Medical Student Research Day
Program and Abstract Book
September 6, 2025

Burrell College of Osteopathic Medicine

Office of Research and Sponsored Programs

Contents

President's Welcome Address

It is my privilege to welcome you to the Burrell College of Osteopathic Medicine's 2025 Medical Student Research Day (MSRD)!

Thank you to our participants and visitors for attending the College's premiere student research event. This is the eighth year that the College has hosted this event and I could not be prouder of the students and faculty who have put forth so much effort to make this day possible. Medical Student Research Day is an immensely important day for our students. Not only does MRSD provide our students the opportunity to gain experience that will give them a competitive edge when applying for future residency programs, it also promotes the research and scholarly efforts of the College on a national scale.

I am pleased to see such an impressive turnout of student abstract submissions by our medical students. The research studies presented have significance because of their potential for translation to Osteopathic Medicine. I would like to take a moment to recognize the efforts of our faculty and staff members of the Burrell College Office of Research and Sponsored Programs. Without our research mentors and the dedication of the staff of the Research Office, none of this would be possible. The Burrell College research community is a rising force, already making significant contributions to advancing knowledge in basic, clinical, and applied biomedical research.

It is my hope that you will engage with our student researchers and their mentors to learn both about their current projects and the ongoing investigative endeavors at Burrell College.

John L. Hummer, MHA
President & Co-Founder
Burrell College of Osteopathic Medicine

Dean's Welcome Address

It gives me great pleasure to recognize the many students who traded their summer break for an opportunity to further their own education in the field of research. This year's Summer Research Program encompasses investigations in population health, including infectious disease prevention, human physiology, anatomy, pathology and clinical medicine, a testimony to the varied interests of our students and their faculty mentors.

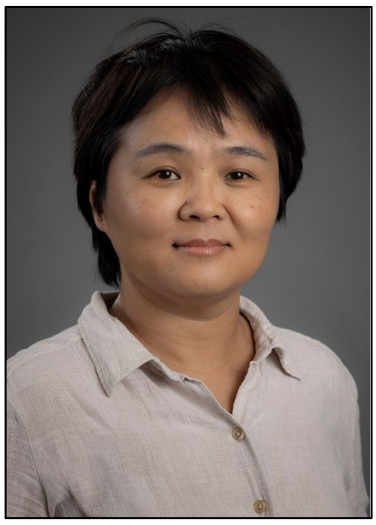
I am encouraged to see those interested in becoming the next generation of physician-scientists helping advance our medical knowledge for the benefit of our profession and our patients. Please join me in appreciating their enthusiasm to share the skills and knowledge they have gained from this experience.

William Pieratt, DO, FACP
Dean and Chief Academic Officer
Burrell College of Osteopathic Medicine

Keynote Speaker – Bob Coni, DO

I was a non-traditional med student; I worked as a Nuclear Med Tech for 5 years before entering school. I attended NYIT-COM '82-86. I then did an Osteopathic rotating internship followed by a Neurology residency at Albany medical College Hospitals. I practiced Neurology and taught medical students, IM residents, Fam Med and ED residents in the Lehigh Valley of PA, at two large networks (Lehigh Velley Health Network and St Luke's University Health Network), where I was from 1990-2014. There I practiced neurorehab and headache medicine in addition to general neurology. In 2014 I moved to Myrtle Beach to practice stroke and general neurology until coming to FL to be at Burrell last year.

Keynote Speaker – Linxia Gu, PhD



Dr. Linxia Gu is a Professor in the Department of Biomedical Engineering and Science at the Florida Institute of Technology. Her research focuses on developing biophysics models and medical devices to advance the diagnosis, planning, and treatment of diseases at the interface of physics and the human body. Specific applications include cardiovascular stenting and traumatic head injuries, in collaboration with clinicians. Her team's work has resulted in over 150 journal publications and $16 million in research funding.

Schedule Overview

Saturday, September 6, 2025 – All times in Eastern Time	
8:00 AM – 8:50 AM	Coffee/Pastries Optional poster viewing *(Authors present posters later)* **Location: 2nd Floor, Reception, Room 209**
8:50 AM - 9:00 AM	Welcome Remarks *Thomas P. Eiting, Ph.D., Director of Student Research* **Room 282**
9:00 AM – 10:30 AM	Poster Presentations *Student authors present their posters.* **Rooms 247, 248, and 2nd Floor Hallway**
10:30-10:45 AM	Break **2nd Floor Reception, Room 213, Room 249**
10:45-11:15 AM	Keynote Address – Bob Coni, DO *"Research: Experiences in Critical Thinking"* **Room 282 and via zoom https://burrell-edu.zoom.us/j/91907775261 [Meeting ID: 919 0777 5261 Passcode: 268728]**
11:15-11:45 AM	Keynote Address – Linxia Gu, PhD *"Bridging Physics and Medicine: How Biophysics and Biodevices Improve Diagnosis and Treatment"* **Room 282 and via zoom https://burrell-edu.zoom.us/j/91907775261 [Meeting ID: 919 0777 5261 Passcode: 268728]**
11:45 AM – 12:00 PM	Closing Remarks *Doris Newman, DO, Campus Dean* **Room 282**
12:00 -12:45 PM	Lunch, *(All attendees)* **2nd Floor Reception**
12:45 PM – 1:00 PM	Award Ceremony **Room 282**

Schedule in Detail

Welcome Remarks. 8:50 – 9:00 am, Room 282

Thomas P. Eiting, Ph.D.
Director of Student Research, Burrell College of Osteopathic Medicine

Poster Presentations. 9:00 – 10:30 am, Rooms 247, 248, 2nd Floor Hallway

P1. Oligodendroglioma: 2021 WHO Updates to Diagnostic Classification, Isocitrate dehydrogenase (IDH) Tumor Mechanism and Seizure Pathogenesis
LaShay Taylor, Alexia Mishock, Murat Gokden, Trey Lemley
Mentor: Angelica Oviedo, MD

P2. Disaster Type and Prehospital Mortality: A Multi-Year Review of U.S. Storm Events and Relevant Mortality Burden, 2010–2023
Audrey Hritz, Patricia Martin
Mentor: Dana Mathew, MD

P3. Gaps in Humanitarian WASH Coverage in Displacement Camps: A Cross-Regional Visual Assessment Using HDX Data
Ankit Prasad, Sonnyi Kang, Raaghib Riazudeen, Saketh Yanamala
Mentor(s): Dana Mathew, MD

P4. From Simulation to Storm: Measuring the Real-World Outcomes of a Civilian-Military Multiagency Hurricane Preparedness Exercise
Ariena Torabi Goudarzi, Jake Orent, Nicole Salcedo
Mentor: Dana Mathew, MD

P5. Disaster Mortality Disparities by Disaster Type and Region
Devin Stanley, Madisen Wicker, Alexandra Zambriczki Lee
Mentor: Dana Mathew, MD

P6. A Scoping Review of Sexual Violence at Mass Gatherings: Prevalence, Risk Factors, and Prevention Strategies
Piercarla Martinez, Julia Campos, Sheryl Ross
Mentor: Dana Mathew, MD

P7. Experiences of Sexual Assault Among Women Engaged in Wilderness and Outdoor Activities: An Online Survey
Jessica Bixha, Alara Nigro, Valerie Kobzarenko, Nancy Chau
Mentor: Dana Mathew, MD

P8. Analysis of Barriers, Sustainability, and Burnout in Wilderness Medicine Careers
Madisen Wicker, Peter Sagorski
Mentor(s): Dana Mathew, MD

P9. An Unexpected Intraoperative Discovery: Parasitic Leiomyoma in a Perimenopausal Patient with Complex Abnormal Uterine Bleeding
Kellee Diaz
Mentor(s): Rahul Lohana, MD

P10. Predictive Ability of the Classification of Ground Level Falls as Syncopal Versus Mechanical in a Mixed Intensive Care Unit Population: A Retrospective Cohort Study
Emily Ta
Mentors: John Culhane, MD, Raymond Okeke, MD, Mir Saleem, MD

P11. Natural Language Processing: A New Approach to Analyzing Sleep Related Issues in the Inpatient Setting
Mark-Joseph Velasquez
Mentors: Philipp Schulz, MD; Daniel Rongo, MD; Janey Dudley, MD; Likhita Shaik, MD; Katie Tran, MD, and Safia Khan, MD

P12. The Arts as an Intervention for Anxiety in Pediatric Cancer Patients
Molly Eisenberg
Mentor: Jagdish Khubchandani, PhD

P13. Assessing and Improving HPV Vaccine Uptake in Pediatric Clinics
Huerta D*, Jain I*, Patel R
*Authors contributed equally to the project
Mentor: Kristin Gosselink, PhD

P14. A Case of Botulism: Clinical Presentation, Diagnosis, and Management
Nicholas Hillard, Will Haff, Alejandro Esparza
Mentor: Ashish Mahindra, MD

P15. Artificial Intelligence as a Transformative Framework for Acceleration of Drug Discovery and Development
Rachel Curtis
Mentor: Keshab Paudel, MD

P16. Osteopathic Manipulative Intervention for Irregular Menses and Dysmenorrhea
Julia Pacek, Carolina del Mar Orria Ferreira, Ariena Torabi, Devin Stanley
Mentors: Brett Picciotti, DO, Aimee Raup, DO

P17. Utilizing the Energetic Model of Osteopathic Treatment of Chapman Points in an Educational Setting
Danielle Polow, Lyndsay Sheerin
Mentor(s): Adrienne Kania, DO

P18. Using OMT on overhead athletes to enhance Range of Motion and Prevent Injury
Salvatore Corallo *, Ryan Casini*
* denotes equal contribution between authors
Mentor: Brett Picciotti, DO

P19. Beyond the Meds: Impact of OMM in Management of Migraine Headache
Lillian McBee, Sydney Schoen, Eric Pei, Elisha Ekowo, Andrew Harrison, Nicholas Horvath
Mentor(s): Robert J. Coni, DO, Brett Picciotti, DO, Arleen Lally, DO

P20. A Comparative Analysis of Sports-Related Ocular Trauma with Biomechanical Insights from Finite Element Analysis
Brooke Santoriello, Jose Colmenarez Moreno
Mentor: Linxia Gu, PhD

P21. Unveiling potential complications with sub retinal injections
Cristobal Cabrera, Jose Colmenarez
Mentor: Linxia Gu, PhD

P22. The Effects of Chemical and Thermal Treatments on Bone Density
Eli Rudnisky, Emily Ahearn
Mentor: Taylor Polvadore, PhD

P23. Comparative Analysis of Static vs. Dynamic Imaging in Alzheimer's Disease
Evan Cohen, Sara Glaser
Mentors: Debasis Mitra, PhD, Robert Coni, DO

P24. Early Detection of Alzheimer's Disease via Multimodal Deep Learning Models Using Magnetic Resonance Imaging, Magnetic Resonance Spectroscopy, Genetic Data, and Electronic Health Records
Sarah Mortero, Sonnyi Kang, Michael Trimboli
Mentor(s): Xianqi Li, PhD

P25. Parametric FSI Study of Capillary Artery Behavior and Brain Damage in Ultrasound Mediated BBB Treatment
Seo Hyun (Emily) Park, Jose Colmenarez Moreno
Mentor: Linxia Gu, PhD

P26. Treating Persistent Atrial Fibrillation with Vagal Nerve Stimulation
Margaret Jeng
Mentor(s): Harald Stauss, MD, PhD

P27. Development of an Epsin-Mimetic Peptide-Loaded PCL-Gelatin Scaffold for Small-Diameter Vascular Grafts
Elora Mukhopadhyay, Fatemeh Goodarzinia, Riley Jasperson, Tryfon Theophilopoulos
Mentor: Christopher Bashur, PhD

P28. Advancing mRNA Therapeutics: Foundational Work Toward Cell-Specific Vaccines and Chronic Disease Treatment
Benjamin Nakagawa, Emily Westfall
Mentor: Drew Weissman, MD, PhD

P29. Effects of Acute and Repeated Emotional Stress on GAD67 Expression and Fos Activation in the Amygdala
Alex Tai*, Matthew Arcemont*, Matin Babaev*, Derek Bangerter* (*equal contribution)
Mentor: Kristin Gosselink, PhD

P30. Correlation Between Screen Time, Sleep Duration, and Stroop Effect Among First-Year Osteopathic Medical Students
Summer Hales, Emily Ahearn, Piercarla Fernandez, Mark Parsamian
Mentor(s): Raju Panta, MD, Pedro Del Corral, MD, PhD

P31. Knowledge and Perception of Artificial Intelligence (AI) in Medical Education among Preclinical Osteopathic Medical Students and Faculty
Jake Orent, Hassan Cordash, Laura Francois
Mentor: Raju Panta, MD

P32. Mapping Educational Access Gaps in Conflict-Affected Regions Using HDX Data
Student Authors:
Chloe Watkins, Michael Yingst, Ishita Jain
Mentor: Dana Mathew, MD

P33. The Impact of Preclinical Curriculum Based Serving-Learning on Osteopathic Medical Students' Understanding of the Social Determinants of Health
Ojeni Touma, Mena Eskander, Salvatore Corallo, Catrina Wiltshire McLeod
Mentor: Mary Lacaze, MD

P34. Defining Fairness in Sport Leadership: A Scoping Review Protocol & Preliminary Findings
Timothy J. Khalil, Taniah Ali
Mentor(s): Katherine E. Hirsch, PhD

P35. Species Identification of Wild Nematodes Using ITS2 DNA Barcoding
Tina Rivera
Mentor: Timothy Crombie, PhD

P36. Discovery of Complex Co-occurring Mutational Positions in *Spike* and *Membrane* protein sequences of SARS-COV-2
Valerie Kobzarenko
Mentor(s): Debasis Mitra, PhD

P37. Streptococcus Anginosus causing a 1.5cm Mitral Valve Vegetation in a Patient with HOCM
William Haf, Nicholas Hillard, Alejandro Esparza, Jake Orent
Mentor: Magdy El-Din, MD

Break. 10:30 – 10:45 am, Coffee/tea/cookies, 2nd Floor Reception, Rooms 213 & 249

Please make your way down to Room 158 while enjoying your treats, as our oral presentation session will begin promptly at 10:30.

Keynote Address. 10:45 – 11:15 am, Room 282

Research: Experiences in Critical Thinking
Bob Coni, DO
Associate Professor of Preclinical Medicine, Burrell College of Osteopathic Medicine

Keynote Address. 11:15 – 11:45 am, Room 282

Bridging Physics and Medicine: How Biophysics and Biodevices Improve Diagnosis and Treatment

Linxia Gu, PhD

Professor, Biomedical Engineering and Science, Florida Institute of Technology

Closing Remarks. 11:45 am – 12:00 pm, Room 282

Doris Newman, DO

Campus Dean, Burrell College of Osteopathic Medicine

Lunch. 12:00 – 12:45 pm, 2nd Floor Reception

Please grab a plate and join your friends for lunch in the 2nd floor reception area, or anywhere else you like. Our award ceremony will begin promptly at 12:45 pm.

Award Ceremony. 12:45 – 1:00 pm, Room 282

Thomas P. Eiting, Ph.D.

Director of Student Research, Burrell College of Osteopathic Medicine

Abstracts – Poster Presentations

P1. Oligodendroglioma: 2021 WHO Updates to Diagnostic Classification, Isocitrate dehydrogenase (IDH) Tumor Mechanism and Seizure Pathogenesis
LaShay Taylor, Alexia Mishock, Murat Gokden, Trey Lemley
Mentor: Angelica Oviedo, MD

Objective:
Instructional case report intended to be used as a learning tool within the Pathology Competencies for Medical Education under the basic competencies: Disease Mechanisms and Process, Organ System Pathology, and Diagnostic Medicine and the Therapeutic Pathology.

Background/Introduction:
Oligodendrogliomas are primary CNS tumors of glial origin marked by IDH mutation and 1p/19q codeletion. Historically diagnosed by histology alone, they are now molecularly defined per World Health Organization (WHO) 2016 classification updates. The 2021 WHO revision also replaced older terms like low grade and anaplastic with numeric designations: Grade 2 or Grade 3.

Methods:
Utilization of the 2021 5th WHO Classification of Central Nervous System Tumors for updated classification of oligodendroglioma and literature reviews on clinical presentation, work up, and treatment.

Conclusion:
This educational case presentation will serve as a blueprint for recognizing the diagnostic features of oligodendroglioma for medical students and residents.

P2. Disaster Type and Prehospital Mortality: A Multi-Year Review of U.S. Storm Events and Relevant Mortality Burden, 2010–2023
Audrey Hritz, Patricia Martin
Mentor: Dana Mathew, MD

This study quantifies and compares disaster-related injuries and deaths in the U.S. from 2010–2023 using NOAA Storm Events data. We analyzed over 40,000 events by hazard type, region, season, and injury mechanism. Tornadoes caused the most injuries (13,966), while heat events were the deadliest (3,990). Cold-related events had the highest fatality rate (91.75%), whereas hail had the lowest (3.73%). While most deaths were direct, events like fog, cold, and snowstorms showed high indirect mortality. The South experienced the greatest impact, with spring accounting for the most injuries and summer the most deaths. Wildfires and heat-related events are increasing, likely due to climate change. These findings highlight the need for hazard-specific planning, improved surveillance, and targeted strategies for at-risk populations and indirect outcomes.

P3. Gaps in Humanitarian WASH Coverage in Displacement Camps: A Cross-Regional Visual Assessment Using HDX Data

Ankit Prasad, Sonnyi Kang, Raaghib Riazudeen, Saketh Yanamala
Mentor(s): Dana Mathew, MD

Objective:
This study develops a replicable, data-driven method to assess WASH adequacy in displacement camps using open-access data. It quantifies people-per-latrine ratios in Ethiopia, Sudan, and Bangladesh, classifies burden via Sphere Standards, maps disparities with GIS, compares results to HNO/DTM narratives, and offers a scalable framework to guide targeted humanitarian interventions.

Methods:
A cross-sectional geospatial analysis was conducted to assess alignment between WASH (Water, Sanitation, and Hygiene) infrastructure and population density in displacement camps in Ethiopia and the Rohingya camps in Bangladesh. Public datasets from the Humanitarian Data Exchange (HDX) and Rohingya Response were used to extract population figures, WASH facility locations, and camp coordinates. Service coverage ratios (e.g., persons per latrine) were calculated in Microsoft Excel. Geospatial analysis was conducted via QGIS by creating visual heat maps illustrating the distribution and density of available latrines relative to camp populations, thereby identifying regions with inadequate WASH provisions. Google Maps was used for interactive mapping information. Administrative boundaries were also extracted and compiled from HDX datasets.

Results:
More than half of sampled camps in Sudan and Ethiopia exceeded critical thresholds, with values >150 people per latrine. One Ethiopian camp reported 160 individuals per latrine. In contrast, the Rohingya camps in Bangladesh demonstrated higher WASH coverage, with many reporting ratios <50. Visualizations confirmed severe service deficits in conflict-intensified zones.

Conclusion:
This study presents a scalable, low-cost approach to identifying WASH service gaps using HDX data. Camps in East Africa, especially those in conflict-affected or remote areas, show critical infrastructure shortfalls. By combining simple ratio metrics with geospatial mapping and contextual analysis, this method supports more equitable and evidence-based WASH planning. It also offers a tool for early warning on disease and protection risks.

P4. From Simulation to Storm: Measuring the Real-World Outcomes of a Civilian-Military Multiagency Hurricane Preparedness Exercise

Ariena Torabi Goudarzi, Jake Orent, Nicole Salcedo
Mentor: Dana Mathew, MD

Objectives:
This study evaluates the perceived influence of the Vista Forge full-scale, civilian/military multi-agency exercise on communication, operations, and interagency coordination during the subsequent Hurricane Helene response.

Methods:
A mixed-methods survey was distributed to 100 individuals involved in both the Vista Forge exercise and the Hurricane Helene response. A total of 21 individuals representing EMS, emergency management, public health, military, and NGO sectors completed responses. The responses were analyzed using descriptive statistics and thematic coding of open-ended questions. Key domains included personnel familiarity, communication systems, medical readiness, resource tracking, volunteer management, and interagency coordination.

Results:
Participants reported several improvements in disaster response directly attributed to the Vista Forge exercise, including enhanced communication redundancy (e.g., Starlink deployment), clearer delineation of roles, and stronger liaison effectiveness. Respondents highlighted persistent gaps in interoperability between agencies, documentation standardization, and coordination between field operations and emergency operations centers (EOCs). Political pressures and insufficient volunteer management were also cited as barriers during the Hurricane Helene response.

Conclusions:
Findings suggest that complex, multi-agency exercises such as Vista Forge can strengthen real-world disaster response, particularly in communication and operational coordination. Nonetheless, persistent challenges in documentation, leadership integration, and system interoperability highlight the need for targeted improvements in exercise design and policy implementation. Future disaster preparedness efforts should incorporate mechanisms for cross-agency standardization and address structural limitations not easily mitigated through training alone.

P5. Disaster Mortality Disparities by Disaster Type and Region
Devin Stanley, Madisen Wicker, Alexandra Zambriczki Lee
Mentor: Dana Mathew, MD

Objective
The objective of this study is to provide a 20-year comparative overview of disaster mortality by type and region from 2000 to 2023 using public Emergency Database (EM-DAT) data from the Humanitarian Data Exchange, with the aim of identifying disparities in human impact and informing preparedness strategies.

Methods
This cross-sectional descriptive study analyzes disaster records from the Emergency Events Database (EM-DAT) available via the Humanitarian Data Exchange. Disasters were filtered by year, disaster type, and region. Regional categories were determined by cross-referencing a World Health Organization reference region list. Summary statistics were provided for total deaths, injuries, and affected populations. The 4 deadliest natural disasters were determined by examining the mortality rates per region over the 20-year study period. Mortality and injury ratios per event and per affected population were calculated. Mortality and injury ratios were then compared by region to ascertain if regions with the highest affected population also witnessed congruent mortality rates. These ratios were plotted using the Flourish mapping software to visually represent mortality hotspots.

Results
Earthquakes, extreme temperatures, storms, and floods are the top four deadliest natural disasters worldwide, respectively. Earthquakes cause the most deaths despite being less frequent. Flooding is the most frequent natural disaster and creates the largest number of injuries (n=1.80×109). However, earthquakes result in the greatest number of deaths (n=9.03×104). The Region of the Americas (AMRO) experiences the most frequent natural disasters (n=2.15×103), while the Western Pacific Region (WPRO) suffers the largest number of individuals affected (n=1.79×109). The Southeast Asian Region (SEARO) experiences the highest number of total deaths (n=5.25×105), but EURO has the highest death rate per capita (~0.0066). Natural disasters disproportionately affect larger populations in both SEARO and WPRO, indicating structural vulnerably and space for improvement. The high mortality per capita of the EURO calls to question aging population and heat reliance. SEARO experiences a record 2.81 × 102 deaths per disaster, while WPRO has the highest number of injuries per disaster (n=1.41×106). The high mortality rates of SEARO are starkly contrasted by the total death rate of the African Region (AFRO), which experiences only 3.64×104 deaths. There is a difference of 4.88×105 deaths between the record SEARO and AFRO, and the African Region does not experience the lowest number of natural disasters of all regions studied.

Conclusion
Models have been created to demonstrate the need for early investments and policy design based on evidence for improved resource allocation in Brazil, however there is a need for global disaster analysis (Gomes da Silva MA et al., 2025). Previous studies indicate healthcare gaps in areas including surge capacity, human resources, and post-disaster recovery (Gabbe B et al., 2019). This study examines the need for both mass casualty training and resource allocation to regions in need. Additional training should be provided to EURO and SEARO as SEARO has the highest mortality rates and EURO experiences the highest mortality per capita. WPRO and AMRO require additional investment in logistics, infrastructure, and rapid response. Mortality rates vary significantly by region and by type, with a growing frequency and deadly in areas of geographical and structural vulnerability, supported by data from EM-DAT.

P6. A Scoping Review of Sexual Violence at Mass Gatherings: Prevalence, Risk Factors, and Prevention Strategies

Piercarla Martinez, Julia Campos, Sheryl Ross,
Mentor: Dana Mathew, MD

Abstract
Introduction:
Mass gatherings pose unique challenges for public safety and emergency response, including heightened risks of sexual violence. Factors such as crowd density, alcohol and drug use, and inadequate security contribute to these risks.2, 9 These incidents not only endanger individuals but also strain on-site medical and psychosocial services.

Objective:
This scoping review examines the prevalence, risk factors, and reporting patterns of sexual violence at mass gatherings, with the goal of informing prevention strategies and improving response systems.

Methods:
Following PRISMA-ScR guidelines, a protocol was developed using the Population, Concept, and Context (PCC) framework. Studies were included if they addressed sexual violence during events with over 1,000 attendees, such as festivals, concerts, or sporting events. Populations studied included victims, perpetrators, bystanders, law enforcement, and event organizers.

A comprehensive search across seven databases (PubMed, Scopus, ScienceDirect, ResearchGate, SAGE Journals, EBSCOhost, and Google Scholar) and grey literature (e.g., Teen Vogue) identified relevant studies using search terms such as "sexual assault," "mass gatherings," and "music festivals." No restrictions were placed on study design, geography, or publication year.

Results:
Sixteen studies met the inclusion criteria. Extracted data included study design, event type, population characteristics, risk factors, prevalence, and documented interventions. Sexual violence was consistently reported as being underrecognized and underreported.

Six key themes emerged: (1) alcohol and drug use, (2) environmental risks (e.g., overcrowding, poor lighting), (3) vulnerability of women aged 17–24, (4) bystander inaction, (5) normalization of harassment, and (6) limited effectiveness of prevention strategies. Victims often considered unwanted sexual contact "normal" in these settings. Reporting was primarily informal—victims confided in friends or staff rather than law enforcement—due to distrust and fear of inaction.

Conclusion:
Sexual violence at mass gatherings is a persistent, underreported issue. Findings highlight the need for trauma-informed, gender-sensitive policies; environmental design improvements; and targeted bystander interventions. Integrating these measures into mass gathering planning and emergency preparedness can reduce harm and strengthen safety infrastructure at high-risk events.

P7. Experiences of Sexual Assault Among Women Engaged in Wilderness and Outdoor Activities: An Online Survey

Jessica Bixha, Alara Nigro, Valerie Kobzarenko, Nancy Chau
Mentor: Dana Mathew, MD

Objective: The primary goal of this study is to estimate the prevalence of sexual harassment and assault among individuals engaged in outdoor physical activity and to describe behavioral changes that may result from these experiences. In addition, this study will assess how experiences vary across demographic groups, including age, race/ethnicity, gender identity, and geographic location. Furthermore, we aim to explore the characteristics of the individuals reported to have perpetrated these behaviors.

Methods:
The online, 23-question survey is delivered through Qualtrics. The survey consists of 22 multiple choice questions and 1 open-ended question. Most survey questions were adapted from The Revised Sexual Experiences Survey Victimization Version (SES-V). The recruitment process aims to collect 400-800 responses. Participants will be recruited over a 6–8-week period using a targeted, online outreach strategy. The survey is posted on relevant Facebook groups, Instagram, and Reddit. Inclusion criteria were adults ≥18 who identify as women (including transgender women and non-binary individuals identifying with womanhood) who have engaged in solo or group wilderness activities, experienced sexual assault, harassment, or unwanted sexual attention in outdoor settings, and those who may have altered their

outdoor activities due to another woman's similar experience. Qualtrics security features to prevent bot responses are employed such as CAPTCHA verification and restricted submissions from the same IP address. Attention check questions are included throughout the survey to ensure data validity and participant engagement. Survey responses are required to be at minimum 80% completed to be included in the data analysis.

Results:
This study will investigate patterns in attack locations, victim and perpetrator demographics, incident frequency, and assault types using correlation analyses (Pearson's or Spearman's, depending on distribution normality). It will also compare assaults in wilderness and non-wilderness settings to determine whether environmental context influences behaviors or circumstances. If the dataset is sufficiently large, principal component analysis (PCA) will be applied to visualize multivariate relationships and identify latent factors that may contribute to these incidents. Further exploration of habit changes can be done to assess whether shifts in behavior are influenced by environmental factors, perceived safety, or accessibility to resources. Additionally, this study will explore how the individuals who experience sexual assault and/or harassment in outdoor physical activity settings may have changed their patterns of behavior after the incident. For instance, victims may alter group size, change routes, begin carrying defensive tools such as pepper spray, or even stop participating in outdoor physical activity all together. With these variables to analyze we aim to close the gap in wilderness research surrounding the experiences and safety of women in outdoor activity spaces.

Conclusion:
With this study, we aim to examine the localized prevalence of sexual assault and harassment, specifically among women in outdoor physical activity settings, and further identify behavioral changes that occur among these individuals after such experiences. Additionally, with the survey data gathered across a large sample size, we aim to isolate trends and patterns that might indicate certain risk factors among women who experience sexual assault in outdoor physical activity settings. Additionally, analysis of patterns in underreporting and gaps in available support services will offer further context for interpreting the findings. With the identification of these factors, we can contribute to informed policymaking and initiatives that will more effectively keep this population safe.

P8. Analysis of Barriers, Sustainability, and Burnout in Wilderness Medicine Careers
Madisen Wicker, Peter Sagorski
Mentor(s): Dana Mathew, MD

Objective:
In particular, the aim is to explore whether there are meaningful differences in the experiences of wilderness medicine professionals based on years of practice in the field, level of education, gender and geographical residence in order to assess the financial sustainability of wilderness medicine. Increasing data on these aspects may impact potential physicians' decision to pursue careers in wilderness medicine and enhance institutional recognition of the specialty.

Methods:
This study utilizes an anonymous internally generated online survey to collect data from providers working in wilderness medicine with Qualtrics, a web-based platform. The survey includes a combination of multiple-choice, Likert scale, and open-ended questions designed to gather quantitative and qualitative data

on career sustainability, burnout, job roles, and gender-based experiences, and was designed to build off the works of others in the wilderness medicine community (Thurman J.T., et al (2024), Watkins K.D., et al. (2025), Hawes H.M. et al. (2024), and Trout et al. (2021)). The survey sections include: (1) introduction to study and informed consent; (2) background and demographics; (3) barriers and enablers; (4) geographic disparities in opportunity; (5) satisfaction, burnout, sustainability, and future plans. Distribution will occur via email, professional networks (wilderness medicine society, ACEP-Wilderness Medicine etc.), and targeted wilderness medicine companies around the USA. The goal subject population will be composed of 550 licensed medical professionals (based on a power analysis from Thurman et al. (2024); effect size = 0.154, alpha = 0.050, power = 0.950) actively involved in Wilderness Emergency Medical Services (WEMS). The effect size used in the sample size calculation reflects expected differences in these areas, especially how burnout or perceived sustainability may vary between early- and late-career providers or between men and women. The goal is to ensure enough responses from a diverse group of participants to confidently identify and describe these differences. These individuals will be identified through professional societies, EMS and wilderness medicine training organizations, and the professional networks of subject matter experts (SMEs). All participants are asked to confirm that they work under medical direction and are authorized to provide advanced care in wilderness settings.

Results:
The findings are expected provide actionable insights into the employment landscape and highlight barriers or facilitators to professional success in this field. It is anticipated that the survey will take 15-20 minutes for each participant to complete, and based on the power analysis from Thurman J.T., et al. (2024), it is expected that at least 100 survey responses out of the 550 collected will be fully completed for analysis. Similar results are expected in this study to previous surveys conducted by Thurman J.T., et al. (2024) and Watkins K.D., et al (2025), which align with the hypothesis that there will be disparities among wilderness medicine providers. For example, Thurman J.T., et al. (2024) reported that only 51% of survey responders were paid as WEMS providers. It is therefore expected that a similar number of respondents in this survey will report that they are paid for their work in wilderness medicine. Per the survey conducted by Watkins K.D., et al (2025), only 19 out of the 79 residency programs who responded offered wilderness medicine tracks, leading to the approximation that many providers will report difficulties entering the wilderness medicine field based on training disparities.

Conclusion:
Based on the findings from the referenced wilderness medicine literature, this study is expected to reinforce the conclusion that disparities remain among wilderness medicine providers. The expected disparities include differences in years of wilderness medicine experience, educational background, gender, and geographic location. By illuminating these differences, this study hopes to contribute to a growing body of evidence that may influence career decision-making for prospective physicians and strengthen the case for greater institutional recognition of wilderness medicine. As the specialty seeks to balance its unique demands with long-term viability, understanding these demographic and experiential factors is critical to ensuring both provider retention and equitable opportunity in this challenging and essential domain.

P9. An Unexpected Intraoperative Discovery: Parasitic Leiomyoma in a Perimenopausal Patient with Complex Abnormal Uterine Bleeding
Kellee Diaz
Mentor(s): Rahul Lohana, MD

Abnormal uterine bleeding (AUB) is a prevalent gynecologic condition that can substantially reduce quality of life through anemia, functional impairment, and psychological distress. Uterine leiomyomas are a well-established structural cause of AUB. In contrast, parasitic leiomyomas, defined as smooth muscle tumors detached from the uterus and revascularized by adjacent tissues, are extremely rare, with few cases reported in the literature. This report describes a 49-year-old G5P3023 woman with a three-year history of heavy, regular menstrual bleeding and severe cramping, complicated by chronic iron deficiency anemia. Her medical history included stage III renal failure, recurrent deep vein thromboses, type 1 diabetes mellitus, hypertension, hyperlipidemia, and gastroparesis. During robotic-assisted laparoscopic surgery, a parasitic leiomyoma was unexpectedly found adherent to the large bowel. This intraoperative finding increased surgical risk due to the potential for bowel injury, significant hemorrhage, and perioperative complications associated with her comorbidities and anticoagulation therapy. Recognition of rare fibroid variants in patients with AUB is critical, especially in individuals with multiple comorbidities, as surgical complexity and complication risk are significantly elevated.

P10. Predictive Ability of the Classification of Ground Level Falls as Syncopal Versus Mechanical in a Mixed Intensive Care Unit Population: A Retrospective Cohort Study

Emily Ta
Mentors: John Culhane, MD, Raymond Okeke, MD, Mir Saleem, MD

Objective:
To compare the frequency of selected cardiovascular and neurologic findings in patients with syncopal or mechanical falls. If these conditions are found more in one group, providers may have a higher suspicion and lower threshold to conduct a workup. If the syncopal versus mechanical classification cannot predict important differences, then this system is less useful. The hypothesis is that cardiovascular and neurologic diagnoses and procedures are more common for patients with a syncopal fall.

Methods:
This retrospective registry review compares outcomes for patients with falls classified as syncopal versus mechanical. The data source is the Medical Information Mart for Intensive Care (MIMIC) III database. Patients experiencing a fall documented in the history of present illness (HPI) or during the admission were included. Syncopal versus mechanical etiology was analyzed as a predictive factor for length of stay, mortality, and cardiovascular and neurologic outcomes. Significance for categorical variables was tested with a chi-square and continuous variables with a T-test. Multivariate analysis was performed with logistic regression for binary outcomes and linear regression for continuous outcomes.

Results:
Overall mortality for mechanical falls was 384 (54.2%) versus 480 (45.2%) for syncopal ($p<0.001$). Conditions more common among the syncopal group include cardiac valve disorder - 151 (14.2%) versus 76 (10.7%) ($p=0.038$), arrhythmia - 540 (50.8%) versus 322 (45.5%) ($p=0.03$), orthostatic hypotension - 38 (3.6%) versus 8 (1.1%) ($p=0.003$), and need for pacemaker implant or revision - 87 (8.2%) versus 13 (1.8%) ($p<0.001$). The difference in myocardial infarction was not significant. Syncopal etiology was an independent predictor of outcomes including overall mortality - adjusted odds ratio (OR) 0.75 ($p=0.005$), gastrointestinal bleed- (OR) 1.74 ($p=<0.001$), orthostatic hypotension - OR 3.34 ($p=0.002$), and need for pacemaker placement or revision - OR 4.0 ($p<0.001$).

Conclusion:
Mortality was lower for patients with syncopal falls. Cardiovascular conditions were significantly more common among syncopal fall patients, but the incidence, especially for arrhythmia, was high and nearly equal in the mechanical group. We believe that a standard workup for orthostasis and arrhythmia should be performed for both groups, regardless of syncopal versus mechanical etiology.

P11. Natural Language Processing: A New Approach to Analyzing Sleep Related Issues in the Inpatient Setting

Mark-Joseph Velasquez
Mentors: Philipp Schulz, MD; Daniel Rongo, MD; Janey Dudley, MD; Likhita Shaik, MD; Katie Tran, MD, and Safia Khan, MD

Objective:
To evaluate how sleep-related issues and their management impact hospital length of stay (LOS) in inpatient settings using large language models to analyze unstructured clinical notes.
Introduction: Natural language processing at a large scale can offer the opportunity to gain insights into large datasets of text that may otherwise be difficult to manage through traditional methods. Poor sleep quality has been associated with adverse effects (i.e., increased pain perception, cognitive dysfunction, and delayed recovery). Despite this, practice patterns vary among practitioners in managing acute insomnia and sleep disturbances in the inpatient setting. This study aims to analyze the impact of sleep difficulties, their management, and effect on the hospital length of stay (LOS) with the use of a large language model (LLM).

Methods:
The datasets MIMIC-IV and MIMIC-IV-Note databases (Beth Israel Deaconess Medical Center) were examined in March 2025. A random sample of 125,000 patients were selected to optimize both computational efficiency and data representativeness. Patient documentation including history of present illness and discharge summaries were evaluated with "gemini-2.0-flash" via one-shot batch prompting to extract details regarding sleep-related issues and management during the hospital stay at Beth Israel Deaconess Medical Center. Outputs were evaluated based on presence of sleep-related issues, location, and associated newly prescribed insomnia medications by discharge. These populations were evaluated for statistically significant differences in their distributions using the Mann-Whitney U test.

Results:
Analysis of 125,000 patient encounters revealed that the mean hospital LOS was significantly longer for patients with sleep-related issues (201.9 hours) than for those without (115.9 hours) ($p < 0.0001$). ICU patients with sleep-related issues exhibited a longer mean LOS (365.8 hours) than those without (224.7 hours) ($p < 0.0001$). The most prescribed medications for sleep were trazodone, zolpidem, and lorazepam. Prescription of zolpidem was associated with the shortest length of stay (155 hours).
Conclusion: This study highlights the potential of large language models to drive the discovery of new insights to such a large scale and reveal patterns in inpatient care. It shows the significant impact that sleep-related issues and their management play during in-hospital admissions and length of stay. While clinical outcomes and decisions are inherently complex, the patterns derived from this analysis open an opportunity for further inquiry and exploration.

P12. The Arts as an Intervention for Anxiety in Pediatric Cancer Patients
Molly Eisenberg
Mentor: Jagdish Khubchandani, PhD

Background:
As the number of children being diagnosed with cancer increases globally, a rising issue has been the mental status of children diagnosed with cancer and undergoing treatment. Many children and adolescents suffer from anxiety and anxiety disorders. Rather than alleviating anxiety symptoms with medications, the arts can be used as a therapeutic tool to help alleviate anxiety. This study aims to see how effective various art therapies can be as an intervention for pediatric cancer patients experiencing anxiety.

Methods:
A systematic review of articles was conducted using databases such as PubMed and Google Scholar. Relevant keywords include cancer, pediatric, children, intervention, tumor, child, anxiety, mental, psychological, youth, art, music, dance, and their synonyms accordingly. Included articles were selected to be done in the years 2015-2025, and only original intervention primary sources. Included studies evaluated the effects of various art therapies on anxiety in pediatric oncology patients.

Results:
Eighteen articles met inclusion criteria and encompassed different creative arts therapies. All reviewed studies reported statistically significant reductions in anxiety following interventions. Music therapy consistently demonstrated positive outcomes, particularly when patient-selected. Art based interventions, including drawing and mandala creation, were also effective across age groups. Dance and movement therapies improved anxiety and emotional regulation as well. A multimodal approach showed dose-responsive effects, with more frequent exposure linked to greater reductions in procedural anxiety. Several interventions also yielded secondary benefits such as improved mood, communication, and quality of life.

Conclusion:
Creative arts therapies are effective interventions for reducing anxiety in pediatric oncology patients. Their integration into standard cancer care has the potential to enhance emotional resilience and improve holistic outcomes. Future research should explore long-term effects, standardized protocols, and individualized approaches for arts interventions.

P13. Assessing and Improving HPV Vaccine Uptake in Pediatric Clinics
Huerta D*, Jain I*, Patel R
*Authors contributed equally to the project
Mentor: Kristin Gosselink, PhD

Objective:
Human papillomavirus (HPV) causes cervical cancer and is also linked to oropharyngeal and other urogenital cancers. Despite the proven efficacy of the HPV vaccine, hesitancy is a major barrier to uptake. Strong provider recommendations can improve series completion rates. This study assessed HPV- and

vaccine-related behaviors among providers across type and level of practice, hypothesizing that a provider-focused intervention would increase HPV vaccine uptake in pediatric clinics.

Methods:
The current phase of the project has been designed and the survey finalized, and IRB approval is pending. Data from a prior study that formed the foundation for this project has been more deeply analyzed. Provider responses to rank-order questions on important aspects of patient-provider communication around HPV and the vaccine were evaluated and compared. Healthcare professionals in Las Cruces, New Mexico and El Paso, Texas were recruited to participate; comparisons were made between pediatricians and other medical professionals, physicians versus nursing or pharmacy practitioners, and providers in training versus in practice. Provider zip code, gender, and ethnicity were also collected. Averages response scores were compared by two-tailed T-test, with $p \leq 0.05$ considered statistically significant. Methods for the next phase of this study will include the recruitment and survey of pediatricians and pediatric clinics in Florida, Southern New Mexico and West Texas. HPV vaccine distribution data from the last two to three years will be collected from each clinic. A survey containing questions about HPV vaccine distribution, HPV knowledge, and personal practices will be completed by pediatricians at those clinics. Half of the clinics will then be randomly selected and given an informational flyer on HPV and the vaccine. After one year, HPV vaccine distribution data will again be collected from all the clinics, and the data compared across clinics and pre-/post-intervention.

Results:
In analyzing the rank order questions that were provided, physicians and other providers (n=56), such as nurses and pharmacists, differentially ranked aspects of patient care that are likely influenced by a strong provider-patient partnership. Physicians ranked accurate diagnosis as more important (2.5 vs. 3.6 out of 5.0) than nurses or pharmacists ($p = 0.04$). Additionally, providers in practice showed different rankings than providers in training of behaviors that may increase the likelihood of a patient or parent accepting a vaccine. These behaviors included communicating understanding of patient/parent viewpoint, demonstrating respect and compassion, establishing trust, giving accurate and up-to-date information, and providing strong vaccine recommendation. Physicians in training also highly ranked (1.5 vs. 2.5 out of 5.0) providing a strong vaccine recommendation, compared to physicians in practice ($p = 0.01$). This indicates that trainees were more likely than those already in practice to view a strong recommendation as an important influence on vaccine acceptance. Finally, we compared pediatricians to physicians in other specialties using the same rank-order question described above. Pediatricians, on average, ranked providing accurate and up-to-date vaccine information to the patient/parent as 1.7, while other specialty physicians ranked providing a strong vaccine recommendation as 1.7; both differences were statistically significant ($p = 0.01$ and $p = 0.03$, respectively), indicating that pediatricians view accurate and up-to-date vaccine information as the most influential factor in patient/parent acceptance.

Conclusion:
Our analysis indicates that it is important to note how perspectives among individual healthcare practitioners can vary according to their experience and field of practice. Multiple opportunities have emerged through which we might strengthen provider understanding and their vaccine recommendation strategies. Our data demonstrate that pediatricians rated most highly the importance of giving patients accurate information and assuring that patients accept that information, while other types of providers ranked empathy and giving a strong recommendation as the most important factors or behaviors. We conclude that the relationship between vaccine uptake in pediatric clinics, and HPV vaccine uptake specifically, should be investigated at a deeper level. Future directions for this project will seek to expand on our hypothesis and these findings through application of an intervention to pediatricians, selectively, and evaluation of their professional experiences and approaches.

P14. A Case of Botulism: Clinical Presentation, Diagnosis, and Management
Nicholas Hillard, Will Haff, Alejandro Esparza
Mentor: Ashish Mahindra, MD

Botulism is a rare but severe neuroparalytic disease caused by botulinum neurotoxins. This report discusses the case of a patient presenting with progressive descending paralysis, ultimately diagnosed with foodborne botulism. The patient's clinical course, diagnostic findings, and management, including the administration of botulinum antitoxin and supportive care, are described. The case highlights the importance of early recognition and intervention to prevent respiratory failure and improve outcomes.

P15. Artificial Intelligence as a Transformative Framework for Acceleration of Drug Discovery and Development
Rachel Curtis
Mentor: Keshab Paudel, MD

Objective:
This review evaluates the role of AI across key phases of drug development, including target discovery, de novo design, repurposing, screening, and clinical innovation. It examines methods including ML, DL, NLP, GNNs, transformers, and generative models. These techniques enable predictions, biomarker discovery, and patient stratification by integrating data, uncovering patterns, and enhancing precision, efficiency, and innovation, while addressing ethical, regulatory, and privacy considerations.

Methods:
Literature searches were conducted using the Burrell College of Osteopathic Medicine Library system, which provides access to databases such as PubMed, MEDLINE, ScienceDirect, Oxford Academic, Nature, Cell Reports, and Frontiers. The following keyword combinations were used: "Artificial Intelligence" AND "Drug Discovery", "QSAR and Artificial Intelligence", "AI in Drug Repurposing", "AI in De Novo Drug Design", "AI and Clinical Trials", and "AI and Virtual Screening."

Search filters prioritized peer-reviewed, English-language articles focused on AI applications in pharmaceutical and drug development. Articles were excluded if they did not address AI in drug discovery/development, lacked biomedical or pharmaceutical relevance, or lacked relevance to biomedical or pharmaceutical research.

The majority of included studies were published between 2020 and 2025, with select earlier works (e.g., 2003 and 2016) added when cited in recent literature and deemed foundational to current AI-driven drug discovery. The screening process involved removing duplicates, reviewing titles and abstracts for relevance, and assessing full-text eligibility. Of approximately 100 records initially identified, around 88 remained after duplicate removal, of which 50 were excluded at title/abstract screening, and 38 full-text articles were assessed. Ultimately, 33 articles were included for review.

Results:
A total of 33 peer-reviewed articles met inclusion criteria and were analyzed. AI applications were identified across all major phases of drug development. In target discovery and validation, machine learning (ML), deep learning (DL), natural language processing (NLP), and graph neural networks (GNNs) integrated multi-omics, structural, and literature data to prioritize novel targets. Examples included SVM-based gene expression analysis identifying FEN1 in breast cancer and GNN frameworks such as EMOGI and NETTAG mapping disease-specific networks.

In de novo drug design, generative adversarial networks (GANs), variational autoencoders (VAEs), transformers, and reinforcement learning generated novel compounds with high predicted drug-likeness (QED), low synthetic complexity (SAscore), and favorable binding affinities, in some cases outperforming FDA-approved references.

Drug repurposing and virtual screening studies applied ML and DL to gene expression, protein interaction networks, and molecular docking data to uncover new indications. Notable platforms such as PandaOmics identified repurposing opportunities for diseases including endometriosis, hepatitis C, glioblastoma, and COVID-19.

In clinical development, AI supported biomarker discovery, toxicity prediction, patient stratification, and trial optimization. Convolutional neural networks (CNNs) classified histological images, predicted therapy resistance, and aided patient–trial matching. Digital twin models simulated individualized treatment responses, suggesting reduced trial cost and duration.

Across these applications, the results demonstrate that AI can enhance efficiency, precision, and innovation in drug development compared to traditional techniques by uncovering novel targets, generating high-potential compounds, identifying new therapeutic uses for existing drugs, and improving patient selection and trial design. These studies collectively highlighted AI's potential to reshape the drug development process.

Conclusion:
As artificial intelligence becomes more deeply integrated into pharmaceutical development, it is reshaping how drugs are discovered, designed, repurposed, and evaluated. This review has highlighted how a range of AI techniques, including ML, DL, NLP, reinforcement learning, and graph-based modeling are being used to process complex clinical and biomedical data. Collectively, these approaches have improved target identification, streamlined molecular design, and enhanced trial precision and patient safety across multiple stages of drug development.

Strong ethical, regulatory, and safety frameworks will be essential as these technologies advance. Clear standards for transparency, oversight, bias mitigation, and data protection will help ensure that AI tools remain fair, explainable, and responsibly managed within clinical and research settings. Governance models should address dataset representativeness to prevent disparities in care, apply fairness-aware optimization strategies to reduce bias, and mandate rigorous validation before clinical deployment. International collaboration on benchmarking tools and harmonized guidelines can further support consistent and safe adoption across healthcare systems.

From identifying promising targets and designing novel compounds to repurposing existing therapies and optimizing clinical trials, AI is helping to bridge long-standing gaps between research, development, and real-world application. By uniting diverse datasets, streamlining decision-making, and uncovering patterns that traditional methods may overlook, AI is reshaping each phase of the pharmaceutical process. With continued innovation supported by robust governance, these advancements have the potential to accelerate therapeutic discovery while ensuring that outcomes are safer, more effective, and more accessible for patients worldwide.

P16. Osteopathic Manipulative Intervention for Irregular Menses and Dysmenorrhea

Julia Pacek, Carolina del Mar Orria Ferreira, Ariena Torabi, Devin Stanley
Mentors: Brett Picciotti, DO, Aimee Raup, DO

Objective:
To investigate the effect of osteopathic manipulative techniques (OMT) on menstrual cycle regularity and pelvic pain-related symptoms in females with irregular menstrual cycles. The main objective of the study is to investigate the effects of OMT in regulating the menstrual cycle. The secondary objective of the study is to determine if OMT reduces pelvic pain related to the menstrual cycle.

Methods:
Study participants that meet the eligibility criteria for participation, determined with a screening survey, will be randomized to one of two groups: intervention or control. Each participant will receive a standardized exam consisting of diagnosis and intervention with either osteopathic intervention or sham technique. The survey will be a questionnaire that indicates patient's pain scale level and menstrual cycle qualities to assess efficacy of osteopathic manipulative interventions. Study members will be deemed competent prior to administering any intervention. There will be 5 techniques performed in every session for the intervention group. The 5 techniques are the following: suboccipital release, sympathetic rib raising, innominate somatic dysfunction intervention, sacral rocking, and prone pelvic diaphragm release. The control group will receive sham technique. This will consist of diagnosing the somatic dysfunction without intervention, which consists of light touch in the applicable regions. Reports on patient menstrual cycles duration and frequency will be done using Stardust, an app for menstrual data. Participants will receive intervention twice a month for 3 months and will be required to have an appointment prior to their first intervention.

Results:
The project is currently under IRB review, and the results are pending. A literature review was conducted to investigate the effect of OMT on primary dysmenorrhea. The research shows that OMT techniques are effective in reducing pain in primary dysmenorrhea and, in some cases, improving the quality of life of participants. However, there is minimal evidence supporting the use of OMT to regulate the menstrual cycle. The current standard treatment for irregular menses is the use of contraceptives, while the standard for dysmenorrhea is the use of non-steroidal anti-inflammatory drugs (NSAIDs). This study aims to investigate the effectiveness of OMT in regulating the menstrual cycle and its impact on pelvic pain related to menstruation, with the goal of exploring OMT as an alternative treatment method rather than relying solely on medications.

Conclusion:
OMT is a non-invasive alternative treatment for reducing pain associated with primary dysmenorrhea, however, a more standardized, generalizable, and longterm research is needed to strengthen clinical recommendations for patients. NSAIDS are currently used to treat dysmenorrhea, but this only alleviates the pain and does treat the root cause of it. The standard treatment for irregular menses is not inclusive to those who are trying to conceive; OMT would provide a treatment option for this population. This research project aims to have a larger pool of subjects to obtain more results and aim to provide conclusive results on

the effects of OMT. Moreover, it seeks to determine if OMT can be a beneficial treatment for regulation of the menstrual cycle and related pelvic pain. The standard treatment for irregular menses is not inclusive to those who are trying to conceive; OMT would provide an alternative treatment for this population. These findings can provide innovative data that can benefit women's health.

P17. Utilizing the Energetic Model of Osteopathic Treatment of Chapman Points in an Educational Setting

Danielle Polow, Lyndsay Sheerin
Mentor(s): Adrienne Kania, DO

Objective:
The objective of this study is to determine if a guided bioenergetic treatment of a single Chapman point changes the diagnosis/es of pelvic and/or sacral somatic dysfunctions. The bioenergetic model of osteopathic care emphasizes the concepts of life force or inherent energy flow within the body, energetic communication with the environment, and tissue biophysical and bioelectrical properties.

Methods:
In this study students assessed and treated their lab partner for pelvic and sacral somatic dysfunctions. All findings pre- and post- treatment were recorded on a provided data form. Each student was also additionally tasked with identification of a Chapman point. For students in the 2024 cohort, the ganglion impar point was identified, and for students in the 2025 cohort, the sciatic point was identified. Treatment followed a script delivered by the PI to each class session. Following completion of treatment and documentation, findings were analyzed for statistical significance via a paired-T-test. As this material is part of the curriculum for OMM IV, no consent is required and the study received expedited IRB approval (BURRELL IRB 0129_2024).

Results:
A total of 182 participants were enrolled within the study in 2024 focusing on the ganglion impar point, from which we received 160 responses. For the pelvic somatic dysfunction, 18 responses were excluded. In the one-sample t-test for the proportion of diagnoses changed (93 [67 changes + 26 possible change] out of 142 subjects) compared to a hypothesized proportion of 50%, we observed a statistically significant change in diagnosis ($p = 0.0003$). For the sacral somatic dysfunction, 14 responses were excluded. In the one-sample t-test for the proportion of diagnoses changed (71 diagnoses changed out of 146 subjects) compared to a hypothesized proportion of 50%, we did not observe a statistically significant change in diagnosis ($p = 0.7411$). A total of 175 participants were enrolled within the study in 2025 focusing on the sciatic point, from which we received 134 responses. For the pelvic somatic dysfunction, 14 responses were excluded. In the one-sample t-test for the proportion of diagnoses changed 59 (59 [31 changes + 28 possible change] out of 120 subjects) compared to a hypothesized proportion of 50%, we did not observe a statistically significant change in diagnosis ($p = 0.8560$). For the sacral somatic dysfunction, 7 responses were excluded. In the one-sample t-test for the proportion of diagnoses changed (61 diagnoses changed out of 127 subjects) compared to a hypothesized proportion of 50%, we did not observe a statistically significant change in diagnosis ($p = 0.6580$).

Conclusion:
Our findings demonstrate statistically significant changes pre- to post treatment at the ganglion impar within the pelvis, with no statistical significance noted in treatment of the ganglion impar point at the sacrum or at the sciatic point within the pelvis or sacrum. These findings suggest that treatment of Chapman points has significance within medical interventions. The lack of statistical significance in multiple outcomes may be attributed to the choice of Chapman points that were treated and the study sample. There were variations within the numbers of participants due to some choosing not to participate, submitting incomplete documentation, or submitting uninterpretable data. The general population included healthy, young, medical students presenting with presumably elevated sympathetic tone and minimal sciatic tension. In addition, only a single Chapman point was treated when the bilateral points are typically addressed, limiting measurable effects. Overall, the treatment and efficacy of Chapman points appears to depend on patient needs and complaints. Despite the majority of data collected, Chapman point treatment shows a promising approach even among students unskilled in an advanced treatment technique.

P18. Using OMT on overhead athletes to enhance Range of Motion and Prevent Injury
Salvatore Corallo *, Ryan Casini*
* denotes equal contribution between authors
Mentor: Brett Picciotti, DO

Objective:
The primary objective is to assess and determine the effectiveness of Spencer's technique at improving shoulder range of motion (ROM) and preventing injuries in overhead throwing athletes on the Florida Institute of Technology Men's Division II Baseball team. The secondary objectives of this study is to determine the impact of OMT on enhancing player durability, reducing muscle fatigue, long-term performance (ie: throwing velocity), and improving recovery time over the course of three months while participating in team related activities.

Methods:
This study will evaluate the effects of Spencer's Technique and Muscle Energy Technique (MET) on shoulder mobility, discomfort, and performance in collegiate baseball players. All athletes will receive weekly 10 minute osteopathic manipulative intervention (OMI) sessions for 90 days, administered by students who trained at Burrell College of Osteopathic Medicine (BCOM) Florida campus.

The study will include healthy male athletes ages 18–35 from the Florida Institute of Technology baseball team, representing all positions and throwing demands. Participants may have mild to moderate shoulder dysfunction due to their frequency of overhead throwing. No control or placebo group will be used, allowing direct assessment of these osteopathic manipulative medicine (OMM) techniques in a real-world setting.

Data will be collected at baseline and during follow-ups, including objective range of motion (ROM) measurements using a goniometer and subjective assessments via self-reported surveys. Surveys will use Likert scales, open-ended questions, and Kerlan-Jobe Patient Reported Outcome measures to evaluate discomfort, fatigue and performance. All evaluations will occur in a controlled environment by a single trained evaluator team to ensure consistency and reduce variability.
Evaluators must demonstrate competency in all OMM techniques and complete standardized training in data collection, documentation and proper use of a goniometer. This design aims to provide practical insights into how OMM may enhance recovery and performance in collegiate athletes.

Anticipated Results/Discussion:
Despite relative advancements in both treatment options and athlete strength and conditioning regimens, shoulder injuries are among the most common sports related injuries in overhead throwing sports. The National Collegiate Athletic Association (NCAA) report on baseball sustained injuries attributes 16.1% of injuries to the shoulder from 2014-15 through the 2018-19 season (Boltz et al., 2021). Prior literature demonstrates sufficient evidence that suggests overuse injuries are still prevalent despite the advancement of athlete strength and ability. Previously, the use of osteopathic manipulative treatment (OMT) and its effectiveness was investigated at Seton Hill University in collaboration with the Lake Erie College of Osteopathic Medicine (LECOM) (Curcio et al., 2016). LECOM published findings highlighting the effectiveness of Spencer's Technique in improving range of motion after a single session of manipulation in 15 athletes. Based on this finding, our study design of multiple sessions over the course of 90 days will aim to further elucidate the effectiveness of Spencer's technique longitudinally in an expanded cohort.

Conclusion/Future Direction:
Based on our findings from the initial literature review, we anticipate our study's outcome will align with previous findings. With the incorporation of multiple intervention sessions, we expect larger improvements in range of motion and meaningful reductions in overall pain, accompanied by long-term benefits that enhance overall function and performance.

P19. Beyond the Meds: Impact of OMM in Management of Migraine Headache
Lillian McBee, Sydney Schoen, Eric Pei, Elisha Ekowo, Andrew Harrison, Nicholas Horvath
Mentor(s): Robert J. Coni, DO, Brett Picciotti, DO, Arleen Lally, DO

Objective:
To assess the efficacy of Osteopathic Manipulative Treatment (OMT) in reducing the frequency and severity of migraine headaches. Our hypothesis: Compared with sham touch, a standardized 4–6-week course of weekly or biweekly OMT will produce a greater reduction in migraine burden. Changes in frequency and/or severity of migraine headaches will be documented in daily diaries. We expect application of OMT will result in a 50% reduction in either frequency or severity of headache.

Methods:
Adults (ages 18–65) meeting International Classification of Headache Disorders-3 (ICHD-3) criteria for migraine are recruited via community and campus advertising and screened for eligibility. Enrolled subjects are randomized to receive either OMT or standardized sham "touch therapy." Both interventions are administered by trained osteopathic medical students under provider supervision in four weekly sessions at Burrell College.

The OMT protocol includes muscle energy techniques (MET) for cervical (C2–7), thoracic (T1–T2), atlantoaxial (AA), and occipitoatlantal (OA) dysfunctions, as well as thoracic outlet myofascial release and suboccipital release soft tissue method. Sham treatment mimics hand placement, contact time, and patient positioning without therapeutic force. Subjects complete a Migraine Disability Assessment (MIDAS) before and after the treatment series and maintain a daily migraine diary (frequency, severity, and triggers) from study entry through completion. Outcomes include changes in MIDAS score and diary-recorded headache burden throughout the intervention.

Results:
To selectively standardize the treatments used on the subjects, the research team has met to practice OMT. We conducted three sessions overseen by Dr. Picciotti, during which the research team practiced on each other. The OMT sessions consisted of suboccipital release and MET for C3-C7, T1- T2, OA, and AA. The research team also practiced using pressure sensors to ensure standardization of pressure applied in each treatment. During these practice sessions, student participants noted an average decrease of 4-5 points on a 1-10 point pain scale taken before and after treatment. While there is room for bias since these student participants are part of the research study, these initial findings support continuation of the randomized control trial. It is anticipated that protocolized OMT will be feasible to deliver with high fidelity by trained student operators, evidenced by adherence to predetermined pressure and timing ranges and low rates of protocol deviations. Recruitment and retention are expected to be acceptable for a pilot, with the majority of randomized participants completing at least four treatment visits and all outcome assessments. Safety signals are expected to be minimal—limited to transient soreness typical of manual therapy.

Conclusion:
Compared with sham touch, the OMT group is expected to demonstrate a greater reduction in migraine burden over the treatment window, reflected in fewer monthly migraine days, lower average pain intensity, and improved HIT-6 scores. Based on the standardized per visit documentation of techniques and immediate responses, exploratory analyses are expected to identify which regional dysfunctions and modalities are most frequently associated with short-term symptom relief, informing effect-size estimates and refinement of a larger, adequately powered trial. Collectively, these results are expected to demonstrate procedural standardization, operator reproducibility, and preliminary clinical benefit sufficient to justify a multicenter study with longer follow-up and stratification by migraine phenotype.

OMT on migraines offers a non-invasive, low risk, & cost-effective treatment approach as an alternative or complementary therapy to a patient's current migraine treatment regimen. Efficacy of treatment could serve to reduce the use of current more invasive techniques, reliance on medication, or serve as a synergistic treatment approach to achieve maximal migraine symptom relief. For the over 1 billion people who suffer from migraines, OMT can broaden the scope of treatment options while potentially reducing patient admissions, medication related side effects, and health care costs by providing a holistic patient centered approach.

P20. A Comparative Analysis of Sports-Related Ocular Trauma with Biomechanical Insights from Finite Element Analysis
Brooke Santoriello, Jose Colmenarez Moreno
Mentor: Linxia Gu, PhD

Objective:
This review aims to analyze and compare the spectrum of ocular injuries sustained during sports activities, with a particular focus on incorporating biomechanical insights with clinical data. This paper seeks to

characterize sport-specific injury mechanisms, evaluate finite element method (FEM) analyses, and highlight risk factors and prevention strategies relevant to long-term visual outcomes.

Methods:
A comprehensive literature review was conducted using PubMed and Google Scholar to identify peer-reviewed articles, case studies, and systematic reviews on sports-related ocular trauma through July 2025. Search terms included combinations of "ocular trauma," "sports eye injury," "blunt eye trauma," and individual sport names such as "basketball," "soccer," "pickleball," and "tennis." Boolean operators refined searches for relevance. Inclusion criteria were studies in English detailing eye injuries caused by sports, with a focus on mechanisms, injury classification, outcomes, and prevention. Articles unrelated to ocular trauma or not linked to sports contexts were excluded. There was no exclusion criteria based on geographical location of publications. Key anatomical regions affected, injury types (e.g., corneal abrasion, hyphema, retinal detachment), and sport-specific trends were cataloged. Finite element method (FEM) simulations were reviewed to analyze mechanical stress distributions within ocular tissues during ball impact scenarios. Additional data on aging, myopia, and diabetes as risk modifiers were extracted. Protective equipment guidelines were also evaluated to assess their effectiveness in preventing trauma.

Results:
Over 600,000 sports-related eye injuries occur annually in the U.S., with basketball, baseball, and soccer contributing to the majority of cases. Closed-globe injuries such as corneal abrasions, hyphema, angle recession, and traumatic cataracts were the most common, particularly in sports with fast-moving projectiles or close-contact play. FEM studies showed that sports like pickleball and badminton can generate high localized stresses (up to 0.62 MPa) at vulnerable ocular structures, such as the iridocorneal angle and zonular fibers, explaining observed cases of angle recession, cyclodialysis, and lens subluxation. Rhegmatogenous retinal detachments were frequently linked to blunt trauma in basketball and racquet sports. Myopia, diabetes, and advanced age were shown to predispose athletes to more severe injuries. Despite evidence that 90% of ocular trauma is preventable, adoption of protective eyewear remains limited. Sports such as paintball, hockey, and squash demonstrate lower injury rates where mandated protective eyewear is enforced.

Conclusion:
Sports-related ocular trauma remains a prevalent and preventable cause of vision loss. With the rise of emerging sports like pickleball, clinicians must be aware of newly documented injury patterns and biomechanical forces unique to each sport. Protective eyewear adoption remains critical, particularly for high-risk populations including older adults and individuals with myopia or diabetes. Incorporating FEM analyses into ocular trauma research enhances understanding of injury mechanisms and helps inform more targeted preventive strategies. Public health efforts, athlete education, and policy implementation on protective standards are essential to reducing the burden of sports-related ocular injuries.

P21. Unveiling potential complications with sub retinal injections
Cristobal Cabrera, Jose Colmenarez
Mentor: Linxia Gu, PhD

Objective:
Subretinal injection offers a new therapeutic administration route for ocular disease, but precise technique is required to prevent adverse outcomes. The goal of the study is to correlate subretinal injection flow rate

to retinal pigment epithelium (RPE) damage. In addition, the study will attempt to quantify the maximum bleb size that can be formed before creating retinal and macular holes.

Methods:
We used a finite element analysis system (FEA), ABAQUS, to run five thousand simulations controlling for various injection flow rates, macular thickness, and bleb radii. The biomechanical response was quantified using fracture mechanics and were graphed accordingly.

Results:
The pressure required to propagate the bleb is correlated with the retinal thickness and compliance (retinal stiffness). A thicker retina with more compliance required a higher injection flow rate to create the bleb, increasing the chances of RPE damage. Retinal tears may occur before full bleb propagation is achieved.

Conclusion:
These findings highlight the importance of slow and controlled injection rates to minimize RPE damage during subretinal injection. Establishing a maximum bleb size threshold is crucial to preventing retinal and macular holes. This information may help clinicians establish safer, more predictable protocols for future interventions.

P22. The Effects of Chemical and Thermal Treatments on Bone Density
Eli Rudnisky, Emily Ahearn
Mentor: Taylor Polvadore, PhD

Background:
Structural and material properties are key to determining whether a bone allograft can withstand mechanical forces before full integration. Sterilization methods (thermal, chemical, irradiation) are used for pathogen inactivation, but can alter properties like anisotropy and elastic modulus. The goal of our study is to investigate bone density using these various preservation methods and to try to identify whether the changes in bone stiffness (elastic modulus) observed after chemical and thermal treatment are caused by mineral loss (bone density changes), collagen disruption, or a combination of both.

Objective:
The objective for this study is to determine whether the changes in elastic modulus from these three treatments are due to mineral leaching or changes in the collagenous bone matrix itself. Determining the main cause can assist future research studies in this area of interest. Determining the most effective method for preserving the structural and mechanical properties of bone, while at the same time effectively sterilizing the bone sample can substantially improve preservative techniques for procedures such as bone allografts.

Methods:
Cortical bone samples were analyzed from the humerus of a 14 Bos Taurus that were placed into four different treatments that included Saline (control), Formalin, Ethanol, and Autoclave. These samples were CT scanned along with a phantom containing known hydroxyapatite densities. ImageJ was used to collect gray scale values from a total of 80 specimens. 25 random pixel points and 15 overall slice averages were taken from 15 random

slices from these specimens. This produced a total of 390 points of data per specimen that included min, max, and mean gray scale values. After obtaining these grayscale values, Rstudio was utilized to convert grayscale values into bone density values by referring to the hydroxyapatite phantom included in the CT scans. 2-way ANOVA was used to compare all groups at once, and TukeyHSD was used to compare each individual group against all others. All groups demonstrated statistically significant results ($p>0.001$) when compared with the Saline control.

Results:
ANOVA analysis showed that autoclaving had the largest effect in decreasing bone density. The decrease in bone density is most likely due to a combination of mineral leaching as well as collagen degradation that occur from the intensity of the heat during the treatment. Ethanol had mixed results in bone density suggesting that the mineral content was partially protected as the collagen matrix was being broken down. Lastly, Formalin resulted in an increase in bone density which requires additional research to determine the complex mechanism for it doing so. The findings from the study demonstrate that the preservation treatments tested significantly affect bone density. Ethanol, Formalin, and Autoclave all produced statistically significant ($p>0.001$) differences from the Saline control. Formalin demonstrated a consistent increase in bone density with percent change values as high as 25.92% (BH18). Ethanol showed mixed results, with some percent changes being as high as 7.17% (BH1), and some being as low as -19.45% (BH13). Autoclave consistently resulted in a decrease in bone density, with most of the specimens demonstrating negative percent change values.

Conclusion:
The effects of different preservation treatments on a bone's elastic modulus all produced statistically significant results. These results demonstrate that Ethanol and Formalin are the best options for bone preservation, while Autoclave is the least effective. Additionally, further research is required to determine as to why Formalin is increasing the bone density.

P23. Comparative Analysis of Static vs. Dynamic Imaging in Alzheimer's Disease
Evan Cohen, Sara Glaser
Mentors: Debasis Mitra, PhD, Robert Coni, DO

Introduction:
Alzheimer's Disease (AD) is the sixth leading cause of death in Americans and the most common cause of Dementia in older adults. Early and accurate diagnosis is critical for optimal treatments and effective care planning. The pathogenesis of AD involves extracellular β-amyloid plaques and intracellular tau neurofibrillary tangles, which are thought to work synergistically towards neurodegeneration. The amyloid cascade hypothesis states that β-Amyloid plaques trigger conversion of tau to a toxic state, and consequently toxic tau triggers more β-Amyloid plaques, creating a pathological positive feedback loop. Positron emission tomography (PET) is widely used for AD diagnosis, commonly through standard uptake value ratio (SUVR), and less frequently, distribution value ratio (DVR). However, these methods can be limited to lack of specificity (SUVR) and time requirements (DVR).

Objective:
The objective of this study is to determine if a novel 3 factor nuclear imaging approach - a dynamic imaging technique developed with custom written code, is a more accurate and clean way to detect AD pathology early on. This study evaluates this new 3-factor specific binding technique that isolates tau signal while reducing off-target binding and background noise.

Methods:
DVR, SUVR, and 3-factor images from 21 patients spanning three cohorts: Alzheimer's Disease, non-AD tauopathies, and cognitively normal controls, were compared. Each scan was analyzed for uptake patterns, anatomical clarity, and correspondence to known pathological regions, particularly Braak stages in AD.

Results:
3-factor specific binding consistently provided clearer anatomical definition compared to DVR and SUVR. Key regions involved in Alzheimer's Disease, such as the hippocampus, parahippocampal gyrus, entorhinal cortex, and calcarine sulcus, were more sharply visualized using the 3-factor method. Overall, the 3-factor specific binding technique reduced background noise, enhanced anatomical clarity, and better isolated true tau signal, especially in regions where DVR and SUVR often showed blurring or poor structural delineation.

Conclusion:
The qualitative findings from this study suggest that 3-factor specific binding imaging offers meaningful improvement over traditional DVR and SUVR methods in visualizing tau pathology. The 3-factor specific binding imaging analysis allowed more detailed images of key brain regions implicated in Alzheimer's Disease, especially in Braak stages. This method of viewing imaging has potential value in early detection and thus proper and timely therapies for Alzheimer's Disease. However, this study had limitations. The sample size was relatively small, and the image interpretation was primarily qualitative. A larger sample size and a qualitative way to compare tau amongst imaging methods would be beneficial for a future study to further support the conclusion. Overall, the results of this study support 3-factor specific binding as a promising method for improving the diagnostic utility of tau PET imaging in AD and related disorders.

P24. Early Detection of Alzheimer's Disease via Multimodal Deep Learning Models Using Magnetic Resonance Imaging, Magnetic Resonance Spectroscopy, Genetic Data, and Electronic Health Records

Sarah Mortero, Sonnyi Kang, Michael Trimboli
Mentor(s): Xianqi Li, PhD

Objective:
To develop and evaluate a multimodal deep learning model for early Alzheimer's disease detection using direct imaging-based prediction, removing reliance on cognitive scores and using data from the National Alzheimer's Coordinating Center (NACC).

Methods:
Alzheimer's disease (AD) is a leading cause of dementia, with neurodegenerative changes

beginning years before clinical symptoms manifest. This project proposes a multimodal deep learning framework integrating Magnetic Resonance Imaging (MRI), Magnetic Resonance Spectroscopic Imaging (MRSI), genetic data such as blood based biomarkers, and Electronic Health Records (EHR) to improve early detection of Alzheimer's disease (AD).

This study proposes a new deep learning model that differs from previous approaches which relied on derived cognitive scores such as DeMO and COG, and instead focuses on direct feature extraction from imaging data and unified feature-level fusion. All data that are used for model training are sourced exclusively from the National Alzheimer's Coordinating Center (NACC), which provides clinical, imaging, and neuropathological data across multiple Alzheimer's Disease Research Centers (ADRCs). The model will be designed to classify Alzheimer's dementia (ADD) vs. non-ADD cases based on imaging and multi-modal inputs (ie: MRSI). Planned validation will use existing clinical labels to evaluate model performance with available neuropathological findings.

Results:
Since the project is currently in the training and development phase, current efforts focused on literature review and from a technical aspect, selecting eligible cases with high-quality imaging, constructing the preprocessing framework, and training and optimizing the initial model. Results are not yet available, however preliminary model tests are focused on optimization and accuracy. Once data preprocessing and model training are complete, initial training can begin with the quantitative measures will be reported.

Conclusion:
As model development is ongoing, no definitive conclusions can be made at this stage. However, the updated framework has the potential to enable earlier identification of Alzheimer's dementia. Anticipated challenges include heterogeneous imaging quality, incomplete spectroscopic or biomarker data, and high computational demands. Future work will focus on continued training, validation, and improving model interpretability using SHAP-based techniques to understand influential features in the decision-making process.

P25. Parametric FSI Study of Capillary Artery Behavior and Brain Damage in Ultrasound Mediated BBB Treatment

Seo Hyun (Emily) Park, Jose Colmenarez Moreno
Mentor: Linxia Gu, PhD

Objective:
Quantify how microbubble collapse during focused ultrasound (FUS) loads compliant cerebral micro vessels and identify which bubble/vessel configurations most strongly drive endothelial injury, separating shockwave and micro-jet contributions and relating wall stresses to published damage thresholds.

Methods:
We built a finite-element model of a compliant capillary segment representing endothelial and basement-membrane layers and simulated single-bubble collapse under pulsed FUS. Bubble–wall stand-off ($\beta = r/d$) and initial bubble size ($r/d\_wall = 0.4–0.6$) were varied while keeping acoustic pressure in a clinically used range. We computed time-resolved fields of maximum/minimum principal stress, shear stress, and principal strain within the vessel wall and tracked jet kinematics (onset, peak velocity, attenuation) and

shock-wave emission. Stress/strain maxima, their timing, and spatial footprints were compared across β and size conditions to distinguish shock-dominated versus jet-dominated loading. We also analyzed wave propagation along the vessel after impact and contrasted internal energy/kinetic energy evolution across bubble sizes to explain observed trends. Finally, we mapped the simulated wall loads to literature injury bands (tensile ≈0.2–0.4 MPa; shear >0.4 MPa) to contextualize clinical risk.

Results:
Mechanical loading depended strongly on proximity. As β decreased (bubble closer to the wall), wall strain and shear rose and peaks occurred earlier; the early shock phase was predominantly compressive (minimum principal stress), whereas the later jet phase produced larger tensile maxima. At β = 0, jet impact generated tensile stresses ≈0.4 MPa and shear >0.85 MPa, exceeding commonly cited damage bands. Peak jet speed increased as β fell, reaching ~9×10^4 mm/s, but decayed exponentially before contact, creating a highly localized impulse. Larger bubbles collapsed more slowly and stored more kinetic energy, but a small, near-wall bubble could match, or exceed, the wall stresses of a larger, more distant bubble. Post-impact, stress waves propagated along the vessel, indicating potential for effects beyond the immediate focal point. Across sizes, maximum internal energy density at collapse was approximately size-independent under the modeled loading, explaining why proximity dominated risk.

Conclusion:
During FUS-mediated BBB opening, geometry trumps size: small bubbles near the wall produce the earliest and largest endothelial loads, with jet-driven tensile and shear stresses reaching clinically relevant thresholds. These results argue for incorporating vessel-level mechanical indices (tensile/shear peaks and their timing) and bubble–wall proximity into planning/monitoring, alongside acoustic pressure. Practically, protocols that limit near-wall bubbles (or adjust exposure when proximity is likely) should reduce vascular injury risk while preserving BBB permeability. The framework offers a mechanistic bridge from acoustic settings to endothelial safety margins and supports refinement of closed-loop FUS control for drug delivery.

P26. Treating Persistent Atrial Fibrillation with Vagal Nerve Stimulation
Margaret Jeng
Mentor(s): Harald Stauss, MD, PhD

Objectives:
Persistent atrial fibrillation (AF) is characterized by continuous AF that is sustained for greater than 7 days. Persistent AF can be difficult to control despite various pharmaceutical and procedural interventions. This can affect a patient's quality of life as symptomatic patients report constant fatigue, palpitations, dyspnea, and syncope. AF also increases risk of stroke, thromboembolic events, heart failure and overall mortality. With our aging population, AF is becoming the most common sustained arrythmias. In this study, our goal is to help patients with persistent AF lower overall heart rate with a non-invasive technique and improve their quality of life. We use a transcutaneous auricular vagus nerve stimulator (taVNS) to trigger the parasympathetic tone and slow the atrioventricular conduction. We hypothesized this would reduce ventricular rate in patients with persistent AF.

Methods:
Patients were recruited from social media pages, screened for persistent AF and enrolled based on

the inclusion and exclusion criteria. Enrolled patients were instructed to place the taVNS on their ear for 30 minutes every day. For 1 week, they were asked to set it to a high-current rate and place on the concha portion of the ear. This acted as our experimental condition. The following week, they would place the taVNS on their earlobe at a low-current rate. This is our control or sham condition. For the entire 2-week study duration, patients maintained a ECG patch on their anterior chest wall to collect cardiac data. They also maintained daily logs of the taVNS and self-reported symptoms. Heart rate variability, maximum and minimum one-minute heart rate values were analyzed.

Results:
Data was analyzed on the first four patients. Their ECG results showed that high intensity taVNS reduced 1-minute maximal heart rate by approximately 20 bpm during and after stimulation as compared to before stimulation. We analyzed a 24-hour heart rate profile for a patient with the highest resting heart rate and saw lower maximum heart throughout the day as compared to the control stimulation. We recently enrolled two more patients and have not concluded data analysis yet.

Conclusions:
taVNS works by increasing parasympathetic tone to slows AV conduction and reduces ventricular rate in patients with persistent AF. These preliminary findings suggest taVNS may provide a noninvasive, neuro-modulatory approach to ventricular rate control. Patients report reduced fatigue, more active during the day, and better sleep quality. With ongoing enrollment, we hope to further strengthen our hypothesis and statistical power. Larger studies are warranted to confirm clinical efficacy.

P27. Development of an Epsin-Mimetic Peptide-Loaded PCL-Gelatin Scaffold for Small-Diameter Vascular Grafts

Elora Mukhopadhyay, Fatemeh Goodarzinia, Riley Jasperson, Tryfon Theophilopoulos
Mentor: Christopher Bashur, PhD

Objective:
To develop a small diameter synthetic vascular graft incorporating peptide-loaded microparticles to promote endothelialization without requiring pre-seeding steps.

Methods:
Electrospun vascular grafts were fabricated using polycaprolactone (PCL) dissolved in hexafluoroisopropanol (HFIP) to create fibrous scaffolds. Poly(lactic-co-glycolic acid) (PLGA) microparticles were synthesized at two viscosities (0.65 and 0.21 dL/g) and loaded with one of three peptide conditions: UPI peptide, scrambled peptide (control), or no peptide (blank control). Scanning electron microscopy (SEM) was used to confirm particle size and morphology. The microparticles were suspended in gelatin and coated onto the PCL grafts, with crosslinking to slow gelatin degradation and enable sustained peptide release. Surgeries involved microsurgical implantation of the grafts in rat abdominal aortas, requiring precise clamp placement and approximately sixteen microsutures total (eight per anastomotic site) per graft for anastomosis. Surgery was technically challenging due to anatomical variation and tissue fragility, requiring high microsurgical precision. VEGFR2 (vascular endothelial growth

factor receptor 2) expression was the intended target for UPI peptide delivery, hypothesized to support in vivo endothelialization and reduce vascular inflammation. At this stage, SEM analysis was used to assess microparticle consistency and coating integrity.

Results:
Initial graft fabrication and peptide loading were successful, with SEM confirming consistent microparticle morphology. Microparticle coating using gelatin was partially successful, with only one or two grafts showing complete and uniform retention. No quantitative in vivo or molecular results were available at this time due to the early phase of ongoing studies. Rat surgical implantation was successfully performed on several animals, though outcome variability was high due to the technical complexity of the microsurgical procedure. In vivo data on patency, peptide release, and endothelialization are pending as analysis is ongoing.

Conclusion:
The developed PCL-gelatin vascular grafts incorporating peptide-loaded microparticles represent a promising approach for creating off-the-shelf, pre-seeding-free small-diameter grafts. While scaffold and particle fabrication were successful, coating adherence remains a challenge requiring optimization. Surgical techniques were refined, though outcome variability highlights the steep learning curve for this model. Future work will focus on analyzing in vivo graft patency, VEGFR2 expression, and inflammatory response to validate the therapeutic potential of this system.

P28. Advancing mRNA Therapeutics: Foundational Work Toward Cell-Specific Vaccines and Chronic Disease Treatment
Benjamin Nakagawa, Emily Westfall
Mentor: Drew Weissman, MD, PhD

mRNA technology has been recognized as one of the key future pathways for numerous therapies to induce expression of defective proteins and prevent disease through vaccines. The technology still needs many refinements, especially to make its delivery cell type specific. This is the focus of the Weissman Lab as a whole, while they work to treat chronic diseases and cancers. During the summer research project, we worked to produce some of the key components necessary for this research such as Luciferase and TGF-beta mRNA. These compounds will be used in the manufacture of these vaccines as they are progressed through mouse trials. The projects then are verified by running ELISA assays of the serum aliquots from these mice to ensure the treatments and cell-specific targeting are working effectively. Our protocols and testing methods are the first steps in the process to utilize mRNA technology in a much larger way as the research progresses.

P29. Effects of Acute and Repeated Emotional Stress on GAD67 Expression and Fos Activation in the Amygdala
Alex Tai*, Matthew Arcemont*, Matin Babaev*, Derek Bangerter* (*equal contribution)
Mentor: Kristin Gosselink, PhD

Objective:
The 67kD variant of glutamate decarboxylase (GAD67) is the rate-limiting enzyme for GABA synthesis, playing a key role in maintaining inhibitory tone within the central nervous system. The goal of this project was to evaluate stress-induced changes in GAD67 expression in the amygdala, a structure involved in emotional regulation, cognitive function, and modulation of the hypothalamic–pituitary–adrenal (HPA) axis.

Methods:
Adult male Sprague–Dawley rats were randomly assigned to control, acute stress, or repeated stress conditions and exposed to physical restraint for 30 min per day for 0, 1, or 14 days, respectively. All stress exposures occurred near the beginning of the light cycle. On day 14, 2h after the restraint period, rats were deeply anesthetized and transcardially perfused with saline and 4% paraformaldehyde. Fixed brain tissues were collected, sectioned at 30μm), and processed for Nissl staining, Fos immunohistochemistry, or GAD67 in situ hybridization. GAD67 density and Fos-positive cell counts were analyzed in multiple sections through the rostrocaudal extent of the amygdala, including specific subregions, using ImageJ software. Data from individual sections were summed or average for each animal, and compared by treatment group. Significance was determined at the $p \leq 0.05$ level.

Results:
Repeated stress animals demonstrated reduced GAD67 mRNA signal in specific amygdala subregions relative to non-stressed controls, while acute stress produced more localized and less pronounced effects. Using ImageJ software data to record darkness values which represented GAD67 expressions, (with lower values meaning more expression and higher values meaning less), when averaged across the medial and central amygdala, GAD67 expression was lowest in the acute stress group (93.32), followed by repeated stress (89.64) and control animals (86.73). Analysis of Fos expression is ongoing.

Conclusions:
Stress exposure alters GAD67 expression in the amygdala in a manner dependent on stress chronicity. These findings suggest that repeated stress may disrupt inhibitory control within amygdala circuits, potentially contributing to heightened emotional reactivity and vulnerability to anxiety-related disorders. Given the wide distribution of projections from the amygdala to other brain regions, a change in inhibitory neurotransmission could have far-ranging implications for neurological function. Lastly, we were not able to achieve double-labeling to determine whether GAD67-expressing neurons are also Fos-positive and stress responsive. Doing so would strengthen our argument that stress directly impacts amygdala neurons and leads to altered inhibition, thus outlining a potential mechanism through which stress contributes to the development of affective disorders.

P30. Correlation Between Screen Time, Sleep Duration, and Stroop Effect Among First-Year Osteopathic Medical Students

Summer Hales, Emily Ahearn, Piercarla Fernandez, Mark Parsamian
Mentor(s): Raju Panta, MD, Pedro Del Corral, PhD

Objective:
This study aimed to examine the relationships between average daily screen time, self-reported sleep duration, and cognitive performance measured through the Stroop effect in first-year osteopathic medical students. Drawing from previous research linking sleep quality and technology used to test executive

function, we hypothesized that students who reported longer sleep duration, and less screen time would demonstrate faster reaction times on Stroop testing, reflecting stronger selective attention and cognitive flexibility. By exploring these associations in a cohort facing intensive academic demands, this study sought to determine whether modifiable lifestyle habits might be meaningfully related to cognitive processing speed and accuracy under conditions that require conflict resolution.

Methods:
This cross-sectional observational study was conducted among first-year osteopathic medical students at Burrell College of Osteopathic Medicine. Participants were recruited voluntarily and provided informed consent prior to enrollment. Cognitive performance was evaluated using the EncephalApp Stroop Test, administered via participants' smartphones. The test comprised congruent trials (word meaning and font color matched) and incongruent trials (word meaning and font color differed). Reaction times for congruent (OffTime) and incongruent (OnTime) trials were recorded, and the Stroop effect was calculated as the difference between these two measures.

Participants completed an anonymous Qualtrics survey, distributed via email, which collected demographic data (age in years and months, gender, and self-reported vision problems) along with self-reported average daily screen time and nightly sleep duration (in hours and minutes) for the previous week and month, as recorded by their smart devices.

A total of 69 responses were received between March 14 and July 27, 2025. Of these, 20 responses were excluded due to incompleteness or duplication, resulting in a final sample of 49 participants for statistical analysis. All data were anonymized and securely stored in password-protected files. Statistical analyses were performed using Microsoft Excel. Separate linear regression models were used to assess the relationships between Stroop effect and both screen time and sleep duration. An additional regression model evaluated the association between screen time and sleep duration. Statistical significance was defined as $p < 0.05$.

Results:
The final sample included 49 participants, with an average age of 25.61 ± 3.58 years. Of these, 20.4% identified as male and 79.6% as female. The mean reaction time for congruent trials was 54.06 ± 10.06 seconds, while incongruent trials averaged 60.94 ± 13.59 seconds. The Stroop effect, calculated as the difference between incongruent and congruent reaction times, had a mean value of 6.87 ± 7.38 seconds. Linear regression analyses revealed no statistically significant relationship between Stroop effect and average daily screen time for the prior week ($R^2 = 0.0023$, $p = 0.746$), nor with average nightly sleep duration for the prior week ($R^2 = 0.0287$, $p = 0.25$) or the prior month ($R^2 = 0.0303$, $p = 0.237$). However, a statistically significant moderate negative association was observed between average daily screen time and average nightly sleep duration for the prior week ($R^2 = 0.14$, $p = 0.0088$), indicating that each additional hour of screen time was associated with approximately 0.15 fewer hours of sleep.

Conclusion:
Within this cohort, no statistically significant relationship was found between screen time or sleep duration and performance on the Stroop test, suggesting that variations in these lifestyle factors did not produce measurable differences in selective attention or cognitive flexibility. However, the observed link between increased screen time and reduced sleep duration aligns with existing literature on the negative impact of technology use on sleep. Although direct cognitive effects were not identified, the interplay between screen time and sleep may still influence student well-being and academic outcomes.

This study faced limitations due to its reliance on voluntary student participation, which resulted in a smaller-than-expected sample size and potential inaccuracies in self-reported data. Additional constraints included students' inability to reliably track their sleep duration and limited access to the EncephalApp Stroop test. Data collection is ongoing and will continue among first-year osteopathic medical students. However, future studies should aim for larger sample sizes, objective sleep tracking methods, and broader

cognitive assessments to better understand these relationships and evaluate whether lifestyle modifications could enhance cognitive performance in rigorous academic environments.

P31. Knowledge and Perception of Artificial Intelligence (AI) in Medical Education among Preclinical Osteopathic Medical Students and Faculty

Jake Orent, Hassan Cordash, Laura Francois
Mentor: Raju Panta, MD

Objective:
To evaluate the perceptions of AI integration in medical education, focusing on perceived benefits, concerns, and readiness to adopt AI-based tools among preclinical osteopathic medical students and faculty.

Introduction:
Artificial intelligence is rapidly transforming healthcare in several fields, including radiology, neurology, cardiology, pathology, and is being increasingly used in medical education. It provides tailored learning experiences, adaptive feedback, and resources based on evidence. Large language models such as ChatGPT have shown that they can combine difficult material, give personalized explanations, and achieve performance comparable to medical students, showcasing its possibility to become educational tools. It is important to know levels of knowledge and opinions of AI in order to create targeted educational programs and make sure that AI is used responsibly in schools. This study fills that gap by looking at how much preclinical osteopathic medical students and faculty know about AI, what they think are benefits and what they are worried about. This information can help with curriculum development and policy formation.

Methods:
A cross-sectional survey was administered via Qualtrics to all preclinical osteopathic medical students (n=486) and faculty (n=52) at Burrell College of Osteopathic Medicine through email invitations and class announcements. The 22-item test evaluated formal training exposure, perceived benefits, concerns, and preparedness for adoption in educational settings. It was adapted from validated tools in previous literature (Sassis et al., 2021; Civaner et al., 2022). Items tested included 5-point Likert scale ratings, multiple-choice questions, and free-text responses. Descriptive statistics were calculated for quantitative data using Excel, and thematic coding was applied to qualitative responses. Respondents with >20% missing data (n=3 faculty) were excluded from analysis; exclusion did not meaningfully alter representativeness. IRB approval was obtained.

Results:
Responses were received from 65 students (13.4% response rate) and 18 faculty (34.6% response), of which completed responses were 11.1% (n=54) of students and 28.8% (n=15) of faculty. Student mean age was 26.4 ± 3.9 years and faculty mean age was 54.7 ± 11.2 years. The majority of 54 respondents (85.2%) reported having no formal AI training, and their baseline AI knowledge was moderate (=3.07 ± 0.77). Improved knowledge acquisition (= 2.39 ± 1.01), shorter information retrieval times (mean = 2.65 ± 1.14), and better practice question creation (mean = 2.44 ± 1.10) were among the perceived advantages. However, the majority (mean = 1.44 ± 0.63) stressed the need to verify AI-generated content, expressing concerns about overreliance, ethics, and accuracy, which is consistent with earlier findings (Wang & Preininger, 2019; Li et al., 2023). Concerns about privacy (27%), ethical issues (31%), over-reliance on

technology (40%), and job displacement (16%) were the most prevalent. Although some people preferred AI over conventional search engines (mean = 3.00 ± 1.19), most people agreed that clear institutional policies were necessary before implementing AI-based tools (mean = 1.69 ± 0.83).
From the faculty cohort (66.7% male), most reported partial (53.3%) or substantial (33.3%) knowledge of AI in medical education, although 60% had not received any formal AI training. Faculty reported using AI primarily to generate practice questions (60%) and case vignettes (66.7%), rather than for reviewing or generating exam questions (≤20%). 40% of faculty members encountered AI-related topics occasionally, and 46.6% encountered them always or frequently. While acknowledging AI's potential to improve educational efficiency, these findings support students' concerns about accuracy, ethics, and the lack of formal institutional policies for integration.

Conclusion:
Although there are still many concerns about accuracy, ethics, and policy frameworks, preclinical osteopathic medical students and faculty see AI as a promising tool for improving efficiency and learning in medical education. Limitations include small sample size, potential response bias, and lack of longitudinal follow-up. As suggested by Jackson et al. (2024) and Alkhaaldi et al. (2023), successful integration will necessitate the creation of institutional policies, ethical and privacy protections, and focused AI literacy training. These results highlight the necessity of proactive curriculum and development to guarantee the ethical and successful integration of AI in osteopathic medical education.

P32. Mapping Educational Access Gaps in Conflict-Affected Regions Using HDX Data
Chloe Watkins, Michael Yingst, Ishita Jain
Mentor: Dana Mathew, MD

Objective:
This study aims to identify and map regions in Sudan and Somalia where schools face the greatest strain from large numbers of school-age children and internally displaced persons (IDPs), using HDX humanitarian data. The goal is to create a practical, numeric classification system for educational strain and visualize it through an interactive map, so humanitarian actors can priori-ze urgent resource allocation.

Methods:
Using data from the Humanitarian data exchange, including information for UHNCR, REACH, and Educa-on Cluster dashboards, we focused on two indicators which were the school age population and internally displaced populations. We then used this data to create a 4--er strain classification based on low (<250), moderate (251–500), high (501–999), and extreme (≥1000 per school). These thresholds represent progressively unsustainable educational conditions. Finally, we visualized the data with bar charts and an interactive choropleth map so users can explore regional disparities in real time.

Results:
It was found that multiple schools in Sudan and Somalia exceeded 500 internally displaced persons or school-aged children per functional school, indica-on high or extreme strain on these locations. Some regions exceeded 1000 per school likely causing classroom breakdown, safety risks, or denial of access requiring urgent intervention or scaling. The most critical areas of strain in Somalia include Banadir, Hiiraan, and Southwest states, while in Sudan these areas

include Darfur and Khartoum. The interactive map makes these disparities visible and easy to compare across regions.

Conclusion:
Our data bridges the gap of global frameworks lack of numerical data for strain thresholds turning raw data into actionable insight. The visualizations provided support more equitable and data-driven priori-za-on of education interventions in complex humanitarian settings, where needs often exceed resources.

P33. The Impact of Preclinical Curriculum Based Serving-Learning on Osteopathic Medical Students' Understanding of the Social Determinants of Health

Ojeni Touma, Mena Eskander, Salvatore Corallo, Catrina Wiltshire McLeod
Mentor: Mary Lacaze, MD

Objective:
This study aims to evaluate whether mandatory, longitudinal preclinical curriculum based service-learning significantly impacts osteopathic medical students' understanding of the Social Determinants of Health.

Methods:
This study involved a cohort of 218 first-year medical students at the Burrell College of Osteopathic Medicine, Las Cruces campus. Participating students completed two sequential surveys. The first survey was completed in December of 2024 prior to being assigned to their community venue site and the second survey in May 2025 at the end of their first year of medical school. Students were notified both in class, and via email to participate in voluntary study surveys reporting their experiences. The surveys were designed using a 5-point Likert Scale (1= strongly disagree, 2 = somewhat disagree, 3 = neither agree nor disagree, 4 = somewhat agree, 5 = strongly agree) to assess students' enthusiasm for the integration of community based service-learning into the curriculum, perceived preparedness for serving diverse populations, and confidence in identifying SDoH related to patient and community member health disparities. There was also the opportunity for students to respond to the question, "How has your experience at your community venue site impacted your personal understanding of the Social Determinants of Health?"

Aggregated data was statistically analyzed using Qualtrics and Python with Mann-Whitney U test to determine significance between surveys. Qualitative feedback was thematically analyzed in addition to quantitative findings to determine anecdotal impacts on the students' learning.

Results:
Survey data were collected from the same student group at two time points (Survey 1: n=137; Survey 2: n=86). Statistical analysis using Mann-Whitney U tests revealed no significant difference in enthusiasm for community-based learning (Survey 1 median = 4.0, IQR = 1.0; Survey 2 median = 4.0, IQR = 1.0; $U = 5044.5$, $p = 0.390$). Similarly, there was no significant change in perceived preparedness to serve diverse populations (Survey 1 median = 4.0, IQR = 2.0; Survey 2 median = 4.0, IQR = 2.0; $U = 6024.5$, $p = 0.181$). In contrast, a statistically significant increase was observed in students' confidence in identifying SDoH contributing to health disparities (Survey 1 median = 4.0, IQR = 1.0; Survey 2 median = 4.0, IQR = 1.0; $U = 4011.0$, $p = 0.001$).

In response to the open-ended question "How has your experience at your community venue site impacted your personal understanding of the Social Determinants of Health?" students reported enhanced

empathy and compassion, directly attributing their improved understanding of the SDoH to their community venue site experiences. Notable themes included the differentiation between theoretical learning of SDoH and real person interactions, increasing awareness of community resources or lack thereof, and a more nuanced understanding of family dynamics that influence patient care.

Conclusion:
Preliminary evidence suggests that mandatory pre-clinical service-learning significantly improves medical students' understanding of the SDoH. While enthusiasm for preclinical community based learning remained stable, students reported decreased feelings of preparedness to serve diverse patient populations possibly indicating initial overestimation or recognition of previously unknown preparedness gaps. Specific qualitative feedback highlighted students' greater understanding of socio-economic factors influencing healthcare access and outcomes, encounters that challenged preconceived notions, and an increase in empathy for future patient and community member interactions.

As this is a pilot program, more longitudinal data is required to comprehensively assess the long-term efficacy of including required service-learning into osteopathic medical students' preclinical curriculum. This may also be affected by community venue site placement, so future analyses will also compare responses from both within and between those placements. In addition, attrition attributed to students being at the end of the academic year likely impacted the data completeness. Future directions also plan to include the Melbourne Florida campus, which will allow for further evaluation of regional differences, and community venue specific differences. Expanding to include the Florida campus will provide further evidence to evaluate the effectiveness of the course and track changes in students' confidence levels over time. Increasing the sample size may help enhance reliability and improve statistical power and yield increased survey response rate.

P34. Defining Fairness in Sport Leadership: A Scoping Review Protocol & Preliminary Findings
Timothy J. Khalil, Taniah Ali
Mentor(s): Katherine E. Hirsch, PhD

Objective:
This scoping review examines what is currently known about leader fairness in sport across academic literature. The aim is to map the conceptual landscape surrounding theories, leader behaviors, and athlete outcomes related to perceived fairness. Fairness plays a central role in fostering environments where trust, cohesion, and psychological safety can thrive, enabling leadership approaches that support performance, motivation, and team dynamics. These impacts are particularly relevant across competitive sport, education, and rehabilitative care settings.

Methods:
This project follows Arksey and O'Malley's (2005) scoping review framework and PRISMA-ScR guidelines. The seven stages include: (1) identifying the research question, (2) identifying relevant studies, (3) selecting studies, (4) charting the data, (5) collating, summarizing, and reporting the results, (6) consulting with stakeholders, and (7) defining implications and next steps. Seven research questions were formulated to explore fairness definitions, theoretical foundations, target populations, measurement strategies, and outcomes associated with fair or unfair leadership. A structured data extraction framework was created, incorporating over 18 variables including age group, level of play, fairness definitions, outcome measures, and leadership characteristics. Boolean keyword searches were piloted using the EBSCO Burell database with librarian guidance. Zotero was used to manage references and extract articles

from the initial search. Two peer-reviewed articles were independently screened and charted by both student researchers to test inter-rater reliability and refine the extraction tool. Full article screening is ongoing, and current results reflect only the two articles used in the preliminary testing phase, completing up to stage three.

Results:
Preliminary findings based on the two articles selected for inter-rater reliability and charting protocol testing revealed substantial variation in how fairness is defined, operationalized, and assessed. Both studies referenced Greenberg's perceived justice theory and Colquitt's procedural justice model, but applied them differently. One study found that coach fairness predicted athlete leadership development via team cohesion and identification. The other reported gender-based differences in perceived justice and its relationship to athlete satisfaction over time. Definitions of fairness were presented as relational and context-dependent, shaped by leadership behavior and athlete demographics. Variations also emerged in the reported level of play (e.g., "senior" vs. "professional") and in how thoroughly participant data such as age or gender were reported. These results support the utility of the extraction tool in capturing conceptual and methodological inconsistencies across the literature.

Conclusion:
Leader fairness is a significant but inconsistently defined construct in sport leadership literature. Preliminary findings underscore the importance of fairness in shaping athlete experiences, psychological safety, and leadership development. As the review continues, this work will synthesize fairness-related definitions, theoretical models, measurement approaches, and leadership traits, providing structured insights for researchers, coaches, and organizations. By identifying gaps and highlighting influential antecedents of perceived fairness, this review supports the advancement of evidence-based leadership strategies that promote equity, trust, and team function across athletic, educational, and rehabilitative environments.

P35. Species Identification of Wild Nematodes Using ITS2 DNA Barcoding
Tina Rivera
Mentor: Timothy Crombie, PhD

Using model organisms to demonstrate the impact of genetic variability on phenotype and the heritability of epigenetic traits is an important area of research not only for animal health, but human medicine. To identify and characterize the local genetic diversity of wild nematodes, we collected 35 substrate samples across three independent collection trips. From those samples we isolated a total of 46 nematodes, and we identified six ITS2 positive nematodes. We sequenced the ITS2 positive nematodes to reveal their genetic variation, and study the implications that may have on their phenotypic response to the environment.

P36. Discovery of Complex Co-occurring Mutational Positions in *Spike* and *Membrane* protein sequences of SARS-COV-2

Valerie Kobzarenko
Mentor(s): Debasis Mitra, PhD

Objective:
This work builds on prior efforts to identify co-occurring mutation positions (CMPs) in SARSCoV-2 by extending the analysis from receptor binding domains to multiple complex protein sequences [1]. The focus includes the *Spike* protein, which mediates viral–host membrane fusion, and *Membrane* protein, a structural protein critical for viral assembly. Both proteins exhibit numerous insertions and deletions, increasing computational complexity and making the identification of CMPs more challenging.

Methods:
We applied non-negative matrix factorization (NMF) to a dataset of over 1.2 million SARS-CoV-2 *Spike* and *Membrane* protein sequences obtained from the National Center for Biotechnology Information (NCBI) database spanning 2019 to the present. To address the high frequency of insertions and deletions, a previously developed cost function was enhanced to maintain sequence alignment and preserve the mutation–presence matrix format required for factorization.

The previously used alternating least squares was optimized with a weighting component to improve processing speed and computational efficiency, enabling large-scale analysis without exhaustive combinatorial searches. A range of biologically relevant factor *(r)* thresholds was systematically evaluated to capture co-occurring mutation patterns while minimizing noise, ensuring applicability across diverse protein targets. Additional algorithmic refinements addressed the sparse nature of the mutation matrix, further reducing computational overhead and allowing efficient detection and characterization of mutation clusters across millions of sequences.

Post-factorization refinement involved computing factor frequencies against a predefined threshold to ensure non-continuous sequences (NCSs) retained high fidelity with minimal information loss. The resulting positional mutations were then mapped to their corresponding aligned reference sequence, including the Wuhan strain.

Results:
A total of 35 distinct co-mutation positions (CMPs) were identified in SARS-CoV-2 following removal of duplicate CMPs and application of filtering criteria. The longest CMP comprised 61 mutation positions and was present in 2.72% of all analyzed sequences. Although this proportion represents a relatively small subset of sequences, the extensive number of co-occurring mutations within a single pattern renders it computationally significant, highlighting potential linkage between multiple evolutionary events. Another high-prevalence CMP containing 30 mutation positions was observed in 43% of sequences, suggesting a more dominant co-mutation signature within the dataset. All CMPs were localized exclusively to the *Spike* protein, with no patterns extending into the *Membrane* protein. Examination of the initial mutation matrix for the membrane protein revealed a sparsity of mutations in this region, with an overwhelming concentration of changes occurring in the Spike protein, consistent with its known role in host receptor recognition and immune system interaction.

Several CMPs contained previously documented immune escape variants, including those in the receptor-binding domain (RBD) and in other *Spike* subdomains (SD) associated with altered transmissibility and immune evasion [2]. The well-known D614 mutation [3], located outside the RBD, appeared frequently both as an independent factor and as a recurring subcomponent in multiple CMPs, reflecting its persistent presence across viral lineages. Another notable position,

H655, also located in the region before S1/S2 cleavage, was similarly represented among CMPs, underscoring its potential functional relevance [4-5]. These findings reinforce the central role of the *Spike* protein as the primary locus of adaptive mutational change in SARS-CoV-2 evolution.

Conclusion:
Although our analysis did not identify any co-occurring positional mutations between the *Spike* and *Membrane* proteins, it revealed a strikingly high number of *Spike* protein CMPs. This underscores the methodology's ability to extract critical, otherwise non-obvious insights from large-scale sequence datasets. The *Membrane* protein, despite its known structural and functional interaction with *Spike*, showed a comparatively low mutation frequency. This disparity is noteworthy given the extensive mutational diversity of *Spike*, suggesting markedly different evolutionary pressures. Such findings reinforce the pivotal role of *Spike* in viral adaptation and immune evasion, underscoring its importance as a primary target for vaccine development and therapeutic intervention. Beyond these biological implications, this study highlights the strength and adaptability of the analytical framework, which can systematically scan vast genomic repositories, isolate mutation patterns of potential functional significance, and contextualize them in relation to protein-protein interactions. Importantly, it does so in a scalable, reproducible way, minimizing reliance on incidental discovery.

The insights derived here illustrate both biological relevance and methodological robustness, making it a powerful tool for genomic surveillance and pathogen evolution studies. Our analysis examined positional mutation co-occurrence for *Membrane* and *Spike* proteins due to their interaction; if needed, it can be applied solely to *Membrane* proteins to explore their CMPs.

P37. Streptococcus Anginosus causing a 1.5cm Mitral Valve Vegetation in a Patient with HOCM
William Haf, Nicholas Hillard, Alejandro Esparza, Jake Orent
Mentor: Magdy El-Din, MD

Infective endocarditis is a rare but potentially deadly disease that commonly affects the elderly population and those with pathologies affecting native heart valves such as mitral valve prolapse, aortic valve disease and others. A 74 year old female with a past medical history of type 2 diabetes mellitus and hypertrophic obstructive cardiomyopathy presented to the Emergency Department with a chief complaint of shortness of breath and diarrhea for 3 weeks after a recent dental visit. The patient was found to have Streptococcus Anginosus bacteremia on blood culture. The transthoracic echocardiogram did not show any valvular abnormalities but a subsequent Transesophageal Echocardiogram demonstrated a 1.5cm mitral valve vegetation. The patient was then transferred to a higher acuity facility for surgical intervention due to the risk of embolization and stroke. This case highlights the necessity for extensive imaging in patients with bacteremia, particularly those with underlying structural heart disease and recent minor dental procedures.

Thank you for Attending our 8th Annual Medical Student Research Day (1st on the Melbourne Campus)

Burrell College of Osteopathic Medicine

3100 S. Babcock St., 2nd Floor

Melbourne, FL 32901

www.burrell.edu

research@burrell.edu