

# 2022 MS1 INTRO Summer Research Program

## Mentors and Projects

**Agmon, Aric, PhD**, Department of Neuroscience

- Form and function of cortical inhibitory interneurons

**Bardes, Jim, MD**, Department of Surgery

- Guiding Prehospital Transport My research focuses on utilizing technology based solutions to improve outcomes after trauma and critical illness in a rural environment. We study the disparities present and the effect of long transport times on these illnesses. Students on this project will work on data collection and data cleaning. Learn about our analysis techniques and may get exposure to machine learning techniques.

**Brefczynski-Lewis, Julie**, PhD, Department of Neuroscience

- Physiological and brain imaging changes with a mindfulness technique in social stress situations

**Brown, Candice, PhD**, Department of Neuroscience

- Interaction between sex and age in experimental ischemic stroke

**Dietz, Matthew, MD**, Department of Orthopaedics

- Treating biofilm in prosthetic joint infection --- Students will create biofilm in a standardized system and analyze methods to improve treatment by removing biofilm through biophysical and chemical disruption. If remote work is required/requested will evaluate the clinical outcomes of patients treated with debridement and irrigation and retention of components.

**Duenas, Omar, MD**, Department of Obstetrics and Gynecology

- Substance abuse during pregnancy The DFMB (drugs free moms and babies) state initiative is being implemented in different hospitals across WV and we are looking into its impact compared to those patients who declined the intervention

**Feinberg, Judith, MD**, Department of Behavioral Medicine/Infectious Diseases

- Multiple research projects all involving either harm reduction (avoiding overdose, e.g.) and the prevention & treatment of injection drug use-associated infections such as HIV and hepatitis C.

**Hayanga, J.W. Awori, MD**, Department of Cardiovascular and Thoracic Surgery

- An exploration of the causes of mortality in patients on ECMO during a pandemic

**Kellermeyer, Brian, MD**, Department of Otolaryngology

- 1. Investigation surgical outcomes for treatment of cerebrospinal fluid leaks of the temporal bone. We will be looking at our patients operated on for this condition here at WVU as well as a systematic review and meta-analysis of the current literature on this topic.
- 2. Building a redcap database of hearing implants performed here at WVU (bone anchored hearing aids and cochlear implantation) with retrospective outcomes research. We will be looking into factors leading to success in this implants and their ability to improve quality of life and hearing after surgery.

**Kidd, Kacie, MD**, Department of Pediatrics

- I use mixed methods research to explore the experiences of parents of gender diverse youth and develop interventions to help them support their children with the goal of reducing health inequity.

**Lewis, James, PhD**, Department of Neuroscience

- (1) Chronic pain functional neuroimaging research: We are continuing a brain imaging project (using functional magnetic resonance imaging, fMRI) to map brain regions associated with the perception of chronic headache pain in an individual diagnosed with new daily persistent headache (NDPH) disorder. The project entails 3D-printing of MR-compatible devices, data collection and data analyses. Our goal is to functionally characterize brain networks associated with pain perception from this unique perspective/condition, and then to pursue potential interventions to reduce pain through neuromodulation.

**Lindsey, Brock, MD**, Department of Orthopaedics

- Effects of cytokine-loaded PLGA nanoparticles in vitro and in vivo. Briefly, PLGA nanoparticles loaded with various cytokines will be produced and evaluated in cell culture and in a mouse model.

**Lockman, Paul, PhD**, Department of Pharmaceutical Sciences

- Cold atmospheric plasma as an adjunct to radiotherapy for brain tumors.

**Makary, Chadi, MD**, Department of Otolaryngology

- Effect of smell rehabilitation on smell outcome after sinus surgery for chronic rhinosinusitis: a prospective randomized study

**Malla, Midhun, MD**, Department of Internal Medicine/Hematology-Oncology

- Integrating pharmacogenomics based testing in patients with gastrointestinal malignancies

**Minc, Samantha, MD**, Department of Cardiovascular and Thoracic Surgery

- Implementing a community engaged amputation intervention in rural West Virginia. This project is an NIH funded 5 year grant that uses implementation science, mixed methods and community engagement principles to work with a high risk area in rural West Virginia to prevent amputation

**Nelson, Randy, PhD**, Department of Neuroscience

- Sex Differences in Circadian Disruption by Exposure to Artificial Light at Night on Vascular Function. Circadian rhythms, or cycles that occur approximately once every 24 h, manifest in virtually every physiological process, in nearly every organism. These rhythms, sustained by the master circadian clock, the suprachiasmatic nucleus (SCN) of the hypothalamus, allow for optimal timing of biological processes that ensure the organism's homeostasis, and are entrained to precisely 24h by daily exposure to light. Disruption of the molecular mechanisms that sustain these rhythms have marked noxious consequences on physiology and behavior which impair survival. The cellular and molecular mechanisms underlying these effects have been widely studied and linked to multiple diseases and disorders, however, environmental contributors to disrupted circadian rhythms and the associated disorders have only recently been taken into consideration. Specifically, exposure to artificial light at night (ALAN) has been associated with disruption of the endogenous circadian biological clock (SCN) and the body's inability to properly regulate internal homeostatic processes. Indeed, exposure to ALAN has been associated with multiple disorders including cardiovascular disease and is classified as a risk factor for the development of cancer in night shift workers. Because the SCN is entrained by light and is maximally affected by short wavelength (blue) light, the present dissertation work aims to 1) uncover whether exposure to low level ALAN (5 lux), affects circadian regulation of aortic reactivity, 2) determine whether

return to a completely dark nocturnal environment, following ALAN exposure during recovery from cardiac arrest, reverses the effects of ALAN on cerebrovasculature, and 3) examine whether filtering out blue-wavelength light at night ameliorates the effects of ALAN during recovery from a cardiovascular injury.

**Olfert, Mark, PhD**, Department of Human Performance - Exercise Physiology

- Cardiopulmonary and vascular effects on offspring from maternal vaping (electronic cigarettes) during pregnancy.

**Palko, Joel, MD**, Department of Ophthalmology

- Investigation of ocular surface angioarchitecture using hemoglobin video imaging and optical coherence tomography. Aim 1: Determine if preoperative measurements of aqueous vein outflow and ocular surface angioarchitecture can aid in predicting MIGS outcomes. In this exploratory analysis, we will use low-cost, noninvasive imaging including hemoglobin video imaging (HVI) and anterior segment optical coherence tomography angiography (AS-OCTA) to image the morphology, number, and spatial relationship of ocular surface vessels in which aqueous fluid drains. We hypothesize that there are measurable differences in preoperative metrics such as vessel density, diameter, fractal dimensions and vessel aqueous content between eyes that achieve success and failure with MIGS. We will also use the raw images and videos obtained during this observational study to train convolutional neural networks to evaluate their potential to predict MIGS outcomes and obtain feature importance from these models using class activation maps. Aim 2: Evaluate the effects of MIGS on distal aqueous outflow. We hypothesize that eyes that achieve IOP lowering with MIGS will have consistent pre to postoperative changes in aqueous vein morphology, aqueous content, and number. HVI imaging of aqueous veins will be completed preoperatively and postoperatively during standard follow up visits after surgery. This aim will define the relationship between MIGS success, IOP lowering, and aqueous outflow for the first time with noninvasive imaging.

**Patel, Brijesh, DO**, Department of Cardiology

- Advancing Care of Patients with Cancer at Risk for Heart Diseases. My clinical research focusing on care of patients with cancer who develop or at high risk for premature cardiac diseases.

**Pei, Ming, MD/PhD**, Department of Orthopaedics

- Title: Rejuvenation of adult stem cells using decellularized extracellular matrix for chondrogenesis Short description: Decellularized extracellular matrix will be characterized using immunofluorescence staining for key matrix components. Adult stem cells grown on decellularized extracellular matrix will be assessed for proliferation and multi-lineage differentiation capacities. Proliferation evaluation includes relative EdU incorporation, population doubling time, flow cytometry for surface marker level, and real-time PCR for stemness gene expression. Differentiation assessments include tri-lineage induction in terms of chondrogenic, adipogenic, and osteogenic differentiation. The student will also have an opportunity to be involved in writing a review article.

**Petrone, Ashley, PhD**, Department of Pathology, Anatomy, and Laboratory Medicine

- Identification of Clinically Relevant Anatomical Variations in the Gross Anatomy Laboratory

**Salido, Ezequiel, MD/PhD**, Department of Ophthalmology/Biochemistry

- Study of the photoreceptors extracellular matrix and associated diseases. This work will use cutting-edge single-molecule resolution microscopy (STORM) combined with gene therapy introducing an extracellular matrix protein tagged with a fluorophore. All these techniques will elucidate the composition and dynamic of the extracellular matrix in the photoreceptors

**Sherman, Jonathan H., MD**, Department of Neurosurgery

- Exposure to helium gas discharge tube in blood brain barrier disruption The blood-brain barrier (BBB) is a major obstacle that inhibits movement of drugs into the brain. Brain metastases are known to change the BBB and lead to creation of the blood-tumor barrier (BTB) which is leaky in nature. Although the BTB is leaky it retains the ability to prevent delivery of chemotherapeutics to brain tumors. Consequently, investigating novel ways to disrupt the BTB to improve drug delivery is of interest. Cold atmospheric plasma (CAP) is an ionized room temperature gas that interacts with biological material without resulting in thermal damage. Typical CAP emits reactive oxygen species (ROS) and reactive nitrogen species (RNS) which creates a reactive environment; CAP also produces electromagnetic (EM) emission but the biological response to this is understudied. Here, we used a novel non-invasive helium discharge tube, which produces EM emission in the microwave power spectrum, to examine the effects of said helium discharge tube on BBB disruption. We hypothesized that exposure to the helium gas discharge tube would disrupt the BBB because prior research

shows that microwave EM emission can illicit ROS production and ROSs have been documented to disrupt the BBB. In our initial work, 4- to 6-week-old BALB/cJ mice were given 7 minutes of therapy to the top of the skull with a previously designed helium gas discharge tube. We then performed our in situ brain perfusion technique with radiolabeled sucrose on control mice and mice immediately, 15 minutes, 1 hour, and 6 hours after treatment. Radiolabeled sucrose was used to measure vascular volume. We found that 6 hours after treatment vascular volume was significantly increased when compared to our controls. This result indicates that 6 hours after treatment the BBB is disrupted. We look forward to test a combinatory therapy of helium discharge tube treatment with conventional treatments, in both glioblastoma and breast cancer metastases, to improve survival rates and decrease tumor progression.

**Singh, Shailendra, MD**, Department of Gastroenterology/Advanced Endoscopy

- Endoscopic Sleeve Gastroplasty for treatment of Obesity. Endoscopic Sleeve Gastroplasty (ESG) has emerged as a promising endoscopic bariatric therapy for the treatment of obesity. WVU medicine is a national leader in performing minimally invasive procedures like ESG for treatment of obesity. We aim to optimize the technique for ESG and study the short term and long term outcomes.

**Umer, Amna, PhD**, Department of Pediatrics

- Population level epidemiological study types of substance use during pregnancy and infant outcomes Intrauterine opioid and stimulants exposure and neonatal abstinence syndrome.

**Winstanley, Erin, PhD**, Department of Behavioral Medicine & Psychiatry

- Tailored Retention and Engagement for Equitable Treatment of OUD and Pain (TREETOP) that is a collaboration with the University of Pittsburgh. The TREETOP study, in summer 2022, will be focused on an engagement study of a pain self-management intervention plus medications for opioid use disorder in primary care settings.
- A national survey investigating problems initiating buprenorphine treatment among patients using illicitly manufactured fentanyl.

**Yakovenko, Sergiy, PhD**, Department of Human Performance

- Biomechanical correlates of improved motor function after osseointegration procedure in lower-limb amputees.

**Zdilla, Matthew, DC**, Department of Pathology, Anatomy, and Laboratory Medicine

- Improving the Surgical Approach to Trigeminal Neuralgia through Geometric Morphometric Analysis