Medical Student Research Day
Program and Abstract Book
September 13, 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 – Robert Hostoffer, DO

Dr. Hostoffer graduated from John Carroll University and received his D.O. in 1985 at the Philadelphia College of Osteopathic Medicine. He completed residency training at Doctors Hospital in Columbus, Ohio, and a fellowship at the University of Alabama. He was the Clinical Associate Director of pediatric and adult Immunology at Case Western Reserve University. Dr. Hostoffer is board certified in Allergy and Immunology and is currently an Associate Professor in Pediatrics at Case Western Reserve. He is a fellow of the American Academy of Allergy, Asthma, and Immunology and the Clinical Immunology Society. He is also past president of the American College of Osteopathic Pediatrics.

Schedule Overview

Saturday, September 13, 2025 – All times in Mountain Time	
7:00 AM – 7:45 AM	Coffee/Pastries **Bear Den**
7:45 AM – 8:00 AM	Welcome Remarks *Scott Cyrus, DO., Chair, Clinical Medicine* *Thomas P. Eiting, Ph.D., Director of Student Research* **Room 158**
8:00 AM – 9:00 AM	Keynote Address – Robert Hostoffer, DO *Enhancement of Osteopathic Research and Philosophy* **Room 158 and via zoom https://burrell-edu.zoom.us/j/91907775261** **[Meeting ID: 919 0777 5261 Passcode: 268728]**
9:00 AM – 11:00 AM	Poster Presentations *Student authors present their posters.* **Foyer/Hallway/Rooms 152/153, 155/156**
11:00 AM – 12:00 PM	Oral Presentations **Room 158 and via zoom https://burrell-edu.zoom.us/j/91907775261** **[Meeting ID: 919 0777 5261 Passcode: 268728]**
12:00 PM – 12:45 PM	Lunch (*All attendees*) **Bear Den/Patio**
12:45 PM -1:00 PM	Award Ceremony and Closing Remarks **Room 158**

Schedule in Detail

Welcome Remarks. 7:45 – 8:00 am, Room 158

Scott Cyrus, D.O.
Chair, Dept. Clinical Medicine, Burrell College of Osteopathic Medicine

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

Keynote Address. 8:00 – 9:00 am, Room 158

Enhancement of Osteopathic Research and Philosophy
Robert Hostoffer, DO
Allergy Immunology Associates, Inc.
Professor, Case Western Reserve University

Poster Presentations. 9:00 – 11:00 am, Foyer/Hallway/Rooms 152/152, 155/156

P1. Oligodendroglioma: Insights into the 2016 WHO Classification Updates and Seizure Pathogenesis
LaShay Taylor, Alexia Mishock, Murat Gokden, Trey Lemley
Mentor: Angelica Oviedo, MD

P2. Anticonvulsant to Adverse Effect: A Case Report on Confounding Presentations of Common Mood Stabilizer and Antiepileptic Drug
Janie Tyler Williamson
Mentor: Karam Elahi, MD

P3. Methicillin-Resistant *Staphylococcus aureus* (MRSA) Detection with Loop-Mediated Isothermal Amplification (LAMP) Assay for Use in Screening Patients and Healthcare Professionals in Field Study Settings
Jasmine Gutierrez and Jessica Hopkins
Mentor: Debra E. Bramblett, PhD

P4. COVID-19 Vaccination Hesitancy Among People Living with HIV: Prevalence, Determinants, and Strategies for Improved Uptake
Nia Prabhu, Karishma Craig
Mentor: Jagdish Khubchandani, PhD

P5. Evaluating the Relationship Between Metals and Hepatitis C Virus (HCV) Infection in U.S. Adults
Weston R. Stokey
Mentors: Humaira H. Rahman, MD, PhD, Stuart Munson-McGee, PhD

P6. Skin cancer recognition and education among community health workers for optimal preventative medicine
Alessandra Merenna, Natalie Govea, Britany Hartshorn, Michelle Moye, Elizabeth Robbins, Alexa Ware
Mentor: Debra E. Bramblett, PhD

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. Too many cooks in the kitchen?: A comparison of preferences for formal and informal athlete leaders
Morgan Divine
Mentor(s): Katie Hirsch, PhD

P9. Global COVID-19 Vaccine Hesitancy Among Individuals with Mental Illness: A Scoping Review
Karim ElSweissi, Anthony Ebraham
Mentor: Jagdish Khubchandani, PhD

P10. Defining Fairness in Sport Leadership: A Scoping Review Protocol & Preliminary Findings
Timothy J. Khalil, Taniah Ali
Mentor(s): Katherine E. Hirsch, PhD

P11. Evaluation of the Osteopathic Compression of the Fourth Ventricle Manipulative Technique on Parasympathetic Activity
Adrian Cordero, Mia Cotero, Taylor Marelli
Mentor(s): Adrienne Kania, DO

P12. Utilizing the Energetic Model of Osteopathic Treatment of Chapman Points in an Educational Setting
Danielle Polow, Lyndsay Sheerin
Mentor(s): Adrienne Kania, DO

P13. Progressive Neuromuscular Weakness in a Patient with VCP Gene Mutation: A Case Report
Khadija Saifullah
Mentor: Aamr Herekar, MD

P14. COVID-19 Vaccination Refusal among Cancer Survivors: Global Review of Trends and Predictors
Ahmad Adwan
Mentor(s): Jagdish Khubchandani, PhD

P15. Beyond the Needle: Utilizing Osteopathic Manipulative Treatment as an Alternative to Glucocorticoid Injections for Treatment of Adhesive Capsulitis in a Patient with Diabetes
Anamaria Ancheta, Marc James Thor Uy, Alexis Thompson
Mentor: Adrienne Kania, DO

P16. Pharmacogenomics and Personalized Medicine: A Review of Recent Advances and Challenges
Fatima Sabira
Mentor: Keshab Raj Paudel, MD

P17. Identification of Biomarkers for Cervical Cancer and Development of Methods to Screen for Them
Bertha Tejeda, Niha Kothapalli, Matthew Wernecke
Mentors: Debra E. Bramblett, PhD, Chris Hague, PhD

P18. Assessing and Improving HPV Vaccine Uptake in Pediatric Clinics
Daisy Huerta, Ishita Jain, Radha Patel
Mentor: Kristin Gosselink, PhD
*Authors contributed equally to the project

P19. Assessing Adherence to Annual Dilated Eye Exams Among Diabetic Patients in the Paso del Norte Region
Marina Quairoli, Trisha Via Dae Talla, Jeffrey Briggs
Mentor: Kristin Gosselink, PhD

P20. Real-World Comparison of Depression and Anxiety Risk in Psoriasis Patients Treated with Biologics or Traditional Systemics
Paola Ramirez, Kriseira Lamas, Grace Luta
Mentor: Ioana Pasca, MD

P21. Recurrent Deep Venous Thrombosis Following Direct Oral Anticoagulation Therapy Failure in an Elderly Male: A Case Report and Literature Review
Jacob Candelaria, Megan Altekruse, Parker Friedentag
Mentor: Abraham Guimareas, MD

P22. Anomalous Aortic Origin of the Right Coronary Artery: Diagnostic Challenges and Management Strategies
Kevin Chih, Sruti Somani, Jazmin Wright-Zornes, Mohini Vadalia
Mentor(s): Udit Bhatnagar, MD, Roi Altit, MD

P23. Optimization of Primary T Cell Expansion for Phosphoproteomics Study of a Type I Diabetes Associated ZAP70 Mutation
Meghana Kalahasti
Mentors: Vinothini Arunagiri, PhD, Lin Shen, MD, PhD

P24. Risk factors associated with the development of lymphedema following breast cancer surgery: project development for an early-career medical student
Sruti Somani
Mentors: Mary E. Lacaze, MD, Kristin L. Gosselink, PhD

P25. Sun Protection Attitudes and Habits Amongst Medical Students
Simran Bhakta, Tyler Peters
Mentor: Debra Bramblett, PhD

P26. The Role of Preadipocytes in Skin Barrier Immunity and Infection Control
Niketa Dixit, Caitlin Blades
Mentor(s): Arun Kumar, MD

P27. Physiologic Responses to Postural, Autonomic, and Thermal Interventions With Potential to Convert Paroxysmal Atrial Fibrillation to Sinus Rhythm
Biola Eniola, Sukla Mohajan, Esmeralda Ponce, Gilda Tchao
Mentor: Harald M. Stauss, MD, PhD

P28. AI-Assisted Detection of Metal Ions with FSCV-Based Electrochemical Sensors for Potential Biomedical Applications
Mariam Fahmy
Mentor(s): Siddhartha Bhattacharyya, PhD

P29. Predictive Machine Learning Modeling of Nasal Airflow Metrics Using Anatomical Features from CT scans
Amir Reza Pashmineh Azar
Mentor(s): Thomas P. Eiting, PhD

P30. Digital Surgery of Nasal Airways Using Publicly Available CT Datasets
Shrishti Jain, Abhinav Bhattarai
Mentor(s): Thomas P. Eiting, PhD

P31. Periacetabular Osteotomy
Breanne Mullins
Mentor: Justin LaReau, MD

P32. Non-invasive cervical vagus nerve stimulation, but not auricular VNS, increases brain alpha waves and reduces arterial blood pressure
Andrea Coello, Aamani Pillutla, Gurpreet Telwar, Rodela Ahmed
Mentor: Harald Stauss, MD, PhD

P33. The Impact of a Literacy-Appropriate Educational Handout on Anxiety and Pain During Electromyography and Nerve Conduction Studies: A Randomized Controlled Trial
Charles Goorman
Mentors: Jerald Moser, MD, Scott Goorman, MD

P34. Comparing Submaximal and Maximal Exercise Testing Efficacy on Identifying Clinically Relevant Blood Pressure Metrics
Mark Parsamian
Mentor: Pedro Del Corral, PhD, MD

P35. Neuroinvasive West Nile Virus Presenting as Guillain-Barré Syndrome: A Diagnostic Challenge
Atish Kumar, Onyinyechi G. Nwosu
Mentor(s): Michael Elliot, MD

P36. Environmental Sampling for *Coccidioides* Exposure in Southern New Mexico: A Preliminary Assessment of Valley Fever Risk
Angela Al-Hanna, Sebastian Kania, Chris Peverada, Diane Schulmeister, David Trejo
Mentor: Michael Woods, PhD

P37. Detecting SARS-CoV-2 in Bats of New Mexico using Immunohistochemistry and Genetic Techniques
Celeste Cisneros, Hannah Yun
Mentor: Thomas P. Eiting, PhD

P38. Potential effects of natural substitutions on the functional activity of hypoxia-inducible factor 1α (HIF-1α) in the high-altitude deer mice *Peromyscus maniculatus sonoriensis*
Sam Glaser, Ana Vazquez, Gissel Salgado
Mentor(s): Alex Gasparian, PhD

P39. Chronic Stress Effects on the Blood Brain Barrier
Darlene Jones
Mentor: Kristin L. Gosselink, PhD

P40. Comparing Deciduous Dentition Morphology Across Species
David Hunter, Manisha Bandari
Mentor: Taylor Polvadore, PhD

P41. Ontogeny of TMJ Articular Disc in Tufted and Untufted Capuchins
Alexis Boundas
Mentor: Taylor Polvadore, PhD

P42. Capuchin Feeding Ontogeny: Assessment of Tongue Volume
Maya Rademacker, Samiyah Jaffrey
Mentor: Taylor Polvadore, PhD

P43. Hormones and Energetics in Reproductive Bats
April Rivera, Krisha Gupta, Hannah Bott
Mentors: Thomas Eiting, PhD, Teri Orr, PhD

P44. 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

P45. 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

P46. 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

P47. 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

Oral Presentations. 11:00 am – 12:00 pm, Room 158

Zoom link: https://burrell-edu.zoom.us/j/91907775261 [Meeting ID: 919 0777 5261 Passcode: 268728]

11:00 – 11:10 am
O1. Disparities in Left Heart Catheterization and Mortality Among NSTEMI Patients with Schizophrenia: Insights from the National Inpatient Sample Database
Afreen Bakht, Keri Bow
Mentor : Ahmad Mustafa, MD

11:10 – 11:20 am
O2. Hip Pathology in the Dancing Athlete
Natalie Nacy, Alexandra Wade
Mentor: Dustin Volkmer, MD

11:20 – 11:30 am
O3. Assessment of Efficacy and Cost-Benefit Ratio of Real Tissue Adjuncts in Surgical Procedural Training
Andrew Peace, Brandon Snyder
Mentors: Nathan Williams, MD, Spencer Mattingly, PhD

11:30 – 11:40 am
O4. Assessing the Perceptions of Osteopathic Medical Students' beliefs since Transitions in the USMLE step 1 and COMLEX level 1 examinations to Pass/Fail
Milo Taylor
Mentor: Robert Goldsteen, DO

11:40 – 11:50 am
O5. Development of isothermal detection assays for Human Papilloma Viruses (HPV) at the point of care
Elizabeth Young, Yareli Reyes
Mentor: Debra Bramblett, PhD

11:50 am – 12:00 pm
Q & A Session for all Oral Presenters

Lunch. 12:00 – 12:45 pm, Bear Den/Patio/Room 158

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 158

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

Abstracts – Poster Presentations

P1. Oligodendroglioma: Insights into the 2016 WHO Classification Updates 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. Anticonvulsant to Adverse Effect: A Case Report on Confounding Presentations of Common Mood Stabilizer and Antiepileptic Drug

Janie Tyler Williamson
Mentor: Karam Elahi, MD

Introduction:
Acute bacterial meningitis is a life-threatening infection characterized by inflammation of the meninges and subarachnoid space, most commonly caused by Streptococcus pneumoniae and Neisseria meningitidis in adults. The classic triad of meningitis symptoms are fever, neck stiffness, and altered mental status. However, this triad is present in only about 41% of cases, with headache, fever, and neck stiffness being the most frequent symptoms. Lumbar puncture must be obtained in order to make an official diagnosis, however a patient with the classic triad of symptoms gives a high index of suspicion of meningitis; and empiric antibiotics are normally started as soon as possible.

Lamotrigine is a common anticonvulsant and mood stabilizer. The mechanism of action is not fully understood, but it is believed to inhibit voltage-sensitive sodium channels, stabilizing neuronal membranes and increasing presynaptic release of excitatory neurotransmitters such as glutamate and aspartate. It is well known that use of lamotrigine can cause a maculopapular rash but it can also cause more serious side effects, particularly Steven Johnson Syndrome if given too quickly via an intravenous line or in conjunction with valproate.

This case outlines the events following a 68 year old female's presentation to the emergency department and follows her course of treatment during admission and her ultimate discharge diagnosis.

Case Description:
This is a case of a 68 year old female from New Mexico with a past medical history of lung and breast cancer remission who presented to the emergency department with five days of dizziness, confusion, headache, nausea, neck stiffness, pruritic maculopapular rash, and low-grade fever, suspicious for acute bacterial meningitis. Physical exam findings included positive Kernig's and Brudzinski's signs, increasing clinical index of suspicion for bacterial meningitis. The patient's white blood cell counts never spiked, however this was thought to be due to her immunocompromised status from her breast cancer drug regimen of Letrozole. Empiric treatment for bacterial meningitis was initiated. CT scan of the head was negative, showing no acute intracranial pathology. The patient became more alert and oriented each day during admission and her rash gradually improved, first centrally then peripherally. Initially, the marked improvement of her overall status was attributed to the empiric antibiotic treatment. However, after consultation with infectious disease, lumbar puncture was deferred pending MRI results because it was hypothesized that her symptoms may not be meningeal in origin after all. In conclusion, holding her lamotrigine (after decades of use) coincided with rapid clinical improvement and resolution of rash after her third day of admission, suggesting a drug-induced etiology rather than true infection.

Discussion:
This case shows the unexpected side effects related to the common anticonvulsant and antiepileptic drug lamotrigine. While lamotrigine's most common side effects are rash, this case shows far more severe side effects of the drug that masqueraded as bacterial meningitis. Initial workup of this patient included physical exam, imaging, and lab workup for acute bacterial meningitis. Given all of the patient's initial signs and symptoms, the appropriate course of action was taken by starting empiric antibiotic treatment and admission for symptom management. After consultation with Infectious Disease, the treatment course began to shift to include the possibility of lamotrigine being the primary cause for her presentation. After discontinuing her lamotrigine, the patient's confusion, pain, and rash drastically improved. Orders for the lumbar puncture were discontinued as imaging results started coming back as unremarkable for any meningeal swelling or other associated findings. After three days of admission, the patient was discharged home without confusion, neck stiffness, or rash; and without her lamotrigine prescription.

P3. Methicillin-Resistant *Staphylococcus aureus* (MRSA) Detection with Loop-Mediated Isothermal Amplification (LAMP) Assay for Use in Screening Patients and Healthcare Professionals in Field Study Settings

Jasmine Gutierrez and Jessica Hopkins
Mentor: Debra E. Bramblett, PhD

Objective:
Community-acquired and nosocomial Methicillin-resistant *Staphylococcus aureus* (MRSA) is a serious health and economic issue. *S. aureus* poses a significant health risk to patients due to its ability to cause systemic, life-threatening diseases. Therefore, early, efficient, and accurate detection of MRSA carriage in susceptible individuals within a point-of-care setting is essential to improving patient outcomes. We aim to demonstrate how Loop-mediated Isothermal amplification (LAMP) can be used to quickly and accurately identify MRSA carriage in patients and healthcare professionals with the same specificity as other screening methods, such as qPCR, without significant sample processing.

Methods:
Each reaction contained purified H2O, *MecA* or 16S RNA primer, target DNA, and WarmStart® Colorimetric LAMP 2X Master Mix with UDG (M1804S) in each tube.
To test functionality and specificity of our primers (*MecA* and 16S RNA), we ran a basic LAMP assay, consisting of a positive template control and negative template control for each tested primer set. All samples were prepared and run using a PTC-200 DNA Engine MJ Thermal cycler for 30 minutes at 65 C.

Following confirmation of primer functionality, we then tested primer sensitivity by performing a 10-fold dilution series from 1:1 to 1:100,000 with a genomic DNA concentration range of 27.04 uL/mL to 2.7 x10^-4 uL/mL with our purified *S. aureus* (29213, ATCC) and MRSA DNA (43300, ATCC) samples. The sensitivity of the LAMP assay was then compared to that of qPCR. qPCR was performed using CFX96 Thermal cycler from Bio-RAD with a MRSA Probe set (10010611, IDT).

To test possible utilization of the LAMP assay for *S. aureus* and MRSA detection in unprocessed nasal swabs, we then cultured reference strains of S. aureus and MRSA bacteria, collected the resulting colonies, and suspended the live bacteria in a TE buffer solution. All protocols involving live bacteria were performed in a BSC hood. We then performed our standard LAMP assay protocol and incubated for 30 minutes at 65 C. All tubes containing unprocessed bacterial samples were deemed inert and non-infectious following completion of the thermocycling protocol.

Results:
The m*ecA* gene was successfully detected by our LAMP assay in MRSA DNA. 16S ribosomal RNA gene sequences were detected in both MRSA and methicillin-sensitive S. *aureus* DNA samples by our LAMP assay. We were able to detect *mecA* sequences in as low as 8.9 copies of genomic bacterial DNA when dilutions were performed.

The LAMP assay with either primer set was successful in detecting each genomic DNA target (mecA and 16S ribosomal RNA gene markers) in unprocessed bacterial samples. A dilution series was not performed with the unprocessed bacterial samples.

qPCR and LAMP assay results demonstrated comparable sensitivity to MRSA DNA dilution samples. It was noted that at higher dilutions the pH color change of our LAMP assay samples demonstrated weaker responses but were still noticeable enough to interpret a positive result. Our positive results were further confirmed using the HybriDetect Universal Lateral Flow Assay kit (MGDH 1, Milenia Biotec).

Conclusion:
Preliminary data demonstrates the potential utilization of LAMP for *S. aureus screening* in the field. We hope to further test the use of LAMP assay technology to conduct a prospective cohort study evaluating MRSA carriage rates of medical and nursing students in their pre-clinical and clinical training years. One of the limitations of this study would be the challenge in determining the average bacterial count in a colonized person. This reflects a problem in evaluating the utility of the assay for human samples. We plan to perform additional 10-fold dilution series protocols using unprocessed bacteria samples to further evaluate LAMP assay sensitivity. An additional limitation at this point is that our assay only screens for *mecA*

resistance gene where there are other types of antibiotic resistance genes that are clinically important, like *mecC*.

P4. COVID-19 Vaccination Hesitancy Among People Living with HIV: Prevalence, Determinants, and Strategies for Improved Uptake

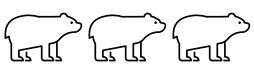
Nia Prabhu, Karishma Craig
Mentor: Jagdish Khubchandani

Objective:
Individuals diagnosed and living with HIV (PLHIV) face a heightened risk of severe outcomes from COVID-19 primarily due to their frequently weakened immune systems and a greater incidence of comorbid conditions. The purpose of our investigation was to conduct a comprehensive global review of COVID-19 vaccination hesitancy and determinants of vaccine uptake in this population along with recommending strategies for optimal vaccine coverage.

Methods:
To extract the studies for this investigation, a scoping review of the published literature was conducted by three investigators using predefined inclusion and exclusion criteria, more than a dozen keywords, and from 4 scholarly databases. The initial search resulted in 630 studies that were assessed for suitability.

Results:
A final pool of 27 studies (n = 11,090 PLHIV) from 18 countries was included in this review. The overall pooled prevalence rate of COVID-19 vaccine refusal among PLHIV worldwide was 39.9% (95% CI = 35.01–43.2%). The major factors associated with acceptance of the COVID-19 vaccines were male sex, older age, higher education, prior vaccination and influence of healthcare providers. The major reasons for COVID-19 vaccination refusal were concerns about vaccine safety, side effects, and efficacy; lower perceived risks from COVID-19; misinformation and lack of knowledge; and mistrust in experts, authorities, or pharmaceutical companies.

Conclusion:
Vaccine hesitancy concerning COVID-19 continues to be widespread among people living with HIV (PLHIV), influenced by a multifaceted combination of sociodemographic, clinical, and perception-related factors. There is an urgent need for targeted interventions, such as culturally appropriate educational campaigns, direct outreach from trusted healthcare professionals, and efforts to dispel misinformation, to tackle these issues and enhance vaccine acceptance within this vital demographic. Future studies should investigate the efficacy of these interventions and further examine the particular informational requirements of PLHIV in relation to vaccination.



P5. Evaluating the Relationship Between Metals and Hepatitis C Virus (HCV) Infection in U.S. Adults

Weston R. Stokey
Mentors: Humaira H. Rahman, MD, PhD, Stuart Munson-McGee, PhD

Objective:
Environmental exposure to heavy metals due to their extensive industrial use is another potential risk factor for Hepatitis C virus (HCV), a Flaviviridae virus. Such exposure can lead to immune system dysregulation and elevated oxidative stress, contributing to prolonged inflammation. In this study, barium (Ba), cadmium (Cd), cobalt (Co), manganese (Mn), molybdenum (Mo), lead (Pb), antimony (Sb), thallium (Tl), tin (Sn), and tungsten (W) were analyzed with their association on HCV infection prevalence.

Methods:
Data from the National Health and Nutrition Examination Survey (NHANES; 2013–2020, including pre-pandemic 2017–March 2020) were used to examine HCV infection and metal exposure among 18,073 adults aged 20–80. Urinary metals data were available for 5,751 participants. All analyses were conducted using R software. Comparisons of continuous measurements (e.g., age) between HCV status were made using the two-sample t-test. Wilcoxon rank sum tests were also performed as a non-parametric alternative to account for non-normal distribution of metal concentrations. Chi-squared test and corresponding p-values were also conducted to explore differences in HCV prevalence rates between subject-specific factors. Logistic regression analysis was used to examine associations of urinary metal with HCV risk for participants. Covariates were included in the multivariate logistic regression model for each metal variable. All statistical analyses were done using the 'survey' package in R (version 4.2.0). The level of significance was set at a p-value of < 0.05 for all hypothesis testing.

Results:
This study found that nearly all examined covariates were positively associated with HCV infection compared to HCV-negative participants. Higher prevalence rates were observed among males (prevalence [PR] 2.49%), non-Hispanic Whites (PR 1.94%), and non-Hispanic Blacks (PR 2.24%). Additional risk factors included having less than a 9th-grade education (PR 2.91%), being divorced/widowed/separated (PR 3.66%), having a family income-to-poverty ratio below 1.3 (PR 3.93%), alcohol consumption (PR 1.98%), and smoking or second-hand smoke exposure (PR 2.50%). HCV infection was significantly associated with increasing urinary Co levels [odds ratio (OR): 1.179; 95% confidence interval (CI): 1.056–1.316]. Elevated W levels in the third and fourth quartiles (Q3 and Q4) were linked to higher HCV prevalence compared to the lowest quartile (Q1), with ORs of 13.623 (95% CI: 1.683–110.251) and 11.687 (95% CI: 1.212–112.655), respectively. Mo levels were also significantly associated with HCV infection across Q2, Q3, and Q4 (ORs 7.186 [95% CI: 2.400–21.515], 5.472 [95% CI: 1.617–18.522], and 8.579 [95% CI: 2.401–30.660], respectively), relative to Q1. Finally, the interquartile ranges (IQRs) for Cd, cobalt Co, Mo, Pb, Sb, Sn, and W were found at higher frequencies among HCV-positive individuals compared to those who were HCV-negative.

Conclusion:
HCV infection was positively associated with increasing urinary Co, W, and Mo

levels. Tungsten (W) levels were further classified into quartiles, and compared to the dl, Q3 and Q4 showed a higher positive association with HCV infection. Molybdenum (Mo) showed a significant positive association across quartiles Q2, Q3, and Q4 with HCV infection, compared to the lowest quartile (Q1). Second, Cd and Pb were detected at higher concentrations in HCV positive participants, compared to HCV-negative participants. Additionally, studies should aim to be conducted under a clinical or prospective study design to best establish a pathologic pathway. Finally, analysis of demographic factors showed that age, gender, race, education level, marital status, alcohol status, and cotinine level were significant risk factors positively associated with infection of HCV. These results continue to demonstrate that HCV infection and metal exposure are significant public health issues and warrant further attention given the numerous risk factors and observed toxic health effects. Future studies and health professionals should aim to increase education, continue serum and urinary testing, and mitigate metal exposure for all individuals.

P6. Skin cancer recognition and education among community health workers for optimal preventative medicine

Alessandra Merenna, Natalie Govea, Britany Hartshorn, Michelle Moye, Elizabeth Robbins, Alexa Ware
Mentor: Debra E. Bramblett, PhD

Objective:
Per the American Cancer Society, 104,960 new melanoma diagnoses are expected in 2025, and it is estimated that 8,430 melanoma mortalities will occur in the United States. This study aimed to evaluate the foundational knowledge in recognition of melanoma and confidence in communication about skin health amongst Community Health Workers (CHW) in New Mexico and Florida.

Methods:
We are conducting an online Qualtrics survey with the intention to reach approximately 300 CHW's from New Mexico and Florida between the summer and fall of 2025. The online survey is being distributed in three ways: 1) Email through the director of the Office of Community Health Workers in New Mexico 2) Email through the statewide program director of the Florida Community Health Worker Coalition, and 3) Presentations in person at CHW symposiums. The survey consists of three parts. The first part includes a 16-question pre-questionnaire regarding CHW demographics, an assessment of CHW ability to recognize lesions suspicious for melanoma, their confidence, and comfort in communication about skin health. The second part consists of an educational ABCDE flyer on melanoma. The survey concludes with a post-questionnaire re-evaluating skills and attitudes in addressing skin health. Inferential statistics including a standard t-test and chi-square are being used to compare several variables in our data set including differences between states, geographical classifications, and CHW experience level.

Results:
At this time we are continuing to collect data from both states.

Conclusion:

We expect higher overall correct identification and confidence in recognizing lesions suspicious for melanoma by the CHW's located in Florida as compared to New Mexico. A higher overall correct identification is also expected when comparing urban versus rural populations between and within the two states. With a higher incidence rate and a greater population, the CHWs in Florida have the opportunity for greater exposure and education in skin diseases such as melanoma, guiding their recognition of such lesions. We will be considering the possibility that CHW relationships with their communities may differ between urban and rural and may influence the data. We may also see improved performance with CHW's with increased experience. Incorporating a short educational flyer on melanoma in the CHW training program may improve competency, confidence, and increased awareness. Future goals are to find additional ways to improve CHW knowledge in dermatological care with the intention to bridge the gap in skin health care experienced by individuals in the communities they serve.

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. Too many cooks in the kitchen?: A comparison of preferences for formal and informal athlete leaders

Morgan Divine
Mentor(s): Katie Hirsch, PhD

Objective:
Athlete leadership has emerged as a rapidly growing area of interest in the field of sport psychology. Athlete leadership plays an important role in building team cohesion, performance, outcomes and satisfaction. There has been an abundance of research focused on the role of the formal athlete leader and the assigned coach on team dynamics. Despite this, research has focused primarily on the role coaches and/or formally assigned athlete leaders have played in shaping team dynamics and culture. Informal athlete leaders, teammates respected by their peer but who have not been given an official title, are also a source of significant team influence. They often fill roles that formal leaders cannot, such as providing emotional support and positive feedback to teammates. Little research has been done to explore whether athletes prefer different leadership behaviors to be displayed by their formal versus informal leaders. There is still an important gap in knowledge that remains in sports leadership. It is still not understood whether athletes desire different leadership behaviors to be exhibited from their formal versus informal athlete leaders. By addressing this gap in knowledge, we can advance our understanding of leadership models in sport, which can contribute to optimizing and enhancing team leadership and performance.

Methods:
The guiding theory used for this study is the Multidimensional Model of Leadership (MML) and the Full Range Model of Leadership (FRML), using the Leadership Scale for Sports (LSS) and the Differentiated Transformational Leadership Inventory (DTLI) to assess the desired leadership qualities in formal and informal athlete leaders. In Phase I, approximately 350 current or recently retired NCAA athletes across all collegiate divisions and sports will complete two adapted questionnaires, one evaluating formal athlete leaders' behaviors and one for informal athlete leader behaviors, measuring preferred leadership behaviors, such as training and instruction, social support, democratic decision-making, inspirational motivation, and appropriate role modeling. Responses will then be analyzed using repeated-measures MANOVA to identify differences in behavioral preferences between leader types. In Phase II, a selected subset of 20 athletes and 10 coaches will participate in semi-structured focus groups further exploring perceptions of formal and informal leadership roles, the similarities and differences between them, and additional contextual factors specified by the participants. By identifying specific leadership behaviors desired by athletes from their different leadership types, this research aims to provide insight for coaches, sport psychologists, and leadership development programs to target the identified behaviors desired by athletes from their various leadership types. Findings of this study may be able to inform and direct leadership development strategies for cultivating both formal and informal athlete leaders more effectively, enhancing team cohesion and performance, while fostering leadership skills that extend beyond the athletic environment.

P9. Global COVID-19 Vaccine Hesitancy Among Individuals with Mental Illness: A Scoping Review

Karim ElSweissi, Anthony Ebraham
Mentor: Jagdish Khubchandani, PhD

Objective:
To determine the global prevalence, reasons, and predictors of COVID-19 vaccine refusal among individuals with mental illness, and to identify common barriers and enablers influencing vaccination uptake in this population.

Methods:
A broad review was conducted to identify peer-reviewed studies reporting COVID-19 vaccine refusal or hesitancy in individuals with diagnosed mental illnesses. Searches included articles from research websites such as: PubMed, Scopus, and Google Scholar, covering January 2020–May 2025. Studies were eligible if they reported quantitative refusal/hesitancy rates and/or qualitative barriers/enablers in populations with psychiatric diagnoses. Data extracted included sample size, country, setting (inpatient, outpatient, community), mental illness type, refusal/hesitancy rates, and identified factors affecting uptake. A total of 36 studies from 74 countries were included, representing 102,458 participants with conditions such as schizophrenia, bipolar disorder, depression, anxiety, and substance use disorders. Reported refusal or hesitancy rates were compiled, and a pooled average was calculated. Barriers and enablers were categorized thematically across studies.

Results:
Across all included studies, the pooled prevalence of COVID-19 vaccine refusal or hesitancy among individuals with mental illness was 32.9%, with reported rates ranging widely by diagnosis. The highest hesitancy rates exceeded 60% in some inpatient and low-resource settings, while the lowest rates were under 10% in high-trust, high-access health systems. The most frequently cited barriers were concerns about vaccine safety and side effects, doubts about efficacy, mistrust of governments, healthcare providers, or pharmaceutical companies, low perceived COVID-19 risk, misinformation, and logistical challenges such as transportation or appointment access. Enablers of vaccine uptake included prior influenza vaccination, older age, higher education, hospitalization, trust in health authorities, and strong healthcare provider recommendations.

Conclusion:
COVID-19 vaccine refusal and hesitancy remain disproportionately high among individuals with mental illness worldwide, with nearly one-third of this population unvaccinated. Concerns over safety, efficacy, and trust, along with structural access barriers, are consistent global themes. Strategies to improve uptake should address misinformation, enhance accessibility, and build trust through targeted communication from trusted healthcare providers. Developing interventions that address both psychosocial and structural barriers is critical for improving vaccine equity and ensuring adequate protection for individuals with mental illness in future public health emergencies.

P10. 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.

P11. Evaluation of the Osteopathic Compression of the Fourth Ventricle Manipulative Technique on Parasympathetic Activity
Adrian Cordero, Mia Cotero, Taylor Marelli
Mentor(s): Adrienne Kania, DO

Objective:
To evaluate whether two approaches to the osteopathic Compression of the Fourth Ventricle (CV4) technique—the Frymann and Wales methods—produce differing effects on autonomic nervous system activity. The Frymann technique emphasizes extension of cranial rhythmic motion, and the Wales technique applies continuous medial compression. Outcomes measured included heart rate variability, blood pressure, and pupillary response, with the aim of identifying technique-specific physiological responses.

Methods:
Eligible participants provided informed consent, demographic information, and completed screening for exclusion criteria. Participants were instructed to abstain from caffeine/food for 2–3 hours and tobacco for 48 hours before testing. A manual blood pressure and heart rate measurement were recorded, and

subjects underwent a brief osteopathic screening of the cervical and upper thoracic spine. Identified somatic dysfunctions were treated with muscle energy technique.

Participants were instrumented with ECG leads and a wristwatch blood pressure monitor. Testing occurred in a darkened room with red light illumination. Baseline data collection included 30 minutes of rest with continuous ECG monitoring. Blood pressure measurement and pupillometry of the right eye took place before and after the 30-minute rest period. Subjects were then randomized to receive one of three five-minute interventions: Frymann CV4, Wales CV4, or a sham where the investigator's hands were placed beside the subject's head. Still point duration was recorded, with blood pressure recordings at the beginning and end of the still point. Blood pressure and pupillometry were repeated immediately after intervention.

A 30-minute recovery period followed, during which ECG was continuously recorded. Blood pressure and pupillometry were reassessed at the end of the recovery period. Pupillometry parameters included maximal and minimal pupil diameter, latency of constriction, constriction velocity, and maximum constriction velocity. Data were analyzed via one-way ANOVA for within- and between-group differences.
Results:
Preliminary analysis of the first six subjects revealed a statistically significant increase in systolic blood pressure at the end of the Frymann intervention compared to multiple pre- and post-intervention time points (p-values 0.0393 to 0.0029), suggesting a possible transient sympathetic activation.

Diastolic blood pressure increased significantly at the end of the Wales intervention compared to select baseline and recovery measurements ($p=0.0264$ to 0.0104), though findings were inconsistent across time points, suggesting inconclusive results on parasympathetic activity.
Pupillometry showed decreased maximum constriction velocity (MCV) following Frymann compared to baseline ($p=0.0423$) and decreased MCV following sham compared to the end of the initial rest period ($p=0.0498$).

Average heart rate analysis revealed no statistically significant changes for any intervention.

Conclusion:
Preliminary findings suggest the Frymann CV4 method may produce a short-term increase in systolic blood pressure, potentially indicating sympathetic activation, while the Wales method showed inconsistent diastolic pressure elevations. Pupillometry changes were minimal and inconsistent across interventions. Heart rate remained unchanged. Given the small preliminary sample size, these results are inconclusive and should be interpreted with caution. Further data collection and analysis, particularly during the intervention period and in relation to still point duration, are needed to clarify technique-specific autonomic effects.

P12. 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.

P13. Progressive Neuromuscular Weakness in a Patient with VCP Gene Mutation: A Case Report

Khadija Saifullah
Mentor: Aamr Herekar, MD

Objective:
To describe the diagnostic evaluation and clinical course of a patient with progressive neuromuscular weakness associated with a valosin-containing protein (VCP) gene mutation, highlighting diagnostic challenges and management considerations.

Methods:
A 58-year-old male with hyperlipidemia presented for evaluation of progressive weakness beginning in 2011 with foot drop and balance issues. A comprehensive review of patient history, family history, physical examinations, neurological assessments, electromyography (EMG) studies, laboratory evaluations, and genetic testing results were compiled. The patient's clinical course was documented across multiple visits. Differential diagnoses considered included amyotrophic lateral sclerosis (ALS), stiff person syndrome, and hereditary spastic paraplegia. EMG studies assessed motor and sensory function across multiple muscle groups. Laboratory tests included vitamin B12, folate, HbA1c, inflammatory markers, autoimmune panels, and creatine kinase. Genetic testing was reviewed for neuromuscular disease-related mutations. Supportive management interventions and referrals were noted.

Results:
Symptoms began with foot drop and gradually progressed proximally, with loss of balance, recurrent falls, spasticity, and difficulty sitting upright without engaging abdominal muscles. Neurologic exam revealed weakness, muscle spasms, bilateral hand tremor resolving with dorsiflexion, and cold distal extremities. EMG showed sensory and motor dysfunction with decreased recruitment in multiple muscle groups and bilateral carpal tunnel syndrome. Laboratory studies revealed low folate (5.2 ng/mL) but were otherwise unremarkable, including ANA and inflammatory markers. Genetic testing performed three years prior was positive for a VCP gene mutation. Family history was significant for father and brother with similar progressive weakness, the father dying at age 78 of presumed cardiac disease. The patient failed gabapentin, baclofen, and riluzole. Management included vitamin supplementation, wrist splints, physical/occupational therapy, and referral to a movement disorder specialist and the Mayo Clinic for further evaluation.

Conclusion:
This case underscores the complexity of diagnosing progressive neuromuscular weakness, particularly when symptoms overlap with ALS, stiff person syndrome, and hereditary spastic paraplegia. Identification of a VCP gene mutation provided a unifying etiology consistent with multisystem proteinopathy. While no curative therapy exists, supportive management and genetic counseling are essential. Early recognition of VCP-related disease may guide targeted evaluation, avoid unnecessary treatments, and inform family risk assessment.

P14. COVID-19 Vaccination Refusal among Cancer Survivors: Global Review of Trends and Predictors

Ahmad Adwan
Mentor(s): Jagdish Khubchandani

Objective:
The goal of this review was to assess the global prevalence of COVID-19 vaccination refusal among individuals living with cancer, identify the key reasons for refusal and hesitancy, and determine the factors associated with vaccine uptake in this population

Methods:
A scoping-review design was used to identify and synthesize evidence on COVID-19 vaccine refusal among individuals living with cancer. 71 studies encompassing data from more than 100 countries were included in this review. Two independent investigators (AA and JK) performed systematic searches in PubMed and Google Scholar, initially combining terms such as "cancer," "oncology," "tumor", "neoplasm", "oncologic"," malignancy", "coronavirus," "COVID-19," "SARS-CoV-2," "vaccine," "vaccination," "hesitancy," and "refusal." To maximize retrieval, they varied keyword order and repeated searches until no new records emerged. Titles and abstracts were screened for relevance, and full texts of potentially eligible studies were examined to confirm inclusion criteria and to uncover additional citations. Any disagreements over study eligibility or data extraction were resolved through consensus discussion. This review includes English-language articles published on or after January 1, 2020 that enrolled individuals living with cancer and reported primary data on COVID-19 vaccine refusal. Refusal was defined by responses of "no," "refused," "declined," "disagreed," "did not want," or "do not intend" to receive a COVID-19 vaccine; participants who answered "unsure," "uncertain," or "undecided" were excluded from the refusal category. We extracted refusal proportions from each study and calculated a pooled prevalence (with 95 % confidence intervals) using a random-effects meta-analytic model. Finally, we summarized the principal reasons for refusal and the key facilitators of vaccine acceptance across studies.

Results:
The pooled prevalence of COVID-19 vaccine refusal among cancer individuals was 36% (95 % CI 27%-45%). The most frequently cited reasons for refusal included fears about vaccine safety and side effects, worries that it might interfere with their cancer treatments, doubts about its efficacy in immunocompromised individuals, a lack of clear, cancer-specific information, mistrust of non-medical or governmental sources, and a perception of low personal COVID-19 risk. Conversely, factors positively associated with vaccine uptake were clear recommendations from trusted healthcare providers, a desire to protect themselves and loved ones, positive prior vaccine experiences, access to accurate cancer-specific information and high health literacy, recognition of their elevated COVID-19 risk, and convenient, institution-supported vaccination programs.

Conclusion:
These findings underscore the urgent need for tailored, evidence-based interventions such as enhanced patient education, robust clinician patient communication, and system level policies to address barriers and bolster confidence in COVID-19 vaccination among individuals with cancer. Implementing such strategies across healthcare settings will be essential to protect this high-risk population against current and future COVID-19 related threats.

P15. Beyond the Needle: Utilizing Osteopathic Manipulative Treatment as an Alternative to Glucocorticoid Injections for Treatment of Adhesive Capsulitis in a Patient with Diabetes

Anamaria Ancheta, Marc James Thor Uy, Alexis Thompson
Mentor: Adrienne Kania, DO

Objective:
This case study aimed to evaluate Spencer's Technique, an osteopathic manipulative treatment (OMT), as a safe and effective alternative to glucocorticoid injections in managing adhesive capsulitis in a patient with type 2 diabetes mellitus. The primary outcome was change in shoulder range of motion across treatment sessions. A secondary aim was to assess the feasibility of integrating OMT into primary care as a non-invasive, low-cost option for patients with limited physical therapy access.
Methods:
A 54-year-old female with type 2 diabetes mellitus, right shoulder adhesive capsulitis, and prior physical therapy presented with progressive pain and restricted mobility. The patient had completed her allotted insurance-covered physical therapy sessions and expressed concern about glucocorticoid injections due to potential worsening of hyperglycemia. Spencer's Technique, a seven-step articulatory OMT, was chosen as the intervention. Treatments were administered over four visits between November 2023 and January 2024. At each session, active ROM was assessed with a goniometer prior to and immediately after intervention. Measurements included flexion, extension, abduction, internal rotation, and external rotation. Standardized positioning was maintained: the axis of the goniometer placed at the acromion, the stationary arm aligned with the trunk, and the mobile arm following the humeral shaft. Photos were taken at key sessions to document pre- and post-treatment changes. To exclude neuropathic contributors, C6 and C7 reflexes, dermatomal sensation from C2–T2, and gross motor strength were evaluated. Data were recorded systematically at each visit to allow comparison across sessions. Improvements were tracked as both absolute changes in degrees and percentage increases relative to normal ranges. Intervals between sessions were noted, and any regression between visits was documented. This design allowed the study to evaluate both the immediate biomechanical effects of OMT and the importance of treatment frequency in sustaining gains.

Results:
Across all four sessions, OMT produced measurable improvements in ROM, most pronounced in flexion, abduction, and internal rotation. On 11/23/23, flexion improved from 155° pre-treatment to 168° post-treatment. Subsequent sessions demonstrated cumulative gains, with flexion reaching 172° by 1/18/24. Abduction improved from 130° pre-treatment to 173° post-treatment at the same visit, representing a return to near-normal range. Internal rotation, initially limited to 34°, improved to 77° by the final session, surpassing 100% of the minimum normal range. External rotation increased from 34° to 45°, and extension rose from 36° to 44°. Improvements were immediate following treatment, suggesting an acute reduction in soft tissue restriction and improved joint mechanics. However, intervals longer than two weeks between sessions were associated with partial regression in motion, particularly in internal rotation and flexion. These findings highlight the importance of consistent application of OMT in maintaining functional progress. The patient also reported subjective improvements, including decreased pain with overhead reaching and daily activities such as driving and lifting objects. She expressed satisfaction with OMT as a non-invasive, medication-free treatment option, especially given her prior difficulty accessing additional physical therapy. Overall, the results support Spencer's Technique as an effective intervention for adhesive capsulitis in diabetic patients.

Conclusion:
Spencer's Technique, when applied consistently in a primary care setting, effectively improved ROM in a patient with adhesive capsulitis and type 2 diabetes mellitus. The intervention reduced stiffness and enhanced function without the adverse metabolic effects associated with glucocorticoid injections. Weekly or biweekly treatments were particularly effective in sustaining improvements, whereas longer gaps between sessions allowed partial regression. This case highlights the value of OMT as a holistic and patient-centered modality that is both cost-effective and accessible, especially for patients with chronic illness or limited insurance coverage. Integrating OMT into primary care may expand treatment options for musculoskeletal disorders, reduce reliance on pharmacologic interventions, and improve patient satisfaction. Larger-scale studies are warranted to further evaluate OMT's role as a viable alternative to conventional therapies for adhesive capsulitis and other chronic musculoskeletal conditions.

P16. Pharmacogenomics and Personalized Medicine: A Review of Recent Advances and Challenges
Fatima Sabira
Mentor: Keshab Raj Paudel, MD

Objective:
This review aimed to synthesize recent literature on pharmacogenomics and its role in personalized medicine, highlighting advancements, diverse clinical applications, population-specific considerations, current limitations, and future research directions to advance the field.

Methods:
A systematic search was conducted across PubMed, Scopus, and Google Scholar. Keywords used included "pharmacogenomics," "personalized medicine," and "precision medicine." Articles published in English from January 1, 2015, onwards were considered for inclusion. The selection process involved screening titles and abstracts, followed by full-text assessment, resulting in 29 studies included in the final review.

Results: Pharmacogenomics studies revealed significant impacts of genetic variations on drug metabolism, efficacy, and adverse drug reactions (ADRs). Key findings include: *CYP2C19* polymorphisms affecting clopidogrel response (risk of major adverse cardiac events/bleeding) and dabigatran pharmacokinetics (influenced by *ABCB1*, *CES1*). *CYP2D6* poor/intermediate function increased chemotherapy-induced peripheral neuropathy risk with taxanes. *UGT1A1* polymorphisms increased irinotecan toxicity. *SLCO1B1* and *ABCG2* variants were linked to statin-associated muscle symptoms and liver enzyme elevation. PGx testing showed promise in guiding antidepressant selection (*CYP2D6*, *CYP2C19*, *CYP2B6*, *SLC6A4*, *HTR2A*) and improving outcomes in bipolar disorder (*DRD2*, *HTR2A*, *MTHFR*, *SLC6A4*, *OPRM1*, *COMT*, *BDNF*). In a Ugandan cohort, >99% had actionable pharmacogene phenotypes, with enrichment for African-prevalent alleles (*CYP3A5*1, *CYP2B6*9, *CYP3A5*6, *CYP2D6*17, *CYP2D6*29, *TPMT*3C).

Conclusion:
Pharmacogenomics is foundational to personalized medicine, enabling tailored drug therapies to optimize efficacy and minimize ADRs. This review highlights the profound influence of genetic polymorphisms across various therapeutic areas. Despite advancements, substantial barriers to clinical implementation persist, including knowledge gaps among healthcare providers, limited integration into routine practice,

and underrepresentation of diverse populations in genomic research. Future efforts must prioritize exploring rare genetic variants, leveraging advanced genomic technologies, expanding testing in various disease areas, enhancing clinician education, and critically, increasing the representation of diverse populations to ensure equitable access to personalized medicine globally.

P17. Identification of Biomarkers for Cervical Cancer and Development of Methods to Screen for Them

Bertha Tejeda, Niha Kothapalli, Matthew Wernecke
Mentors: Debra E. Bramblett, PhD, Chris Hague, PhD

Objective:
Cervical cancer remains a major global health concern, with approximately 71.2% of cases attributed to high-risk human papillomavirus (HPV) types 16 and 18. This study aims to test potential biomarkers for diagnostic screening of cervical cancer. Based on literature review, KRT17 and Ki-67 were selected as candidate biomarkers due to their reported upregulation in cervical cancer.
Methods:
Summary: We used different lines of HPV+ cancer cells for our experiments. SiHa cells are HPV 16+ while Hela cells are HPV 18+. C33A cells are negative for all HPV types. To transfect our cells, we used Lipofectamine 3000. First, we transfected with a gfp expression plasmid to test transfection efficiency. We then transfected with HPV-16 E6/E7 expression plasmid and collected RNA. Finally, we used the RNA collected in a LAMP assay to see whether gene expression associated with the presence of HPV-16 and HPV-18 such as Ki67 and KRT17 is upregulated.
Transfections: Determined transfection efficiency of 3 cancer cell lines (ATCC): SiHA cells, HeLa cells, and C33A. pCMV-GFP expression plasmid (Addgene) was transfected into each cell line utilizing Lipofectamine 3000 (Invitrogen) transfection agent and Opti-MEM medium (Invitrogen). After achieving a desired transfection efficiency, transfection of C33A cells negative for HPV with HPV-18 purified plasmid DNA-45152D| ATCC and Addgene: p1321 HPV-16 E6/E7 was performed.
Primer Design and LAMP Experiment: Primer design and RT-LAMP Assay (Snapgene, Clustal omega, NEB primer design tool) stock concentration 100 micomolar. Performed RT-LAMP assay to test transfected C33A cells for E6/E7 expression. Materials and reagents used: MJ thermocycler, Ultrapure water from Thermofisher, Cat 10977015, NEB warm start from New England Biolabs, M1800Snew containing BST2.0 warm start DNA polymerase and WarmStart RTx. Positive LAMP controls: HPV-18 plasmid DNA ATCC; 45152D and HPV-16 plasmid DNA ATCC; 45113D.
RNA Isolation and Sequencing: RNA was isolated from transfected and untransfected C33A cells using RNeasy Plus Universal Kit (Qiagen). RNA was sent for RNAseq with Novogene for comparison between HPV-16, HPV-18 transfected cells and untransfected cells.

Results:
Transfection efficiency exceeded 70% in C33A cells using gfp plasmid permitting subsequent introduction of HPV-18 and HPV-16 E6/E7. From these cells, we were able to isolate high quality, large yield RNA meeting Novogene's RNA sequencing requirements. Expression of E6/E7 was then successfully validated using an in-house loop mediated isothermal amplification

(LAMP) assay, which provided rapid and specific detection consistent with gene expression. RNA sequencing has been performed and currently under analysis.

Conclusion:
RNA sequencing is ongoing however we hypothesize that there will be an increased expression of Ki-67 and KRT17 in E6/E7 transfected cell lines when compared to untransfected cells. These findings may contribute to the development of diagnostic screening tools for early detection of high-risk HPV infections.

P18. Assessing and Improving HPV Vaccine Uptake in Pediatric Clinics
Daisy Huerta*, Ishita Jain*, Radha Patel (*Equal Contribution)
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.

P19. Assessing Adherence to Annual Dilated Eye Exams Among Diabetic Patients in the Paso del Norte Region

Marina Quairoli, Trisha Via Dae Talla, Jeffrey Briggs
Mentor: Kristin Gosselink, PhD

Abstract:
Objectives: Diabetic retinopathy (DR) can cause vision loss in persons with diabetes mellitus (DM). The American Diabetes Association (ADA) and International Council of Ophthalmology (IOC) advise annual/biannual eye exams for persons with DM. Prior research linked healthy lifestyles to better visual function but missed underserved groups. The current study surveys rural, low-SES, predominantly Hispanic colonias in the Paso del Norte region to assess knowledge and adherence to DR screening recommendations.
Methods: Participants (n=125) will be primarily recruited through in-person communication and flyer distribution at local businesses and regional community events. Regional healthcare partners who offer support for individuals with DM will help facilitate our engagement and data collection. Surveys were developed using the Qualtrics platform and may be taken in paper form or online through a QR code or weblink. Twenty-seven multiple choice questions are included, covering topics such as demographic information, diabetes awareness, eyecare, comorbidities, and disease management.

Results: Previous research showed a significant ($p \leq 0.05$) positive correlation between the FANTASTIC lifestyle survey and dimensions of the VFQ-25, including general vision, mental health, ocular pain, dependency, and composite score. Specifically, individuals with a high FANTASTIC score, corresponding with a more beneficial lifestyle, also showed a high VFQ-25 score, indicating better visual function. Rural populations like those in the Colonias of PdN have limited access to specialized medical care and emergency services, and more exposure to environmental hazards. Hispanic populations, also highly represented in PdN, experience more lapses in their care for DR. These observations lead us to predict worse adherence to diabetic eye exam guidelines in PdN and Colonia residents compared to their urban counterparts.
Conclusion: Adherence to the ADA's and IOC's guidelines for dilated eye exams is a cornerstone in surveilling DR and is an important aspect of DM care that is often overlooked
by the general population. Rural populations within PdN tend to be underserved and experience more healthcare disparities than those living in the urban centers. They are predominantly Hispanic, Spanish-speaking, with a lower SES, leading to multiple healthcare barriers. We expect lower adherence to guidelines for diabetic eye exams among individuals with diabetes in this group. Identifying behaviors and barriers that preserve vision and delay the onset of DR would have a meaningful impact for patients in this community.

P20. Real-World Comparison of Depression and Anxiety Risk in Psoriasis Patients Treated with Biologics or Traditional Systemics

Paola Ramirez, Kriseira Lamas, Grace Luta
Mentor: Ioana Pasca, MD

Background:
Psoriasis is a common, chronic inflammatory skin condition that is associated with depression and anxiety. Psoriasis can be treated with biologics (e.g., etanercept, adalimumab) or traditional systemic therapies (e.g., methotrexate, cyclosporine). While biologics have demonstrated improvements in quality of life and depressive symptoms in studies, these studies do not compare outcomes to systemic therapies or explore generalized anxiety disorder (GAD), limiting their generalizability. Understanding how different therapies impact psychiatric outcomes is essential to improving treatment strategies for individuals living with psoriasis.

Hypothesis:
We predict that the incidence of depression and GAD will be lower in patients treated with biologics when compared to systemic therapies.

Methods:
We conducted a retrospective cohort study using the TriNetX global network platform. Adult patients with psoriasis and no prior diagnosis of depression or GAD were identified and matched using propensity scores. Two cohorts were generated: patients treated with biologics and patients treated with systemic therapies. The primary outcomes were new diagnoses of depressive disorder and GAD within 730 days post-treatment initiation. Risk ratios and 95% confidence intervals were calculated after 1:1 matching (n=23,551 per group).

Results:
Biologic therapy was associated with a higher incidence of major depressive disorder (1.167%) compared to traditional systemic agents (0.945%), and this difference was statistically significant (p=0.0041, RR = 0.922, 95% CI: 0.873–0.975). Biologic therapy patients were also more likely to use antidepressants (p=0.0193, RR = 0.81, 95% CI: 0.679–0.967). GAD rates were comparable between groups, but not significant (biologics=5.294% vs. traditional=5.071%, RR = 0.958, 95% CI: 0.884–1.038).

Conclusion:
In this cohort, biologics and traditional systemic therapies demonstrated a statistically significant difference in psychiatric safety profiles. These findings highlight that while biologics and systemic therapies offer substantial therapeutic benefits for psoriasis, they also exert a measurable impact on depression and anxiety, underscoring the complex balance between dermatologic efficacy and psychiatric outcomes.

P21. Recurrent Deep Venous Thrombosis Following Direct Oral Anticoagulation Therapy Failure in an Elderly Male: A Case Report and Literature Review
Jacob Candelaria, Megan Altekruse, Parker Friedentag
Mentor: Abraham Guimareas, MD

Objective:
This case report describes the unique presentation of recurrent deep vein thrombosis (DVT) in the setting of direct oral anticoagulation therapy (DOAC), specifically apixaban in a 71-year-old-male. The patient presented with right lower extremity swelling and tenderness approximately 19 days post deep venous thrombectomy.

Methods:
Clinical data were collected through a retrospective chart review, including history, physical examination findings, diagnostic results, treatment interventions.

Results:
Laboratory tests showed an elevated partial thromboplastin time (PTT >200s; Ref: 21.0-34.0s), decreased red blood cell count ($4.45 \times 10^6/\mu L$; Ref: $4.64\text{-}6.00 \times 10^6/\mu L$), slightly decreased hemoglobin (14.4 g/dL; Ref: 14.5-17.7 g/dL), and reduced estimated glomerular filtration rate (53.73 mL/min/1.73m²; Ref: ≥60 mL/min/1.73m²). International normalized ratio (INR), platelet count, liver function tests, and electrolytes were within normal limits.

Lower extremity Doppler ultrasonography confirmed an extensive right lower extremity DVT extending proximally to the saphenofemoral junction. The patient was started on a heparin drip, and interventional radiology was consulted for a deep venous thrombectomy.

Given the seemingly unprovoked nature of the DVTs despite DOAC therapy, testing for hypercoagulable syndromes was performed, including Factor V Leiden mutation, prothrombin gene mutation, and antiphospholipid syndrome (APS) panels. Results were negative except for the lupus anticoagulant profile within the APS panel, which revealed elevated prothrombin time (21.4s; Ref: 12.0-15.5s), elevated thrombin time (>150.0s; Ref: ≤19.5s), and elevated dRVVT screen (2.26; Ref: ≤1.20). Initial post-surgical management included a single full dose of enoxaparin, Apixaban 5 mg daily for at least three months, and follow-up with the patient's primary care provider.

Conclusion:
This case highlights the importance of identifying risk factors for recurrent DVT in patients who fail empiric DOAC therapy and underscores the need for individualized treatment and comprehensive hematological testing in cases of recurrent, seemingly unprovoked DVT.

P22. Anomalous Aortic Origin of the Right Coronary Artery: Diagnostic Challenges and Management Strategies

Kevin Chih, Sruti Somani, Jazmin Wright-Zornes, Mohini Vadalia
Mentor(s): Udit Bhatnagar, MD, Roi Altit, MD

Objective:
Anomalous aortic origin of the right coronary artery (AAORCA) is a rare congenital abnormality in which the right coronary artery arises from unusual locations and subsequently takes on an aberrant course. This case illustrates the complexities in evaluating symptomatic patients with coronary anomalies and highlights current management strategies, including the criteria for surgical intervention, diagnostic algorithms, and the role of ischemia testing in guiding treatment decisions.

Methods:
We conducted a detailed case review of a 53-year-old female diagnosed with an interarterial AAORCA. The patient's evaluation included a review of her medical history, physical examination, and multimodal cardiac imaging. Cardiac computed tomography angiography (CCTA) was used to define anatomical characteristics, specifically the vessel origin and interarterial course between the aorta and pulmonary artery. Stress testing and ischemia assessment were performed to evaluate functional significance. We reviewed the relevant literature and compared diagnostic and management strategies, including the role of surgical correction versus conservative monitoring in patients with high-risk anatomy but inconclusive ischemia findings. The decision-making process was guided by current recommendations, risk stratification criteria, and patient-specific factors, with multidisciplinary input from cardiology and cardiothoracic surgery teams.

Results:
Cardiovascular work-up showed negative serial troponins, minimal ST depressions in leads II, III and aVF, and an ejection fraction of 60-65% without significant valvular dysfunction disease. Cardiac CT angiography revealed an anomalous RCA arising from the left sinus with a superior takeoff near the sinotubular junction, coursing between the aorta and pulmonary artery without intramural evidence. The ostium appeared slit-like and the proximal portion of the RCA appeared to be very narrow with possible compression but no evidence of significant atherosclerotic disease. She was referred to a higher-level center due to her symptoms and high-risk anatomy. At the referral center, a left heart catheterization (LHC) confirmed the anomalous RCA origin from the left sinus with a high takeoff. The proximal RCA showed approximately 80% focal narrowing and accompanying chest tightness, which resolved with intracoronary nitroglycerin. Although catheter-induced spasm was considered, her prior NSTEMI and current findings raised the possibility of dynamic obstruction or vasospasm as a complicating factor. A

repeat LHC with acetylcholine provocation testing demonstrated normal coronary microvascular function and failed to reproduce vasospasm.

An exercise treadmill test showed no signs of inducible ischemia and she reported relief of her chest discomfort with antianginal medications, including nitroglycerin. Given the absence of inducible ischemia and with symptom resolution, surgical correction was deferred. At her three-month visit, she reported continued improvement in her anginal symptoms.

Conclusion:
This case highlights the diagnostic evaluation and management associated with an anomalous aortic origin of the right coronary artery AAORCA, particularly when the anatomical course raises suspicion for high-risk features. Our patient initially appeared to be a surgical candidate due to her interarterial course and symptomatic presentation. However, further evaluation with LHC and vasoreactivity testing revealed no evidence of an intramural segment or sustained ischemia. As a result, surgical intervention was deferred in favor of conservative management. This case identifies the need for an individualized approach that incorporates anatomic characterization, functional testing, and clinical context to guide decision-making. While certain high-risk anatomical variants and symptomatic patients may require surgical correction, others can be safely managed conservatively. A comprehensive, patient-centered strategy remains essential to ensure appropriate treatment while avoiding unnecessary intervention.

P23. Optimization of Primary T Cell Expansion for Phosphoproteomics Study of a Type I Diabetes Associated ZAP70 Mutation

Meghana Kalahasti
Mentors: Vinothini Arunagiri, PhD, Lin Shen, MD, PhD

Objective / Hypothesis:
T cell antigen receptor (TCR) recognition and signaling play an important role in the pathogenesis of Type 1 diabetes (T1D), an autoimmune disease that is characterized by the T cell mediated destruction of pancreatic β cells and the presence of islet autoantibodies. Whole-exome analysis of a family with a father and children affected with T1D revealed a heterozygous missense mutation R496L, in the 70-kD T cell receptor ζ-chain associated protein (ZAP70). ZAP70 is a protein tyrosine kinase that is critical for TCR signaling. Mutations in ZAP70 are associated with immunodeficiency and autoimmunity in both human patients and in mouse models. Structure analysis of ZAP70 showed that R496 is a highly conserved basic residue that serves as an electrostatic filter in the substrate binding region of ZAP70 kinase domain. We hypothesize that the change from a basic residue to a nonpolar residue (arginine to leucine) causes a change in the substrate selection of ZAP70, eventually leading to decrease in TCR signaling. To test this hypothesis, we plan to take a systematic and unbiased approach to compare phospho-proteomes of resting and stimulated primary mouse CD4 T cells carrying either the WT or the mutant ZAP70. The goal of the current study is to optimize in vitro expansion of primary mouse CD4+ T cells required for the phosphoproteomics study.

Approach:
Primary CD4+ T cells were isolated from mouse spleens using two approaches: magnetic column-based separation and fluorescence-activated cell sorting (FACS). Cell proliferation was monitored over a 6-day period. Cell counts were measured using trypan blue exclusion to assess both total number and viability. Western blot analysis was performed to detect phosphorylation of ZAP70 both at the basal state and following anti-CD3 stimulation.

Results:
Column selection proved more effective for expanding CD4+ T cells. 1 million cells were plated immediately following column selection and when counted on day 4, the cell count was 8.96 million cells when initially stimulated with 1 μg of anti-CD3. On day 6, the cell count for 3 μg of anti-CD3 stimulation was 14 million. For 3 μg of anti-CD3 stimulation, the cell count on day 4 was 8.58 million cells and on day 6 was 17.84 million cells. Column selection yielded CD4+ naïve T cells with a high purity of approximately 93%, which was sufficient for downstream applications. Column-selected CD4+ T cells demonstrated the best expansion when stimulated with 1 μg and 3 μg of anti-CD3, indicating that these conditions effectively promoted T cell expansion without inducing overstimulation. In contrast, fluorescence-activated cell sorted (FACS) CD4+ T cells exhibited minimal to no proliferation across all tested stimulation conditions. 1 million cells were plated after FACS sorting and on day 4 with 1 μg of anti-CD3, the cell count was 2.24 million cells. The cell count decreased to 0.4 million cells on day 6 with 1 μg of anti-CD3. For 3 μg of anti-CD3 stimulation condition, day 4 cell count was 0.66 million and on day 6 was 1.4 million cells. This lack of expansion suggests that the FACS sorting process increased mechanical stress for the primary CD4+ T cells. When evaluating the optimal time point for phosphoproteomics analysis, day 4 emerged as the most suitable. CD4+ T cells expanded for 4 days remained largely in a basal, unstimulated state, allowing for ZAP70 phosphorylation following re-stimulation with anti-CD3. In contrast, cells expanded to day 6 showed phosphorylation of ZAP70 at the basal state even without stimulation with anti-CD3. This indicates that they are no longer in the basal state and therefore, not optimal for phosphoproteomics analysis.

Summary / Conclusions:
These findings showed that column-selected CD4+ T cells exhibited better expansion and remained functionally responsive to stimulation at day 4. Therefore, relative to sorted CD4+ T cells, column selected CD4+ T cells are more suitable for the phosphoproteomics study to dissect the impact of the ZAP70 R496L mutation on ZAP70 substrate selection and TCR signaling.

P24. Risk factors associated with the development of lymphedema following breast cancer surgery: project development for an early-career medical student

Sruti Somani
Mentors: Mary E. Lacaze, MD, Kristin L. Gosselink, PhD

Objective:
Breast cancer-related lymphedema (BCRL) is a significant and under-recognized complication that follows breast cancer surgery. This project will investigate some of the contributors to BCRL in New Mexico,

where a majority of counties are Health Professional Shortage Areas. Our goal is to understand how demographic and lifestyle variables, access to care, and availability of support systems may influence breast cancer diagnosis and treatment timelines and impact the risk or severity of BCRL.

Methods:
Currently in the development phase, this retrospective study will recruit adult women who have undergone surgery for breast cancer within the last ten years. Following an informed consent process, participants will complete a survey, with the option of taking the survey in English or Spanish language format. Survey questions will gather demographic information as well as information on participant feelings, concerns and behaviors associated with their breast cancer diagnosis. The PSS-4 instrument will be used to assess current perceived stress levels in the participants. Following survey completion, a partial review of participant medical records will be done to obtain relevant information such as cancer stage at diagnosis, timing and treatments employed, extent of surgical procedures performed, and other health conditions. Together, the survey and medical record data will be used to identify risk factors for breast cancer and the development of BCRL in this population. A mixed methods approach will be used to analyze the data, including descriptive statistics where appropriate, and conversion of survey responses to coded numeric values for quantitative analysis. Significant differences will be determined at the $p \leq 0.05$ level.

Results:
We are currently working to establish a clinical partner and secure IRB approval. No data have been collected at this time. We have, however, used a review of the literature and consulted with clinical faculty to develop the survey which has been completed. In addition, we have determined which information will be critical to obtain from participant health records so that we can succeed with our project but minimize risk. Our challenges have included: 1) gaining access to the patient population and medical records; 2) aligning partner efforts with IRB oversight; and 3) determining an appropriate sample size for analysis of multiple outcomes.

Conclusion:
We expect to find that sociodemographic and lifestyle variables, access to care, and availability of support systems will contribute to BCRL risk and severity. More specifically, we expect that these factors will lead to delayed diagnosis and treatment of breast cancer, which could result in later-stage diagnosis and/or a need for more aggressive treatment, including more extensive surgery. These outcomes are already known to increase the risk for developing lymphedema. As a future step, we plan to translate our findings into a community education initiative targeting prevention and early detection. We will develop resources for distribution and use tactile breast models to educate individuals, increase awareness of breast health, and highlight the importance of breast self-examination and seeking early care, particularly in areas where healthcare access may be limited. Ultimately, we strive to bridge clinical insights to community health education, increasing awareness, promoting timely care and early intervention, and supporting better long-term outcomes for breast cancer survivors.

P25. Sun Protection Attitudes and Habits Amongst Medical Students

Simran Bhakta, Tyler Peters
Mentor: Debra Bramblett, PhD

General Outline and Purpose of Research:

Our survey-based project focuses on sun protection attitudes and habits in medical students. We predict there is a difference between medical students at BCOM, which self-categorize into 2 groups: Fitzpatrick types 1-3 and Fitzpatrick types 4-6.

By using medical students attending the same program as the research population, we can avoid certain interfering variables such as level of education, allowing survey results to more accurately reflect non-educational influences in sun protection attitudes and habits, including ethnicity/culture, social media, family, healthcare providers, and personal interest.

The Fitzpatrick scale is a classification of skin type based on reaction to sun exposure. The scale includes 6 different Fitzpatrick types (1-6) with 1 being the fairest and most tendency to burn and 6 being the darkest and the most tendency to tan. Survey respondents are provided with a description of the Fitzpatrick scale by Dermet® to self-identify their skin type.

Data collected from a 2015 US National Health and Interview Survey (NHIS) showed that 10.9% of non-Hispanic Blacks and 24.7% of Hispanics reported using sunscreen with an SPF of 15 or higher always or most of the time for sun protection, compared with 40.4% in non-Hispanic Whites (2). We are extrapolating this data for this project, predicting that medical students with Fitzpatrick skin types 1-3 will exhibit attitudes/behaviors similar to the non-Hispanic Whites in the NHIS study, and Fitzpatrick skin types 4-6 will exhibit attitudes/behaviors similar to the Hispanic population in the NHIS study.

Design of Study:

The study group design will involve two independent study groups (Fitzpatrick skin types 1-3 and Fitzpatrick skin types 4-6) determined based on the students' self-identifying answer.
To address the research question of whether there is a significant difference in sun protection habits/attitudes between medical students of Fitzpatrick scores of 1-3 and 4-6, we developed a multiple-choice survey on Qualtrics. The 13-question survey establishes basic demographics, year of study, Fitzpatrick type, sun protection attitudes and behaviors, and influences on behavior. Subjects include preclinical and clinical BCOM medical students from two locations: Las Cruces, NM and Melbourne, FL. Each student will receive a link to the Qualtrics survey by email.

Discoveries and Results of Research, Conclusion, Key Takeaways:

Data collection and analysis will continue until September 2025. We predict the survey data will reveal differences and/or patterns in skincare habits and attitudes between the 2 populations of study (Fitzpatrick 1-3 and 4-6), the purpose of this study being to compare this study to previous studies (NHIS) and to reveal possible correlations between behavior and year of medical education, age, and other variables in the survey.

BCOM Dermatology education includes an integumentary block in the Musculoskeletal course during 2nd year and relevant in-clinic experience during 3rd/4th year rotations. Therefore, we predict a significant difference between responses at each year of medical education.

P26. The Role of Preadipocytes in Skin Barrier Immunity and Infection Control

Niketa Dixit, Caitlin Blades
Mentor(s): Arun Kumar, MD

Objectives:
1. To investigate the proliferation of preadipocytes in response to Staphylococcus aureus skin infection and their role in expanding the dermal fat layer as part of the immune defense. 2. To evaluate the adipogenic differentiation capacity of preadipocytes and its contribution to the production of the antimicrobial peptide cathelicidin (CRAMP). 3. To elucidate the dual role of preadipocytes as both progenitor cells and active participants in innate immune responses via CRAMP synthesis. 4. To define the contribution of preadipocyte-derived CRAMP to overall dermal antimicrobial defense mechanisms during infection.

Methods:
C57BL/6 mice were intradermally injected with S. aureus USA300. Preadipocytes were isolated from digested dorsal skin, cultured, and induced to differentiate. Oil Red O staining confirmed adipogenesis. Skin sections underwent H&E and immunofluorescence staining for Pref-1, CRAMP, and Ly6G. Gene expression (Camp, Adipoq, inflammatory markers) was measured by qPCR; protein levels were assessed via Western blotting. CRAMP function was evaluated using neutralizing antibodies in vitro and in vivo. Bacterial burden was determined through CFU counts. Data were analyzed using unpaired t-tests or ANOVA ($p < 0.05$).

Results:
In vivo, infection triggered visible skin lesions and dermal fat layer expansion within 24–72 hours. Histology and immunofluorescence confirmed increased Pref-1^+ preadipocytes in infected dermis. Isolated preadipocytes differentiated into lipid-rich adipocytes in vitro. qPCR showed significant upregulation of Camp and Adipoq in infected tissue; Western blotting confirmed increased CRAMP protein levels. CRAMP localized to both Pref-1^+ cells and Ly6G$^+$ neutrophils, indicating dual sources. Neutralizing CRAMP resulted in larger lesions and higher bacterial burden ($p < 0.01$), while in vitro inhibition reduced bactericidal activity. Mice with stronger preadipocyte responses exhibited lower CFUs, linking preadipocyte activation to bacterial clearance.

Conclusion:
Preadipocytes play a critical role in the skin's immune defense against S. aureus. Beyond serving as adipocyte precursors, they actively contribute to antimicrobial defense through CRAMP production and support of neutrophil recruitment. Their activation and differentiation are essential for limiting infection and promoting bacterial clearance. These findings position preadipocytes as immunologically active cells and potential therapeutic targets to enhance host resistance to bacterial skin infections.

P27. Physiologic Responses to Postural, Autonomic, and Thermal Interventions With Potential to Convert Paroxysmal Atrial Fibrillation to Sinus Rhythm

Biola Eniola, Sukla Mohajan, Esmeralda Ponce, Gilda Tchao
Mentor: Harald M. Stauss, MD, PhD

Context:
In our previous survey study, patients with paroxysmal atrial fibrillation (pAF) reported self-management strategies used in their home setting to terminate pAF episodes. These strategies included postural interventions, autonomic maneuvers, and ice-cold fluid imbibement, among others. In alignment with the 2nd osteopathic tenet, applying these self-management strategies may potentially activate inherent self-regulatory and self-healing mechanisms to ultimately convert paroxysm into sinus rhythm. It is currently unknown, which exact physiologic mechanisms are activated by the patient-reported self-management strategies and how such physiologic mechanisms can contribute to the conversion of pAF to sinus rhythm. Thus, we investigated the physiologic responses to a postural intervention, an autonomic maneuver, imbibement of ice-cold fluid, and a combination of the three interventions.

Objective:
The long-term goal of our study is to develop effective and safe self-management strategies to convert pAF into sinus rhythm in the patient's home setting. The specific objective of this study was to unravel the physiologic responses to a postural intervention (leg raising), to an autonomic maneuver (diving response), and to ice-cold fluid imbibement. Specifically, we assessed the responses of heart rate, arterial blood pressure, stroke volume, cardiac output and total peripheral vascular resistance to these interventions. Once these physiologic responses are better understood, effective and safe self-management strategies may be developed.

Methods:
The study was approved by the Institutional Review Board of Burrell College and all young healthy volunteers (n=15, 3♂) provided written informed consent. Exclusion criteria: Pregnancy/nursing; chronic or acute conditions; use of prescription medications except contraceptives. Some subjects participated in multiple sessions separated by at least two days. A 30-minute baseline recording (supine position) was followed by 10 minutes with legs raised by 20 cm (group 1); three inspiratory breath holds while wearing an ice-cold face mask (diving response, group 2); 30 minutes of recording following 500 mL ice-cold water imbibement (group 3); or a combination of these interventions (group 4). Stroke volume was obtained by impedance cardiography, heart rate was derived from the ECG, blood pressure was recorded by finger plethysmography. Data are presented as means±standard error of the mean. Statistics were calculated by one-way analysis of variance.
Results:
Systolic blood pressure increased with leg raising (121.9±4.0 mmHg at baseline vs. 139.4±7.2 mmHg, n=8, P=0.06), the diving response (121.9±3.0 mmHg at baseline vs. 136.1±5.0 mmHg, n=8, P=0.01), and ice-cold water imbibement (123.4±3.8 mmHg at baseline vs. 137.2±6.5 mmHg, n=8, P=0.03), but not for the combination of the three interventions (122.1±5.4 mmHg at baseline vs.116.9±4.9 mmHg, n=8, P= 0.16). Heart rate decreased in response to all interventions with the most pronounced bradycardic response observed with the combination of the three interventions (68.8±3.5 bmp at baseline vs 61.1±3.4 bmp, n=8, P=0.01). The diving response increased stroke volume (68.6±6.6 mL at baseline vs. 94.4±10.2 mL, n=8, P=0.06) and cardiac output (4.2±0.4 L at baseline vs. 5.4±0.6 L, n=8, P=0.11). Likewise, the

combination of all three interventions (group 4) increased stroke volume (59.1±6.8mL at baseline vs. 84.3±9.8 mL, n=8, P=0.01) and cardiac output (4.1±0.6 L at baseline vs. 5.2±0.7 L, n=8, P=0.03).

Conclusion:
We observed substantial hemodynamic responses to interventions used by patients with pAF in an attempt to revert paroxysms into sinus rhythm. These hemodynamic responses may activate intrinsic self-regulatory and self-healing mechanisms, potentially contributing to the conversion of pAF. Mechanisms contributing to the conversion of pAF may include activation of atrial stretch receptors by changes in cardiac preload, activation of baroreceptor and cardiopulmonary receptor reflexes leading to changes in the autonomic innervation of the atria potentially affecting conduction velocity and refractory period of atrial myocytes. The results of our study provide a strong rationale for testing the effectiveness of some of these interventions in patients with pAF.

P28. AI-Assisted Detection of Metal Ions with FSCV-Based Electrochemical Sensors for Potential Biomedical Applications

Mariam Fahmy
Mentor(s): Siddhartha Bhattacharyya, PhD

Objective:
Metal detection and its concentration is important for diagnosing, treating, and preventing different diseases. Thus, this research project aims to provide a machine learning (ML) based, reliable method to detect metal ions compared to other analytes. The use of ML is a promising method in the detection of metal which is being tested in this research effort.

Methods:
The data used was of Cu2+ collected through Fast Scan Cyclic Voltammetry (FSCV). Each analyte exhibits a unique cyclic voltammetry curve. Different Machine learning Models are then trained to analyze the data of the curve and be able to detect the amount of analyte. The code developed to train ML algorithm was developed with the help of OpenAI's ChatGPT. Three main machine learning models were used: Artificial Neural Network (ANN), Convolutional Neural Network (CNN), and Physics-Informed Neural Networks (PINN). The models were run and tested on the PyCharm programming integrated development environment (IDE). The following metrics were measured to find the most accurate model: coefficient of determination, mean absolute error, and mean squared error.
Results:
The most accurate predictions were provided by the PINN model, which uses a simplified version of the Nernst-Planck equation. The following metrics were calculated for the PINN model: R2=0.9957, MAE=0.0020, MSE=0.000. The R2 (coefficient of determination) value determines how well the ML model predicts and fits the data used. The closer the value is to one, the more accurately the model can predict and fit the data. The MAE (mean absolute error) is the difference between the predicted and actual value. The closer the MAE to 0, the more accurate the predictions. The MSE (mean squared error) is the MAE squared. It is also a measure of how

accurate the predictions are by being closer to zero. The PINN yielded the best results compared to the other machine learning models used.

Conclusion:
ML provides a promising method to detect metal ion concentration in a biological sample. This research shows promising results for the use of PINN to detect Cu2+ concentration through data collected by FSCV. The PINN model can be used to detect concentrations of other ions and analytes. The final aim is to find a model that will be able to detect both the analyte and the concentration.

P29. Predictive Machine Learning Modeling of Nasal Airflow Metrics Using Anatomical Features from CT scans

Amir Reza Pashmineh Azar
Mentor(s): Thomas P. Eiting, PhD

Objective:
To develop and assess machine learning models that predict nasal airflow metrics, such as pressure drop and velocity, from anatomical features extracted from CT scans. This approach aims to provide a rapid, low-cost alternative to computational fluid dynamics (CFD) for early diagnosis and surgical planning.

Methods:
Thirty high-resolution nasal CT scans were segmented and converted to 3D meshes. CFD simulations in OpenFOAM provided ground-truth airflow metrics, including pressure drop, velocity, and wall shear stress. Anatomical features—volume, minimal cross-sectional area (to be quantified following refinement of computational slicing and segmentation), mean curvature, and nasal valve angle—were extracted using Python and VTK. Data were standardized and used to train multiple regression and ensemble models, including Linear Regression, Random Forest, Support Vector Regression, XGBoost, and Multi-Layer Perceptron. An 80/20 train–test split with k-fold cross-validation assessed model performance using MAE, RMSE, and R^2 metrics.

Results:
Feature extraction yielded nasal cavity volume (0.0489 cm^3), mean curvature (0.4069), nasal valve angle (30.98°), and minimal cross-sectional area (quantification ongoing; requires optimized landmark alignment and segmentation refinement). Example CFD results showed an inlet–outlet pressure drop of 1.5709 Pa, inlet velocity magnitude of 1.04 m/s, and outlet velocity of 0.20 m/s. Preliminary models demonstrated strong correlations between anatomical features and pressure drop, with Random Forest and XGBoost achieving $R^2 > 0.85$.

Conclusion:
Anatomical features from nasal CT scans can accurately predict CFD-derived airflow metrics using machine learning. This offers a faster, more accessible alternative to CFD for preliminary diagnosis and surgical planning in nasal obstruction. Future work will finalize the minimal cross-sectional area measurement following computational refinement, expand the dataset, optimize model parameters, and validate predictions against clinical outcomes.

P30. Digital Surgery of Nasal Airways Using Publicly Available CT Datasets

Shrishti Jain, Abhinav Bhattarai
Mentor(s): Thomas P. Eiting, PhD

Objective:
To develop patient-specific computational fluid dynamics (CFD) models of normal and abnormal nasal airways using publicly available CT datasets, simulate virtual surgical modifications, and compare airflow patterns before and after intervention to identify structural changes that optimize nasal airflow.

Methods:
CT scans from the publicly accessible CQ500 dataset were evaluated for complete nasal anatomy and adequate resolution for three-dimensional reconstruction. Selected DICOM files were imported into 3D Slicer for segmentation of the nasal cavity, generating initial surface meshes of the airway anatomy. These 3-Dimensional models were refined in GeoMagic Wrap to smooth jagged edges and correct surface irregularities, ensuring suitability for simulation. Anatomical variability was addressed by defining physiologic airflow paths specific to each model. Refined geometries were converted into solid volumetric models for further ongoing computational fluid dynamics (CFD) analysis.

Post-processing and visualization will be conducted in Paraview to assess airflow velocity, pressure gradients, and streamline patterns. In cases with anatomical abnormalities, such as septal deviation or perforation, "digital surgeries" will be performed by virtually modifying the geometry to approximate surgical correction. Modified models underwent the same CFD workflow to enable direct comparison of airflow metrics with the unaltered anatomy. All simulations were executed on the NMSU Discovery supercomputing cluster, following established nasal CFD protocols.

Results:
Data collection and model construction are still ongoing. Initial modeling results from both 3DSlicer as well as GeoMagic are encouraging, as the original information and data have been maintained and altered appropriately. Upon completion, CFD simulations will quantify airflow patterns, resistance, and olfactory cleft delivery in both normal and pathological anatomies. Comparative analyses will measure the extent to which digital surgical modifications restore airflow toward normal function. Some anticipated results include improved airflow velocity and reduced resistance in digitally corrected models, with changes varying by the type and extent of anatomical modification.

Conclusion:
This project will establish a reproducible workflow for generating patient-specific nasal airway CFD models; thus enabling analyses of both anatomy and function. By simulating surgical interventions digitally, we can quantitatively evaluate their impact on airflow and identify structural changes that most effectively restore normal physiology. The findings will contribute to a better understanding of how nasal anatomy affects airflow and will inform surgical planning for conditions such as chronic rhinosinusitis and deviated septum. The methodology can be extended to a broader range of anatomical variations, ultimately supporting personalized and evidence-based surgical decision-making in otolaryngology. Further,

advancements in modeling softwares like these can eventually go on to revolutionize the field of surgery as a whole, by applying individualized case-based interventions.

P31. Periacetabular Osteotomy
Breanne Mullins
Mentor: Justin LaReau, MD

The periacetabular osteotomy has become the gold standard in the surgical approach to treating acetabular dysplasia, also known as developmental dysplasia of the hip. In addition to the osseous pathology that is observed in acetabular dysplasia, it is also common for patients in this population to have labral pathology, which adds complexity to the surgical plans in treating this condition. Today, there are a variety of surgical methodologies employed to treat acetabular dysplasia with concomitant labral damage. However, as reflected in the literature, there is yet to be a standard approach to treatment. This review aims to shed light on the latest progress of surgical approaches to treating labral injuries with acetabular dysplasia, as well as provide insight into methods that yield promising long-term results. Additionally, this review will raise questions and highlight areas in the treatment plan that remain to be fully investigated and that should be considered by orthopedists interested in hip preservation techniques in the young adult.

P32. Non-invasive cervical vagus nerve stimulation, but not auricular VNS, increases brain alpha waves and reduces arterial blood pressure
Andrea Coello, Aamani Pillutla, Gurpreet Telwar, Rodela Ahmed
Mentor: Harald Stauss, MD, PhD

Objective:
Vagus nerve stimulation (VNS) has been demonstrated to reduce stress-induced cortisol release. Several non-invasive techniques for VNS are currently available, including transcutaneous auricular and cervical VNS. Cervical VNS potentially activates efferent and afferent vagal nerve fibers, while auricular VNS activates the auricular branch of the vagus nerve, which is a purely afferent nerve. We hypothesized that VNS causes a state of mental tranquility, thereby reducing arterial blood pressure and increasing the amplitude of low frequency brain waves. In addition, we predicted that these effects will be more pronounced in cervical VNS in comparison to auricular VNS.

Methods:
The study was approved by the Burrell College Institutional Review Board and included 16 healthy young participants (5 ♂) who provided written informed consent. Exclusion criteria included pregnancy, acute or chronic illnesses, and use of prescription medications, except contraceptives. Participants were randomly assigned to: time control (CTR, no intervention), transcutaneous cervical VNS (cVNS), transcutaneous auricular VNS applied to either the tragus (atVNS) or the cymba conchae (acVNS). A 30-minute baseline recording was followed by VNS or no intervention. VNS was applied three times for 5 min. Each 5 min VNS

was followed by 1 min without stimulation. cVNS was delivered bilaterally using the Pulsetto device (25 Hz, 100 μs, < 40 mA). atVNS and acVNS (10 Hz, 300 μs, 2-3 mA). Heart rate (ECG), blood pressure (finger plethysmography), and a single-channel EEG (FP1 location) were recorded continuously. Statistics included one-way ANOVA for repeated measures with posthoc t-tests for each experimental group. $P < 0.05$ was considered significant, $0.05 < P < 0.10$ was considered a trend.

Results:
Systolic blood pressure only decreased during cVNS (133.6±5.0 mmHg at baseline vs. 124.2±4.8 mmHg, n=7, $P<0.05$) but not in the time control or both auricular VNS groups. No significant changes in heart rate were observed in any group. The amplitude of alpha waves in the EEG increased only in the cVNS group (0.654±0.070 arb. units at baseline vs. 0.827±0.076 arb. units, n=7, $P=0.06$) but not in the time control or both auricular VNS groups. No significant changes were observed for any other EEG waves.

Conclusion:
Non-invasive transcutaneous VNS reduced systolic blood pressure and increased alpha waves in the EEG of the frontal lobe when the cervical vagus nerve was targeted bilaterally, but not when the auricular branch of the vagus nerve was stimulated unilaterally. Increased alpha waves are consistent with a more relaxed mental state which may have caused the reduction in systolic blood pressure with cVNS potentially through decreased stress hormone release.

P33. The Impact of a Literacy-Appropriate Educational Handout on Anxiety and Pain During Electromyography and Nerve Conduction Studies: A Randomized Controlled Trial
Charles Goorman
Mentors: Jerald Moser, MD, Scott Goorman, MD

Objective:
To assess whether a concise literacy-appropriate educational handout given immediately before EMG and/or NCS reduces anticipatory anxiety and perceived procedural pain in adults. A secondary aim was to explore whether effects differ by gender or baseline anxiety, with primary outcomes measured by changes in VAS-A scores and secondary outcomes by VAS-P scores.

Methods:
This randomized controlled trial was conducted at an outpatient orthopedic clinic in Southern Arizona with adults (≥18 years) referred for electrodiagnostic testing—electromyography (EMG), nerve conduction studies (NCS), or both. All procedures were clinically indicated and performed by credentialed providers following AANEM safety standards, without pharmacologic anxiolytics unless already prescribed for unrelated reasons.

Upon arrival, participants were invited to join the study, provided informed consent, and completed a baseline anxiety rating using the Visual Analog Scale for Anxiety (VAS-A). They were then randomly assigned via an envelope-draw method to receive either an educational handout describing the EMG/NCS procedure (intervention) or a neutral hydration pamphlet (control). Envelopes were sealed, opaque, and pre-shuffled to ensure allocation concealment. After reading their assigned material,

participants completed a second VAS-A, then underwent their scheduled testing. Immediately afterward, they rated procedural pain on the Visual Analog Scale for Pain (VAS-P).

All measures were self-reported on paper and submitted anonymously in sealed envelopes to reduce bias and protect confidentiality. Complete blinding was not feasible due to staffing constraints, but standardized instructions and self-report methods minimized potential bias.

Anxiety and pain were measured using the VAS, a 10 cm line anchored with descriptors from "No anxiety/pain" to "Worst imaginable anxiety/pain." Descriptive statistics summarized data; independent samples t-tests compared groups; two-way ANOVA assessed subgroup effects; and linear mixed-effects models analyzed repeated measures, with generalized estimating equations considered for robustness.

Results:

A total of 82 participants were enrolled, with 43 assigned to the control group and 39 to the intervention group. Ages ranged from 20 to 102 years (62.01 [15.17]), and the sample was 61.3% female. Baseline anxiety scores (VAS-A) averaged 2.79 (SD = 3.11), postprocedural anxiety averaged 2.27 (SD = 2.67), and procedural pain scores (VAS-P) averaged 2.22 (SD = 1.59).

Pain outcomes showed a significant benefit for the intervention group, who received a literacy-appropriate educational handout. Their mean pain score (1.11 [0.89]) was markedly lower than that of the control group (3.11 [1.48]); $t(79) = 7.13$; $P < .001$, with a mean difference of 2.00 (95% CI, 1.44–2.56), representing a clinically meaningful reduction. Anxiety outcomes for the full sample revealed that the intervention group experienced a greater mean reduction in anxiety from pre- to postprocedure (0.72 [2.09]) compared to controls (0.00 [0.00]); $t(54.91) = 2.07$; $P = .043$, mean difference 0.72 (95% CI, 0.02–1.42). Subgroup analysis of participants with elevated baseline anxiety found no group differences at baseline, but postprocedurally, the intervention group reported significantly lower anxiety (3.32 [2.52]) than controls (4.03 [2.48]); $t(47) = 2.08$; $P = .043$, mean difference 0.71 (95% CI, 0.02–1.39).

Gender effects on pain were examined using two-way ANOVA, revealing no main effect of gender ($P = .374$) but a strong main effect of group ($P < .001$). The gender-by-group interaction approached significance ($P = .113$), suggesting a possible moderating effect. Pairwise comparisons confirmed significantly greater pain in the control group (mean difference = 1.89; $P < .001$). The model explained 41.4% of the variance in pain scores, highlighting the substantial impact of the educational intervention.

Conclusion:

This randomized controlled trial found that a brief, literacy-appropriate educational handout significantly reduced both perceived procedural pain and anticipatory anxiety in patients undergoing EMG/NCS testing. The reduction in pain was substantial and clinically meaningful, while anxiety decreases, though smaller, were most evident in participants with high baseline anxiety. These results suggest that targeted preprocedural education can improve patient experience even in brief, low-cost formats. The findings are consistent with prior work in other procedural contexts, indicating that reducing anxiety before a procedure may not only offer psychological reassurance but also modulate central pain processing, leading to lower reported discomfort. While the study's design, including self-report measures and variability in clinical delivery, limits the ability to attribute effects solely to the handout's content, the results provide preliminary evidence supporting its utility as a quality improvement measure. Given the scalability, minimal resource requirements, and potential to enhance tolerability, integrating such patient-centered materials into routine electrodiagnostic practice may be a practical strategy to reduce distress and improve adherence. Further research is warranted to confirm these effects in larger samples, assess long-term benefits, and explore optimal content and delivery methods across diverse patient populations and procedural settings.

P34. Comparing Submaximal and Maximal Exercise Testing Efficacy on Identifying Clinically Relevant Blood Pressure Metrics

Mark Parsamian
Mentor: Pedro Del Corral, PhD, MD

Objective:
Maximal exercise stress testing can be used to determine if individuals are at an increased risk for cardiovascular disease. Our goal was to determine if submaximal exercise testing is as efficient at identifying individuals who meet blood pressure (BP) criteria.

Methods:
Participants: 16 subjects (5 females and 11 males). Subjects were apparently healthy, non-smokers, no current medication use, and non-hypertensive (BP ≥ 140/90). Age range: 24-32 (Mean: 28 ± 0.7)
Maximal Exercise Test: Subjects' resting blood pressures and HR were recorded. They were started on bicycle ergometry protocols ranging from 30-110 W with 20-40 W increments per 2-minute stage. Blood pressure, HR, and RPE were recorded every stage, and subjects were asked to go as many stages as possible for a maximum of seven stages.
Submaximal Exercise Test: A protocol was designed to elicit ~65% of the final stage maximal exercise W per subject. Subjects exercised on this W for 30 minutes with blood pressure, HR, and RPE recorded at rest, 5, 10, 20, and 30 minutes.
Data Analysis: We fixed the maximal data to the stage at which closest matched submaximal workload (W) and compared it to the submaximal data at the closest time. Means and standard errors were calculated in Microsoft Excel, and T-Tests were used to determine statistical significance ($p<0.05$). All data were compared to age and sex-adjusted thresholds for blood pressure metrics (peak SBP (mmHg), ΔSBP (mmHg), and SBP/W slope (mmHg/W)) used in cycle ergometry for increased cardiovascular disease risk. The data were also compared to DBP thresholds of peak ≥ 90 mmHg and ΔDBP ≥ 10 mmHg for increased cardiovascular risk.

Results:
There were statistically higher means for peak SBP, ΔSBP, and SBP/W slope in the submaximal vs maximal exercise trial (all $p<0.05$), while there were no differences in workload (W), heart rate (BPM), RPE, peak DBP, and ΔDBP. The mean results for maximal and submaximal exercise testing for peak SBP, ΔSBP, and SBP/W slope were: (168 ± 8.0; 176 ± 8.8 mmHg), (49 ± 7.1; 57 ± 8.1 mmHg), and (0.37 ± 0.03; 0.44 ± 0.05 mmHg/W), respectively. The mean results for maximal and submaximal exercise testing for workload, heart rate, RPE, peak DBP, and ΔDBP were: (128 ± 11.0; 130 ± 10.6 W), (142 ± 3.4; 143 ± 3.4 BPM), (12.3 ± 0.5; 11.8 ± 0.4), (72 ± 2.1; 74 ± 2.7 mmHg), and (-2.63 ± 2.20; -3.09 ± 2.99mmHg), respectively.

When comparing individuals' peak SBP, ΔSBP, and SBP/W to age and sex-adjusted thresholds, maximal and submaximal data identified: (1 subject; 2 subjects), (1 subject; 2 subjects), and (3 subjects; 4 subjects), respectively.

When comparing individuals' peak DBP and ΔDBP to thresholds (peak ≥ 90 mmHg and ΔDBP ≥ 10 mmHg), maximal and submaximal data identified: (0 subjects; 2 subjects) and (1 subject;1 subject), respectively.

Conclusions:

Clinically, when comparing each individual's peak SBP, ΔSBP, and SBP/W slope to age and sex-adjusted thresholds, one additional subject was identified in the submaximal data. For peak DBP and ΔDBP, submaximal data identified two additional subjects that met criteria. The individuals who met DSB thresholds were more females than males in comparison to the SBP thresholds. The present findings suggest that submaximal exercise may be comparable to maximal exercise in assessing the BP metrics predictive of future cardiovascular disease. These BP metrics can be used to unmask hidden hypertension and identify individuals at high risk for future myocardial infarctions and strokes. The benefit of submaximal testing is that it allows a larger patient population to be tested. This includes individuals who are normally excluded from maximal testing, including individuals with recent myocardial infarctions, strokes, uncontrolled heart failure, extremely exaggerated BP responses, and arrhythmias. Submaximal exercise is also more closely, in terms of workload, representative of an individual's day-to-day tasks (going up stairs, carrying groceries, etc.) and can illustrate CVD risk factors in people's lives. With these findings, we hope to encourage future studies with larger sample sizes and the ability to follow up on patients in the future to assess if submaximal exercising can identify individuals at increased risk for CVD.

P35. Neuroinvasive West Nile Virus Presenting as Guillain-Barré Syndrome: A Diagnostic Challenge

Atish Kumar, Onyinyechi G. Nwosu
Mentor(s): Michael Elliot, MD

Objective:
Neuroinvasive West Nile Virus (WNV) can mimic Guillain-Barré Syndrome (GBS) due to overlapping neurological symptoms. The objective of this study was to highlight the diagnostic challenges of distinguishing neuroinvasive WNV from GBS in patients presenting with acute flaccid paralysis.

Methods:
This case study was based on a retrospective review of a 61-year-old female patient admitted to Lovelace Medical Center. Clinical data were gathered from electronic medical records,including ED visits, laboratory results, imaging, and cerebrospinal fluid (CSF) analysis. Diagnostic evaluations included CT, MRI, lumbar puncture, and serological testing for viral pathogens (West Nile Virus, herpes simplex virus). Treatment involved empiric antiviral therapy, intravenous immunoglobulin (IVIG), gabapentin for neuropathic pain, antibiotics for catheter-associated urinary tract infection (CAUTI), and supportive measures such as Foley catheter placement and electrolyte replacement. A multidisciplinary approach was employed with input from infectious disease, neurology, and physical therapy specialists. The patient's clinical course, response to interventions, and laboratory findings were carefully monitored to inform the diagnostic process and guide management decisions.

Results:
The patient presented with progressive bilateral lower extremity weakness, neuropathic pain,abdominal discomfort, and urinary retention. Initial misdiagnosis included gastritis and suspected GBS. Neurological examination revealed flaccid paralysis with absent reflexes. CSF analysis demonstrated elevated protein (114 mg/dL) and lymphocytic pleocytosis (38 WBC/mm^3) without albuminocytologic dissociation, suggesting a viral etiology. Imaging studies were unremarkable. CSF HSV PCR was negative, while serologic testing confirmed West Nile Virus IgM (7.69) and IgG (2.51). Additional findings included

catheter-associated UTI with E. coli, leukocytosis, hypokalemia, hypoalbuminemia, and an elevated lipase level without evidence of pancreatitis. Treatment included IVIG, gabapentin, antibiotics, Foley catheter placement, electrolyte repletion, and rehabilitation therapy. The patient's neurological deficits persisted, but her condition stabilized with multidisciplinary care.

Conclusion:
This case highlights the diagnostic challenges of distinguishing neuroinvasive WNV from GBS due to overlapping clinical features such as progressive weakness and flaccid paralysis 1 . Early serological testing is critical to confirm WNV, as supportive care remains the mainstay of treatment 2 . Management requires a multidisciplinary approach including infectious disease, neurology, rehabilitation, and supportive care strategies. This case emphasizes the importance of maintaining a broad differential diagnosis in acute neurological presentations and underscores the need for heightened clinical vigilance in endemic regions.

P36. Environmental Sampling for *Coccidioides* Exposure in Southern New Mexico: A Preliminary Assessment of Valley Fever Risk
Angela Al-Hanna, Sebastian Kania, Chris Peverada, Diane Schulmeister, David Trejo
Mentor: Michael Woods, PhD

Objective:
Coccidioidomycosis is a fungal infection endemic to the southwestern US, with established presence in California and Arizona. Despite increasing clinical diagnoses in southern New Mexico, the environmental distribution of *Coccidioides* spp. in the region remains poorly defined. Notably, no published studies had confirmed the presence of *Coccidioides* in New Mexico soils prior to summer 2025. Our objective was to assess the environmental presence of *Coccidioides* spp. in southern New Mexico soil.

Methods:
Environmental data were collected in southern New Mexico in May, June, and July 2025. Soil sampling targeted regions in and around Las Cruces based on prior PCR-positive findings in 2024. A total of 150 soil samples across four zip codes were collected using sterile stainless-steel trowels and stored in 15 mL pre-labeled centrifuge tubes containing glass beads. Samples were transported in rigid, secondary containers and processed in a biosafety cabinet. DNA extraction was performed using the Omega BioTek E.Z.N.A.® Soil DNA Kit. Samples were screened for *Coccidioides* DNA using TaqMan-based real-time PCR assays (CocciDx and CocciENV). All PCR assays were performed in triplicate, and positive controls were included in each run.

Results:
A total of 150 soil samples were collected across multiple sites in the Las Cruces region, selected based on previous reports of Valley Fever cases and environmental suitability for *Coccidioides* spp. All samples underwent DNA extraction followed by real-time PCR analysis targeting CocciDx and CocciENV. No positive results were detected in any of the samples. PCR amplification curves showed no amplification above threshold levels in any replicate, and all negative controls remained negative, confirming no contamination. Although environmental conditions in some sites were consistent with known *Coccidioides* habitats, no fungal DNA was detected in this sampling round. These results suggest a low or undetectable presence of *Coccidioides* DNA in the sampled areas at the time of collection.

Conclusion:

In this preliminary study, we did not detect *Coccidioides* spp. DNA in any of the soil samples collected from targeted sites in southern New Mexico. These findings suggest that environmental risk and background exposure to *Coccidioides* may be lower than previously presumed in the sampled regions. However, this contrasts with clinical reports of Valley Fever cases in the area, indicating that the presence of *Coccidioides* may be spatially variable or episodic. These results underscore the need for broader and more frequent environmental surveillance. To address this, we plan to continue sampling on a monthly basis to account for potential seasonal fluctuations and improve the likelihood of detection. Future research should include expanded geographic sampling, multiple time points, and analysis of additional environmental variables to more accurately characterize the distribution and exposure risk of *Coccidioides* spp. in New Mexico.

P37. Detecting SARS-CoV-2 in Bats of New Mexico using Immunohistochemistry and Genetic Techniques

Celeste Cisneros, Hannah Yun
Mentor: Thomas P. Eiting, PhD

Objective:
SARS-CoV-2 is a strain of coronavirus that causes COVID-19, a respiratory illness associated with the COVID-19 pandemic. Bats are a known reservoir of the virus, and were implicated in the early exposure of the virus to humans during the pandemic. Our project is focused on determining if molecular methods can be used to detect the presence of coronaviruses in bats species from southern New Mexico. This is done through an immunohistochemistry approach using microscopic imaging and a molecular screening approach.

Methods:
For immunohistochemistry, tissue samples of lungs and kidneys were initially fixed in formalin for preservation. Upon retrieval, specimens underwent several rounds of ethanol and histoclear washes to prepare for embedding in paraffin wax. Embedded specimens were cut into 5 micron slices for mounting onto glass slides. Several slides were made per specimen to allow for both hematoxylin and eosin staining and/or DAB staining for immunohistochemistry analysis. As per the protocol, we applied two types of primary antibody; one for a spike protein and the other for the viral nucleocapsid. The Avidin Biotin Complex was used to amplify the antibody signal, and final visualization was done using DAB. For the genetic sampling and PCR analysis, we extracted RNA from the specimens which was then inactivated with heat and then stored in -80C. Forward and backward primers were designed to target the RdRp gene. Lastly, the cDNA was run through a gel electrophoresis protocol to separate out DNA fragments by size and charge. The resultant gel was imaged using an ultraviolet imager to facilitate visualization.
Results: Immunohistochemistry revealed putative DAB-positive staining in tissue specimens from *Artibeus jamaicensis, Eptesicus fuscus*, and *Antrozous pallidus*, indicating the presence of the target antigen. Positive staining was localized primarily to the lung, confirming successful antigen detection. Comparison with known positive coronavirus samples is ongoing. Hematoxylin and Eosin (H&E) staining provided clear visualization of cell architecture and tissue organization, allowing for assessment of histological integrity and morphological characteristics.

Gel electrophoresis of our cDNA products has so far failed to show evidence of our coronavirus in our samples. However, work carried out during previous years' SRE project showed putative genetic product, so additional testing is warranted to delineate a definitive conclusion regarding evidence of coronavirus genetic material in our samples. Subsequent trials will be conducted using additional extracted,

purified, and amplified DNA from the left lower lung sample of *Carollia perspicillata* and from an Eptesicus fuscus sample to confirm repeatability and enhance signal clarity.
Conclusion:
Immunohistochemistry analysis demonstrated the presence of DAB-positive stained cells in tissue samples from *Artibeus jamaicensis, Eptesicus fuscus,* and *Antrozous pallidus*, suggesting the presence of coronavirus-associated antigens. This staining pattern supports the hypothesis that viral proteins may be present within the examined tissues.

Genetic analysis through gel electrophoresis produced inconclusive results in initial trials. Additional specimen trials and more specific molecular assays—such as RT-PCR or sequencing—are necessary to uncover the genetic material from our tissue samples and to establish a definitive link to the coronavirus genome.

Taken together, these findings provide preliminary support for the presence of coronavirus antigens in tissue samples, though genetic confirmation remains pending. Continued molecular testing will be required to validate and expand upon these initial observations.

P38. Potential effects of natural substitutions on the functional activity of hypoxia-inducible factor 1α (HIF-1α) in the high-altitude deer mice *Peromyscus maniculatus sonoriensis*

Sam Glaser, Ana Vazquez, Gissel Salgado
Mentor(s): Alex Gasparian, PhD

Abstract:
Hypoxia-inducible factor-1 (HIF-1) is a key transcriptional regulator that enables cellular adaptation to low oxygen. It is a heterodimer composed of an oxygen-sensitive α subunit (HIF-1α) and a constitutively expressed β subunit (HIF-1β). Under normoxia, HIF-1α is hydroxylated on two proline residues, ubiquitinated by the von Hippel–Lindau (VHL) protein, and degraded via the proteasome. Hypoxia inhibits this degradation, leading to HIF-1α accumulation, nuclear translocation, and activation of target genes. In addition to oxygen-dependent regulation, phosphorylation at specific serine residues can also influence HIF-1α stability and activity.

Genetic analysis of the high-altitude Peromyscus maniculatus revealed two amino acid substitutions in HIF-1α—Ser630Ala and Val662Ile—potentially linked to hypoxia adaptation. We hypothesized that these substitutions affect protein stability by ablating degradation by the proposed phosphorylation of Ser630. To test this, we expressed recombinant P. maniculatus HIF-1α variants (Ser630/Val662 vs. Ala630/Ile662) in 786-O human renal cell carcinoma cells. Western blotting revealed multiple isoforms, suggestive of alternative splicing. Cycloheximide pulse-chase assays demonstrated slower degradation of the Ala630/Ile662 variant compared to Ser630/Val662, possibly due to loss of a phospho-accepting serine at position 630. We will further assess protein accumulation using the proteasome inhibitor bortezomib.

These findings may provide insight into post-translational mechanisms underlying HIF-1α stability and the molecular basis of high-altitude adaptation.

P39. Chronic Stress Effects on the Blood Brain Barrier

Darlene Jones
Mentor: Kristin L. Gosselink, PhD

Objective:
The blood-brain barrier (BBB) shelters the brain from toxins and regulates homeostasis. Chronic stress has been shown to disrupt BBB integrity via cortisol-driven inflammation and tight junction degradation. The goal of this project was to assess the effects of acute or repeated restraint stress on the BBB in the amygdala. Restraint is an emotional stressor, and the amygdala functions in emotional regulation; this work may increase our understanding of pathogenesis in neuropsychiatric diseases.

Methods:
Adult male Sprague–Dawley rats were exposed to acute (30min x 1d) or repeated (30min x 14d) restraint stress or maintained as non-stressed controls. All restraint occurred between 0900 and 1100, near the beginning of the light cycle. At the end of the stress period, the 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 and fluorescence immunohistochemistry (IHC). Markers of the BBB localized by IHC were rat endothelial cell antigen (RECA)-1 for vascular endothelial cells and Claudin-5 or Occludin for tight junction proteins. Images of stained sections were captured at 10x magnification with a digital camera mounted on a fluorescent microscope. Staining intensity was quantified in multiple sections through the rostrocaudal extent of the amygdala using ImageJ online software. Nissl-stained sections, an atlas, and darkfield images were used to verify the anatomical region for analysis. Data from individual sections were averaged for each animal and compared by treatment group. Significance was determined at the $p \leq 0.05$ level.

Results:
We have been able to achieve successful staining for all markers and capture images for analysis. RECA-1 and Occludin staining can be seen and evaluated at 10x magnification; Claudin-5 may not be an effective marker for our study since it would need to be quantified at 40x and would be difficult to correlate with the other markers. Consistent localization of the amygdala and its subregions has been accomplished. Initial results suggest that 14d of restraint stress (30min per day) may not be a strong enough stimulus to remodel the vasculature of the brain, which is not unexpected. The presence or density of tight junction proteins, however, may be changed by this level of stress exposure and lead to compromised BBB function.

Conclusions:
We are unable to draw strong conclusions at this time since the number of animals analyzed is low. However, our results indicate that we have succeeded in developing methods to evaluate the effects of stress on the BBB. Future work will increase our data pool and may include a similar study in female animals. In addition, our sister project is evaluating GAD67 and Fos expression in the amygdala and how these might change in response to stress. It will be interesting to see how our combined findings might provide insight into the mechanisms of how the incidence or progression of anxiety, depression, or other neurological conditions might result from chronic stress exposure.

P40. Comparing Deciduous Dentition Morphology Across Species

David Hunter, Manisha Bandari
Mentor: Taylor Polvadore, PhD

Objective:
This study examined morphological and compositional differences in deciduous premolars and canines between Cebus capucinus and Sapajus apella, aiming to determine how these structures in infants and juveniles relate to mechanical function—including resistance to wishboning and shear forces—prior to adult dietary demands.

Methods:
High-resolution CT scans of deciduous dentition were conducted on subadult and juvenile specimens of C. capucinus and S. apella. Each scan was segmented by radiodensity to isolate enamel, dentin, and pulp volumes. These slices were compiled into 3D models for volumetric analysis. Specimens were selected to ensure comparable developmental stages, minimizing age-related bias and focusing on functional morphology. The first premolars and canines were analyzed separately to assess their respective contributions to resisting wishboning and shear forces (mainly for the premolars), and using density-derived segmentation and mechanical proxies for functional loading (particularly for puncturing forces required by canine dentition). Comparative metrics included enamel-to-tooth volume ratios and regional density distribution separating the teeth into the following categories: Enamel, Root, Pulp, and Dentin. No adult specimens were used, allowing inference of juvenile function rather than direct adult comparison.

Results:
Juvenile and subadult specimens exhibited significantly reduced enamel volume relative to total tooth volume, especially in the deciduous premolars. This supports reduced mechanical demand in early life and confirms the teeth's limited role in resisting high shear or compressive forces prior to dietary transition. Volumetric asymmetry suggested species-specific differences: S. apella juveniles showed slightly higher enamel retention in canines compared to C. capucinus, possibly reflecting divergent timelines in dietary development. Canines in both species displayed a composition suited to protective soft tissue function, with reduced mineral density concentrated distally. These patterns correlate with behavioral observations suggesting limited use of piercing or prey-processing behaviors in juveniles, reinforcing the hypothesis that deciduous canines serve more as spatial placeholders than fully functional tools during adolescence.

Conclusion:
Findings suggest that deciduous dentition in C. capucinus and S. apella is structurally and compositionally adapted for low-impact dietary function. Reduced enamel ratios and volume distribution imply that wishboning and shear resistance are not prioritized until permanent dentition emerges. Species-level variation in canine enamel content may reflect behavioral or developmental divergence, but both species demonstrate a consistent functional strategy of minimizing mechanical investment in teeth used primarily for safe ingestion rather than prey acquisition or aggressive display. This supports a model of dentition as a developmental scaffold tuned to early-life constraints, with mineral investment ramping up as ecological demands increase. We were unable to identify a significant difference between the species, revealing a very similar form and function of the deciduous dentition amongst the two. Further studies integrating behavioral data and wear pattern analysis could clarify functional transitions and the ecological significance of deciduous morphology.

P41. Ontogeny of TMJ Articular Disc in Tufted and Untufted Capuchins

Alexis Boundas
Mentor: Taylor Polvadore, PhD

Objective:
Previous behavioral studies have shown that tufted capuchins (*Sapajus spp.*) regularly consume diets with greater mechanical demands than untufted capuchins (*Cebus spp.*). These dietary differences have been associated with variation in mandibular cross-sectional geometry, craniofacial form, masticatory muscle leverage, and jaw adductor architecture. Building on this framework, the present study tests the hypothesis that the temporomandibular joint (TMJ) articular disc is proportionally larger in species adapted to tougher diets. This study aims to determine if articular disc measurements are related to dietary mechanical demands in tufted versus untufted capuchin monkeys.

Methods:
Two groups of captured capuchin monkeys, *Sapajus* (tufted) and *Cebus* (untufted), were fed the same diet. Five high-resolution computed tomography (CT) scans of crania from each adult subgroup were analyzed. Using Slicer, the surface area and volume of each TMJ articular disc were measured and normalized by the area of the first lower molar, then calculated as the product of the crown's length and width. Molar area was used to estimate body size and account for scaling effects. Using R, the standardized measurements of the surface area and volume of the TMJ articular disc (each divided by molar crown area) were statistically compared using independent-sample t-tests to evaluate differences in disc size ratios between tufted and untufted capuchins.

Results:
At this time, no results have been calculated or analyzed. However, it is expected that tufted capuchins will have significantly larger articular discs by both volume and surface area to withstand their mechanically harder diets compared to untufted capuchins.

Conclusion:
If tufted capuchins, which are evolutionally adapted to a more mechanically demanding diet, have proportionally and significantly larger articular discs by both volume and surface area, TMJ disc morphology may be functionally linked to dietary mechanical demand. For future studies, additional sampling across age classes and dietary contexts will be done to confirm the patterns and explore potential developmental or functional mechanisms.

P42. Capuchin Feeding Ontogeny: Assessment of Tongue Volume

Maya Rademacker, Samiyah Jaffrey
Mentor: Taylor Polvadore, PhD

Objective:
Presented here is an investigation of tongue volumes across capuchin ontogeny as it pertains to diets with differing levels of mechanical difficulty. It is known that tufted capuchins (Sapajus spp.) and untufted capuchins (Cebus spp.) have different diets that correspond to distinct mechanical challenges, wherein tufteds consume harder, more mechanically challenging foods, and untufteds consume softer, less

challenging foods. The aim of this study is to evaluate the tongue volume relative to feeding behavior, as behavioral differences can create morphological differences across closely related species.

Methods:
CT scans were utilized to investigate changes in tongue volumes across both the tufted and untufted groups in an effort to differentiate any morphological differences that could be seen. Using 3D Slicer software, each specimen's tongue was segmented on a 2D scale, using defined borders for each segmentation. The apex of the tongue acted as the anterior border, the posterior surface (base) of the tongue, including the lingual tonsils, acted as the posterior border, and the mucosal lateral borders of the tongue acted as the lateral borders. The inferior border follows the inferior surface of the tongue, including the entirety of the geniohyoid muscle to its attachment at the mandibular symphysis, while excluding the suprahyoid musculature. The generated segmentations were then used to estimate the tongue volume for each respective specimen. A Kruskal Wallace test comparing the absolute tongue volumes was ran, using the tongue volumes relative to molar area to approximate for the specimen's body mass.

Results:
Resulting data found that tufteds had larger tongue volumes compared to untufteds (p0.05), which in using the jaw length as a proxy for oral cavity volume, demonstrates that the tufteds have a bigger tongue for their respective mouth size.

Conclusion:
As the data supports, there are significant differences between both tufteds and untufted species of capuchin monkeys. This corresponds to the results of previous studies that have demonstrated the correlation of morphological differences across capuchin species due to dietary differences, specifically seen in the muscles of mastication, craniofacial shape, and cortical bone density. Findings specific to the tongue volume imply that tufted capuchins have a statistically significant larger tongue volume, as well as a larger tongue relative to the size of the mouth. Further findings indicated that untufteds have a bigger tongue relative to the overall size of the individual. Collectively, these imply that the harder and larger foods consumed by tufteds can result in morphological differences in oral soft tissue structures, such as the tongue, and may show further correlates when compared to the volume of the oral cavity and/or size of the individual. Larger tongue volume as well as a larger tongue relative to oral cavity size could indicate soft tissue morphologies that are reflective of mechanical challenges when undergoing masticatory processes, such as mechanically pushing food boluses onto the palate

P43. Hormones and Energetics in Reproductive Bats
April Rivera, Krisha Gupta, Hannah Bott
Mentors: Thomas Eiting, PhD, Teri Orr, PhD

The regulation of hormones and energy metabolism during pregnancy is crucial for the survival of mother and offspring, both during and after gestation. *Artibeus jamaicensis* bats share many aspects of their reproductive biology with humans, except that *Artibeus* mothers typically have two pregnancies per year: one that follows a "normal" developmental progression (hereafter termed "non-delayed"), and one in which the developing embryo enters a prolonged diapause (termed "delayed"). Pregnancy is an

energetically demanding process that requires successful management of nutrition, hormones, and immunity. *Artibeus* bats, which consume a diet of primarily fruit, must have careful hormonal regulation to prevent blood glucose spikes, especially during pregnancy when metabolic demands are higher. Differences in placental anatomy, insulin receptor expression, and modulation of blood leptin levels are all hypothesized to play a role in regulating delayed pregnancies.

One goal of this project was to identify differences in the architecture of the placenta that may be associated with the different types of pregnancy. Such differences could arise, for example, from differences in hormone fluctuations during delayed vs. non-delayed pregnancies. To examine this question, we prepared histological samples of placental tissue from both types of pregnancy. We employed various staining techniques, light microscopy, and ImageJ software to examine the anatomical differences in placental tissues. Our results indicate the microanatomy of the placenta may have vascular differences between the non-delayed and delayed pregnancies of these bats. Specifically, we found differences between the vascular area and nuclei count of the placental tissues for both types of pregnancies. Additional analyses are ongoing.

Insulin is a well-known regulator of glucose uptake into tissues. Another goal of this study was to determine whether a difference in insulin receptor expression could be a regulator of the delayed state. To achieve this, we employed immunohistochemistry to assess the expression of insulin receptors in placental tissues from both delayed and non-delayed pregnancies. Our findings are still inconclusive at this time. Our final goal was to analyze circulating leptin levels during *Artibeus* pregnancy. Leptin is involved in satiety and appetite suppression, but it also plays a role in gestation. We hypothesize that there may be circadian patterns or other differences in circulating leptin levels due to the high energy demands and increased adipose deposition that occur during pregnancy. We collected blood samples from bats at various times of day and in both pregnant and non-pregnant bats to better understand how much leptin is circulating during these key periods. Our focus is to establish a baseline serum leptin concentration, for which we utilized an ELISA assay. Mouse ELISA leptin kits were used since the sequences are fairly conserved and cross-reactive. Our work on this front is still ongoing, but our initial assays have resulted in fine-tuning of methods to detect leptin levels.

While still ongoing, our investigation into insulin receptor expression, placental architecture, and leptin regulation in *Artibeus jamaicensis* may provide early insights into the potential mechanisms underlying the reproductive flexibility in this species. These findings lay the groundwork for future studies exploring how the physiological adaptations in these bats may have parallels to human reproductive physiology.

P44. 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.

P45. 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

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.

P46. 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.

P47. 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.

O1. Disparities in Left Heart Catheterization and Mortality Among NSTEMI Patients with Schizophrenia: Insights from the National Inpatient Sample Database

Afreen Bakht, Keri Bow
Mentor : Ahmad Mustafa, MD

Objective:
The timing of cardiac catheterization in patients with non-ST elevation myocardial infarction (NSTEMI) is influenced by various factors, including the GRACE and TIMI scores. However, non-traditional cardiovascular risk factors, such as schizophrenia are often overlooked. This study aimed to investigate the rates of left heart catheterization (LHC) in NSTEMI patients with and without schizophrenia and to evaluate its impact on mortality outcomes.

Methods:
National Inpatient Sample (NIS) Database 2016-2018 was used to sample individuals presenting with NSTEMI. Patients were stratified into schizophrenia and non- schizophrenia cohorts. Baseline characteristics and comorbidities were collected using ICD-10 codes. Outcomes included LHC rates and mortality. To account for confounding, the two groups were matched 1:1 using Greedy Propensity matching. They were matched on age, gender, race, hypertension, diabetes, coronary artery disease, carotid artery disease, chronic obstructive pulmonary disease, dyslipidemia, obesity, chronic heart failure, smoking, and peripheral arterial disease. Pre-match and post-match analysis was performed.

Results:
Of the 413,080 NSTEMI patients included in the study, 2,587 had schizophrenia. Schizophrenia patients were younger (63.2 vs 69.77 years; $p<0.01$) and had lower rates of coronary artery disease, dyslipidemia, hypertension, smoking, obesity, and peripheral vascular disease. LHC was performed less frequently in schizophrenia patients compared to non-schizophrenia patients (10.3% vs 20.6%; $p<0.001$). Mortality was higher in schizophrenia patients who did not undergo LHC compared to those who did (8.2% vs 2.6%; $p=0.001$). After 1:1 propensity matching, both groups had 2586 patients. Post-match analysis revealed that schizophrenic patients were significantly less likely to receive LHC (OR: 0.47 [0.40-0.56]; $p<0.001$). Additionally, schizophrenic patients who did not undergo LHC had increased mortality (OR: 3.32 [1.55-7.14]; $p=0.002$)

Conclusion:
Patients with NSTEMI and schizophrenia underwent fewer LHC compared to those without schizophrenia and had higher mortality rates. Socioeconomic barriers, medication adverse effects and interactions, follow-up care, and family support are some factors that may influence physicians' decisions regarding LHC in schizophrenia patients presenting with NSTEMI. Enhancing physician awareness of the elevated mortality associated with these barriers and implementing patient-specific interventions to address them should be prioritized to improve patient outcomes and reduce mortality rates.

O2. Hip Pathology in the Dancing Athlete

Natalie Nacy, Alexandra Wade
Mentor: Dustin Volkmer, MD

The physical demands of dance predispose athletes to morphological changes that can increase their risk of injury, especially in the hip, where hyperflexion, excessive external rotation, and hyperabduction are required for many dance positions. Morphological changes commonly observed in dancers, such as hip dysplasia and prominence of the anterior inferior iliac spine, can lead to a variety of injuries, including femoroacetabular impingement (FAI), CAM impingement, pincer impingement, subspine impingement, labral tears, external and internal snapping hip syndrome, and hip microinstability. With the recent rise in the popularity of dance, it has become increasingly important to diagnose hip pathologies in dancers accurately and to understand how these structural changes affect the body in order to guide effective treatment. This paper provides a comprehensive review of current literature on hip pathologies and discusses standard diagnostic and treatment options. Diagnosing hip injuries in dancers can be complex, as symptoms often overlap with other conditions. When properly identified early, conservative treatments such as rest, activity modification, and physical therapy are often highly effective. However, in some cases, hip arthroscopy may be necessary and has been shown to produce good outcomes.

O3. Assessment of Efficacy and Cost-Benefit Ratio of Real Tissue Adjuncts in Surgical Procedural Training

Andrew Peace, Brandon Snyder
Mentors: Nathan Williams, MD, Spencer Mattingly, PhD

Introduction:
Surgical procedure simulations are a key part of the education and training of healthcare professionals. However, these simulations often suffer from a common problem: a strong correlation between the cost and realism of various training models. The "gold standard" of training models has long been considered either fixed, lightly embalmed, or fresh cadaveric tissue. While studies have proven these models to be highly effective for training purposes, the cost of acquiring such tissues can be prohibitively expensive. Conversely, "DIY" anatomical models are inexpensive and accessible but lack realism. Between cadaveric tissue and full-synthetic manikins, lies a potential third option for training realism: porcine tissue. Porcine tissue has long been used as a standard substitute for human tissue in biomedical research due to its similarity. This study compares three teaching adjunct types – cadavers, porcine tissue, and DIY anatomical models – for perceived utility and cost-effectiveness in thoracostomy training.

Methods:
Twenty-nine second-year medical students completed a pre-instruction survey to evaluate their familiarity and procedural comfort with tube thoracostomy, using a 5-point Likert scale. Students received a standardized slideshow-based tutorial on the procedure. Following instructions, all students first performed the procedure on a DIY model. They were then divided into two groups: one repeating the procedure on the porcine thorax while the other used the cadaver models. These groups then switched,

ensuring all students experienced all three models and minimizing potential order bias in model evaluation. Following each model, students repeated the confidence survey, with the addition of how they would rate each model on anatomic accuracy, tissue feel, ease of practice, and sensory acceptability (olfactory, tactile, visual, etc.), using a 5-point Likert scale. These responses generated two main variables: confidence score and model score. For both confidence and model scores, Dunn's Multiple Comparison Tests, following Kruskal-Wallis ANOVA tests, were used to evaluate the variation in skill confidence across models, as well as evaluating the experiences of the students across the three models used.

Results:
Data analysis demonstrated no significant difference in student experience between the porcine and cadaveric models ($p = 0.488$), but significant differences were observed when comparing the DIY model to both the porcine and cadaveric models ($p < 0.001$ for both). Results also showed there was no significant difference when comparing procedural confidence during the porcine and cadaveric model sessions ($p > 0.999$) across all student subjects, indicating that results were not influenced by order bias in their evaluation of tissue models.

Discussion:
Taken together, these results demonstrate that the porcine model was viewed as favorably among students as cadaveric tissue for thoracostomy training. Given the significant cost difference between the two (porcine: $5.94 per site vs cadaveric: $143.09 per site), porcine models may represent a highly cost-effective adjunct in surgical training procedures. In contrast, inexpensive DIY anatomical models ($0.59 per site, $14 initial build cost), while still considered useful by students, do not supply the same level of realism or quality as their real tissue counterparts, and are therefore only recommended as a final option in training situations. Restrictions of this study were budgetary constraints and availability of subjects. Future research in this field should consider increasing the sample size and incorporating a greater number of porcine and cadaveric models to enhance statistical power, thereby minimizing potential sources of bias or error.

O4. Assessing the Perceptions of Osteopathic Medical Students' beliefs since Transitions in the USMLE step 1 and COMLEX level 1 examinations to Pass/Fail
Milo Taylor
Mentor: Robert Goldsteen, DO

Objective:
Since the transition of the USMLE step 1 and COMLEX level 1 examinations to pass/fail in 2022, there has been very little research into the impact of this transition on osteopathic medical students. The goal of this study is to investigate the impact of the transitions of these exams to pass/fail on osteopathic student well-being depending on their intended specialty.

Methods:
A Qualtrics survey was administered to students at the Burrell College of Osteopathic Medicine. This survey included a free response question asking what specialty the student intended to pursue. Then the perceived stress scale 10 (PSS-10) was administered. The responses were divided into four groups based

on how competitive the intended specialty was. The PSS-10 score averages were calculated for each group and compared.

Results:
The most competitive group had a PSS-10 mean score of 20.29, the intermediate group had a mean PSS-10 score of 21.29, the least competitive group had a mean PSS-10 score of 21, and the undecided group had a mean PSS-10 score of 20.33.

Conclusion:
There was very little difference in stress levels between the four groups, and therefore intended specialty seemed to not have any effect on stress levels. This possibly confirms our hypothesis that there would be no difference in stress levels between the groups because the pressure of obtaining a high numerical score on these exams has been eliminated. While this preliminary data suggests that the NBOME and NBME may have succeeded in improving student well-being with the decision to make these exams pass/fail, further research must be done to investigate the effects of this transition.

O5. Development of isothermal detection assays for Human Papilloma Viruses (HPV) at the point of care

Elizabeth Young, Yareli Reyes
Mentor: Debra Bramblett, PhD

Objective:
The goal is to establish that Loop Mediated Isothermal Amplification (LAMP) can be effective in detecting HPV-16 and HPV-18 . We focused on establishing the sensitivity and specificity of the LAMP assay combined with a lateral flow technique on unprocessed DNA of HeLa (HPV-18 positive) and SiHa (HPV-16 positive) cervical cells. Crude cell lysates were compared to diluted, highly purified DNA from the same cells to establish the sensitivity of the LAMP Assay and diagnostic practicality using qPCR .

Methods:
The human cervical cell lines that were either HPV-16 positive used include SiHa (ATCC, HTB-35)HPV-16 positive), HPV-18 positive HeLa (HPV-18 positiveATCC, CCL-2)), and C-33A (ATCC, HTB-31) that are both (HPV-16 and HPV-18 negative and) which that served as was used as the negative control. SiHa and HeLa cell lines were cultured in Dulbecco's Modified Eagle medium, Eagle's Minimum Essential Medium with 10% Fetal bovine serum, and 100U/ml Penicillin-Streptomycin (Gibco, Cat 15140-122). whereas C33A cell lines were maintained inby Eagle's Minimum Essential Medium with 10% Fetal bovine serum, and 100U/ml Penicillin-Streptomycin . All cell lines were grown at 5% CO2 and 37°C in a humid incubator. The cells were removed from culture plates using trypsinization. To calculate the number of HPV DNA copies, total cell concentrations were taken using Nanotek's automatic cell counter. The equation used to calculate total viral genome copy number (#) for the crude extracts is: $(Total\ cell\ concentration\ in\ cell\ /\ \mu L)(Volume\ used\ for\ LAMP\ in\ \mu L)(HPV\ genome\ copy\ \#) = Total\ copy\ \#$. For analytical validation, we verified the biotinylated colorimetric LAMP assay primers' specificity by

incubating our reaction microcentrifuge tubes in the MJ Thermocycler for 30 minutes at 65°C followed by use of Milenia Biotec's Lateral Flow kit. Our LAMP assay and lateral flow techniques were also used on a dilution series of SiHa (1:10, 1:100, 1:1000, 1:10000) and HeLa (1:50, 1:500, 1:5000, 1:50000) cell lines using Ultrapure water as a diluent to determine sensitivity. We evaluated the diagnostic accuracy of our LAMP Assay against the current gold standard, q-PCR, using highly purified HPV-16 and HPV-18 DNA using CFX software.

Results:

Specificity: Tube 3 with crude HeLa DNA and HPV-18 primers and tube 6 with crude SiHa DNA and HPV-16 primers yielded color changes (hot pink to yellow) indicating positive results. Our non-template controls (NTC) and crude C-33A DNA tubes were negative. Tube 4 had HPV-16 primers and crude HeLa DNA, which yielded a coral pink color and a faint line on lateral flow detection (LFD) strip – all other LFD strips were consistent with its tube.

LAMP on Purified DNA Dilution Series: Tubes 1 (NTC), 4, and 5 with purified SiHa DNA dilutions 1:1000 and 1:10000 (approx. 1.2 x 108 and 1.2 x 107 HPV-16 DNA copies, resp.) and their LFD strips were negative. Tubes 2 and 3 with SiHa DNA dilutions 1:10 and 1:100 (approx. 1.2 x 1010 and 1.2 x 109 HPV-16 DNA copies, resp.) and their LFD strips were positive. Tubes 1 (NTC), 2, 3, 4, and 5 with purified HeLa DNA dilutions 1:50, 1:500, 1:5000, and 1:50000 (approx. 1.7 x 108, 1.7 x 107, 1.7 x 106, and 1.7 x 105 HPV-18 DNA copies, resp.) were negative. However, LFD strips 2 and 3 were positive.

LAMP on Crude DNA Dilution Series: Tubes 1 (NTC), 4, and 5 with crude SiHa DNA dilutions 1:1000 and 1:10000 (approx. 3.2 and 0.3 HPV-16 DNA copies, resp.) and their LFD strips were negative. Tubes 2 and 3 with crude SiHa DNA dilutions 1:10 and 1:100 (approx. 315 and 32 HPV-16 DNA copies, resp.) and their LFD strips were positive. Tubes 1 (NTC) and 5 with crude HeLa DNA dilution 1:50000 (approx. 0.3 HPV-18 DNA copies) and their LFD strips were negative. Tubes 2, 3, and 4 with crude HeLa DNA dilutions 1:50, 1:500, and 1:5000 (approx. 290, 29, and 3 HPV-18 DNA copies, resp.) and their LFD strips were positive.

q-PCR Comparison: a majority of purified HPV-16 and HPV-18 DNA dilutions yielded amplification results prior to the 30th cycle. Crude SiHa and HeLa DNA dilutions did not generate amplification results until after or near the 30th cycle.

Conclusion:

The developed colorimetric LAMP assay demonstrated specificity for both HPV-16 and HPV-18. However, reaction tube 4, containing HPV-16 primer mix and crude HeLa DNA, yielded a subtle color change from hot pink to coral pink and a faint line on the lateral flow detection (LFD) strip. We believe this was likely due to contamination since it was adjacent to positive test tube 3. Our LAMP assay detected as few as approximately 32 copies of HPV-16 DNA and 3 copies of HPV-18 DNA in the crude DNA dilution series experiments. Interestingly, some LAMP reactions showed no color change despite yielding positive results in the Lateral Flow test, suggesting the presence of buffering agents in the crude lysate which may have interfered with the colorimetric reaction or that lateral flow techniques are more sensitive than our LAMP assay. This observation underscores the need for further investigation into the impact of sample cellular matrix components and additional dilution series to more precisely define the assay's sensitivity limits. Our qPCR results indicate that purified cDNA is necessary for accurate amplification when using q-PCR techniques. We believe that nonspecific amplification of our crude DNA samples occurred near the 30th cycle, which consequently amplified artifacts, resulting in false-positive amplification results. qPCR on our purified cDNA samples demonstrated amplification results under the 30th cycle, highlighting the importance of purified DNA for qPCR. Compared to LAMP, however, the

purification process is both time- and resource-intensive. These findings support the LAMP assay's potential as a practical screening tool for HPV at the point-of-care. However, further clinical validation is required to fully assess its diagnostic accuracy and real-world applicability.

Thank you for Attending our 8th Annual Medical Student Research Day

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