchers committed to the improved understanding of the off-target effects of immunotherapy. Specifically, our translational research group, led by Dr. Edward Garon, consists of individuals from a variety of different training levels, from undergraduates interested in cancer research to senior DGSOM faculty member, that meet on a weekly basis (see Plan for Mentorship and Support of Students Section below) to discuss and pursue research questions aimed at improving the care of patients with advanced malignancies. This project entitled, 'In depth evaluation of immune-related adverse events (irAEs) in cancer patients treated with immune checkpoint inhibitors (ICIs)' is a direct extension of our ongoing efforts to better characterize irAEs, the unique toxicities of immunotherapy in cancer. Our initial contribution to this important field of research came in the form of our impactful publication in *Cancer Immunology Research* (Lisberg et al, 2018, See Supporting Documents), in which we showed that patients with non-small cell lung cancer who experienced a treatment related adverse event experienced improved outcomes with an ICI (pembrolizumab). Next, we have followed with a manuscript in final revisions at *Lung Cancer*

	(See Supporting Documents), evaluating the incidence of thyroid related toxicities arising after ICI therap and are now pleased to have an IRB approved protocol (IRB#20-000723) recently put into place that allows our group to evaluate immunotherapy toxicities across the UCLA Medical System, which will serve as the foundation for the current project. Students will take an active role in evaluating key clinical questions regarding immunotherapy toxicities such as (a) How prevalent are delayed onset irAEs (DIREs)?, an area with little progress, but significant clinical relevance since delayed irAEs could significantly compromise patient quality of life, (b) Can the risk of developing pneumonitis be predicted prior to immunotherapy initiation? Ie are there clinicopathological factors that predict development of pneumonitis, one of the most devastating irAEs, and, as such: Should certain high-risk patients be managed differently even prior to pneumonitis appearance? (c) What is the clinical course of immunotherapy related acute interstitial nephritis and how do clinical features of this toxicity correlate with histological findings? It must be acknowledged that the preceding areas of clinical interest will certainly change over time, but given the litany of potential research questions that need to be answered in the field of immunotherapy related toxicity, supported by the knowledge that the tools required to evaluate these questions are already in-place via our research group, a high-level of confidence exists that multiple timely questions will be available for students to choose from by time of project initiation. To ensure student success, work will be guided by Drs. Garon and Lisberg, both of whom have 80% protected time to pursue research and mentor students given ongoing substantial grant support including an R01 and K08 among others. Furthermore, manual curation of the data required to support the project is not necessary (Ie this is not a massive chart review project), since we have a HIPAA compliant REDCap database that has been in place for more than 5 years and automatically pulls relevant clinical data into discrete fields, as well as CTSI supported data obtainment services to facilitate. As mentioned above, this project has also already received IRB approval (IRB#20-000723, See Supporting Documents), alleviating regulatory barriers to success. Finally, a track-record of success exists for this type of project that assures suitability for a medical student, as the second author of the *Cancer Immunology Research* publication cited above performed his analysis during a gap year between undergraduate studies and eventual medical school matriculation, while the first author of our *Lung Cancer* publication is currently a third year DGSOM student.
21-041	A second example is a project titled, “The Microbiome and Cervical Immune Factors among Women with Intrauterine Devices (IUDs)”. This project is currently collecting pilot data to support a grant application for a larger prospective cohort study. Our goal is to examine associations between the cervical microbiome, inflammatory immune markers, and clinical symptoms experienced by women with hormonal and copper IUDs. The student could participate in all aspects of the study, including patient enrollment, patient interviews, biospecimen handling, and data management. The student would have the opportunity to create a smaller sub-study of their own and write up the findings. There would also be the opportunity to gain experience with lab assay techniques. A third example is a project titled, “Human Papillomavirus Infection in Mothers and Newborns”. The project is currently in the patient enrollment phase at the Prenatal Clinic and Pediatric Clinic at the UCLA-Harbor campus. The goal is to examine associations between HPV vaccine status in the mother and evidence of oral and genital HPV in the infant. The timeline for the project is to be determined, and the student’s activities will depend on the project phase coinciding with their Discovery Year. Another option is for the student to work with Dr. Hwang to create their own smaller project in the area of adolescent reproductive health that would be feasible for the student to lead from start to finish.
21-601/ 21-800	PASE’s Global Surgery research portfolio (http://surgery.ucla.edu/pase) spans across Cameroon, Uganda, Mozambique, and Armenia; and includes a number of capacity-building initiatives to develop research infrastructure in these low- resource settings. In Cameroon, Dr. Juillard has a long-standing collaboration with the Ministry of Public Health and the University of Buea to improve trauma care delivery through a multi-institutional trauma registry, a trauma QI program, and a mobile-based follow-up program to monitor injury-associated disability post-discharge. Similarly, Dr. Dicker’s collaborative work with the Soroti Regional Referral Hospital in Eastern Uganda has led to the establishment of several hospital-based surveillance tools that collect data on the epidemiology, clinical management, and outcomes of various surgical conditions in the Soroti region. In Armenia, Dr. Shekherdimian works in partnership with the Ministry of Health to develop national level policy and strategy and implement organized

	national cancer screening programs in the Southern Caucasus nation. Armenia, a former Soviet Republic with a fragmented and largely unregulated health care system, continues to have a disproportionate burden of disease attributable to poor quality health care. As such, the Ministry of Health convened a working group to develop a comprehensive national quality policy and strategy. The chair of this working group is Dr. Shant Shekherdimian. Finally, the UCLA-Mozambique surgical partnership founded in 2010 and led by Dr. Daniel DeUgarte aims to facilitate training of Mozambican pediatric surgeons and anesthesiologists and promote local research and QI projects. PASE faculty also lead a number of projects in the United States that are focused on preventing violence-related injuries and deaths in California through evidence-based violence prevention programs. Other injury prevention projects aim to improve transportation infrastructure and bring mental health to the forefront of trauma care. Dr. Jesus Ulloa and Dr. Sha'shonda Revels are also involved in surgical equity-related research to identify barriers affecting access to surgical services and their disproportionate impact on vulnerable populations. Students seeking to contribute to these projects will have the opportunity to participate in data management and secondary data analysis of hospital-based registries in Cameroon and Uganda. In Armenia, students will have the opportunity to be involved in the activities of the policy development group, including participation in research and assessment components, development of innovative quality assurance/improvement initiatives and identification and adaptation of best practices from other successful experiences. In addition, this project will expose students to health system governance, interface with development banks and the World Health Organization, policy development and program implementation in LMIC settings. Datasets from other ongoing PASE projects are also accessible to students to formulate research questions, conduct analyses, and generate manuscripts based on their findings. Some students may also partake in primary data collection activities locally or abroad, depending on the project.
21-706	The MMC lab members meet twice a week, for three hours on each occasion; this program avoids both lectures and unidirectional monologs. Passive learning becomes active. The first of those weekly meetings will involve a guest speaker from a relevant professional field; the second will turn from theoretical discussion to practical applications and workshopping. Skills are introduced and then immediately applied to deliverables of professional benefit to each and every lab member. As shown below, students may focus on traditional publications or prepare multimedia tools and deliverables for healthcare advocacy, no matter their area of expertise. The MMC will advance careers both inside and beyond established settings. Grading: Satisfactory /Unsatisfactory **LAB ONE: Narrative Medicine (Ten Weeks)** **Learning Goal.** Foster skills and professional self-improvement in the following three areas of communication: 1. **Patient-Physician Narratives**: o *Week One*: Patient/caregiver role-playing to practice process skills o *Week Two*: Motivational interviewing to help patients follow treatment plans o *Week Three*: Video analysis of one's verbal or body language with patients o *Week Four*: The role of language/narrative in giving meaning to illness and wellness o *Week Five:* CBT: the way patients speak about their past, giving shape to future hopes based on belief systems and/or emotional responses to treatment. o *Week Six*: Culturally-specific attitudes surrounding illness and disability 2. **Self-Narratives:** o *Week Seven*: Journaling, creative assignments and discussion with tenured physicians to share stories about coping with loss or malpractice o *Week Eight*: Dealing with the guilt, moral conflicts and self-doubt of medicine 3. **Professional Peer Narratives**

o *Week Nine*: Group discussion and critique of *peer* role-playing
4**. Civic Narratives:** learning to be an advocate for the patient; building public trust
o *Week Ten*: An Introduction to Lab Two. Presentations of video dossiers compiled in Weeks 1-9.
LAB TWO: Storytelling in Healthcare: Television and Film (Ten Weeks)
Learning Goals
o Comprehend the explicit and implicit values of entertainment media and their influence on the public perception of health-related issues.
o Comprehend and recreate positive ways in which televisual media can affect both public perception and individual patients' sense of agency
o Appreciate and then recreate the narrative structure of culturally specific entertainment media in workshops
1. Traditions and Norms in the Televisual Representation of Healthcare
The theoretical ability of television, radio, and journalism to create impactful narratives faster than movie studios, thus playing a greater role in advocacy. The famous examples under examination will help students to grasp how social, perceptual norms accrued over the decades.
o *Week One*: Television, Health, and Race
o *Week Two*: Health and Children's Television
o *Week Three:* Medical Practice on Streaming Platforms and TV
2. Specific Medical Conditions in Recent Cinema
A detailed examination of how three challenging topics are handled in today's cinema, again shaping public attitudes. Examples offered will be both positive and negative, beginning with the older example of HIV-AIDS.
o *Week Four*: Mental Illness Today
o *Week Five*: Substance Abuse Today
o *Week Six*: PTSD Today
3. From Theory to Practice: Moving into Lab Three
As in Lab One, we turn constantly from theory to practice and now spend a month learning the pros and cons of using social media, while developing the technical and storytelling techniques to disseminate messages swiftly and effectively from a smartphone. As we move from Lab Two to Three, how can we translate the most effective techniques of TV and cinema to a smartphone?
o *Week Seven*: Social Media and (Dis)information
o *Week Eight*: Social Media and Advocacy
o *Week Nine*: Social Media Workshop One
o *Week Ten*: Social Media Workshop Two
LAB THREE: Tools for Advocacy within Journalism and Social Media (Ten Weeks)
Learning Goals
o Attend Q&A sessions with industry professionals from broadcasting, specifically from newspapers, podcasting studios, and screenwriting guilds.
o Reproduce their fundamental skill-sets in weekly sessions dedicated to the *making* of advocacy-focused editorials, essays, podcasts, and even a brief screenplay.
1. What do Stories Do the Brain and How Can That Help Me be Persuasive?
o *Week One*: Storytelling from a Neurological and Psychological Standpoint
o *Week Two*: Who Needs Words? Tales of Social Change in the Entertainment Industry using Visuals Alone
o *Week Seven*: Effective Storytelling and Data in Entertainment
o *Week Five*: How to Be Heard Online. How to Build an Audience in Healthcare
2. Journalism and Medicine: Better Writing for Superior Caregiving

	o *Week Three*: "Post-Paper" Journalism and Evidence-Based Stories o *Week Four*: How to Listen… and Then Retell a Patient's Story for Mobile-First Magazines o *Week Six*: How to Write a Powerful Op-Ed on Health Issues **3. Studio Workshops with Sound and Language. Making Better Messages with Affordable Tech** o *Week Eight*: Radio and Podcasting. How to Make and Publish Superior Media o *Week Nine*: Screenwriting 1: How to *Write* Better Drama o *Week Ten*: Screenwriting 2: How to *Pitch* Better Drama