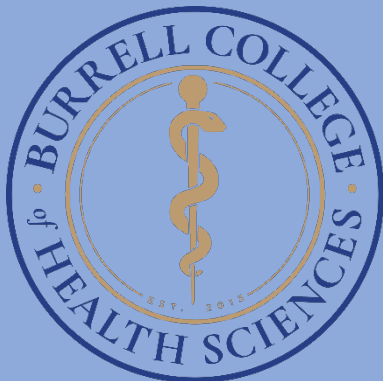


MEDICAL STUDENT RESEARCH DAY
PROGRAM AND ABSTRACT BOOK
SEPTEMBER 19, 2026



Burrell College of Health Sciences
Office of Research and Sponsored Programs

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President's Welcome Address



It is my privilege to welcome you to the Burrell College of Health Science's 2026 Medical Student Research Day (MSRD)!

Thank you to our participants and visitors for attending the College's premiere student research event. This is the second year that the College has hosted this event on the Florida Campus, 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 Health Sciences

Dean's Welcome Address



William Pieratt, DO, FACP
Dean and Chief Academic Officer
Burrell College of Health Sciences

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, 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.

Campus Dean's Welcome Address



Doris Newman, DO, FAAO
Florida Campus Dean
Burrell College of Health Sciences

Good morning and welcome. Although I am unable to be with you today, I send warm greetings and appreciation to everyone in attendance, especially to the Office of Research and Sponsored Projects, especially Drs. Eiting and Hague for their guidance during the 2026 Summer Research Experience here on the Florida campus. I wish all of the student investigators much luck in their presentations and applaud all of our colleagues, educators, and students who share a commitment to discovery and improving patient care through research. Scholarly inquiry drives innovation, strengthens evidence-based medicine, and expands opportunities for future physicians. Thank you all for contributing your time, expertise and enthusiasm. In research, like osteopathic medicine, you are only limited by your imagination so enjoy the day, enjoy the learning and I look forward to hearing about all of the projects.

Keynote Speaker – Chris Bashur, Ph.D.



The core focus of my research involves elucidating how cells interact with their microenvironment (e.g., topography and scaffold composition) and using this knowledge to develop strategies to produce tissue engineered grafts. My lab works on the different stages necessary to develop clinical therapies: including (a) developing novel biomaterials, (b) exploring cell - microenvironment interactions, and (c) determining the viability of constructs in vivo. The primary goal of the lab is overcoming the current limitations to engineering small-diameter vascular grafts, which include the lack of a functional endothelium and limited elastic matrix production. The lab also develops drug delivery strategies for tissue engineering and regenerative medicine.

Schedule Overview

Saturday, September 19, 2026	
7:55 AM – 8:00 AM	Welcome Remarks <i>Thomas P. Eiting, PhD, Director of Student Research</i> Room 282
8:00 AM – 9:00 AM	Keynote Address – Chris Bashur, Ph.D., Florida Institute of Technology <i>"Promoting endothelial cell function for Vascular Tissue Engineering."</i> Room 282
9:00 AM – 11:00 AM	Poster Presentations <i>Student authors present their posters.</i> Rooms 247, 248, and 2nd Floor Hallway
11:00 AM – 12:00 PM	Oral Presentations <i>Student oral presentations.</i> Room 282
12:00 PM – 12:45 PM	Lunch (<i>All attendees</i>) 2nd Floor Reception
12:45 PM -1:00 PM	Award Ceremony and Closing Remarks Room 282

Schedule in Detail

Welcome Remarks. 7:55 – 8:00 am, Room 282

Thomas P. Eiting, Ph.D.

Director of Student Research, Burrell College of Health Sciences

Keynote Address. 8:00 – 9:00 am, Room 282

Promoting endothelial cell function for Vascular Tissue Engineering.

Chris Bashur, Ph.D.

Florida Institute of Technology

Poster Presentations. 9:00 – 11:00 am, Rooms 247, 248, 2nd Floor Hallway

P1. Stress Sensitivity in Different Regions of the Brain: Implications for Epilepsy

Camila Atencio, Miles Davis, Margarita Soltero Gutierrez, Jalin Haskins, Macy Mehdioun, Nathan Smole

Mentor: Kristin Gosselink, Ph.D.

P2. Evaluation of Stress-Induced HYPE Expression in the Brain

Margarita Soltero Gutierrez*, Nathan Smole*, Macy Mehdioun*, Jalin Haskins*, Miles Davis*, Camila Atencio

*Equal contribution

Mentor: Kristin Gosselink, Ph.D.

P3. Concentration-Dependent Effects of Common Local Anesthetics on In Vitro HeLa Cell Wound Healing and Cytotoxic Disruption of Monolayer Integrity.

Brandon Stucken, Ari Barskiy, Gabriel Marquardt, Joshua Ramirez, Emily Waddle

Mentor: Christopher Hague, Ph.D.

P4. Predictive Biomarkers for Immune Checkpoint Inhibitor Therapy: Current Evidence and Future Directions

Dimpal Kasabwala and Merit Mikhael

Mentor: Alexander Gasparian, Ph.D.

P5. 3D Glioblastoma Growth Prediction via Fully Convolutional Spatiotemporal Modeling

Kirolos Shenouda, Jolie Garcia Willis, Wenxi Liu, Michael Trimboli, Matthew Newmarch

Mentor: Xianqi Li, Ph.D.

P6. Microarchitecture of a human gastric extracellular matrix scaffold determined by scanning electron microscopy

Eli Mathew, Carter Luellen, Ava Richard, Jessica Rua

Mentor: Michelle D Cherne, Ph.D.

P7. Sustained UPI Peptide Release from Embedded Microparticles to Enhance Vascular Graft Endothelialization

Sunita George, Cyrah Pinnock, Shirin Changizi, Malsha Nanayakkara, Leah Degard-Edmond, Lauren Hill, Sajae Willis, Chen Hong
Mentor: Chris Bashur, Ph.D.

P8. Photobiomodulation osteogenic effects of blue light on human mesenchymal stem cells

Nicolas Sosa
Mentors: Vipul Kishore, Ph.D., Vinicius da Silva

P9. Keratinocyte Signaling in the Tissue-Resident Memory Niche: A Potential Link to Vitiligo Relapse

Maryann Levy
Mentor: Gabor Szalai, Ph.D.

P10. Neurovascular and Metabolic Effects of Glucagon-Like Peptide-1 Receptor Agonists and Serotonergic Antidepressants: A Systematic Review and Complementary Meta-Analysis

Jeffrey McSherry, Gerard Cabrera, Marco Jaimes-Solis, David Padron
Mentor: Robert Coni, DO

P11. *H. pylori* infection does not increase matrix metalloproteinase activity of human gastric organoids

Catherine Azkue Acosta, Carter Luellen, Jessica Rua, Andrew T Sebrell, Diane Bimzok
Mentor: Michelle D. Cherne, Ph.D.

P12. Proton Pump Inhibitor Exposure and Oralization of the Human Gut Microbiome: A Scoping Review

Lucas McCurdy
Mentor: Mir Saleem, MD

P13. Effectiveness and Safety of OTC Supplements for Mild Anxiety in Young Adults Compared With First-Line Pharmacologic Therapies: A Comparative Literature Review

Diana Sokolov; Karla Del Moral Teppa
Mentor: Mir Saleem, MD

P14. Secondary Geriatric Trauma Transfers to a Level II Trauma Center: Injury Phenotype, Resource Use, Transfer Timing, and Documentation Completeness

Jessica Yanosik
Mentor: Dana Mathew, MD

P15. Peripheral Nerve Injury After Total Hip Arthroplasty: A Review of Incidence, Risk Factors, and Prevention

Eli Rudnisky, Nicolas Sosa
Mentor: Raju Panta, MBBS, MD

P16. Predicting Later Hypoxemia During EMS Care: Baseline and Serial Physiologic Modeling

Hunter Trinh; Jeffrey Zhao
Mentor: Kunal Mitra, Ph.D.

P17. Modeling E-Bike Trauma: Clinical and Biomechanical Evidence for Public Safety Mandates

Luisa Fernandes

Mentors: Linxia Gu, Ph.D., Pengfei Dong, Ph.D.

P18. Post-Stroke Obstructive Sleep Apnea Evaluation Gaps and Risk of Recurrent Ischemic Stroke or TIA

Abigail Ploch, Tanay Malla, Diego Rodriguez

Mentor: Robert Coni, DO

P19. The Effect of Osteopathic Manipulative Medicine on Snoring and Sleep Quality in Children: A Literature Review

Natasha Mahaise, Eli Mathew, Riya Palikonda

Mentor: Doris Newman

P20. A Whole-Body Osteopathic Approach to Chronic Temporomandibular Joint Dysfunction: A Case Report

Yasmeen Attia

Mentor: Jennifer Leavy, DO

P21. Osteopathic Manipulative Treatment in Practice: Medial Meniscal Counterstrain to Treat Chronic Knee Pain: A Case Study

Juliana Helfer, Ashley Wall

Mentor: Paul Capobianco, DO

P22. Associations of Platelet Dose, Injection Number, and Leukocyte Content with Clinical Outcomes After Intra-Articular Platelet-Rich Plasma Injection for Knee Osteoarthritis: A Systematic Review

Kevin Pham, Yidong Tang, Jeffrey Zhao

Mentor: Mir Saleem, MD

P23. A Biodynamic Cranial Osteopathy Approach to Migraine: A Case Study

Leah Degard-Edmond, Nicolas Sosa

Mentor: Paul Capobianco, DO

P24. Explainable AI for Multiclass Brain Tumor Classification

Shrivatsa Sundarraj, Sharukh Khan, Wenxi Liu, Michael Trimboli, Matthew Newmarch

Mentor: Xianqi Li, Ph.D.

P25. Six-Week Changes in Functional Mobility and Dual-Task Performance Among Rock Steady Boxing Participants With Parkinson's Disease

Mark-Joseph Velasquez; Elora Mukhopadhyay; Tryfon Theophilopoulos

Mentor: Robert J. Coni, DO

P26. The Effects of Rock Steady Boxing on Balance and Lower Extremity Motor Function in Patients with Parkinson's Disease

Nneoma Ebiringah, William Milgrim, Maria Karla Gonzalez, Zainab Khawaja, Yasmeen Attia

Mentor: Robert J. Coni, DO

P27. Operationalizing the Biopsychosocial-Spiritual Model in Pain Management: A Narrative AI Approach

Timothy J. Khalil, Jake Orent

Mentors: Mir Saleem, MD, MSc Angelica J. Oviedo, MD

P28. Lactation Knowledge and Confidence Among Individuals Who Have Breastfed or Lactated in Brevard County, Florida: A Cross-Sectional Study

Amani Watson and Amelia Woods

Mentor: Shannon Ingwersen, MD

P29. Statewide Assessment of Geriatric EMS Triage, Clinical Evaluation, Protocols, and Training in Florida: A Two-Phase Cross-Sectional Survey Study

Heather Bruton, Jessica Yanosik

Mentor: Dana Mathew, MD

P30. Jellyfish Sting Recognition and Dive-Operation Readiness: Cross-sectional protocol for divers and dive operations in selected Florida's East Coast counties

Sonia Cherkaoui Jaouad, Yissel Pineiro, Aleisha Sherif, Hayat Nachar

Mentor: Dana Mathew, MD

P31. MRSA Colonization Among Medical and Nursing Populations: A Literature Review

Naisargi Pathak, Melisa Camurlu, Ashwinder Parmar

Mentor: Debra E. Bramblett, Ph.D.

P32. Barriers to Pediatric Behavioral Health Access in an FQHC: A Quality Improvement Study at Brevard Health Alliance. Understanding Delays and Incomplete Continuity of Care to Improve Access for Children

Isha Ratani, Aaisha Khan

Mentors: Sarah Choo-Yick, MD, Nicholette Fox, MD, Brittany Biba, LCSW

P33. Using Large Language Models for Mental Health Care: Cross-Dataset Understanding for Clinicians

Emma Chouljian

Mentor: Siddhartha Bhattacharyya, Ph.D.

P34. Diagnosis, Management, and Athletic Populations Affected by Proximal Radial Nerve Compression Disorders

William Milgrim, Kiran Eikan

Mentor: Pradeep Vanguri, Ph.D.

P35. Association of HMGA1 With Self-Identified Race and Clinical-Genomic Features of Prostate Cancer

Oluwademilade Dairo, Morelle Konchou, Adrianna Amaral de Aragao, Thiago Vidotto, Linda Resar, Tamara L. Lotan

P36. The Relationship Between Ever Smoking 100+ Cigarettes and Ever Being Diagnosed with an Oral Cavity or Pharyngeal Cancer, Modified by E-Cigarette Use and by Sex

Brianna Schroeder

Mentor: Mir Saleem, MD

P37. Influence of Over-the-Counter Medications and Supplements on Children Diagnosed With Attention-Deficit/Hyperactivity Disorder

Karla Del Moral Teppa; Diana Sokolov

Mentor: Mir Saleem, MD

P38. Matched-Country Study: Political Instability and Routine Childhood Immunization

Barillas Carina, Taylor Reagan, Morinvil Christian

Mentor: Dana Mathew, MD

P39. Bias Beneath the Surface: A Pilot Curriculum to Equip Medical Students with Ethical AI Literacy

Jake Orent, Timothy J. Khalil, Ariena Tobari Goudarzi

Mentor: Mir Saleem, MD, MSc

Oral Presentations. 11:00 am – 12:00 pm, Room 282

11:00 – 11:15 am

O1. Spatial Regional Characterization of NMF-Derived Components and DVR Disagreements in Dynamic 18F-AV-1451 Positron Emission Tomography (PET)

Valerie Kobzarenko, Ph.D., Emily Eader, Vaishnavi Abodh Dixit

Mentor: Debasis Mitra, Ph.D.

11:15 – 11:30 am

O2. Public Library-based intervention for Mild Cognitive Impairment and Mild Dementia

Tanay Malla, Naomi Codrington, Victoria Amorim, Leah Degard-Edmond, Diana Pop, Diana Sokolov, Sharukh Khan

Mentor: Robert Coni, DO

11:30 – 11:45 am

O3. Epidemiology of Traumatic Skin Injuries in Female Collision and Contact Sport Athletes Presenting to U.S. Emergency Departments: A NEISS Analysis

Natalie Nacy, Alessandra Merenna

Mentor: Dustin Volkmer, MD

11:45 am – 12:00 pm

O4. Meeting communities where they are: Evaluating HPV vaccination outreach and education strategies in Bexar County

Adriana D. Rodriguez, Erika L. Thompson, Ph.D., Andria Gabriela, Ryann Moore

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

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

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

Thomas P. Eiting, Ph.D.

Director of Student Research, Burrell College of Osteopathic Medicine

Abstracts – Poster Presentations

P1. Stress Sensitivity in Different Regions of the Brain: Implications for Epilepsy

Camila Atencio, Miles Davis, Margarita Soltero Gutierrez, Jalin Haskins, Macy Mehdioun, Nathan Smole
Mentor: Kristin Gosselink, Ph.D.

Objective: Stress has been shown to be a significant seizure risk factor in individuals with epilepsy. Both experimental and clinical studies consistently demonstrate that acute and chronic stress influence seizure susceptibility through various neurological mechanisms. Through academic literature review and Fos staining in rat brain sections, we aim to identify the brain regions that are related to seizure activity and stress responses, and their degree of overlap.

Methods: Fos expression was determined by immunohistochemistry and quantified in the paraventricular hypothalamic nucleus (PVN) and temporal cortex of rats exposed to acute or repeated stress. Animals in the repeated stress group were exposed to 30 min of physical restraint each day for a total of 14 days. Acute stress rats were restrained only once, for 30 min, on day 14. Control rats were handled daily but never stressed. Perfused brain sections (30µm thickness; coronal) were Nissl stained for anatomical reference and immunohistochemically stained for Fos protein to indicate neuronal activation. Tissue sections were incubated overnight at room temperature in primary antiserum against Fos (1:10,000; Abcam), and for 1h at room temperature the next day in secondary antibody (Cy3-conjugated goat anti-rabbit IgG, 1:200; Jackson ImmunoResearch Labs) to visualize specific binding. Stained sections were mounted on gelatin-coated slides and coverslipped with glycerol mountant. Pictures of specific brain regions, the PVN, temporal cortex, and hippocampus, were captured with a digital imaging system coupled to a fluorescent microscope. The number of Fos-positive nuclei was counted in each region, either manually or with the assistance of ImageJ software.

A literature review was conducted, using the Google Scholar search engine to explore the link between stress and epilepsy in the brain regions for which Fos data were collected. Search terms such as “stress”, “epilepsy”, “effect on brain regions” were used to identify and select relevant articles for inclusion.

Results: Findings from the literature review emphasized that chronic or repeated stress promotes the development of epilepsy, or epileptogenesis, and increases seizure frequency through the increased secretion of cortisol. Importantly, dysregulation of the hypothalamic-pituitary-adrenocortical (HPA) axis is correlated to chronic stress and epilepsy, promoting excitatory signaling through the reorganization of epileptogenic brain networks. Human studies highlight the impact of increased cortisol responses due to stress, leading to increased neuronal excitability and lower seizure thresholds. Animal studies also demonstrate that both acute and chronic stress can activate or excite hippocampal-amygdala circuits, increase seizure sensitivity and cause higher CRH expression. Temporal lobe epilepsy, specifically involving the hippocampus, was shown to be very susceptible to stress. Another risk factor seen throughout the literature was chronic early-life stress, leading to HPA-axis dysregulation and, in turn, epilepsy development, weakened synaptic plasticity, and cortisol mis-management, affecting individuals into adulthood. Overall, results from the literature provide experimental data that show that increased

stress exposures throughout life is risk factor for and a good predictor of augmented seizure frequencies. Stress may therefore be a common contributor to epileptogenesis.

ImageJ analysis of Fos staining in 6 sections through the temporal cortex of individual animals in each stress treatment group revealed a sum of 507 positive nuclei in Control rats, 194 in rats exposed to acute stress, and 272 in repeatedly stressed rats. In the PVN, as expected, the sum of Fos-positive nuclei from 5 sections totaled 118 in the Control group, increased to 301 in the acute stress group, and then decreased to 124 in the repeated stress group. Manual counts of hippocampal Fos staining are in progress.

Conclusion: In conclusion, the literature supports a strong relationship between stress and epilepsy, and specifically epileptogenesis, particularly through the dysregulation of the HPA axis. Chronic stress appears to induce disordered HPA axis activation, impair synaptic plasticity, and facilitate neuronal hyperexcitability, specifically within the hippocampus and the temporal lobe of the cortex. In the rat brain, both acute and repeated stress reduced the number of nuclei staining positively for Fos in the temporal cortex compared to what was observed in non-stressed controls. This differed from what was seen in the PVN, where acute stress increased Fos expression and this response adapted or habituated with repeated stress exposure. In both regions, seeing the exact same stressor multiple times caused a shift away from the acute stress condition and allowed the brain to begin to return to its normal Control state.

This aligns partially with the findings from the literature review, emphasizing the important role of the temporal cortex in stress processing and seizure activity. On the other hand, increased epileptic activity was seen mainly under chronic stress conditions, which showed activation levels similar to Controls in our rat brain samples. Our study is currently limited by the low number of animals in our data set. Our conclusions are not strongly supported at this time, but future work will increase our “n”, expand the regions analyzed, and allow for statistical comparisons to be made. Importantly, for now, our results and the literature review findings describe the effects of stress, especially chronic stress, on brain regions that are known to contribute to seizures. It is crucial to provide counseling on stress management in individuals who suffer from epilepsy. Understanding this relationship can help neurologists recommend preventive and therapeutic approaches to their patients, reducing their exposure to stress and reducing epileptogenesis.



P2. Evaluation of Stress-Induced HYPE Expression in the Brain

Margarita Soltero Gutierrez*, Nathan Smole*, Macy Mehdioun*, Jalin Haskins*, Miles Davis*, Camila Atencio

*Equal contribution

Mentor: Kristin Gosselink, Ph.D.

Objective: Stress can negatively affect brain function and contribute to the progression of neurological diseases. This study measured the expression of Fos, a marker of activation, and Huntington yeast interacting partner E (HYPE) in rat brains following exposure to different amounts of stress. HYPE is involved in the unfolded protein response, its levels change in response to cellular stress, and its expression has been correlated with Huntington’s disease, Parkinson’s disease, and cancer.

Methods: Adult male rats were exposed to stress using an acrylic restraining device. The repeated stress condition had the rats in the restraining device for 30 min each day for a total of 14 days; the acute stress

group of rats were restrained only on the last day for 30 min, and the control group had the open restraining device in their cage each day but were never stressed.

Nissl staining was done as a neuroanatomical reference and to confirm our areas of interest for future quantification. Fos expression was localized by immunohistochemistry, and Fos-positive nuclei were counted in the paraventricular nucleus (PVN), the amygdala and the CA2 and dentate gyrus regions of the hippocampus. To perform the Fos immunostaining, brain sections were incubated in a rabbit anti-Fos primary antibody solution (1:10,000 dilution) overnight on a shaker at room temperature. The secondary antibody was a Cy3-conjugated goat anti-rabbit IgG (1:200 dilution) that was incubated for 1 hour on the shaker at room temperature. Immunohistochemistry for HYPE followed the same general procedure, with a rabbit anti-HYPE primary (1:2500 dilution) incubated for 2 nights on the shaker at room temperature. The secondary antibody solution was the same as the one used for Fos but applied during a 90 min incubation. Stained brain sections were subsequently mounted on gelatin-coated slides coverslipped with glycerol mountant.

Images for quantification were taken using a fluorescent microscope coupled to a digital imaging system. The settings used were 10x magnification for the hippocampus and 20x magnification for amygdala and PVN. Hippocampal Fos counts were performed manually, while ImageJ was used for the amygdala and PVN. Data analysis is ongoing for HYPE, where the density of staining will be measured with ImageJ.

Results: Sections stained for Fos were counted by two independent researchers who were blinded to the stress conditions, allowing a maximum of 10% difference between counts, and averaged for each section. Counts from a total of 5 or 6 sections per rat and brain region were summed to get a total count of Fos-positive nuclei. As expected, Fos expression in the PVN was highest in the acute stress group, where 301 nuclei were counted; Control and Repeated rats had nearly equivalent Fos staining, with totals of 118 and 112 nuclei, respectively. In the CA2 region, Fos counts were: Control = 320, Acute = 201, and Repeated = 220. Dentate gyrus Fos counts were: Control = 156, Acute = 172, and Repeated = 130. In the amygdala, the number of Fos-expressing nuclei was: Control = 331, Acute = 118, and Repeated = 170. Quantification of HYPE expression will be shared at a later time.

Conclusions: Different stress conditions lead to differences in Fos expression in regions across the brain that have varying functions. Similar to previous studies, the PVN of Control rats had low levels of Fos expression. Acute stress increased this expression, but then exposure to repeated restraint (the same stress seen over multiple days) led to an adapted or smaller Fos response. As the PVN is the site where stress responses are initiated (both hypothalamic-pituitary-adrenal axis and sympathetic nervous system activation), it is not surprising that acute stress had the biggest impact in our study.

The dentate gyrus also has the most Fos expression in the Acute animals, although the difference between groups were small and may not be significant. In the CA2 hippocampal area and the amygdala, both Acute and Repeated stress decreased Fos expression compared to Control. This study is currently limited by a small sample size, so we are unable to draw any strong conclusions. Future work will increase the n/group and allow for statistical comparisons. We have been able to identify HYPE expression but do not yet know if this expression is altered by stress exposure in our model.

Overall, understanding the stress-mediated expression of Fos and HYPE in the different regions of the brain may help determine the causes of neurological diseases or the development of drugs that target these mechanisms of stress for potential treatment. We will continue to examine and quantify HYPE expression and predict that it will be increased by stress. Such a response to organismal-level stress

could lead to therapies that reduce or prevent stress in patients or modulate HYPE and by extension other components that affect protein folding in the brain.



P3. Concentration-Dependent Effects of Common Local Anesthetics on In Vitro HeLa Cell Wound Healing and Cytotoxic Disruption of Monolayer Integrity.

Brandon Stucken, Ari Barskiy, Gabriel Marquardt, Joshua Ramirez, Emily Waddle

Mentor: Christopher Hague, Ph.D.

Introduction: Scratch-wound assays are commonly used to evaluate cancer cell migration, an important component of tumor invasion and wound repair biology. Prior work suggests that ropivacaine may reduce activity of the mammalian target of rapamycin (mTOR) pathway, a signaling pathway involved in cell growth, metabolism, and tissue repair, which could contribute to delayed wound closure and potentially prolonged post-surgical recovery. However, potentially cytotoxic agents can complicate interpretation by causing cellular rounding, detachment, monolayer disruption, or collapse of cells into the wound space, which may alter scratch-width measurements independently of true migration. Apparent wound closure may also vary within the scratch itself, with greater narrowing observed near the center of the wound than at the edges, possibly due to differences in local cell density or accumulation of detached cells. Local anesthetics, including lidocaine, bupivacaine, and ropivacaine, have been reported to affect cell viability, adhesion, and migration in concentration-dependent ways. This study investigated how these anesthetics influence wound-closure dynamics in HeLa cervical cancer cells. We hypothesized that higher anesthetic concentrations would alter apparent wound closure through both impaired migration and cytotoxic disruption of monolayer integrity.

Methods: HeLa cervical cancer cells were cultured to form confluent monolayers and subjected to a scratch-wound assay. Cells were treated with varying concentrations of lidocaine, bupivacaine, or ropivacaine and monitored longitudinally over multiple days. Scratch distances were measured and normalized to calculate the percentage of wound area remaining open over time. Bupivacaine concentrations ranged from 0.0003 to 3 mM, with untreated control wells included. Lidocaine- and ropivacaine-treated wells were similarly compared across concentrations and time points. Trends were evaluated descriptively by comparing percent wound openness across drug, concentration, and day, with attention to whether changes in wound width reflected organized closure versus cytotoxic monolayer disruption. Representative scratch regions were also reviewed for edge effects, including differences between apparent closure at the center of the scratch and closure near the wound edges.

Results: Contrary to the initial expectation that ropivacaine would produce the greatest delay in closure, bupivacaine demonstrated the clearest concentration-dependent alteration in wound-closure dynamics. By Day 3, control wells had a mean percent still open of approximately 0.13, while low-dose bupivacaine conditions remained near control levels. In contrast, mid-dose bupivacaine showed increased wound openness, and high-dose bupivacaine at 1-3 mM showed the greatest impairment, with mean percent still open values of approximately 0.39. Lidocaine showed a weaker pattern, with most concentrations approximating control by Day 2, while 3 mM lidocaine remained more open than control. Ropivacaine demonstrated the least consistent effect, though higher concentrations showed a mild trend toward greater wound openness. In high-dose conditions, changes in scratch appearance may reflect not only reduced

migration but also cytotoxic effects such as cellular rounding, detachment, debris accumulation, and disruption or collapse of the monolayer. Detached or nonviable cells appeared to accumulate toward the middle of some scratches, creating apparent wound filling that may not represent healthy new cell migration. Greater apparent closure was also observed in the center of some scratches than near the edges, suggesting a possible edge effect related to uneven cell density or redistribution of detached cells.

Conclusion: These data suggest that local anesthetics differentially affect wound-closure dynamics in HeLa cervical cancer cells, with bupivacaine producing the strongest concentration-dependent delay in closure. Lidocaine and ropivacaine demonstrated weaker or less consistent effects, primarily at higher concentrations. Because cytotoxic collapse, monolayer disruption, edge effects, and central accumulation of detached cells can alter apparent scratch width independently of true migration, wound-closure data should be interpreted alongside morphologic assessment and independent viability measurements. Future studies should incorporate viability assays, standardized statistical testing, mTOR pathway analysis, and imaging-based analysis of wound-edge integrity to distinguish impaired migration from cytotoxicity-related artifacts and clarify the clinical relevance of local anesthetic selection in post-surgical wound healing.



P4. Predictive Biomarkers for Immune Checkpoint Inhibitor Therapy: Current Evidence and Future Directions

Dimpal Kasabwala and Merit Mikhael

Mentor: Alexander Gasparian, Ph.D.

Objective: This narrative review evaluates established and emerging predictive biomarkers for response to immune checkpoint inhibitor therapy, including PD-L1 expression, tumor mutational burden, and MSI-H/dMMR. It also examines biomarkers of tumor immunogenicity and the tumor microenvironment and explores integrated biomarker models to improve prediction of treatment response, patient selection, and personalized immunotherapy.

Background: Immune checkpoint inhibitors (ICIs) have revolutionized cancer therapy, producing durable responses in patients across multiple malignancies. However, clinical benefit remains highly variable, with many patients demonstrating primary resistance, acquired resistance, or treatment-limiting toxicity. Consequently, substantial efforts have been directed toward identifying biomarkers that can predict which tumors are most likely to respond to immune checkpoint blockade. These biomarkers reflect different components of the antitumor immune response, including a tumor's ability to generate neoantigens, present those antigens to the immune system, recruit effector immune cells, and sustain antitumor immune activity within the tumor microenvironment. Established biomarkers such as PD-L1 expression, tumor mutational burden (TMB), and microsatellite instability/mismatch repair deficiency (MSI-H/dMMR) are already used in clinical practice, while a growing number of emerging biomarkers are being investigated to improve patient selection and treatment outcomes.

Methods: A narrative review of peer-reviewed literature was conducted using PubMed, ScienceDirect, and the Cochrane Library. These databases were selected to capture complementary sources of evidence, including primary clinical and translational studies, systematic reviews, meta-analyses, and landmark

investigations evaluating established and emerging biomarkers associated with response to immune checkpoint inhibitors.

Results: PD-L1 expression remains the most widely used clinical biomarker, reflecting a tumor's reliance on the PD-1/PD-L1 pathway to suppress antitumor immunity. However, its predictive value is limited by intratumoral heterogeneity, temporal variability, and differences among testing platforms. Tumor mutational burden (TMB) and microsatellite instability/mismatch repair deficiency (MSI-H/dMMR) are associated with increased neoantigen generation, enhancing the likelihood that tumor cells will be recognized by the immune system. Growing evidence also highlights the importance of the tumor microenvironment. High densities of CD8+ tumor-infiltrating lymphocytes (TILs), T-cell inflamed phenotypes, and interferon- γ -related gene-expression signatures are generally associated with improved responses, supporting the concept that checkpoint inhibitors are most effective when a pre-existing but suppressed immune response is already present. In contrast, tumors with absent or limited T-cell infiltration are frequently associated with resistance. Emerging biomarkers such as neoantigen burden, antigen-presentation signatures, and composite transcriptomic profiles may further refine assessment of tumor immunogenicity and immune activation. Growing evidence suggests that integrated biomarker models combining genomic, transcriptomic, and tissue-based markers may outperform individual biomarkers in predicting response to immune checkpoint inhibitors.

Conclusions: No single biomarker reliably predicts response to immune checkpoint inhibitors across all tumor types. While PD-L1 expression, TMB, and MSI-H/dMMR remain clinically useful, each reflects only one aspect of the tumor-immune interaction. Future approaches will likely rely on integrated biomarker platforms combining measures of tumor immunogenicity, antigen presentation, immune-cell infiltration, and inflammatory signaling to improve patient selection and treatment personalization.



P5. 3D Glioblastoma Growth Prediction via Fully Convolutional Spatiotemporal Modeling

Kirolos Shenouda, Jolie Garcia Willis, Wenxi Liu, Michael Trimboli, Matthew Newmarch

Mentor: Xianqi Li, Ph.D.

Objective: To evaluate whether spatiotemporal modeling can accurately predict 3D glioblastoma growth and preserve clinically relevant measures of tumor location and extent over extended forecasting horizons.

Methods: Patient-specific brain anatomy and tumor information were derived from the publicly available UPENN-GBM cohort. Structural MRI was used to define brain, white-matter, and gray-matter regions, and co-registered apparent diffusion coefficient (ADC) imaging was used to construct a normalized proxy of tumor cellularity. Because dense longitudinal imaging of untreated glioblastoma is rarely available, patient-MRI-informed tumor trajectories were generated using a tissue-dependent reaction-diffusion model that represented tumor proliferation and invasion through brain tissue. A total of 200 3D trajectories were generated on $128 \times 128 \times 128$ spatial grids. A fully convolutional spatiotemporal model was then used to forecast tumor evolution over 30- and 60-step horizons. Prediction accuracy was evaluated using tumor overlap, tumor-center displacement, structural similarity, and tumor-volume error.

Results: Tumor location and extent were well preserved during shorter-range prediction. At 30 steps,

the mean Dice score was 0.9568, intersection-over-union was 0.9175, tumor-center displacement was 0.220 voxels, and absolute tumor-volume error was 1.61%. Prediction performance declined gradually over longer horizons but remained strong at 60 steps, with a Dice score of 0.9025 and tumor-center displacement of 0.592 voxels. Absolute tumor volume error increased to 6.32%. Long-range predictions showed a mean volume bias of $-2,223$ voxels, indicating a tendency to underestimate tumor extent. A complete 60-step three-dimensional prediction required 0.486 ± 0.001 seconds.

Conclusion: Spatiotemporal modeling accurately reproduced the location and 3D extent of simulated glioblastoma progression across both short- and longer-range forecasts. The principal limitation at longer horizons was progressive underestimation of tumor volume rather than loss of tumor localization. These findings support further investigation of spatiotemporal prediction as a potential framework for longitudinal assessment of glioblastoma progression. Validation using serial clinical MRI and treatment-associated tumor changes will be necessary before the approach can be applied to patient monitoring or clinical decisionmaking.



P6. Microarchitecture of a human gastric extracellular matrix scaffold determined by scanning electron microscopy

Eli Mathew, Carter Luellen, Ava Richard, Jessica Rua

Mentor: Michelle D Cherne, Ph.D.

Objective: Compare structural differences between Matrigel and human gastric extracellular matrix (hgECM) using scanning electron microscopy (SEM) and determine whether enzymatic degradation can be detected and quantified by measuring Matrigel pore size and hgECM fiber diameter.

Methods: Human gastric extracellular matrix was decellularized to produce scaffolds for a visualization of gastric architecture under SEM. To investigate the effects of ECM proteases on microarchitecture, collagen was treated with collagenase, and Matrigel was treated with trypsin, then imaged using SEM. Decellularized hgECM and Matrigel samples underwent experimental enzyme degradation. 2 mg/mL collagenase was added to hgECM for 60s and 90s, while Matrigel samples were trypsinized for 90s or 10 min. Following enzymatic treatment, samples were fixed with formalin and prepared for SEM. To best visualize structures, samples underwent graded ethanol dehydration, were refixed, critical point dried, and sputter coated. Samples were imaged using a JEOL JSM-IT710HR field-emission scanning electron microscope. SEM images were evaluated for structural characteristics including fiber organization, surface morphology, and pore sizes. Matrigel pore size and hgECM fiber diameter were quantified from SEM using ImageJ with the Fiji extension. Measurements were compared across enzyme degradation duration and sample acquisition dates.

Results: Imaging with scanning electron microscopy demonstrated distinct differences in microstructure between Matrigel and hgECM. Matrigel predominantly exhibits a porous structure, while hgECM was fibrous with a fragmented appearance. Analysis of Matrigel images yielded a mean pore size of $1.351 \pm 0.585 \mu\text{m}$ in negative controls, $1.051 \pm 0.287 \mu\text{m}$ following 90 seconds of trypsinization, and $1.335 \pm 0.462 \mu\text{m}$ following 10 minutes of trypsinization. Although the 90-second trypsin group showed smaller pore measurements, there was no progressive reduction in pore size with increasing trypsin exposure. Considerable sample pore variability was detected, which may have been caused by sample preparation differences.

Enzymatic degradation of hgECM with collagenase was observable under SEM. Mean fiber diameter sizes of negative control hgECM were $0.139 \mu\text{m}$; following 60 seconds of collagenase, mean fiber

diameter was 0.084 μm ; the 90-second treatment fiber diameter was 0.108 μm . Collagenase-treated fiber diameters were smaller than the mean untreated fiber size. SEM visualization and quantitative assessment identified structural differences between Matrigel and hgECM and microstructural changes following enzymatic treatment.

Conclusions: Human gastric extracellular matrix displayed a disorganized fibrous microstructure composed primarily of collagen, distinct from laminin-rich Matrigel. Enzymatic degradation produced measurable changes in both Matrigel pore size and hgECM fiber diameter, detected using SEM. These findings provide baseline evidence supporting the use of SEM in evaluating structural remodeling of ECM scaffolds. Future studies are needed to investigate whether similar patterns of enzymatic degradation can be identified in gastric ECM following inflammatory or pathogen-mediated responses, providing further insight into ECM remodeling in gastric diseases.



P7. Sustained UPI Peptide Release from Embedded Microparticles to Enhance Vascular Graft Endothelialization

Sunita George, Cyrah Pinnock, Shirin Changizi, Malsha Nanayakkara, Leah Degard-Edmond, Lauren Hill, Sajae Willis, Chen Hong
Mentor: Chris Bashur, Ph.D.

Statement of Purpose: Tissue-engineered vascular grafts (TEVGs) are a promising alternative for coronary and peripheral artery bypass, but limited endothelialization and graft stenosis are still challenges. We have previously shown that a UPI peptide can target epsin – vascular endothelial growth factor receptor 2 (VEGFR2) interaction in mice and prevent VEGFR2 internalization [1]. Further, our prior research has also shown that incorporation of epsin-mimetic UPI peptides within TEVGs allowed rapid endothelialization and 100% patency at 1 week [2]. However, we hypothesize that local, more sustained release from microparticle carriers is important for longer-term grafting outcomes. Thus, the goals of this study are to develop microparticle-incorporated luminal coatings for more extended delivery of UPI peptides and to assess their effects on graft endothelialization and remodeling.

Methods: Poly (DL-lactide-co-glycolide) (PLGA) microparticles were prepared using a water/oil/water double emulsion technique with entrapped peptide (2 mg/g peptide/PLGA). Scrambled peptides and water-only control microparticles were also prepared. After lyophilization, SEM imaging and the Micro BCA assay were used for assessment. The microparticles were incorporated into a luminal gelatin coating inside electrospun polycaprolactone (PCL) conduits using needles of varied gauges. The coating thickness was analyzed using optical coherence microscopy (OCM). *In vitro* endothelialization of the conduits was assessed with GFP-positive human umbilical vein ECs (HUVECs). End-to-end grafting in rat infrarenal aortae was performed for 4 weeks, and ultrasound and histological characterization is ongoing. Significance is assessed with one-way ANOVA and Tukey multiple comparisons.

Results: PLGA microparticles exhibited diameters less than the size of capillaries (i.e., average diameter $6.62 \pm 4.1 \mu\text{m}$) (Fig. 1). FITC-tagged UPI peptides demonstrated inclusion of the peptides within the microparticles. The UPI peptides were released continuously from the microparticles over 5 days, and they continued to release at lower levels afterwards. These microparticles were also successfully incorporated within a luminal gelatin coating with no evidence of delamination. CryoSEM showed a smoother luminal

surface. OCM results showed a consistent gelatin layer with peptide-loaded microparticles. Coating thicknesses were 26.13 ± 6.16 , 30.05 ± 1.76 , and 59.63 ± 12.72 μm for needle templates of 18, 20, and 22 gauge, respectively. The 20 gauge needle produced the most consistent results and was therefore used for further studies. GFP+ HUVEC attached to coated conduit lumen (Fig. 2). After 3 days, greater cell spreading and attachment was observed on UPI-gelatin-coated scaffolds than the uncoated electrospun mesh control. PCR analysis is ongoing to compare the EC phenotype on UPI vs. water loaded samples. An *in vivo* study demonstrated that UPI-microparticle loaded grafts remained viable after 4 weeks ($n=3$), with no signs of stenosis. Histology and immunofluorescence are being performed to further compare UPI vs. water-loaded grafts.

Conclusion: This study showed that extended and controlled release of UPI peptides can be achieved for PLGA microparticle-embedded conduits. These coatings were consistent with controllable thicknesses. Preliminary cell culture studies demonstrate the benefit of the coating on HUVEC attachment. *In vivo* studies are ongoing to characterize the impact of UPI peptides on graft remodeling. Overall, this long-term UPI delivery strategy may be important clinically where graft endothelialization takes longer than in rodent models.

References:

- [1] Dong et al., J Clin Invest. 2015; 125(12): 4349-64.
- [2] Changizi et al., Macromol Biosci. 2023; 23(9);e2300073.

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P8. Photobiomodulation osteogenic effects of blue light on human mesenchymal stem cells

Nicolas Sosa

Mentors: Vipul Kishore, Ph.D., Vinicius da Silva

Objectives: The goal of this study was to examine the osteogenic effects of blue light photobiomodulation on human mesenchymal stem cells (hMSCs) by changing the energy density while keeping time constant among the groups. The hMSCs were placed in an osteogenic media and subjected to 4 minutes of blue light therapy every 48 hours. The effects of blue light photobiomodulation were assessed by looking at osteogenic activity, metabolic activity, and mineralization.

Methods: Basal media composed of 270 mL DMEM combined with 10% (30mL) Fetal Bovine Serum (FBS), and 1% (3 mL) Penicillin/Streptomycin was added to 50 $\mu\text{g}/\text{mL}$ Ascorbic Acid + 10 mM β -Glycerophosphate + 100nM Dexamethazone to make osteogenic media. To assess the effects of blue light, hMSCs were cultured in a 48 well plate with the osteogenic media at a density of 3,000 cells/cm². Blue light LEDs were placed below the occupied wells for irradiation with varying energy densities according to their group: a dark control group, 1 Joule (J), 2 J, 4 J, and 8 J. Each group consisted of 3 wells. The different energy groups were created by placing filters on the lights to control the amount of energy that is irradiated on the cells. Each group then received phototherapy for 4 minutes every 48 hours. The experiment was run for 21 days with media changes occurring on days 4, 7, 10, 14, and 18. On days 7, 14 and 21, alamar blue, Alizarin Red S (ARS), and Alkaline phosphatase (ALP) assays were run to assess metabolic activity, mineralization, and osteogenic differentiation, respectively.

Results: Using relative fluorescence units (RFU), we were able to quantify the alamar blue assays. The alamar blue showed cell growth in all blue light photobiomodulation groups compared to the dark group over the 21 days. The 2 J group had the most growth, while the 8 J group showed the least amount of growth on day 21. While analyzing the ARS, we were able to see a small amount of calcification on day 21 in the 8 J group. There were more cells on day 21 in all groups, and we can also see spots of extracellular matrix deposits that can lead to more calcification. The ALP assay was not able to be completed due to a miscalculation of the concentrations to run the assay.

Conclusion: The results demonstrated that the small amount of proliferation on day 21, seen in alamar blue, may correspond to the effect of varying energy densities of blue light in differentiating the human mesenchymal stem cells. Through metabolic activity we can infer the cell culture is expanding, creating more cells. In all light groups, the cells began to proliferate less on day 21 and were producing more extracellular matrices according to the ARS. This is the beginning of calcium deposition. For future experiments, the trials will be run until day 28 which may allow us to see more calcification among the cells's extracellular matrix. Future trials will also include an ALP analysis to quantify the osteogenic differentiation. More quantifiable data is still being calculated and compared with other trials.



P9. Keratinocyte Signaling in the Tissue-Resident Memory Niche: A Potential Link to Vitiligo Relapse

Maryann Levy

Mentor: Gabor Szalai, Ph.D.

Objective: In vitiligo epidermal keratinocytes signal to CD8⁺ tissue-resident memory T (TRM) cells throughout the resident-memory life-cycle—during recruitment, maintenance, and reactivation. This work synthesizes primary and review evidence to assess how these signals may sustain the resident-memory niche and contribute to pathways implicated in its reactivation, proposing a likely mechanism underlying same-site relapse.

Methods: This focused narrative review examines keratinocyte-to-CD8⁺ TRM signaling in vitiligo. PubMed and Google Scholar were searched for primary studies and reviews published from 2017 onward, combining the terms vitiligo, keratinocyte, tissue-resident memory T cell, TRM, CD8, CXCL9, CXCL10, CXCR3, IL-15, IL-15R α , NLRP3, IL-1 β , oxidative stress, damage-associated molecular pattern, relapse, and recurrence. Reference lists of retrieved articles were screened for additional sources, and foundational pre-2017 studies were retained where necessary to establish key mechanisms. Included studies addressed keratinocyte-derived signals to CD8⁺ T cells in vitiligo skin and excluded those confined to disease onset without TRM implications, limited to melanocyte death without an immune-signaling readout, focused on treatment efficacy, or describing general skin TRM biology unconnected to vitiligo. Sixteen sources were included in the review. Evidence was organized by function across three stages of the TRM lifecycle—recruitment, maintenance, and reactivation—with particular attention to reactivation as a potential link between persistent resident memory and same-site relapse. Within each stage, the analysis distinguished findings supported across multiple studies from emerging single-group reports requiring replication and separated keratinocyte-attributed signals from parallel melanocyte- and stromal-derived inputs. Where reported, extracted immunologic measures included cellular sources of chemokines and cytokines, correlations with disease activity, and effects of pathway perturbation in preclinical models. No original patient data was generated, and no statistical pooling was performed.

Results: Keratinocytes are an epidermal source of signals that recruit and sustain components of the

resident-memory niche. Same-site recurrence reflects persistent CXCR3+ CD8+ TRMs in resolved and perilesional skin.

Recruitment: The IFN- γ /CXCL9–CXCL10/CXCR3 axis is the dominant pathway positioning CD8+ T cells in vitiligo epidermis. Keratinocytes are a major in situ source of CXCL9/CXCL10, with IFN- γ signaling critical for T-cell homing and disease progression. Serum CXCL10 also correlates with disease activity.

Maintenance: IL-15/CD122 signaling, with CD122 known as Interleukin-2 receptor subunit beta (IL-2R β), is a central axis supporting CD8+ TRM survival. Oxidative stress induces keratinocyte IL-15/IL-15R α trans-presentation to CD8+ T cells, linking keratinocyte IL-15 to TRM maintenance. Additionally, CD122 blockade reversed disease and reduced skin TRMs, supporting a functional role for this axis in a mouse-model.

Reactivation and inflammatory amplification: Oxidative stress induces keratinocyte inflammatory programs relevant to renewed CD8+ T-cell activity. In vitiligo skin keratinocytes, oxidative stress activates NLRP3, driving IL-1 β production and CD8+ T-cell responses. Circulating IL-1 β is elevated in vitiligo and correlates with disease activity/severity. Disrupting NLRP3/IL-1 β mediated pathways impaired CD8+ T-cell chemotaxis and effector cytokine production. Multimodal profiling identified a distinct keratinocyte population in stable vitiligo secreting CXCL9/CXCL10 and forming inflammatory feedback-loops with T cells linked to disease persistence and impaired repigmentation. Damage-associated molecular patterns also link epidermal stress to immune amplification. Emerging single-group evidence suggests keratinocyte-derived exosomal LKB1 enhances CD8+ T-cell cytotoxic activity. Together, these findings establish several routes whereby keratinocytes sustain or amplify CD8+ T-cell activity, but whether any directly reactivate quiescent TRMs remains unproven.

Conclusion: The reviewed evidence supports regarding keratinocytes as active, underappreciated contributors to the resident-memory niche in vitiligo rather than as a passive backdrop to the CD8/melanocyte interaction. Across the resident-memory life-cycle, keratinocyte signaling contributes to recruitment of CXCR3+ CD8+ T cells through CXCL9/CXCL10, maintenance of TRM effector potential through IL-15 trans-presentation, and reactivation-associated inflammatory signaling through IL-1 β and persistent inflammatory keratinocyte states. Although these mechanisms have largely been studied as separate pathways, organizing them around the resident-memory compartment suggests that keratinocytes may participate not only in recruiting autoreactive CD8+ T cells to the epidermis, but also in maintaining the local conditions that allow disease memory to persist between clinically active episodes. Together, these findings raise a central, unresolved question: do changes in keratinocyte state help determine when persistent TRMs transition back into active effector cells? Keratinocytes act within a multicellular niche alongside melanocyte- and stromal-derived inputs and are not proposed as the sole, primary, or initiating cell in vitiligo pathogenesis. Several reactivation-associated mechanisms remain supported by single-group evidence, and no study has yet directly demonstrated keratinocyte-dependent reactivation of quiescent TRMs in human vitiligo skin—the causal link between persistent keratinocyte signaling, TRM reactivation, and same-site recurrence. Therefore, this phenomenon remains inferred rather than established. Reframing these pathways as components of a coordinated keratinocyte–TRM signaling network transforms scattered mechanistic observations into a testable model and identifies the critical next question: whether keratinocyte activity is necessary for TRM reactivation and subsequent local recurrence.



P10. Neurovascular and Metabolic Effects of Glucagon-Like Peptide-1 Receptor Agonists and Serotonergic Antidepressants: A Systematic Review and Complementary Meta-Analysis

Jeffrey McSherry, Gerard Cabrera, Marco Jaimes-Solis, David Padron

Mentor: Robert Coni, DO

Objective: To systematically evaluate the effects of GLP-1 receptor agonists on stroke outcomes and serotonin antidepressants on glycemic control through two complementary meta-analyses, with the goal of improving understanding of treatment-related factors relevant to neurovascular disease.

Methods: Two complementary meta-analyses were conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. MEDLINE Complete, PubMed, and Scopus were systematically searched from 2016 through 2026. Analyses were performed using RevMan version 8.5.0. The GLP-1RA meta-analysis included randomized controlled trials and retrospective cohort studies evaluating adults with or without type 2 diabetes receiving a GLP-1RA or placebo. Primary outcomes included total, non-fatal, and fatal stroke. The serotonin antidepressant meta-analysis included retrospective cohort studies of adults with type 2 diabetes and depressive disorders receiving serotonin antidepressant therapy or control treatment. The primary outcome was glycemic control.

Results: In the GLP-1RA meta-analysis, 10 of 532 screened studies met the inclusion criteria, representing 68,623 participants. GLP-1RA therapy was associated with a significantly lower incidence of non-fatal stroke compared with placebo (OR, 0.86; 95% CI, 0.78–0.94; NNT = 232), with no observed heterogeneity. GLP-1RA therapy was also associated with a significantly lower incidence of total stroke (fatal and non-fatal combined) compared with placebo (OR, 0.87; 95% CI, 0.79–0.95; NNT = 222), likewise demonstrating no heterogeneity. In the serotonin antidepressant meta-analysis, 3 of 544 screened studies met inclusion criteria, encompassing 6,384 participants. Although glycemic control favored serotonin antidepressant therapy over the control group (OR, 3.80; 95% CI, 0.37–39.19; NNT = 11), the finding did not reach statistical significance because of limited statistical power.

Conclusion: GLP-1 receptor agonist therapy was associated with significant reductions in both non-fatal and total stroke, supporting accumulating evidence that these agents provide cerebrovascular benefits beyond glycemic control. In contrast, the available evidence for serotonin antidepressant therapy demonstrated a favorable trend in glycemic control but was limited by the small number of eligible studies and inadequate statistical power to detect a definitive effect. Collectively, these complementary meta-analyses highlight the potential role of GLP-1RAs in reducing cerebrovascular risk while underscoring the need for larger, prospective studies to clarify the metabolic and neurovascular effects of serotonin antidepressants. Given the frequent co-prescription of these therapies in patients with type 2 diabetes and cerebrovascular disease, future research should investigate their combined clinical implications and potential impact on long-term neurovascular outcomes.



P11. *H. pylori* infection does not increase matrix metalloproteinase activity of human gastric organoids

Catherine Azkue Acosta, Carter Luellen, Jessica Rua, Andrew T Sebrell, Diane Bimzok

Mentor: Michelle D. Cherne, Ph.D.

Background: *H. pylori* is a Gram-negative bacterium that colonizes the gastric mucosa and infects approximately half of the world's population. In chronic *H. pylori* infection, persistent epithelial inflammation induces expression of matrix metalloproteinases (MMPs), zinc-dependent enzymes involved

in gastric extracellular matrix (ECM) remodeling. The gastric ECM is a structural network composed of collagens, glycoproteins, and proteoglycans, and MMPs target these components for degradation. The implementation of human gastric organoids provides a physiological model of gastric epithelium which can be manipulated to study MMP enzymatic activity during *H. pylori* infection. This study investigated the effect of *H. pylori* infection on MMP activity in human gastric organoids and evaluated experimentally induced collagen damage using fluorescein-labeled collagen hybridizing peptide (F-CHP) detection.

Methods: Four independent human gastric organoid samples were collected and treated on separate days per experimental condition: *H. pylori* microinjection, TNF- α treatment as a positive inflammatory control, and uninoculated microinjection as a "mock" mechanical injury control. Subsequently, the samples were concentrated fourfold using centrifugal filter units due to preliminary optimization that demonstrated increased fluorescence in fourfold concentrated human gastric organoid conditioned media. Each sample was plated in duplicates on a 96 Well Black Polystyrene Microplate and incubated with APMA to activate pro-MMPs. MMP activity was measured using the Amplitude™ Universal MMP Activity Assay Kit. Fluorescence was measured kinetically over 60 minutes to assess MMP activity. Gastric tissue samples were separately treated with collagenase or heat denaturation, while untreated tissue and phosphate buffered saline (PBS) were incorporated as controls. Subsequent collagen damage was evaluated using the 3Helix F-CHP assay.

Results: MMP activity did not significantly differ between the *H. pylori*-infected and mock-injection conditions (27.90 ± 0.66 vs. 31.96 ± 6.33 million RFU; $p = 0.3968$). In the TNF- α condition, organoids exhibited greater MMP activity than the *H. pylori*-infected condition (37.75 ± 3.52 vs. 27.90 ± 0.66 million RFU; $p = 0.0221$). MMP activity did not significantly differ between the TNF- α condition and the mock-injection condition ($p = 0.1808$). F-CHP fluorescence was observed to be highest in collagenase-treated tissue (83.59 ± 4.54 million RFU), followed by heat-denatured tissue (51.13 ± 2.06 million RFU), and untreated control tissue (18.56 ± 0.69 million RFU). PBS, as expected, demonstrated minimal fluorescence.

Discussion: Although it is well established that chronic *H. pylori* infection induces expression of MMPs, this study found that *H. pylori* infection did not increase MMP expression relative to mock-injected controls, whereas the TNF- α positive inflammatory control demonstrated greater MMP activity than *H. pylori*-infected samples. This finding may suggest distinct effects of bacterial and inflammatory signaling in MMP activity. Furthermore, a fluorescence assay using F-CHP was able to detect collagen damage in positive control gastric tissue samples, with the collagenase-treated sample displaying the highest observed fluorescence, demonstrating the utility of F-CHP in detecting the presence of degraded collagen in ECM. Future studies could determine whether testing additional inflammatory cytokines with *H. pylori* could distinguish bacterial vs. inflammatory effects on MMP activity.



P12. Proton Pump Inhibitor Exposure and Oralization of the Human Gut Microbiome: A Scoping Review

Lucas McCurdy

Mentor: Mir Saleem, MD

Objective: The primary objective of this scoping review is to characterize the reported associations and effects of proton pump inhibitor exposure on alpha diversity, beta diversity, taxonomic composition, and functional features of the human gut microbiome.

Methods: A literature search was conducted on July 6th 2026 in PubMed using index terms and title/abstract phrases related to proton pump inhibitors (PPI) and gut microbiome outcomes identified during initial determination of project scope. No language restrictions were applied. Gray literature was not included to prioritize studies with complete methods, microbiome outcome reporting, and extractable clinical data. Human studies were eligible for inclusion if they contained PPI exposure or intervention and reported intestinal or fecal gut microbiome outcomes. Eligible microbiome outcomes included alpha diversity, beta diversity, taxonomic composition, microbial function, or infection-related microbiome findings. Studies were excluded if they were animal-only or in vitro-only studies, focused on antibiotics or H. pylori eradication therapy, evaluated other acid suppression medications without a PPI cohort, did not report microbiome outcomes, or assessed only gastric microbiota. At the time of submission data extraction had been completed for 35 included studies, representing 5,469 patients. Extracted data included study design, population, sample size, PPI type and exposure duration, sequencing method, diversity measures, taxonomic and functional findings, and clinical implications.

Results: Exposure to proton pump inhibitors was frequently associated with findings consistent with ‘oralization’ of the gut microbiome. Suppression of gastric acid provides a plausible mechanism by which PPIs may facilitate survival or transit of oral-origin microbes into the distal gastrointestinal tract. Of the 35 studies extracted, 29 reported at least one taxonomic finding consistent with oralization. 25 studies assessed beta diversity, of which 16 reported significant differences in community structure. 31 studies assessed alpha diversity, of which 15 reported no significant difference. Direct functional measurements, not inferred through software such as PICRUSt2, appear to be a moderate gap in the literature at this time.

Conclusion: Across the literature, PPI-associated microbiome alterations appear more consistently characterized by enrichment of oral-associated taxa and shifts in community composition than by generalized loss of microbial diversity. Whether these compositional changes represent transient passage or persistent colonization, and whether they are functionally relevant, remains incompletely resolved. Future studies should prioritize clinically interpretable outcomes alongside diversity metrics, utilize shotgun sequencing, and include direct functional data such as metabolomics and meta-transcriptomics.



P13. Effectiveness and Safety of OTC Supplements for Mild Anxiety in Young Adults Compared With First-Line Pharmacologic Therapies: A Comparative Literature Review

Diana Sokolov; Karla Del Moral Teppa

Mentor: Mir Saleem, MD

Objective: To compare the effectiveness and safety of L-theanine, magnesium, ashwagandha, and kava with first-line pharmacologic therapies, particularly selective serotonin reuptake inhibitors (SSRIs) and serotonin-norepinephrine reuptake inhibitors (SNRIs), for managing anxiety in young adults.

Methods: A narrative literature review was conducted using PubMed, Google Scholar, and ScienceDirect. Search terms included combinations of “anxiety,” “OTC supplements,” “L-theanine,” “magnesium,” “ashwagandha,” “kava,” “SSRIs,” and “SNRIs.” Eligible sources included randomized controlled trials, systematic reviews, meta-analyses, and observational studies published in peer-reviewed journals. Studies were excluded if they lacked anxiety-related outcomes, sufficient methodological detail, or English-language availability. Approximately 30 studies were initially screened. Studies were selected based on relevance, methodological quality, and applicability to anxiety management in young adults, resulting in 13 included references. Evidence was narratively compared across interventions with attention to anxiolytic effects, consistency of findings, and reported safety concerns.

Results: Thirteen of approximately 30 screened studies were included. Ashwagandha showed the most consistent evidence among the reviewed supplements, with multiple randomized controlled trials reporting improved anxiety scores and stress-related biomarkers. Magnesium showed potential benefit mainly in individuals with stress-related symptoms or low baseline magnesium levels, but findings were inconsistent. L-theanine had a favorable safety profile and was associated with modest improvements in stress-related symptoms and sleep quality; evidence for clinically significant anxiety disorders was limited. Kava produced moderate anxiolytic effects in some studies, but hepatotoxicity concerns and inconsistent findings reduced its clinical reliability. Overall, SSRIs and SNRIs demonstrated stronger and more consistent efficacy for moderate-to-severe anxiety disorders than the reviewed OTC supplements.

Conclusion: The reviewed evidence suggests that some OTC supplements may offer modest benefit for mild, situational, or stress-related anxiety in young adults. Ashwagandha had the most consistent evidence of benefit, whereas findings for magnesium and L-theanine were more variable and kava was limited by safety concerns. OTC supplements may be considered complementary options, but the available evidence does not support replacing SSRIs or SNRIs for moderate-to-severe anxiety disorders. Larger, well-designed studies focused on young adults are needed to clarify long-term effectiveness and safety.



P14. Secondary Geriatric Trauma Transfers to a Level II Trauma Center: Injury Phenotype, Resource Use, Transfer Timing, and Documentation Completeness

Jessica Yanosik

Mentor: Dana Mathew, MD

Objectives: The primary objective is to compare the prevalence of high-consequence traumatic injury between primary geriatric trauma-center arrivals and secondary geriatric trauma transfers. The secondary objective is to compare trauma-center resource utilization between pathways using a prespecified composite and component outcomes. We will then describe transfer intervals, transfer reasons, documentation completeness, outside-record availability, and repeat imaging after transfer.

Methods: We will conduct a retrospective cohort study of adults aged 65 or older evaluated for acute traumatic injury within the Health First system from January 1, 2020, to December 31, 2025. Candidate cases will be identified from the trauma registry, trauma activations, consults, admissions, and transfer-center trauma records. The cases will then be screened to exclude non-traumatic presentations and duplicates. The arrival pathway will be classified as primary arrival or secondary transfer. Unclear cases will be flagged for adjudication. Secondary transfers will require confirmation of initial evaluation at another acute-care hospital.

A pre-specified data dictionary and locked Excel abstraction sheet with allowable values will be created and piloted on 10-20 cases before full abstraction. These values will include demographics, arrival pathway, route, transfer type, mechanism, injury diagnoses, severity markers, length of stay, disposition, and transfer-related variables. Absence of documentation will be interpreted as a result, not missing data. Unclear cases will be reviewed by a second individual. Disagreements will be resolved by consensus or principal investigator decision. A random 10- 20% of cases will undergo double review. Inter-rater reliability for key categorical variables will be summarized using percent agreement and Cohen's kappa. After reconciliation, the master linkage file will be separated from the deidentified data set, and the final dataset will be locked before analysis.

Results: Outcomes will be finalized after data collection. The primary analysis will compare the proportion of high-consequence traumatic injuries between primary arrivals and secondary transfers using counts, percentages, absolute risk differences, relative risks, odds ratios when informative, and 95% confidence intervals. This comparison will be unadjusted but interpreted descriptively. If event counts permit, a parsimonious adjusted model will estimate the association between the arrival pathway and high-consequence injury. A secondary adjusted analysis will evaluate a resource-utilization composite using the same descriptive and effect-size framework.

For secondary-transfer patients, we will summarize transfer reasons, accepting service, availability of outside records and imaging, repeat imaging, and documentation completeness scores. Transfer interval calculations will be restricted to cases with complete and plausible timestamps. We will assess whether low documentation completeness is associated with repeat imaging using risk differences and, when sample size allows, adjusted regression controlling for injury region and mechanisms. We will also explore whether documentation completeness relates to longer transfer intervals using median differences or quantile regression. Missing data and outside record incompleteness will be reported as a system-level finding rather than a limitation.

Conclusion: A conclusion will be reached once data collection is complete. We hypothesize that secondary geriatric transfers differ from primary geriatric trauma-center arrivals in high-consequence traumatic injury burden, injury phenotype, mechanism distribution, resource utilization, discharge disposition, and in-hospital mortality.



P15. Peripheral Nerve Injury After Total Hip Arthroplasty: A Review of Incidence, Risk Factors, and Prevention

Eli Rudnisky, Nicolas Sosa

Mentor: Raju Panta, MBBS, MD

Background: Total hip arthroplasty (THA) is one of the most performed and successful orthopedic procedures for the management of end-stage hip disease, providing substantial pain relief and functional improvement. Despite advancements in surgical techniques, implant design, and perioperative care, peripheral nerve injury (PNI) remains an uncommon but potentially devastating complication. Even transient or sensory-predominant nerve injuries may impair patient satisfaction, while motor deficits can result in prolonged disability and compromised postoperative recovery.

Objective: This review aims to provide a comprehensive, clinically focused overview of peripheral nerve injury following total hip arthroplasty by synthesizing current evidence on incidence patterns, anatomical vulnerability, patient- and procedure-related risk factors, mechanisms of injury, and contemporary preventive strategies relevant to both primary and revision THA.

Methods: A structured narrative review of literature was conducted using four databases: PubMed, Medline, PubMed Central, and Google Scholar. The search strategy used combinations of medical subject headings (MeSH) terms and peripheral nerve injury, nerve palsy, total hip arthroplasty, incidence, risk factors, surgical approach, and prevention, using Boolean operators (AND/OR) to refine results. Inclusion criteria focused on peer-reviewed articles published within the last 10 years that reported incidence, risk factors, or preventive interventions for PNI after primary or revision THA. Non-English publications and opinion-only articles were excluded. Two reviewers independently screened titles, abstracts, and full texts, with disagreements resolved by consensus with third reviewer. A total of 29 articles met the inclusion criteria and were reviewed and synthesized qualitatively with emphasis on

clinical relevance rather than formal quantitative comparison.

Review: Reported incidence rates of peripheral nerve injury range from approximately 0.17%-3.7% following primary THA and increase to as high as 7.6% following revision procedures. Sciatic, femoral, lateral femoral cutaneous, and superior gluteal nerves are the most affected, with injury patterns closely related to surgical approach, extent of dissection, limb manipulation, and patient anatomy. Revision surgery, pre-existing spinal pathology, developmental dysplasia of the hip, younger age, diabetes mellitus, and tobacco use are consistently identified as key risk factors. The direct anterior approach is most frequently associated with lateral femoral cutaneous nerve injury, whereas posterior and lateral approaches pose higher risk to the sciatic and superior gluteal nerves, respectively. Preventive strategies discussed in the literature include preoperative risk stratification and optimization of modifiable factors, meticulous surgical technique, approach-specific precautions, gluteus maximus tenotomy in selected posterior approaches, and selective use of intraoperative nerve monitoring in high-risk cases.

Conclusion: PNI following THA remains a rare but clinically meaningful complication with multifactorial etiology. Awareness of approach-specific anatomy, patient-related vulnerabilities, and technical risk factors is essential to minimize injury risk. Incorporation of prevention-focused perioperative strategies and careful surgical planning may reduce the incidence and severity of nerve injuries. Future research should prioritize standardized definitions of nerve injury, prospective evaluation of preventive interventions, and assessment of cost-effectiveness to further guide evidence-based clinical practice in THA.



P16. Predicting Later Hypoxemia During EMS Care: Baseline and Serial Physiologic Modeling

Hunter Trinh; Jeffrey Zhao

Mentor: Kunal Mitra, Ph.D.

Objective: To synthesize source-verified evidence on whether prehospital physiologic measurements can predict later hypoxemia or clinical deterioration and to determine what is known about the incremental value of serial or temporal vital-sign modeling over a baseline snapshot.

Methods: Conducted a focused literature review of 31 sources encompassing EMS cohort studies, prediction-model development and validation studies, systematic reviews, critical-care forecasting studies, national NEMSIS analyses, and official NEMSIS technical documents. References and key claims were verified against original journal records, PubMed or PubMed Central, institutional full text, or official NEMSIS materials. Studies were synthesized according to population, outcome, predictor timing, modeling approach, and applicability to routine EMS care. Baseline approaches used information available at a single prediction landmark or static summaries, whereas serial or temporal approaches incorporated change, slope, variability, trajectory, sequential updating, or ordered physiologic inputs.

Results: Baseline prehospital physiology consistently provided predictive information for short-term adverse outcomes, although performance varied substantially by population and prediction horizon. A 2025 systematic review of 16 studies including 311,932 adults reported AUROCs of 0.68–0.90 for shortterm

mortality, with generally stronger discrimination at shorter horizons. In large unselected ambulance cohorts, established early warning scores commonly achieved AUROCs near 0.67–0.68 for 30-day mortality, whereas prehospital NEWS achieved an AUROC of 0.840 for 1-day mortality. Nonlinear

machine-learning approaches sometimes improved discrimination over fixed scores or conventional models, but gains varied and external validation remained limited. Direct forecasting of later prehospital hypoxemia was concentrated in selected airway or critical-care populations, while ICU waveform studies used substantially denser monitoring than routine EMS data. Serial physiology has been modeled using changes, extrema, averages, variability, clustering, and sequential approaches. Although hospital studies suggest that repeated measurements can add prognostic information, prehospital studies rarely compared otherwise matched baseline and serial models at the same prediction landmark. The incremental value of early serial routine EMS vital signs for predicting later hypoxemia therefore remains uncertain.

Conclusion: Early prehospital physiology contains clinically relevant predictive signal, and temporal modeling is scientifically plausible. However, current evidence does not establish that serial routine EMS vital signs improve prediction of later hypoxemia beyond information available at the initial assessment. The key unresolved question is whether serial physiologic information provides incremental predictive value over a baseline snapshot when both approaches are evaluated within the same population, prediction landmark, outcome definition, modeling framework, and validation strategy. Future studies should also assess calibration, clinically relevant operating thresholds, subgroup performance, external validity, and prospective utility before clinical implementation.



P17. Modeling E-Bike Trauma: Clinical and Biomechanical Evidence for Public Safety Mandates

Luisa Fernandes

Mentor: Linxia Gu, Ph.D., Pengfei Dong, Ph.D.

Objective: To synthesize epidemiological trends, cranio-cervical and maxillofacial injury patterns, and helmet efficacy associated with electric bicycle (e-bike) trauma to inform evidence-based public safety mandates and age restrictions.

Methods: A systematic literature review was conducted using PubMed/MEDLINE, Web of Science, and Google Scholar for peer-reviewed studies published between 2010 and 2026. Search terms included “e-bike,” “electric bicycle,” “s-pedelec,” “micromobility,” “traumatic brain injury,” “cranial trauma,” “maxillofacial injury,” “helmet use,” and “accident reconstruction.” Data were extracted from national registries (e.g., NEISS), Level I trauma center cohorts, matched-pair analyses, and computational crash kinematics. Inclusion criteria comprised peer-reviewed human clinical trauma cohorts, pediatric versus adult head injury series, computational crash kinematics, and naturalistic speed/helmet risk studies focused on powered two-wheelers. Studies evaluating non-motorized bicycles without a micromobility comparison group, isolated non-cranial/maxillofacial minor extremity trauma, and non-peer-reviewed commentaries were excluded.

Results: E-bike operational speeds (20–28 mph) generate impact kinetics comparable to motorcycle collisions rather than traditional bicycles, with head and facial trauma accounting for over 40% of resulting hospitalizations. In synthesized Level I trauma cohorts and matched-pair series, e-bike crashes demonstrated a high burden of neurotrauma: total traumatic brain injury (TBI) rates reached ~66%, predominantly driven by mild TBI (~52%), moderate TBI (~10%), and severe TBI (~3%). Intracranial bleeding occurred in over 31% of analyzed cases, comprising subdural hematomas (~25%), intracerebral hemorrhage (~21%), subarachnoid hemorrhage (~16%), and epidural hematomas (~2%). Pediatric and adolescent cohorts exhibited severe structural neurotrauma, including linear skull fractures, epidural hematomas, pneumocephalus, and traumatic venous sinus thrombosis. Across cohorts, low helmet adherence strongly correlated with elevated neurotrauma severity.

Conclusion: E-bike collisions generate severe, high-energy cranio-cervical and intracranial trauma resembling motorcycle-induced trauma rather than standard bicycle injuries. The disproportionate incidence of TBIs and intracranial hemorrhages, combined with low helmet utilization, highlights a critical regulatory gap. These findings support the implementation of standardized public safety interventions, including universal helmet mandates, reinforced helmet safety standards, and age-specific operational restrictions to reduce preventable neurotrauma.



P18. Post-Stroke Obstructive Sleep Apnea Evaluation Gaps and Risk of Recurrent Ischemic Stroke or TIA

Abigail Ploch, Tanay Malla, Diego Rodriguez

Mentor: Robert Coni, DO

Objective: To determine whether completion of post-stroke OSA evaluation within 180 days is associated with documented recurrent ischemic stroke or TIA within 24 months after index discharge among adults without previously diagnosed OSA, and to identify points of failure within the post-stroke OSA care pathway in order to prevent future unnoticed diagnoses.

Methods: This retrospective cohort study will use electronic medical records (EMRs) from the HealthFirst health system. Adult patients aged 18 years and older with an index ischemic stroke or transient ischemic attack (TIA) during a defined two-year index period will be identified. The index event will be defined as the first documented ischemic stroke or TIA within the study period and confirmed through EMR documentation, diagnostic coding, neurology consultation notes, imaging interpretation, and/or stroke registry documentation when available. Patients with a documented diagnosis of obstructive sleep apnea (OSA) before the index event will be excluded. The index period will end at least 24 months before the study data-freeze date to ensure adequate follow-up for recurrent cerebrovascular events. Patients will be categorized according to OSA evaluation status within 180 days after index discharge as: (1) completed OSA evaluation, (2) OSA evaluation ordered but not completed, or (3) no documented OSA evaluation ordered. Completion may include polysomnography, home sleep apnea testing, or documented sleep medicine evaluation. Collected variables will include demographics, vascular risk factors, stroke characteristics, hospitalization data, outpatient neurology follow-up, sleep medicine referrals, sleep study completion, OSA diagnosis, treatment initiation, and documented treatment adherence when available. The primary outcome will be recurrent ischemic stroke or TIA documented within the HealthFirst system during 24 months of follow-up. Secondary outcomes will assess OSA evaluation ordering and completion, OSA diagnosis, treatment initiation, and adherence. Descriptive statistics will summarize cohort characteristics and care-pathway completion. Categorical variables will be compared using chi-square or Fisher's exact tests, and logistic regression may adjust for potential confounders, including age, sex, diabetes, smoking history, BMI, and other vascular risk factors.

Results: Data collection has not yet begun. Based on preliminary feasibility estimates, approximately 100–200 adult patients with recurrent ischemic stroke or TIA are expected to be identified through retrospective review of Health First Holmes Regional Medical Center electronic medical records. The final sample size will depend on the number of eligible patients meeting inclusion and exclusion criteria, including the absence of a documented diagnosis of obstructive sleep apnea (OSA) prior to the index cerebrovascular event. Planned analyses will compare rates of recurrent ischemic stroke or TIA among patients who completed OSA evaluation within 180 days of discharge and those who did not. Descriptive analyses will also quantify rates of OSA evaluation ordering, diagnostic testing completion, OSA diagnosis, treatment initiation, and documented treatment adherence throughout the post-stroke care pathway.

Multivariable logistic regression models are planned to adjust for potential confounders including age, sex, hypertension, diabetes, smoking history, and BMI.

Conclusion: We hypothesize that among adults without a known diagnosis of obstructive sleep apnea (OSA) before an index ischemic stroke or transient ischemic attack (TIA), failure to complete an OSA evaluation within 180 days after discharge will be associated with a higher rate of recurrent ischemic stroke or TIA documented within the health system during the next 24 months. This study is also expected to identify clinically relevant gaps throughout the post-stroke OSA care pathway, including failure to order or complete sleep medicine referrals and diagnostic testing, as well as gaps in OSA diagnosis, treatment initiation, and documented treatment adherence.

By examining these steps using real case documentations, the study may clarify where patients are most frequently lost along the pathway from post-stroke evaluation to long-term OSA management. By identifying these points of failure we may provide clear targets for future initiatives with improved quality focused on improving diagnostic evaluation, treatment initiation, and long term care after stroke or TIA. These findings may help inform strategies to strengthen recognition and management of OSA as a potentially modifiable contributor to cerebrovascular risk and support broader secondary stroke prevention efforts. Because this study is retrospective and limited to events documented within the HealthFirst health system, its findings will primarily focus on associations and care pathway gaps instead of a causal relationship between OSA evaluation and recurrent cerebrovascular events.



P19. The Effect of Osteopathic Manipulative Medicine on Snoring and Sleep Quality in Children: A Literature Review

Natasha Mahaise, Eli Mathew, Riya Palikonda

Mentor: Doris Newman

Background and Objective: Pediatric sleep-disordered breathing (SDB) encompasses a broad spectrum of disorders ranging from primary snoring to obstructive sleep apnea and is associated with impaired cognition, negative behavioral changes, worsening cardiovascular health, and reduced quality of life. Current treatments focus primarily on maintaining upper airway patency through surgical procedures, continuous positive airway pressure (CPAP), and orthodontic interventions. Osteopathic manipulative treatment (OMT) and manual manipulation may be used as an adjunctive approach to current treatments by addressing upper airway somatic dysfunctions through rebalancing autonomic regulation, restoring lymphatic drainage, and improving respiratory function. The purpose of this literature review is to answer “In children with sleep-disordered breathing, does OMM improve snoring and/or sleep quality at follow-up?” and to examine the effectiveness of OMT on snoring, upper airway dysregulation, or dysfunction. Due to the principles of OMT, we hypothesize that OMT will reduce snoring, improve sleep quality, increase sleep duration, and can be used in conjunction with other conventional allopathic treatments.

Methods: Selected articles were accessible to students at Burrell College. Search terms included combinations of “pediatric”, “osteopathic manipulative treatment,” “osteopathic manipulative medicine,” “osteopathic manipulative treatment”, “manual therapy”, “snoring,” “obstructive sleep apnea”, and “sleep-disordered breathing”. Included articles were written in English, measured and discussed snoring, applied osteopathic or manual treatment, included a population with upper airway dysfunction or sleep-disordered breathing, and used a case study, randomized controlled trial, pilot study, or observational study design. **Results:** Six studies met inclusion criteria, including one systematic review, four randomized controlled trials, and one case series. Treatment interventions investigated included cranial manipulation, sphenopalatine ganglion inhibition, cervical manual therapy, massage therapy, myofascial release (MFR),

muscle energy techniques (MET), and orofacial myofunctional therapy (OMFT). Across studies, manual therapy treatments were shown to improve snoring frequency, sleep quality, daytime sleepiness, upper airway stability, and selected polysomnographic measures, including reductions in apnea-hypopnea index. Pediatric osteopathic evidence was limited but suggested OMT led to improvements in mouth breathing, sleep quality, and snoring following treatment. OMFT and manual therapy studies provide additional evidence supporting the investigation of musculoskeletal approaches to treat upper airway dysfunctions.

Conclusion: Current evidence supporting OMT for pediatric sleep-disordered breathing remains limited but suggests potential benefits in reducing snoring and improving sleep quality by optimizing upper airway mechanics, neuromuscular function, autonomic balance, and lymphatic drainage. Broader evidence from OMFT and manual therapy supports the physiologic rationale for osteopathic intervention. More well-designed pediatric randomized controlled trials are needed to determine the efficacy of OMT as a complementary treatment for children with primary snoring and sleep-disordered breathing.

Future Direction: Of the studies implementing OMT, only one included a pediatric population, highlighting a need for pediatric research evaluating treatment efficacy and technique selection. Future studies should investigate the techniques in protocols indicated by Jacq et al. and others to provide a standardized therapeutic procedure. We plan to address this gap by conducting a pilot study to investigate the impact of OMT on elementary-aged children. The pilot study will focus on establishing an osteopathic protocol targeting somatic dysfunctions of the head and neck down to the level of T6 and assessing whether our procedure is effective in reducing snoring and sleep-disordered breathing.



P20. A Whole-Body Osteopathic Approach to Chronic Temporomandibular Joint Dysfunction: A Case Report

Yasmeen Attia

Mentor: Jennifer Leavy, DO

Objective: Temporomandibular disorder (TMD) is characterized by jaw pain, joint dysfunction, and restricted mandibular motion. Although treatment often focuses on the temporomandibular joint itself, osteopathic principles emphasize the evaluation of regional and global biomechanical contributors that may perpetuate symptoms. This case describes the evaluation and management of comprehensive osteopathic manipulative treatment (OMT) for chronic TMD associated with multiregional somatic dysfunction.

Methods: A 27-year-old female medical student presented with over a decade of temporomandibular joint dysfunction characterized by daily jaw clicking and popping, predominantly right-sided jaw tightness, intermittent pain with wide mouth opening, and symptom exacerbation during periods of stress and prolonged chewing of hard foods. Symptoms had been present since adolescence and progressively worsened over time. Associated symptoms included nocturnal bruxism, chronic neck tightness, tinnitus, ear pressure, decreased cervical range of motion, and daily ocular migraines. The osteopathic structural examination revealed multiregional somatic dysfunction involving the cranial, cervical, thoracic, lumbar, sacral, pelvic, rib, abdominal, and lower extremity regions. The patient underwent three OMT sessions utilizing a combination of techniques including balanced ligamentous tension, muscle energy, facilitated positional release, counterstrain, and myofascial release directed at identified somatic dysfunctions. Clinical outcomes included changes in Numeric Rating Scale (NRS) pain scores, mandibular mechanics, and repeat structural examination findings.

Results: Following OMT, jaw pain improved from 4/10 to 0/10 on the NRS and remained a 0/10 at the three-week follow-up. Progressive improvement in mandibular mechanics was observed, with marked reduction in S-shaped mandibular opening and jaw deviation across follow-up visits. Repeat osteopathic structural exams demonstrated substantial reduction in multiregional somatic dysfunctions, with normalization of structural findings by the three-week follow-up. No treatment-related complications were observed.

Conclusion: This case demonstrates that a comprehensive osteopathic approach in the management of chronic TMD may improve pain, mandibular biomechanics, and multiregional somatic dysfunction. Evaluation beyond the temporomandibular joint may identify contributing biomechanical dysfunctions that are not addressed by localized treatment alone. Although encouraging clinical improvement was observed, larger studies are needed to determine the effectiveness of this approach.



P21. Osteopathic Manipulative Treatment in Practice: Medial Meniscal Counterstrain to Treat Chronic Knee Pain: A Case Study

Juliana Helfer, Ashley Wall

Mentor: Paul Capobianco, DO

Introduction: Chronic knee pain is a common musculoskeletal issue that may persist despite conventional management and involves both structural pathology and secondary neuromusculoskeletal dysfunction. The osteopathic manipulation technique, counterstrain, is an indirect osteopathic manipulative treatment (OMT) technique in which tissues associated with a reproducible tender point are positioned passively into the point of maximal ease. The technique is used to reduce atypical proprioceptive and nociceptive signaling associated with somatic dysfunction and reset the gamma gain. Evidence supporting counterstrain for long-term musculoskeletal outcomes remains limited but has been used in cases where surgical intervention was deemed no longer necessary due to the results osteopathic manipulative therapy has achieved.

Case Presentation: A 24-year-old female presented with a three-year history of chronic left medial knee pain. Osteopathic structural examination demonstrated tenderness upon deep palpation of the left medial knee, including a reproducible tender point along the left medial meniscus consistent with a medial meniscus counterstrain point.

Intervention: Counterstrain was performed with the patient supine. Technique was performed at the patient's left side. The affected knee was flexed to approximately 120 degrees, and the position was fine-tuned using tibial internal rotation and adduction until tenderness at the medial joint-line tender point was reduced by greater than 70%. The position was maintained while monitoring at the tender point for approximately 90 seconds, followed by a slow passive return to neutral and reassessment.

Results: Following treatment, the patient's medial joint-line tenderness decreased from 10/10 for our comparative baseline to 6/10 with initial placement and 1/10 after fine-tuning. The patient reported the pain remained 1/10 immediately after treatment but returned to its baseline pain the following day.

Discussion: This case demonstrates the use of medial meniscus counterstrain as an adjunctive approach in a patient with longstanding medial knee pain. The patient's response suggests that somatic dysfunction may represent a modifiable component of chronic knee symptoms even when pain has been present for

several years. However, causality cannot be established from a single case and single session, and symptomatic improvement should not be interpreted as evidence of structural healing of meniscal pathology.

Conclusion: Medial meniscus counterstrain was associated with short-term improvement in pain and tenderness in a patient with three years of chronic medial knee pain. This case supports further investigation of counterstrain as an adjunct to comprehensive management of chronic knee pain and whether continuous treatment or longer counterstrain duration could be used to achieve longer-lasting results.



P22. Associations of Platelet Dose, Injection Number, and Leukocyte Content with Clinical Outcomes After Intra-Articular Platelet-Rich Plasma Injection for Knee Osteoarthritis: A Systematic Review

Kevin Pham, Yidong Tang, Jeffrey Zhao

Mentor: Mir Saleem, MD

Objective: To systematically evaluate whether platelet dose per injection, cumulative platelet exposure, injection number, and leukocyte content are associated with pain, physical function, patient-reported outcomes, and adverse events after intra-articular autologous platelet-rich plasma (PRP) injections for symptomatic knee osteoarthritis.

Methods: PubMed/MEDLINE and Google Scholar were searched for English-language studies from inception to June 21, 2026. Google Scholar results were retrieved and exported using Harzing's Publish or Perish software. Eligible studies were randomized controlled trials (RCTs) and prospective or retrospective comparative clinical studies of adults with symptomatic knee osteoarthritis treated with intra-articular autologous PRP. Selected studies directly compared formulations or dosing regimens differing in platelet concentration, platelet dose, leukocyte content, injection volume, or injection number and reported at least one clinical outcome related to pain, physical function, patient-reported outcomes, or adverse events. Two reviewers independently screened records and full texts using Rayyan, with disagreements resolved through discussion. Data were extracted for study design, participant characteristics, osteoarthritis severity, PRP composition and dosing, follow-up, adverse events, and clinical outcomes, including the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Visual Analog Scale (VAS), Knee injury and Osteoarthritis Outcome Score (KOOS), and International Knee Documentation Committee (IKDC) score. Risk of bias was assessed using RoB 2 for randomized controlled trials, ROBINS-I V2 for nonrandomized studies, and certainty of evidence was rated using GRADE. Because of clinical and methodological heterogeneity, findings were narratively synthesized by platelet dose per injection, number of injections, cumulative platelet exposure, and leukocyte content. The review protocol was registered with PROSPERO.

Results: Thirteen comparative studies, including nine randomized and four nonrandomized studies, met eligibility criteria. Among six studies evaluating platelet concentration, dose, or injection volume, one triple-blind randomized trial reported greater 6-month improvement with a single 8-mL dose containing approximately 5.65 billion platelets compared with 4 mL containing 2.82 billion platelets in WOMAC-pain (-54.3% vs -28.0%), VAS pain (-54.0% vs -27.6%), and KOOS (10.7% vs 5.1%; all $P \leq 0.001$). One prospective cohort found that higher platelet concentration was associated with greater selected IKDC and KOOS improvements through 12 months. In contrast, four other studies did not identify a clear additional benefit with higher platelet concentration, higher injection volume, or higher-dose PRP. Six studies compared injection number: four reported greater or more sustained improvement with multiple injections

than with a single PRP injection, whereas two found no clear advantage. Evidence for an additional clinical benefit of three injections over two was inconsistent. Regarding leukocyte content, a 132-patient double-blind RCT found no clinically meaningful differences between leukocyte-rich PRP (LR-PRP) and leukocyte-poor PRP (LP-PRP) in efficacy, treatment failure, or adverse events through 12 months. A secondary analysis of one prospective cohort similarly found no association between leukocyte concentration and clinical outcomes or adverse events. Serious treatment-related adverse events were uncommon, with transient pain, stiffness, or swelling predominating. All nine randomized trials had some concerns for risk of bias. Among four nonrandomized studies, three had serious risk of bias and one had moderate risk. GRADE certainty was moderate for all randomized comparisons and low for nonrandomized platelet-exposure comparisons, with downgrading because of inconsistency, imprecision, and risk of bias.

Conclusion: Comparative evidence suggests that platelet delivery and repeated treatment may influence clinical outcomes after autologous intra-articular PRP injections for knee osteoarthritis, but an optimal platelet dose or regimen could not be established. Some studies favored higher platelet concentration or dose while others found no clear additional benefit. Multiple injections generally produced greater improvement than a single injection, but the clinical benefit of a third injection over two remained uncertain. Moderate-certainty evidence from a randomized comparison did not demonstrate clinically meaningful differences between LR-PRP and LP-PRP. Across all studies, heterogeneity in PRP preparation, injection volume, platelet dose, treatment regimen, and study design suggests that these findings should be interpreted cautiously. Further standardized head-to-head randomized trials that isolate individual PRP characteristics are needed.

PRISMA

Adapted from: Page MJ, et al. BMJ 2021;372:n71. doi: 10.1136/bmj.n71.



P23. A Biodynamic Cranial Osteopathy Approach to Migraine: A Case Study

Leah Degard-Edmond, Nicolas Sosa

Mentor: Paul Capobianco, DO

Introduction/Background: Migraine is a common and potentially debilitating condition, affecting approximately 11.7–14.7% of the population, and pharmacologic management may be limited by adverse effects, cost, or insurance coverage. Research evaluating osteopathic treatment for migraine remains limited, particularly regarding the biodynamic model of osteopathy in the cranial field.

Purpose: This case study evaluated whether a biodynamic cranial osteopathic approach could decrease the frequency, intensity, and duration of chronic migraines in a 26-year-old woman with a five-year migraine history and multiple previous head traumas and a cardiac ablation history.

Methods: The patient underwent eight biodynamic osteopathic treatments over approximately three months, with each session assessing changes in migraine symptoms and using sacral and cranial holds to observe changes in primary respiration and tissue motion. Cranial treatment primarily involved Becker holds during the first six sessions and a vault hold during the seventh treatment to assess the sphenoid region, with total hands-on treatment time varying by session.

Results: Migraine frequency decreased substantially during the initial six treatments. During the seventh treatment, a spontaneous release of a medial compression/distortion of the left sphenoid greater wing was

observed; following the eighth treatment, pressure behind the right eye resolved, and after completion of the treatment series, the patient reported no further migraines or prodromal symptoms and was no longer taking prescribed migraine medications.

Conclusion: These findings demonstrate a favorable clinical response following a course of biodynamic osteopathic treatment in the cranial field and provide a basis for further investigation into its potential role in the management of chronic migraine.



P24. Explainable AI for Multiclass Brain Tumor Classification

Shrivatsa Sundarraj, Sharukh Khan, Wenxi Liu, Michael Trimboli, Matthew Newmarch

Mentor: Xianqi Li, Ph.D.

Objective: To evaluate the accuracy and interpretability of artificial intelligence models for distinguishing glioma, meningioma, pituitary tumor, and no tumor on brain MRI.

Methods: Brain MRI images were obtained from two publicly available datasets containing four diagnostic categories: glioma, meningioma, pituitary tumor, and no tumor. Exact duplicate images were removed before analysis, resulting in 7,585 unique images. The dataset was divided into training, validation, and independent test sets of 5,309, 1,137, and 1,139 images, respectively. Three deep learning approaches were evaluated: a convolutional neural network, a Swin Transformer trained from random initialization, and an ImageNet-pretrained Swin Transformer. Diagnostic performance was assessed using accuracy, balanced accuracy, F1-score, and receiver operating characteristic area under the curve (ROC-AUC). To examine how the models reached their predictions, activation mapping, Grad-CAM, Grad-CAM++, LIME, and SHAP were applied to representative test images.

Results: The pretrained Swin Transformer achieved the highest overall performance, with 98.77% accuracy, 98.86% balanced accuracy, a macro F1-score of 98.81%, and a macro ROC-AUC of 0.9998. Its class-specific F1-scores were 0.9854 for glioma, 0.9783 for meningioma, 0.9980 for no tumor, and 0.9906 for pituitary tumor. The convolutional neural network and non-pretrained Swin Transformer achieved accuracies of 94.82% and 93.33%, respectively. Meningioma was the most difficult category for these two models. In representative cases, the pretrained model correctly classified all four diagnostic categories and showed more localized Grad-CAM and Grad-CAM++ responses around visible abnormalities in glioma and meningioma images. In contrast, the other models demonstrated broader attention patterns and both misclassified the selected glioma case as meningioma.

Conclusion: The pretrained model demonstrated high accuracy across all four diagnostic categories and more localized visual explanations in selected tumor cases. These results suggest that transfer learning combined with explainable AI may support accurate and interpretable MRI-based brain tumor classification. Further evaluation using independent clinical datasets and systematic validation of explanation maps is needed before these methods can be considered for clinical decision support.



P25. Six-Week Changes in Functional Mobility and Dual-Task Performance Among Rock Steady Boxing Participants With Parkinson's Disease

Mark-Joseph Velasquez; Elora Mukhopadhyay; Tryfon Theophilopoulos

Mentor: Robert J. Coni, DO

Objective: To evaluate six-week changes in standard Timed Up and Go (TUG), dual-task TUG, dual-task cost, and serial-subtraction performance among individuals with Parkinson's disease participating in Rock Steady Boxing (RSB) at two community sites.

Methods: This prospective, multisite observational study enrolled current RSB participants in Melbourne, Florida, and Las Cruces, New Mexico. At baseline and six-week follow-up, participants completed a standard TUG and a dual-task TUG while performing serial subtraction by threes. Standard TUG time, dual-task TUG time, dual-task cost (dual-task minus standard TUG time), and subtraction accuracy were calculated from paired records. Paired t-tests and Wilcoxon signed-rank tests assessed within-participant change. An exact sign test evaluated the direction of standard TUG changes. Site-specific changes and the difference in change between sites were examined as secondary analyses. Positive change values indicated faster performance.

Results: Thirty-six participants completed paired assessments (Florida, $n = 25$; New Mexico, $n = 11$). Mean standard TUG time decreased from 9.27 ± 2.30 to 8.59 ± 3.12 seconds, a mean improvement of 0.67 seconds (95% CI, -0.07 to 1.41). Twenty-nine participants (81%) improved, with a median improvement of 0.96 seconds (exact sign test, $p < 0.001$). The paired t-test did not reach significance ($p = 0.074$), whereas the Wilcoxon test demonstrated a significant shift toward faster performance ($p = 0.003$; rank-biserial correlation = 0.56). The Florida cohort improved by 1.09 seconds (95% CI, 0.29-1.89; paired t-test, $p = 0.010$); no significant mean change occurred in New Mexico. Change did not differ significantly between sites ($p = 0.129$). Dual-task TUG time was unchanged overall (11.21 ± 4.04 vs 11.12 ± 6.08 seconds; $p = 0.900$). Dual-task cost and serial-subtraction accuracy also showed no significant improvement. Standard and dual-task TUG changes were positively correlated (Spearman $\rho = 0.67$, $p < 0.001$).

Conclusion: Following six weeks of continued RSB participation, 81% of participants completed the standard TUG faster, with a median improvement of approximately one second. The consistency of improvement supports RSB as a promising community-based adjunct for maintaining and enhancing functional mobility in people with Parkinson's disease. Dual-task mobility and subtraction performance did not significantly change, indicating that gains in standard mobility may not translate to cognitive-motor performance over six weeks. These objective, multisite findings support continued clinical use and investigation of RSB, while the observational design precludes attributing improvement solely to RSB.



P26. The Effects of Rock Steady Boxing on Balance and Lower Extremity Motor Function in Patients with Parkinson's Disease

Nneoma Ebiringah, William Milgrim, Maria Karla Gonzalez, Zainab Khawaja, Yasmeen Attia
Mentor: Robert J. Coni, DO

Objective: To evaluate whether participation in a community-based Rock Steady Boxing (RSB) program improves balance and lower extremity motor function in adults with Parkinson's disease (PD). Primary outcomes are the Berg Balance Scale (BBS) and the Unified Parkinson's Disease Rating Scale (UPDRS) motor subsection. Secondary outcomes include functional mobility and gait speed (Timed Up and Go, 10-Meter Walk Test), fall risk, and patient-reported quality of life (PDQ-39).

Methods: This prospective, single-arm cohort study uses a pre-/post-intervention design. Approximately 20 adults with a neurologist-confirmed diagnosis of Parkinson's disease will be recruited from a single Rock Steady Boxing facility in Melbourne, Florida. Inclusion criteria: age 40 or older, current RSB enrollment, independent ambulation with or without an assistive device, capacity to consent, and willingness to attend classes 2–3 times per week. Exclusion criteria: atypical parkinsonism, musculoskeletal injury limiting participation, unstable cardiovascular disease, severe cognitive impairment, other neurologic disorders affecting gait or balance, and concurrent enrollment in another balance intervention study. Each participant completes a six-week intervention of regularly scheduled RSB classes while continuing standard medical care and prescribed medications. Enrollment and data collection occur on a rolling basis across an overall study window of approximately four months. Assessments are administered at baseline and every two weeks thereafter, including UPDRS and PDQ-39, at baseline, and week 6.

Outcome measures are the Berg Balance Scale (balance, fall risk), UPDRS motor examination (motor symptom severity), Timed Up and Go (functional mobility), 10-Meter Walk Test (gait speed, recorded in seconds and converted to meters/second), and PDQ-39 (quality of life). Attendance and missed sessions are recorded as measures of adherence and feasibility.

Data are recorded under study ID numbers only, with identifiers stored separately on a password-protected institutional OneDrive. Paired t-tests will compare baseline and post-intervention scores, with Wilcoxon signed-rank testing substituted if data are not normally distributed. Significance is set at $\alpha = 0.05$.

Results: Data collection for this study is in progress; results are not yet available for reporting. Analyses will report baseline and follow-up scores, absolute and percent change, confidence intervals, p-values, and effect sizes for each outcome measure. Primary analyses will compare pre- and post-intervention BBS and UPDRS motor scores. Secondary analyses will examine TUG, 10MWT, and PDQ-39 change scores, along with attendance and retention as feasibility indicators. Anticipated attrition is 10–20%; paired analyses will include participants with data available at both compared time points, and missing data will be described rather than imputed. Because this is a small pilot cohort, results will be reported in aggregate, and combinations of variables that could render an individual participant identifiable will be avoided.

Conclusion: Conclusions cannot yet be drawn, as data collection is ongoing. This pilot study is designed to generate preliminary, exploratory estimates of the effect of a community-based Rock Steady Boxing program on balance and lower extremity motor function in Parkinson's disease. Prior work has described favorable functional and quality-of-life outcomes associated with boxing-based exercise in this population, but the evidence base remains limited by small samples and outcome measures. By applying standardized clinical instruments across a six-week intervention, this study aims to produce effect size estimates and feasibility data to inform the design of larger, adequately powered investigations. The single-arm design without a control group limits causal inference, and findings will be interpreted as hypothesis-generating rather than confirmatory.



P27. Operationalizing the Biopsychosocial-Spiritual Model in Pain Management: A Narrative AI Approach

Timothy J. Khalil, Jake Orent

Mentors: Mir Saleem, MD, MSc Angelica J. Oviedo, MD

Objective: Pain remains one of the most prevalent conditions worldwide, often assessed using numeric scores that overlook psychosocial and spiritual dimensions. Although the biopsychosocial-spiritual model emphasizes whole-person care, scalable clinical tools remain limited. This study evaluated the feasibility of a narrative AI intake tool designed to capture emotional, social, and spiritual drivers of pain, amplify patient voice, and generate structured clinician summaries.

Methods: A feasibility study was conducted using GPT-4 and no-code platforms. Simulated patients (n=25) submitted narrative intakes via SMS or email, responding to five guided prompts exploring physical, emotional, and spiritual burdens. Natural language processing identified recurring themes and generated clinician-ready summaries with key quotes and discussion prompts. Outputs were assessed for usability, thematic accuracy, and linguistic fidelity.

Results: The tool generated usable summaries in 23 of 25 cases (92%). Summaries averaged 182 words, preserved >90% of original patient phrasing, and consistently avoided anthropomorphic or diagnostic claims. Thematic analysis revealed frequent psychosocial and spiritual contributors to pain, including grief (52%), anxiety (48%), mistrust (44%), and resilience (32%). Failures (2/25, 8%) occurred due to incomplete entries. Outputs were concise, thematically accurate, and demonstrated structured extraction of clinically relevant insights not captured by numeric scores.

Conclusion: This study provides early evidence that narrative AI, grounded in the biopsychosocial-spiritual model, can systematically capture and synthesize whole-person perspectives on pain. By amplifying patient voice and producing concise, clinician-ready summaries, the tool may strengthen empathy, communication, and trust in pain management. Its low-cost, text-based design enhances adaptability across diverse cultural and resource-limited contexts, supporting equitable access to whole-person pain assessment worldwide. Future research will validate clinical performance in real-world populations, assess patient and provider outcomes, and evaluate scalability as a standardized framework for integrating psychosocial-spiritual dimensions into clinical healthcare systems worldwide.



P28. Lactation Knowledge and Confidence Among Individuals Who Have Breastfed or Lactated in Brevard County, Florida: A Cross-Sectional Study

Amani Watson and Amelia Woods

Mentor: Shannon Ingwersen, MD

Background: Breastfeeding provides well-established health benefits for both infants and lactating parents, yet successful initiation and continuation often depend on access to accurate information, skilled support, and community resources. Despite broad public health recommendations supporting breastfeeding, important gaps may persist between what individuals are advised to do and what they understand, experience, and feel equipped to manage.

Objective: This proposed study aims to identify knowledge gaps, barriers, and support needs related to lactation among breastfeeding residents of Brevard County.

Methods: An anonymous cross-sectional survey would be distributed to Brevard County, Florida, residents aged 18 to 55 who are currently breastfeeding or have breastfed within the past 5 years. The survey will be used as a qualitative measure to assess participant knowledge in various aspects of lactation, including common breastfeeding complications (i.e., mastitis), medication usage in relation to breastfeeding, available lactation resources, and proper breastmilk storage. Additional questions will evaluate where participants obtain information on breastfeeding, how confident they feel about the information received, and any barriers to meeting their breastfeeding goals. Basic demographics will be collected to potentially identify trends based on educational background, age, race, and socioeconomic background within Brevard County, Florida.

Intent: This study intends to identify areas of reduced knowledge and confidence of breastfeeding individuals in Brevard County, Florida, to provide actionable information for clinicians, professors, and lactation professionals in the county. Findings may guide the development of targeted educational materials, improve referral and support systems, inform future research into lactation education for healthcare professionals, and help ensure that breastfeeding families receive practical, accessible, and evidence-based guidance that reflects their actual needs in Brevard.



P29. Statewide Assessment of Geriatric EMS Triage, Clinical Evaluation, Protocols, and Training in Florida: A Two-Phase Cross-Sectional Survey Study

Heather Bruton, Jessica Yanosik

Mentor: Dana Mathew, MD

Objectives: We will first aim to assess Florida EMS geriatric-care performance by measuring frontline EMS personnel knowledge, attitudes, and decision quality. Following this, we aim to describe Florida EMS medical director protocols, training, and quality assurance practices. These objectives will allow us to identify gaps between frontline practice and system-level policy/training and determine which modifiable factors are associated with higher guideline-concordant decision making.

Methods: This study is a two-phase, statewide, cross-sectional survey of Florida EMS personnel and EMS medical directors. Phase 1 surveys frontline providers (EMTs, paramedics, critical care paramedics, field supervisors, and educators) who have participated in prehospital care, supervision, or protocol/training implementation within the past year. Phase 2 surveys physician medical directors or designated oversight unit representatives responsible for protocol development, medical direction, or quality assurance. Respondents lacking authority or knowledge in these areas are excluded.

Sampling uses statewide convenience or stratified convenience methods for Phase 1 to ensure geographic and certification level diversity. Phase 2 uses a census approach of all identifiable oversight units. Precision-based sample size calculations yield targets of ~382 Phase 1 respondents and ~132-178 Phase 2 respondents after correction. Recruitment will use agency education officers, medical directors, regional councils, associations, conferences, and department communications for Phase 1 and personalized email invitations for Phase 2. This study is minimal risk. Confidentiality procedures include avoiding name collection, separating identifiers from survey data, suppressing small cells, and using coded oversight-unit identifiers.

Survey instruments combine validated tools with EMS-specific items and vignettes. Phase 1 incorporates the UCLA Geriatrics Attitudes Scale; Phase 2 may use ORIC, AIM/IAM/FIM, or NoMAD

depending on intervention-readiness measures. Content validity will be assessed using expert review and CVI metrics, followed by cognitive interviews with both respondent groups. A pilot test will evaluate usability, burden, and logic flow. Surveys will be built in Qualtrics with secure data management, role-based access, frozen codebooks, and separate identifier files. Reporting will follow CHERRIES for web surveys and STROBE for observational studies.

Results: Outcomes will be finalized after data collection. The analysis will begin with descriptive statistics summarizing respondent demographics, certification level, training exposure, agency characteristics, regional distribution, and protocol-feature distributions. Reliability of validated scales will be assessed using Cronbach's alpha and, when appropriate, omega coefficients. Content validity evidence from expert review will be reported using item level and scale level indices.

Primary Phase 1 analysis will compare vignette-based decision quality across certification levels, years of experience, geriatric-care exposure, GEMS training, agency type, and urban-rural status. Phase 2 analyses will compare protocol comprehensiveness, training intensity, and readiness across service type, region, trauma-center access, and workforce size. Multivariable modeling will evaluate predictors of Phase 1 vignette performance, incorporating variables such as certification level, years in practice, older-adult call volume, GEMS exposure, prior geriatric continuing education, and agency characteristics. If agency identifiers are available, mixed-effects models with random intercepts for agency or oversight units will account for clustering.

Cross-phase integration will examine whether agencies with stronger protocol content, training infrastructure, and quality assurance systems demonstrate higher frontline decision quality. This linkage analysis represents the highest-value component of the study.

Missing data procedures will include reporting item-level missingness, applying predefined scoring rules for partial scaled, and using multiple imputation when predictor missingness is substantial, accompanied by complete-case sensitivity analyses. Nonresponse bias will be evaluated by comparing early versus late respondents and by assessing respondent characteristics against known sampling-frame distributions. If major imbalances are detected, post-stratification weighing may be applied.

Conclusion: A conclusion will be reached once data collection is complete. For our primary objective, we hypothesize that EMS personnel with prior geriatric education will be associated with higher case-based performance and confidence scores. Following a similar pattern, we believe that oversight units with explicit geriatric trauma criteria, continuing education expectations, and active quality assurance loops will show better frontline outcomes. Our final hypothesis is that there will be substantial statewide variation in protocol content, training intensity, and quality assurance infrastructure.



P30. Jellyfish Sting Recognition and Dive-Operation Readiness: Cross-sectional protocol for divers and dive operations in selected Florida's East Coast counties

Sonia Cherkaoui Jaouad, Yissel Pineiro, Aleisha Sherif, Hayat Nachar

Mentor: Dana Mathew, MD

Objective: This study aims to assess jellyfish sting recognition and readiness among divers and dive operation staff in Brevard, Palm Beach, Monroe, and Broward counties. The main objective is to evaluate divers' responses to a prespecified jellyfish sting protocol and the proportion of dive operation staff who meet the study's minimum readiness standard.

Methods: Using Wilderness Medical Society guidelines as the standard reference, two short, anonymous, cross-sectional surveys will be distributed through Qualtrics during the same season and within the same geographic regions. Participants will be recruited through dive shops, university dive clubs, charter boats, training courses, and local dive-related social media groups via direct email and in-person outreach. One survey will assess divers' recognition of the appropriate initial response to jellyfish stings, including red-flag symptoms, recommended post-sting skin care, and contraindicated home treatments. The second survey will assess whether dive boats and programs are adequately prepared to manage jellyfish stings offshore.

Results: Results will assess the proportion of divers who select responses consistent with the prespecified jellyfish sting protocol and the proportion of dive operation staff who meet the minimum readiness standard. (Pending IRB approval)

Conclusion: This study will characterize gaps in jellyfish sting knowledge and preparedness among divers and dive operation staff along Florida's East Coast. Findings may help identify areas for targeted education and improve preparedness for managing jellyfish stings in offshore diving environments.



P31. MRSA Colonization Among Medical and Nursing Populations: A Literature Review

Naisargi Pathak, Melisa Camurlu, Ashwinder Parmar

Mentor: Debra E. Bramblett, Ph.D.

Objective: The objective is to evaluate evidence on MRSA colonization in medical and nursing populations to determine whether profession or clinical exposure alters carriage. Gaining insight into these differences may identify gaps in MRSA prevention and guide medical and nursing students to reduce transmission to patients. Our literature review will be used to guide our hypothesis that MRSA colonization increases as medical and nursing students progress from preclinical to clinical training.

Methods: A literature review was conducted to characterize existing research on methicillin-resistant *Staphylococcus aureus* (MRSA) colonization and associated risk factors among healthcare-related student and professional populations. Search strategies were iteratively broadened to identify studies examining MRSA among nursing students, medical students, nurses, physicians, healthcare workers, and clinical populations across different geographic regions. Thirteen studies were selected based on their relevance to the research topic, publication recency, and alignment with the search terms and research interests. Studies were excluded when the full text was inaccessible or when the study population was limited to a narrowly defined healthcare worker group that did not align with the intended scope of the analysis. This approach allowed us to identify studies with methodologies relevant to our planned project, which will assess MRSA risk factors through survey data and subsequent MRSA testing among preclinical and clinical medical and nursing students.

The selected studies were analyzed across eight methodological areas. These included the study population characteristics, definitions of MRSA colonization, duration of research, survey design, statistical analysis, geographical location, laboratory testing methodologies, and study results. These areas were selected to allow comparison of methodologies across studies and to identify considerations that may be relevant to our own study design, data collection, and future manuscript development. Findings from the literature review will be compiled into a standardized data table to facilitate comparison across studies and guide the methodology of our planned MRSA risk factor analysis.

Results: Among the analyzed findings, MRSA carriage varied significantly by population and setting. A German cardiac care center found that only 1 of 149 (0.7%) healthcare workers carried MRSA, while a New Delhi study found that among doctors and nurses there were 27 of 368 (7.3%) that carried MRSA. A West Bengal hospital found that 28% of the 50 healthcare workers carried MRSA. These 3 aforementioned studies did not report specific profession carriage rates.

Profession specific findings were inconsistent, in a Brazilian pediatric healthcare worker study the MRSA colonization rates were 5.1% overall while nurses specifically had a 16.7% colonization rate ($P = .022$). On the other hand, a Japanese surgical-ward study found that there was a higher MRSA colonization rate among physicians, 31%, than nurses, 3%, ($P = .02$).

Studies comparing increased clinical training did show an association with higher carriage rates. U.S. resident physicians had baseline rates of 2.50% in PGY-1 compared to 4.94% in PGY-2-5 ($P = .68$), while a Quebec study found 0.4% among medical residents versus 0% among preclinical students ($P = 1.00$). An Oman study reported nasal MRSA carriage among preclinical students as 11.4% versus 20.8% ($P > .05$) in clinical year medical students. Overall, these studies suggested a trend toward MRSA exposure with greater clinical exposure, however they were not statistically significant in most cases. Geographic variation in MRSA prevalence should be considered when interpreting the carriage rates.

Risk factor findings alluded to the idea that poor hand hygiene, recent patient contact and contact with MRSA positive patients were associated with carriage. One study showed adult ICU settings showed possible MRSA transmission among patients, healthcare workers, equipment and environmental surfaces. Conclusion: Based on our literature review, MRSA carriage varied substantially across healthcare populations, with reported prevalence ranging from 0.7% to 31% among healthcare workers. Across the reviewed studies, no statistically significant difference was found between MRSA carriage and level of clinical exposure or professional role. However, the absence of statistical significance should not be interpreted as evidence that no association exists. Some studies reported higher carriage among nurses, whereas others reported higher rates among physicians, and studies comparing preclinical students with residents or more clinically experienced students produced similarly inconsistent findings.

Interpretation of these results is limited by differences in study populations, healthcare settings, sampling strategies, laboratory methods, study designs, and assessment of potential risk factors. In addition, the available literature includes limited longitudinal research following students as they transition from preclinical education to direct patient care, and relatively few studies have specifically evaluated this question within U.S. medical and nursing student populations. The relationship between clinical exposure and MRSA acquisition remains insufficient rather than disproven. These limitations highlight the importance of further longitudinal studies using standardized sampling methods and risk factor assessments to determine whether MRSA carriage changes with increasing clinical exposure among medical and nursing students.



P32. Barriers to Pediatric Behavioral Health Access in an FQHC: A Quality Improvement Study at Brevard Health Alliance. Understanding Delays and Incomplete Continuity of Care to Improve Access for Children

Isha Ratani, Aaisha Khan

Mentors: Sarah Choo-Yick, MD, Nicholette Fox, MD, Brittany Biba, LCSW

Objective: To characterize barriers to pediatric behavioral health access at a Federally Qualified Health Center by evaluating referral completion, time to first behavioral health visit, and engagement after initial contact, and to identify quality-improvement opportunities for earlier prevention of healthcare barriers.

Methods: We conducted a retrospective quality-improvement study at Brevard Health Alliance, an FQHC serving Brevard County, Florida. Pediatric patients aged 0–17 years referred for behavioral health services between October 2025 and March 2026 were identified using electronic health record referral and appointment data. Measures included referral volume, completion of the first behavioral health appointment, time from referral to first completed behavioral health visit, subsequent behavioral health visit counts, and insurance distribution. Referral and appointment patterns were reviewed to characterize progression from referral to initial care and continued engagement after first contact. Clinic processes were also compared with evidence-based practices identified through a targeted literature review focused on barriers to pediatric behavioral health access in FQHCs, including wait times, screening, referral processes, follow-up, and transportation. Quality-improvement opportunities were identified in areas such as standardized screening, referral coordination, scheduling, timely handoffs, and structured follow-up.

Results: Of 11,304 unique pediatric patients seen during the study period, 1,171 (10.4%) were referred to behavioral health services. Among referred patients, 767 (65.5%) scheduled and completed an initial behavioral health visit, while 404 (34.5%) did not complete a first visit. Among the 767 patients with matched referral and appointment data, 31 (4.0%) were seen the same day, 321 (41.9%) completed their first visit within 1–30 days, 284 (37.0%) within 31–90 days, and 131

(17.1%) within 91–180 days. Median time from referral to first behavioral health visit was 35 days, exceeding the CMS Medicaid benchmark of ≤ 10 business days for routine outpatient mental health care. Engagement after initial behavioral health contact was also limited. Among patients with behavioral health visit-count data ($n=1,884$), 31.3% completed only one visit, 37.4% completed 2–3 visits, 24.6% completed 4–8 visits, and 6.7% completed 9 or more visits; therefore, 68.7% completed three or fewer visits. Among therapy patients ($n=1,378$), 32.2% had one visit, 31.7% had 2–3 visits, 29.6% had 4–8 visits, and 6.5% had 9 or more visits. Among psychiatry patients ($n=815$), 41.1% had one visit, 52.5% had 2–3 visits, and 6.4% had 4–8 visits, with very few completing 9 or more visits. Medicaid insured 65.9% of the pediatric behavioral health population. Workflow review also identified limited standardized screening beyond the PHQ-2 for patients aged ≥ 12 years and ongoing transportation support through provision of two bus passes after behavioral health visits.

Conclusion: Substantial delays and incomplete linkage to behavioral health care were observed: approximately one-third of referred patients did not complete an initial behavioral health visit, and the median wait to first visit was 35 days. Continued engagement was also limited, with more than two-thirds of patients in the visit-count dataset completing three or fewer visits. These findings identify wait time, referral completion, and retention as key quality improvement targets. Standardized screening, improved scheduling and referral coordination, timely handoffs, structured follow-up for missed or unscheduled referrals, and continued transportation support are reasonable strategies for future implementation and evaluation. Because this was a single-site retrospective quality-improvement study, the findings describe local care processes and do not establish that any specific intervention will improve outcomes.



P33. Using Large Language Models for Mental Health Care: Cross-Dataset Understanding for Clinicians

Emma Chouljian

Mentor: Siddhartha Bhattacharyya, Ph.D.

Objectives: The goal of this study was to observe how 2 different AI systems, ChatGPT and Claude, performed a semantic cross-dataset analysis in order to determine which Large Language Model (LLM) would be more beneficial for clinician use in regards to handling large numbers of mental health diagnoses accurately and efficiently.

Methods: This study uploaded 2 text-based datasets from Kaggle into both ChatGPT and Claude in order to compare the LLMs' responses to 14 inputs involving cross-dataset analysis. The 14 prompts given to the LLMs were created by a researcher in this study. Dataset 1 was a binary set of 232,074 rows with 2 categories - "suicide" and "non-suicide". Dataset 2 was a multi-class set of 992 rows with 4 categories - "suicidal", "depression", "anxiety", and "normal". The specific LLMs tested in this study were ChatGPT's GPT-5.5 Instant LLM and Claude Sonnet 4.6 LLM on medium effort. Prompts were given to the low, medium, and high efforts of Claude Sonnet 4.6; however, the medium effort was ultimately decided upon due to a faster response rate with fewer instances of maxing out on limits than high effort in addition to the outputs showing a better understanding of the prompts than low effort.

Results: After reviewing all outputs from ChatGPT and Claude, variations in the responses to each prompt were noted. ChatGPT pointed out Dataset 2's increased text length in posts as a sign of increased details while Claude suggested text length could be an indicator of mental health when comparing Dataset 1's suicidal to non-suicidal posts. In terms of dataset semantics, while both correctly analyzed the 2 datasets, Claude spoke more on smaller details such as punctuation usage and ChatGPT analyzed from a more general scope. However, the 2 supporting examples ChatGPT gave were not able to be found in the Excel spreadsheets of the datasets using the Find feature. This is a possible sign of hallucination. When asked about using labels from 1 dataset on the other, both gave similar methods for relabeling options but Claude included additional details on the mapping confidence of each class relabel with a brief explanation of why. Overlap was seen in answers about semantic similarity, semantic differences, and contextual similarity of the 2 datasets. However, 1 of 3 example quotes stated by ChatGPT when explaining the datasets' contextual similarity was again unable to be found in the datasets using Excel's Find feature. When prompted to perform a holistic analysis on the datasets using a method from published research, ChatGPT showed the steps on how it could be done based on the paper while Claude was able to apply the method to Dataset 1 and Dataset 2 and show results.

Conclusion: Based on the results of the cross-dataset analysis, Claude Sonnet 4.6 LLM on medium effort could be recommended to clinicians over ChatGPT's GPT-5.5 Instant LLM when used for mental health diagnoses. While not decisive reasons, Claude's in-depth responses and ChatGPT's observed hallucinations led to this conclusion. Future studies on this work can involve running each prompt multiple times in both models and then utilizing a pre-defined score sheet to score each output in order to more clearly determine the accuracy of each model.



P34. Diagnosis, Management, and Athletic Populations Affected by Proximal Radial Nerve Compression Disorders

William Milgrim, Kiran Eikan

Mentor: Pradeep Vanguri, Ph.D.

Objective: To characterize the diagnostic challenges and management outcomes of proximal radial nerve compression disorders, including radial tunnel syndrome (RTS) and posterior interosseous nerve (PIN) compression syndromes, and to identify the athletic populations most represented in the literature, with emphasis on tennis, baseball, and pickleball athletes.

Methods: A scoping literature review was conducted using PubMed to identify studies evaluating proximal radial nerve compression disorders in athletes and physically active populations. The following search algorithm was used: ("radial tunnel syndrome" OR "radial tunnel compression") AND ("posterior interosseous nerve" OR "PIN entrapment") OR ("tennis elbow" AND "posterior interosseous nerve") OR "anatomical tennis elbow" OR "tennis injury epidemiology" OR "pickleball related injuries." Studies were screened for relevance to diagnosis, management, clinical outcomes, and athletic populations affected. A total of 685 studies were identified, with 42 meeting inclusion criteria for qualitative synthesis. Data were extracted regarding diagnostic approaches, treatment strategies, clinical outcomes, and the athletic populations represented. The review was reported according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

Results: Three major findings emerged across the included literature. First, diagnosis of proximal radial nerve compression disorders remains challenging because symptoms overlap with LE, terminology is inconsistent, and no standardized diagnostic approach exists. Physical examination, imaging, and electrodiagnostic testing demonstrated variable diagnostic utility (Ang et al.; Levina and Dantuluri; Shamrock and Das). Çilingiroğlu et al. identified PIN involvement in 19.4% of patients diagnosed with LE compared with 1.9% of healthy controls without LE, suggesting that PIN involvement may occur more frequently among patients with LE. Second, conservative and surgical management generally produced favorable outcomes in selected patients. Patterson et al. reported improved pain and DASH scores following decompression, while McCourt et al. described complete symptom resolution after radial tunnel release in a collegiate baseball pitcher. Ultrasound-guided hydrodissection also demonstrated symptomatic and functional improvement in a case report (Qin et al.). Third, reported cases were concentrated among repetitive upper-extremity athletes, particularly tennis and baseball, while pickleball represents an emerging population. Meng et al. reported lateral epicondylitis in six of eight pickleball-related elbow injuries, while broader injury studies have identified a substantial upper-extremity injury burden in pickleball participants (Meng et al.; Touhey et al.; Hanks & Myers). A recent U.S. emergency-department study found tennis accounted for 61.7% of racket- and paddle-sport injuries compared with 13.1% for pickleball, although pickleball had the highest proportion of upper-extremity injuries at 28.1% (Ferguson et al.).

Conclusion: Proximal radial nerve compression disorders represent an important but poorly characterized cause of persistent lateral elbow symptoms in athletes. The available literature suggests that diagnosis is primarily clinical and may be difficult when symptoms overlap with LE, while both conservative and surgical treatment can produce favorable outcomes when the underlying nerve pathology is appropriately recognized. Tennis and baseball currently account for most sport-specific reports, whereas pickleball is an emerging population with a substantial burden of upper-extremity and lateral elbow injuries. However, the available evidence does not establish the true prevalence of RTS or PIN compression within any of these sports. Future prospective studies should determine the sport-specific frequency of these disorders and establish more consistent diagnostic and management approaches for athletes with persistent lateral elbow pain.



P35. Association of HMGA1 With Self-Identified Race and Clinical-Genomic Features of Prostate Cancer

Oluwademilade Dairo, Morelle Konchou, Adrianna Amaral de Aragao, Thiago Vidotto, Linda Resar, Tamara L. Lotan

Introduction: Overexpression of the chromatin binding protein HMGA1 is associated with tumorigenesis and cancer progression, however little is known about its role in prostate cancer (PCa). We recently performed genome-wide CpG methylation profiling in primary PCa from self-identified White (WH) and Black (BL) men and found that HMGA1 binding sites are relatively hypomethylated among BL compared to WH men, suggesting that there may be more HMGA1 DNA binding in PCa from BL men. Here, we quantified HMGA1 expression in primary PCa from WH and BL men and correlated with clinical-pathologic features and molecular subtypes.

Methods: Nuclear HMGA1 protein expression was measured by digital quantification of a genetically validated HMGA1 immunohistochemistry (IHC) assay utilizing a rabbit monoclonal antibody for HMGA1 (clone EPR7839, Abcam) applied to tissue microarrays (TMA) containing PCa from 194 WH and 177 BL men. To obtain the average HistoScore (H-score) for HMGA1 IHC staining intensity, image analysis and digital quantification of HMGA1 was performed on HALO software (Indica Labs).

Results: HMGA1 expression was numerically higher in PCa from BL men compared to WH men, however this difference was not statistically significant ($p = 0.10$). HMGA1 expression was not significantly associated with pathologic stage ($p = 0.72$) or Gleason grade group (GG) ($p = 0.09$). HMGA1 expression was not associated with *PTEN* deletion status ($p = 0.26$), however tumors with *ERG* fusions were associated with significantly lower HMGA1 expression ($p = 0.0071$) and this was replicated by examining *HMGA1* mRNA expression in the TCGA cohort ($p < 0.0001$). Finally, we found a significant correlation between T-regulatory cell immune content (FOXP3+ cell density) and HMGA1 protein expression ($r=0.2$; $p = 0.0006$), but no significant association with CD3+ or CD8+ T-cell or B-cell content.

Conclusions: Although higher expression of HMGA1 is observed in prostate tumors from BL compared to WH men, this difference was not significant and may be due to lower frequency of *ERG* fusions in PCa from BL men, since these fusions are associated with lower HMGA1 protein and RNA expression. Additional analyses of HMGA1 binding in primary prostate cancer and its biological consequences are currently underway.



P36. The Relationship Between Ever Smoking 100+ Cigarettes and Ever Being Diagnosed with an Oral Cavity or Pharyngeal Cancer, Modified by E-Cigarette Use and by Sex

Brianna Schroeder

Mentor: Mir Saleem, MD

Objective: The first research question asks what the relationship is between ever smoking 100+ cigarettes and ever being diagnosed with an oral cavity or pharyngeal cancer, modified by ecigarette use. The second research question asks what the relationship is between ever smoking

100+ cigarettes and ever being diagnosed with an oral cavity or pharyngeal cancer, modified by sex.

Methods: Data used for the analysis is from the 2023 National Health Interview Survey conducted on United States adults by the National Center for Health Statistics within the Centers for Disease Control and Prevention. The primary exposure is whether a person has ever smoked 100+ cigarettes. The primary outcome is whether a person has ever been diagnosed with an oral cavity or pharyngeal cancer. Effect modifiers are ever used an e-cigarette and sex. Confounders to adjust for will include race, health insurance status, being worried about ability to pay medical bills, employment status, being a parent to child(ren) in the family, ever smoked a cigar or cigarillo, ever used a smokeless tobacco product, and age. All data analysis will be performed using SPSS version 32. To account for the NHIS sample weighting, the complex samples logistic regression analysis will be run rather than a simple logistic regression analysis. A logistic regression model will be run to analyze the relationship between ever smoked 100+ cigarettes and ever being diagnosed with an oral cavity or pharyngeal cancer. A second logistic regression model will be run to adjust for the confounders. A third logistic regression model will be run to adjust for the previously listed confounders and stratifying the exposure-outcome association by the effect first modifier of ever used an e-cigarette, either yes or no. A fourth logistic regression model will be run to adjust for the previously listed confounders and stratifying the exposureoutcome association by the second effect modifier of sex, either male or female. Significance of odds ratios will be assessed using an alpha level of 0.05 associated with a 95% confidence interval. The statistical method used to assess effect modification will be pseudo-maximum likelihood estimation with an alpha level of 0.05.

Results: Demographics of U.S. adults who have and have not ever smoked 100+ cigarettes were similar. U.S. adults ages 18 and up had 2.567 times the odds of ever being diagnosed with an oral cavity or pharyngeal cancer if they have ever smoked 100+ cigarettes compared to United States adults ages 18 and who have not ever smoked 100+ cigarettes (OR = 2.567; 95% CI: 1.467, 4.490). This result was significant. After adjusting for the confounders, the odds of being diagnosed with an oral cavity or pharyngeal cancer in these adults who have ever smoked 100+ cigarettes decreased to 2.474 times the odds of adults who have not ever smoked 100+ cigarettes, but it was still significant (OR = 2.474; 95% CI: 1.365, 4.487). When adjusting for the confounders then stratifying by whether the adult has ever used an e-cigarette, participants who have ever used an e-cigarette had a lower and nonsignificant odds ratio of ever being diagnosed with an oral cavity or pharyngeal cancer if they have ever smoked 100+ cigarettes (OR = 0.017; 95% CI: 0.000, 2.674) when compared to participants who have not ever used an e-cigarette, which was significant (OR = 2.798; 95% CI: 1.540; 5.082). The pseudo-maximum likelihood estimate for the interaction term was -3.024 (SE = 1.202; 95% CI: -5.385, -0.663; Wald F = 6.327, significance = 0.012). Effect modification is considered to be present across levels of ever using an e-cigarette. When adjusting for the confounders then stratifying by sex, males had a higher and significant odds of ever being diagnosed with an oral cavity or pharyngeal cancer if they have ever smoked 100+ cigarettes (OR = 2.868; 95% CI: 1.304, 6.308) when compared to females, whose odds ratio was lower and not significant (OR = 1.819; 95% CI: 0.678, 4.881). The pseudo-maximum likelihood estimate for the interaction term was 0.540 (SE = 0.637; 95% CI: -0.711, 1.791; Wald F = 0.719, significance: 0.397). Effect modification is not considered to be present across levels of sex.

Conclusion: The primary relationship was present when stratifying by ever used an e-cigarette. Participants who have not ever used an e-cigarette are at a higher risk of ever being diagnosed with an oral cavity or pharyngeal cancer if they have ever smoked when compared to participants

who have ever used an e-cigarette and who have ever smoked. Only 4 participants who have ever used an e-cigarette had the outcome while 56 participants who have not ever used an e-cigarette had the outcome. With the small sample size, particularly for participants who have ever used an e-cigarette, there is a lack of evidence of an association across levels of e-cigarette use and risk cannot be adequately determined. There is no definitive support for e-cigarettes being a risk factor. The primary relationship was present when stratifying by sex. Males are at higher risk of ever being diagnosed with an oral cavity or pharyngeal cancer if they have ever smoked when compared to females who have ever smoked. Only 15 females in the sample had the outcome while 45 males had the outcome. Sex was not determined to be an effect modifier. With the small sample size of participants with the outcome, particularly for females, there is a lack of evidence of an association for females. Strengths of this study include the quality of data used for the analysis and application of results. HNCs are rare, so ORs can be interpreted as RRs. Multiple types of variables were considered in this analysis, and each type was adjusted for as appropriate. Limitations include potential confounders that have not been adjusted for or were the best representation of variables available. The number of participants with the outcome was small, restricting the data analysis. Misclassification is also possible. As a cross-sectional study, temporality could not be assessed. Further research should obtain a higher sample size of participants with the outcome to confirm if e-cigarette use is an effect modifier and risk factor.



P37. Influence of Over-the-Counter Medications and Supplements on Children Diagnosed With Attention-Deficit/Hyperactivity Disorder

Karla Del Moral Teppa; Diana Sokolov

Mentor: Mir Saleem, MD

Objective: To evaluate how frequently used over-the-counter (OTC) medications and supplements influence ADHD symptoms in children and adolescents, both independently and when used as adjuncts to prescribed stimulant therapy.

Methods: A literature review was conducted using ScienceDirect, PubMed, Google Scholar, and Cochrane Library. Search terms included “ADHD,” “Children,” “Methylphenidate,” “Omega-3,” “Vitamin D,” “Magnesium,” “Melatonin,” “Zinc,” “Iron,” “Probiotics,” “Antihistamine,” and “Dextromethorphan.” More than thirty five full-text articles were identified and screened after reviewing titles and abstracts. Fourteen peer-reviewed studies published after 2019 involving children and adolescents with ADHD were selected for review. Observational studies, systematic reviews and meta-analyses, randomized controlled trials, case reports, and prospective interventional and case-control studies were included. Non-clinical studies, studies older than seven years, and studies focused only on adults were excluded. The selected studies were reviewed for their effects on ADHD symptoms, their use as adjunctive treatments, and their reported limitations and safety concerns.

Results: The findings varied between the different OTC medications and supplements. Omega-3 supplementation showed a statistically significant improvement in impulsivity in one clinical trial (P-Value: 0.049), although a systematic review and meta-analysis found no significant overall improvement in ADHD symptoms. Vitamin D alone showed inconsistent results, while vitamin D combined with neurofeedback significantly improved ADHD symptoms (P-Value <0.001). Vitamin D combined with magnesium significantly improved conduct, social, and anxiety/shy scores (P-Value: 0.001 for each), while magnesium used with methylphenidate improved total and inattention scores (P-Value: 0.02 and 0.001 respectively). Zinc used with methylphenidate significantly improved inattention (P-Value: 0.02). Iron

supplementation showed improvements in conduct and learning-related outcomes in children with low ferritin levels. Melatonin improved sleep and daytime behavior in 9 of 12 reported cases. Probiotics showed mixed results, with one study showing inattention symptom improvement (P-Value < 0.05) and another finding significant improvement in focus attention, while a synbiotic study found no significant effect. Antihistamines showed to improve irritability (P-Value: 0.03) and hyperactivity (P-Value: 0.04), but caused side effects like drowsiness in 40% of patients. Finally, a pilot study found that dextromethorphan combined with methylphenidate significantly improved irritability at weeks 2, 4, and 8 (P-Values: 0.001, 0.001, and 0.015, respectively).

Conclusion: Some OTC medications and supplements may help improve ADHD symptoms and may be useful as adjuncts to first-line treatment, particularly vitamin D, magnesium, zinc, and iron in selected children. However, evidence for their independent effects remains limited and inconsistent. Many of the studies reviewed had small sample sizes, short study durations, subjective parent or teacher reported outcomes, and potential risks of bias. Methylphenidate continues to have stronger evidence supporting its effectiveness for improving core ADHD symptoms and behavior. Therefore, OTC medications and supplements should not replace established first-line treatments such as methylphenidate. Larger and better regulated studies are needed to determine their effectiveness, safety, and potential role in pediatric ADHD management.



P38. Matched-Country Study: Political Instability and Routine Childhood Immunization

Barillas Carina, Taylor Reagan, Morinvil Christian

Mentor: Dana Mathew, MD

Objective: Estimate the change in immunization coverage after an unrest event in the event country, compared with the change over the same years in a matched control country.

Methods: We conducted a retrospective, ecological matched-country study using publicly available country-year data to evaluate the effects of political turmoil, such as a coup, on the rates of MCV1 and DTP3 vaccine coverages. A secondary analysis was also conducted based on measles incidence rates. Data was obtained from the World Health Organization and the World Bank Group. For each unrest-affected country (event country), we selected a similar country without an unrest event during the study window (control country).

Event countries were chosen due to having an unprecedented and successful coup that led to political change. Data was obtained from Powell & Thyne Coup Dataset. Countries were then matched to a control country based on GDP per capita, WHO region, World Bank Income Group, and regional characteristics similarities during the event year (t_0). The control country must not have had a coup during the analysis window.

The outcomes were based on DTP3 and MVC1 vaccination rates and cases present pre and post event. The pre and post periods were described as 3 years prior to the event ($t-3$) of political unrest as well as the 3 years post the event ($t+2$) with t_0 representing the event year. This allowed us to identify any differences between the event and the country's control. We compared routine childhood immunization coverage before vs after the event year using a Difference-in-Differences approach, adjusting for country and year fixed effects.

Results: Overall, DTP3 coverage decreased in all of the event countries for the three years following the event in comparison to their control countries. The Difference-in-Differences (DiD) result for DTP3 for the Madagascar-Malawi match was -5.93 . For Fiji-Kiribati, the DTP3 DiD was -0.15 . For Haiti-El Salvador, the DTP3 DiD was -12.00 . For Mali-Benin, the DTP3 DiD was -12.00 . For Thailand-Turkey

the DTP3 DiD was -12.53 . The MCV1 coverage average decreased in 4 out of 5 of the evaluated countries compared to the control countries. The MCV1 DiD for the Madagascar-Malawi match was -13.12 . For Fiji-Kiribati, the MCV1 coverage increased, and the DiD was 15.43 . For Haiti-El Salvador, the MCV1 DiD was -9.67 . For Mali-Benin, the MCV1 DiD was -10.33 . For Thailand-Turkey match, the MCV1 DiD was -14.03 . The measles incidence for the evaluated countries varied. The Madagascar-Malawi match saw a decrease in the number of measles cases following the event in Madagascar compared to the control country, with a DiD of -2666.03 . The Fiji-Kiribati match also saw a decrease in measles cases following the event in Fiji compared to the control country, with a DiD of -146.28 . Measles incidence data was unable to be attained for Haiti following the event. Measles incidence increased in both Mali-Benin and Thailand-Turkey pairings as compared to the control country. The Measles incidence DiD for the Mali-Benin match was 869.33 , and the measles incidence DiD for the Thailand-Turkey match was 115.20 . Conclusion: Political unrest and successful coups were generally associated with declines in routine childhood immunization coverage. Across the matched-country comparisons, DTP3 coverage decreased in all five event countries relative to their controls, while MCV1 coverage decreased in four of five pairs. Although measles incidence findings were mixed, increases in measles incidence in the Mali and Thailand event countries suggest that disruptions in immunization services may have important downstream consequences for vaccine-preventable disease. These findings support the potential vulnerability of routine immunization programs during periods of political instability and highlight the importance of maintaining vaccination services during and after periods of unrest. Further research using larger samples and longer follow-up periods is needed to better establish the magnitude and mechanisms of this relationship.



P39. Bias Beneath the Surface: A Pilot Curriculum to Equip Medical Students with Ethical AI Literacy

Jake Orent, Timothy J. Khalil, Ariena Tobari Goudarzi
Mentor: Mir Saleem, MD, MSc

Objective: To evaluate the feasibility and perceived educational value of a brief, discussion-based AI ethics curriculum for pre-clerkship medical students. The curriculum aims to improve learners' ability to recognize algorithmic bias, diagnostic overreliance, depersonalization, and threats to patient autonomy and equity, while promoting ethical discernment, clinical humility, professional identity formation, and osteopathic whole-person care in AI-influenced clinical practice.

Methods: A 50-minute discussion-based curriculum was developed for integration into pre-clerkship ethics, clinical reasoning, or health systems science coursework. The session used two AI-focused clinical vignettes involving ethically complex scenarios, followed by guided small-group discussion, structured ethical analysis, reflective writing, and a large-group debrief. Discussion prompts focused on algorithmic bias, diagnostic overreliance, patient autonomy, equity and access, and the influence of AI on clinical judgment and the patient–physician relationship. A preliminary pilot session was conducted with 16 second-year medical students at Burrell College of Osteopathic Medicine. Faculty with backgrounds in ethics, social medicine, or clinical education facilitated the session. Learner participation, written reflections, and qualitative feedback were used to assess feasibility and perceived educational value. The project did not involve identifiable data or human subjects research; therefore, IRB approval was not required.

Results: Sixteen second-year medical students participated in the preliminary pilot. The majority engaged in the guided discussion and submitted written reflections. Qualitative feedback indicated strong interest in additional curricular time devoted to the ethical and humanistic dimensions of AI. Students reported

greater awareness of algorithmic bias, risks of depersonalization, and their future responsibility for clinical decision-making when AI tools are used. Faculty facilitators observed that the format promoted open dialogue, humility, and ethical discernment, particularly when discussing underserved populations. The pilot demonstrated feasibility and strong learner engagement; however, no quantitative outcome measures or longitudinal follow-up were collected, limiting assessment of knowledge or attitude change.

Conclusion: A brief, case-based AI ethics curriculum was feasible to deliver within pre-clerkship medical education and was well received by participating students. Qualitative findings support the value of structured discussion and reflection for helping learners examine bias, autonomy, equity, depersonalization, and professional responsibility in AI-influenced care. Because this was a small single-institution pilot without quantitative pre- and post-measures or longitudinal follow-up, conclusions are limited to feasibility and perceived educational value. Future work should incorporate pre- and post-session assessments, longitudinal evaluation, faculty development, and broader implementation to determine whether the curriculum produces measurable and sustained growth in ethical AI literacy.



Abstracts – Oral Presentations

O1. Spatial Regional Characterization of NMF-Derived Components and DVR Disagreements in Dynamic 18F-AV-1451 Positron Emission Tomography (PET)

Valerie Kobzarenko, Ph.D., Emily Eader, Vaishnavi Abodh Dixit

Mentor: Debasis Mitra, Ph.D.

Objective: To determine whether non-negative matrix factorization (NMF) of dynamic 18F-AV-1451 positron emission tomography (PET) brain scans offers advantages over conventional distribution volume ratio (DVR) imaging by identifying distinct spatial signal components and characterizing DVR–factor disagreements through regional spatial segmentation, with particular emphasis on regions susceptible to partial-volume effects (PVE).

Methods: We applied NMF to dynamic 18F-AV-1451 brain PET data to derive spatial coefficients and compared the factorization-derived coefficients with conventional DVR images. Regional agreement and disagreement between DVR and the coefficient images were assessed across 50 retrospective scans. Disagreement regions were anatomically classified as PVE-prone or non-PVE based on their location. PVE-prone structures included ventricular and other CSF spaces, corpus callosum, vessels, optic chiasm, and white-matter abnormalities, while cortical association regions were classified as non-PVE. Coefficient and DVR regional values were spatially segmented, averaged within each region, ranked according to their mean values, and subsequently compared. Factorization produced three coefficient maps, one representing blood/tracer dynamics and two representing tracer binding components (specific and nonspecific binding), the spatially segmented averages from each binding coefficient map were independently ranked and compared with the corresponding ranked regional averages from the DVR map. The proportion of disagreement instances occurring in PVE-prone anatomy was compared with an equal-probability benchmark using an exact binomial test and chi-square test. Spatial patterns were also examined qualitatively to determine whether discrepancies were diffuse or localized to specific anatomical structures.

Results: Ranked DVR and the coefficient maps showed complete regional agreement in 31 of 50 participants (62%). Among 63 region-factor disagreement instances, 47 (74.6%) occurred in anatomically PVE-prone structures and 16 (25.4%) occurred in non-PVE regions. The enrichment of disagreements in PVE-prone anatomy was significant relative to an equalprobability benchmark (exact binomial $p < 0.0005$; $\chi^2(1) = 15.25$, $p < 0.0005$). Discrepancies were concentrated in ventricular/CSF spaces, corpus callosum, vessels, optic chiasm, and whitematter abnormalities rather than being broadly distributed throughout the cortex. When repeated appearances of the same anatomical region within a participant were collapsed, 42 of 53 disagreement regions (79.2%) were classified as PVE-prone. Cortical regions commonly used for amyloid assessment showed comparatively preserved agreement between DVR and the factorization-derived maps.

Conclusion: NMF of dynamic 18F-AV-1451 PET scans separated a spatial signal component whose discrepancies from DVR were strongly enriched in PVE-prone anatomy. The localization of disagreements to ventricular, white-matter, vascular, and related structures suggests that the factorization is capturing a distinct anatomical or kinetic signal rather than producing widespread differences in cortical tracer distribution. Since these regions are often susceptible to partialvolume effects, spillover, nonspecific uptake, and heterogeneous tracer kinetics, the observed factor may reflect one or more of these phenomena. These findings support further investigation

of dynamic factorization as a complementary approach for identifying spatially and kinetically distinct signal components that may not be fully captured by static DVR measures.



O2. Public Library-based intervention for Mild Cognitive Impairment and Mild Dementia

Tanay Malla, Naomi Codrington, Victoria Amorim, Leah Degard-Edmond, Diana Pop, Diana Sokolov, Sharukh Khan

Mentor: Robert Coni, DO

Objective: This pilot study will evaluate the feasibility and acceptability of a public library-based, home cognitive stimulation intervention using “Brain Boxes” in adults with mild cognitive impairment or mild dementia and their caregivers. Exploratory outcomes will assess whether the intervention is associated with attenuation of cognitive decline.

Methods: Thirty adults aged 55–85 with mild cognitive impairment or mild dementia and approximately 30 corresponding caregivers will be enrolled. Eligibility will require the ability to provide informed consent and participate in simple cognitive tasks; moderate/severe dementia, major depressive disorder, certain neurologic/psychiatric disorders, recent initiation of dementia medication, and physical inability to use the Brain Boxes will be exclusionary. Participants will complete a 6-month within-subject protocol consisting of a 3-month control phase followed by a 3-month intervention phase. During the control phase, participants will continue usual activities and complete a weekly activity tracker. Montreal Cognitive Assessment (MoCA) testing will be performed at baseline, after the control phase, and after the intervention phase. During the intervention phase, participants will use library-distributed Brain Boxes containing themed puzzles, art, books, and reminiscence activities, with daily engagement tracking and monthly box rotation. Participant depressive symptoms will be assessed with the PHQ-9, caregiver strain with the Modified Caregiver Strain Index (MCSI), and post-intervention participant/caregiver surveys will assess perceived benefit, usability, engagement, and willingness to continue the program. Feasibility outcomes will include recruitment, retention, adherence, and participant/caregiver acceptability. Exploratory efficacy will compare within-participant MoCA change during the intervention phase with change during the preceding control phase.

Results: Participant recruitment and data collection have not yet begun. Protocol development established a target enrollment of 30 participant-caregiver dyads for this feasibility pilot. Assuming 30% attrition, approximately 21 participant completers are anticipated. Power modeling for a future efficacy study estimated that detecting a 1.0-point attenuation in MoCA decline, assuming an SD of 3.0 points, a one-sided paired-samples t-test, $\alpha=0.05$, and 80% power, would require approximately 58 completers. Accounting for 30% attrition, approximately 83 participant-caregiver dyads would need to be recruited for a fully powered efficacy study.

Conclusion: This protocol is designed to determine whether a library-based Brain Boxes intervention is feasible and acceptable for adults with mild cognitive impairment or mild dementia and their caregivers. The pilot will also generate preliminary data on adherence, retention, participant/caregiver experience, and within-participant cognitive change. These findings will inform refinement of the intervention and the design, sample size, and feasibility of a subsequent adequately powered efficacy study.



O3. Epidemiology of Traumatic Skin Injuries in Female Collision and Contact Sport Athletes Presenting to U.S. Emergency Departments: A NEISS Analysis

Natalie Nacy, Alessandra Merenna

Mentor: Dustin Volkmer, MD

Objective: To evaluate the national epidemiology of traumatic skin injuries among female athletes participating in collision and contact sports presenting to U.S. emergency departments, including injury patterns by sport, age group, body region, diagnosis, disposition, and temporal trends from 2015–2024.

Methods: The National Electronic Injury Surveillance System (NEISS) database was queried for female athletes aged 4–24 years presenting to U.S. emergency departments with traumatic skin injuries sustained during collision or contact sports from 2015–2024. Sports included basketball, soccer, cheerleading, wrestling, lacrosse, rugby, martial arts, field hockey, ice hockey, and boxing. Survey-weighted national estimates were analyzed by sport, age group, injury type, body region, and emergency department disposition. Chi-square testing evaluated associations between variables, and linear regression assessed temporal trends.

Results: Soccer (37.11%) and basketball (36.49%) accounted for nearly three-quarters of estimated injuries, while cheerleading represented 14.91%. High school-aged athletes comprised the largest proportion of injuries (46.29%), followed by early adolescents (33.19%). Contusions and abrasions accounted for over 96% of injuries, and the face was the most commonly affected body region (15.29%). Nearly all patients were treated and released from the emergency department, with hospitalizations and transfers remaining rare. Linear regression demonstrated a significant decline in weighted injury estimates over time ($p=0.011$), with a marked decrease in 2020 followed by gradual recovery. Chi-square analyses demonstrated significant associations between injury patterns and sport, age group, disposition, and body region (all $p<0.001$).

Conclusions: Traumatic skin injuries among female collision and contact sport athletes were predominantly minor, primarily affected high school-aged athletes, and were most commonly associated with soccer and basketball. Injury patterns varied significantly across sports and body regions, supporting sport-specific prevention strategies and providing nationally representative epidemiologic data to inform future injury surveillance and athlete care.



O4. Meeting communities where they are: Evaluating HPV vaccination outreach and education strategies in Bexar County

Adriana D. Rodriguez, Erika L. Thompson, Ph.D., Andria Gabriela, Ryann Moore

Background/Introduction: Human papillomavirus can cause six types of cancer, including cervical, anal, vaginal, vulvar, penile, and oropharyngeal. The only preventative measure that ensures 90% effective protection against HPV-related cancers is the HPV vaccine. Yet, Bexar County, Texas, specifically has low HPV vaccination rates at 56.7% compared to 62.9% nationally. To close this gap, the All For Them Bexar

Program was established to improve HPV vaccination by providing patient education and vaccine accessibility.

Purpose/Objective(s): The purpose of this project was to assess outreach efforts for the All For Them Bexar Program for reaching underserved communities in Bexar County. Evaluation of the program's outreach locations and the corresponding population demographics was completed to assess resource allocation relative to identified needs.

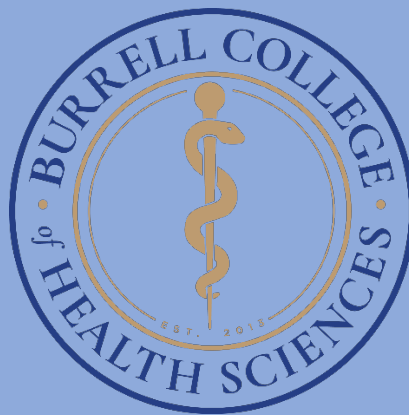
Methods: All For Them Bexar team members enter in outreach data for locations and types of engagement across Bexar County in REDCap. Outreach locations were matched with zip codes in the community and compared with the demographics in the zip code based on census data. Geographic locations were mapped and stratified by engagement types (e.g., online, hybrid, in-person).

Results: Outreach locations cross analysis with census data based on corresponding zip codes relayed that outreach was completed in areas with higher poverty levels, uninsured populations, and limited English-speaking households. With 21.8% and 12.5% of in-person outreach occurring in 78207 and 78237 regions, respectively. Both of which have the highest percentage of residents below the poverty level, the highest level of uninsurance, and speak limited English. Furthermore, significant expansion in community engagement efforts was found from 2025 to 2026 with a 5.8-fold increase.

Conclusion: The All For Them Bexar Programs outreach efforts are reaching the communities that are most underserved in Bexar County. These regions target residents who are more likely to be uninsured and/or living below the national poverty line, bridging community and clinical needs in HPV prevention. Future evaluation should determine how outreach translates to HPV vaccine uptake within Bexar County.



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