UNE COM Research and Scholarship Fall Forum

Friday, October 3, 2025

Innovation Hall, UNE Portland Campus

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12 p.m. **SIGN-IN AND LUNCH**

1 p.m. **WELCOME REMARKS**
Jane E. Carreiro, D.O. '88, *Vice President for Health Affairs; Dean, College of Osteopathic Medicine*

1:15 p.m. **POSTER PRESENTATIONS / JUDGING SESSION #1,** *Odd-numbered posters will present*

2:05 p.m. **BREAK**

2:15 p.m. **KEYNOTE ADDRESS**

ADVANCEMENTS IN MEDICAL EDUCATION ON ADDICTION: FINDING HAPPINESS IN RECOVERY

Joseph Skrajewski, M.A., MFTI
Executive Director of Medical and Professional Education, Hazelden Betty Ford Foundation

A national thought leader on addiction education for professionals, Joseph Skrajewski, M.A., MFTI, has collaborated on many successful initiatives involving the White House Office of National Drug Control Policy (ONDCP), National Institute on Drug Abuse (NIDA), and the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Skrajewski's focus on providing training opportunities to medical students through initiatives such as the Betty Ford Summer Institute for Medical Students (BF SIMS) Fellowship Program has enhanced medical education for countless students. As a flagship institution in the BF SIMS Fellowship Program, UNE is proud to welcome Joseph Skrajewski to our campus and the Fall Research Forum.

3:15 p.m. **POSTER PRESENTATIONS / JUDGING SESSION #2,** *Even-numbered posters will present*

4:05 p.m. **BREAK,** *Tea, coffee, and cookies will be available*

4:20 p.m. **ORAL PRESENTATIONS**

Student Doctor Emily Corkery OMS IV
Basic Science Research: Computer Vision-assisted Analysis of Mouse Pain-Related Behaviors Reveals Unique Behavioral Signals Not Detected by Experimenter Observation

Student Doctor Benjamin Kaphan OMS IV
Clinical Research: Risk Factors for the Development of Postoperative Pneumonia at a Community Hospital

Student Doctors Ritz Tolentino OMS II and Grace Goodfellow OMS II
Educational and Social Research: Understanding and Experience with Career Coaching in Osteopathic Medical Educators: Preliminary Descriptive Cross-Sectional Survey

Student Doctor Linh Nguyen OMS II
Case Study: Recurrent Pediatric Preauricular Fistula with Cartilage-Involved Cyst

5:30 p.m. **AWARDS PRESENTATION AND CLOSING REMARKS**
Matt Havrda, Ph.D., *Associate Dean of Research and Scholarship*

Please park in Bishop Street lot.
Shuttle will bring you to campus.

UNE UNIVERSITY OF NEW ENGLAND
INNOVATION FOR A HEALTHIER PLANET

Poster Judging Session One

1. Adarme, Vincent Paul; Fakharizadeh Devan; Dhillon Hark**: Aerobic Exercise and Seizure Control in Epilepsy: A Systematic Review of Current Evidence and Implications for Future Research**
3. Amore, Alessandra: **Gestational Antidepressant Use and Neurodevelopmental Outcomes in Offspring: A Systematic Review**
5. Blau, Samantha: **The Role of Dock7 in Wnt/?-Catenin Signaling and Osteoblast Function**
7. Castro, Ines: **Implementation and Effectiveness of the Healthy Weight Clinic Type III Hybrid Trial: Massachusetts CORD 3.0**
9. Cheney, Morgan; Ellis, Suzanne; Vellayappan, Sandhya: **Food Insecurity in University of New England Medical Students**
11. Corkery, Emily: **Computer Vision-assisted Analysis of Mouse Pain-Related Behaviors Reveals Unique Behavioral Signals Not Detected by Experimenter Observation**
13. Puri, Jhanvi; Asika Etuka, Brandon; Moschella, Sophia: **Fostering Empathy in the Patient-Medical Student Relationship During a 48-Hour Hospice Home Immersion: Aggregate Journal Analyses for AY 2020-2021**
15. Flood, Brianna: **Correlating D8-BPA Retention and Deleterious Phenotypic Effects on Regenerating Planaria**
17. Gordon, Anthony: **The Efficacy of Platelet Rich Plasma to treat Inflammation Caused by Autoimmune Conditions**
19. Gray, James: **Angiomyolipoma-associated Metabolic Reprogramming in TSC: Insights from Serum Metabolomics**
21. Kaphan, Benjamin: **Risk Factors for the Development of Postoperative Pneumonia at a Community Hospital**
23. Kernstine, Carly: **Loss of CELF4 from renal DRG neurons (RDN) results in a reduction in glomerular podocytes, sex-specific changes in expression of TRPV1 and clinically significant vascular/glomerular injury**
25**.** LaChance, Bryan: **Quality of Life Change Following Arthroscopic Shoulder Surgery Repair of the Rotator Cuff and Influence on Retear Rate**
27. Lam, Stephanie: **Behavioral Consequences of Calorie Restriction and Social Isolation**
29. Marino, Rachel; Lopez, Julia; Tomasetti Grace; Walter, Ashley: **Impacts of Anatomy Outreach for Research and Teaching Advancement (AORTA) Program on High School Students' Career Interests**
31**.** Mensah Otabil, Edith: **Epigenetic Dysregulation of Mitochondrial Homeostasis Drives Aortic Valve Stenosis Reversed by Metformin**
33. Patel, Khushboo: **Functional Analysis of Risk Factors for Cardiopulmonary Bypass-Induced Lung Injury in Congenital Heart Disease Patients**
35. Pham, Luu: **Evaluating Maternal and Hospital Factors Contributing to Cesarean Delivery Disparities During the COVID-19 Pandemic**
37. Platteter, Emilie: **The Role of C-reactive Protein in Cystectomy: Forecasting Future Complications**
41. Sedrak, John: **Rapid Neurodegeneration: Understanding Creutzfeldt–Jakob Disease**
43. Shah, Parita: **Evaluating the Risk of Drug-Induced Liver Injury in Patients on DMARDs and Biologics: A Systematic Review of Hepatotoxicity Profiles and Risk Mitigation Strategies**
45. Shin, John (SungJin): **Analyzing the Relationship Between EPG5 Mutations and the Risk of Chronic Pain-Related Diagnoses**
47. Cama, Kathryn; Stevens, Sarah; Pham, Luu: **A Comparison of AI Platforms for Effectiveness in Addressing Frequently Asked Patient Questions about Anesthesia**
49. Sweeney, Mary: **It's about Time: Addressing the Opioid Epidemic through Interprofessional Health Professions Education Events**
51. Tolentino, Ritz: **Severe Traumatic Brain Injury: Non-Military Patients Essential Need for Behavioral Health Care**
53. Tran, Donna: **Exploring Genetic Links Between Genomic Variants in the Adrenergic Receptor Gene and the Co-Occurrence of Takotsubo Cardiomyopathy with Generalized Anxiety Disorder: Insights for Further Investigation**
55. Wolfe, Aliza: **Comparing Delivery Complications Between Non-Hispanic White Individuals and Other Racial Groups in the United States**
57. Ziedins, Eriks: **Studying Dyschromic Hypertrophic Scar in a Transgenic Mouse Model: Protein-level confirmation differentially expressed genes identified by RNA sequencing**

Poster Judging Session Two

2. Alexander, Michelle: **Aortic Morphology in Bicuspid Vs Tricuspid Aortic Valve Patients: A Matched Computed Tomography-Based Analysis Beyond Ascending Diameter**
4. Ansart, Samantha; Goudreau, Kerrigan: **Identifying Geographic Differences in Sexual Activity and Behaviors in Maine Adolescents**
6. Browne, Melissa; Nasir Mohad: **Treatment For Conjunctivochalsis: A Follow-Up Study to The Combined Approach Utilizing Radiofrequency Cauterization and ThermaLidTM Procedure**
8. Chen, Shelley: **Cannabis Use Across U.S. States and Territories: A Cross-Sectional Analysis of Legalization Type, Duration, and Demographic Trends**
10. Chin, Tiffany: **Sex Differences in Ascending Nociceptive Signals in Rats with Temporomandibular Joint Osteoarthritis**
12. Dennehy, Aisling: **Contribution of Smoking History to Lung Cancer Stage at Diagnosis with Low-Dose CT**
14. Farag, Marina; McLaughlin, Kaci: **Seizure Network Reorganization in the Repeated Flurothyl Model: The Ventromedial Hypothalamus (VMH) as a Critical Gate**
16. Goodfellow, Grace; Tolentino, Ritz: **Understanding and Experience with Career Coaching in Osteopathic Medical Educators: Preliminary Descriptive Cross-Sectional Survey**
18. Govindaraj, Anjanadevi; Yahya, Afnan: **Effect of Antimicrobial Peptides on the Antibiotic-Mediated Killing of Bacterial Biofilms**
20. Greenfield, Madison: **Identifying a Gold Standard Joint-sparing Treatment for Hallux Rigidus: Comparing Long-term Pain Relief, Functional Outcomes, Revision Rates and Patient Satisfaction**
22. Karpe, David: **Cardiac Neural Crest Cells and Ift88 Mutants in Myocardial Development and Integrity**
24. Kim, Albert: **The Role of DOCK7 in Osteoclast Differentiation and Bone Resorption**
26. Lafferty, Hanna: **Approaching ACEs as Social Determinants of Health: How Children Experiencing ACEs are Supported in Vassalboro, Maine**
28. Marcin, Joseph; Atif, Haris: **Long Term Outcomes of Robotic Arm-Assisted Total Knee Arthroplasty (RATKA)**
30. Medidi, Varsha: **Investigating NAD+ Metabolism as a New Frontier for Tuberous Sclerosis Complex Therapy**
32. Nguyen, Linh: **Recurrent Pediatric Preauricular Fistula with Cartilage-Involved Cyst**
36. Pham, Luu; Pai, Sanjay: **Bridging Gaps in Addiction Care: Substance Use in Older Adults, Clinicians, and Communities — Insights from the SIMS Fellowship Experience**
38. Reale, Kevin; Dentry, Tyler: **48 Hour Hospice Home Immersions - Academic Year 2018-19: Student Learning and Skills to Augment Their Career**
40. Savoy, Sarah**: Labeling Neurons Receiving Direct Input from Corneal Primary Afferents in Mouse**
42. Serraj, Laila: **Comparing the Acceptability and Feasibility of Methods for Translating a Clinical Decision Support Tool**
44. Shankar, Meghasri: **A Narrative Review of Supporting Neurodivergent Learners in Medical Education**
46. Sourirajan, Krupa: **Metabolomic Profiling of Normal Human Retinal and Choroid Tissue**
48. Sullivan, Violet: **External Iliac Artery Endofibrosis and Revascularization in a Female Triathlete: A Case Report**
50. Tanikella, Sruthi: **Geographic Variation in Missing Race and Ethnicity Data in Minimum Data Set 3.0**
52. Thomas, Keely; Tomasetti, Grace: **Piloting a Survey to Evaluate the Impacts of the AORTA Program on Osteopathic Medical Student Facilitators**
54. Varghese, Shama: **Evaluating the Impact of the PHIT Program on Interprofessional Competencies and Social Determinants of Health Awareness**
56. Wolfe, Aliza: **Delivery Outcomes in Limited English Proficiency Patients Compared to English-Speaking Patients**

Aerobic Exercise and Seizure Control in Epilepsy: A Systematic Review of Current Evidence and Implications for Future Research

Adarme[1], VP, OMS III, Fakharizadeh[2], D, OMS III, Dhillon, H[3], OMS III, Mercado[4], J, D.P.T., McCullen[5], G, M.D.
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[4]Samuel Merritt University, College of Health Sciences, Oakland, California

Introduction: The role of aerobic exercise in people with epilepsy has long been approached with caution due to concerns about exercise-induced seizures linked to physiological stressors such as hyperventilation, hypoglycemia, and fatigue. Our hypothesis was moderate aerobic exercise is safe and improves overall fitness and quality of life (QoL) in patients with epilepsy. This review evaluated randomized clinical trials of moderate aerobic exercise in people with epilepsy.

Methods: The review followed the Preferred Reporting Items for Systematic Reviews and MetaAnalyses guidelines. Searches were conducted in PubMed, ClinicalKey, Embase, SPORTDiscus, the Cochrane Central Register of Controlled Trials, and PEDro. Inclusion criteria were randomized clinical trial design, moderate aerobic exercise, program duration >12 weeks, clinically diagnosed epilepsy, and reported seizure frequency. 221 unique studies were screened, 9 were evaluated in full, and 6 met inclusion criteria. Data on qualitative changes in seizure events during training, improvements in fitness and QoL were extracted.

Results: The six trials included 190 participants who completed the interventions, with 109 in exercise groups and 81 in controls. Seizure exacerbation occurred in 1.59% of participants overall (1.83% in exercise, 1.20% in control). Significant fitness improvements were observed in 5 of 6 studies conducting objective testing. Quality of life outcomes were inconsistently reported.

Conclusion: Moderate aerobic exercise programs lasting more than 12 weeks appeared to be safe for people with epilepsy and resulted in a very low incidence of seizure worsening and supported benefits in fitness. In the future, standardized protocols defining and regulating exercise intensity, fitness metrics and quality of life assessments are recommended to improve the evaluation of safety and efficacy of aerobic exercise in epilepsy management.

Aortic Morphology in Bicuspid Vs Tricuspid Aortic Valve Patients: A Matched Computed Tomography-Based Analysis Beyond Ascending Diameter

Alexander[1], M, OMS III, Murphy-Genao[2], N, B.S., Lupp Mota[3], A, M.D., Ph.D., Hedgire[4], S.S, M.D.

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[2]Summer Research Trainee Program, Massachusetts General Hospital, Boston, Massachusetts
[3,4]Department of Radiology, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts

Introduction: Bicuspid aortic valve (BAV) is the most common congenital valvular heart defect and it is associated with increased risk of aortic dilation, aortic aneurysm formation, and aortic dissection. Bicuspid aortic valve patients are known to have increased ascending aorta diameter. Ascending aortic diameter (AD) is the primary parameter used clinically to indicate prophylactic interventions for patients with bicuspid aortopathy. The current AD surgical threshold recommended cutoff is 55 mm. Some studies have suggested that lower thresholds and additional CT-based aortic parameters may better characterize BAV-associated aortopathy. Additional parameters such as aortic annulus angle (AoAA), the ascending aortic angle (AAA), and greater curvature length of the aorta (GCL) may enhance risk stratification and individualized care. The aim of this study is to evaluate the differences in aortic morphometric measurements between BAV and tricuspid aortic valve (TAV) patients and assess their relationship with ascending aortic dilation.

Methods: In this retrospective match-pair study BAV patients were matched with TAV patients based on age, sex, and AD. The means and medians of the following geometric measures were captured by ECG gated, contrast-enhanced computed tomography (CT) scans and compared across the pairs using t-tests and Wilcoxon, respectively: AoAA, AAA, AL, GCL, descending diameter (DD), and root diameter (RD). Significance was defined as a p-value < 0.05.

Results: This investigation collected data from 92 matched pairs of BAV and TAV patients (85% men, 15% women, ages 37-83, median AD of 4.4 cm). Paired t-tests revealed significant differences in AL ($p = 0.00$), GCL ($p = 0.002$), DD ($p = 0.0002$) as did Wilcoxon.

Conclusion: Despite matching for ascending aortic diameter, BAV patients demonstrated distinct aortic morphologies in aortic length, greater curvature length, and descending diameter. This supports the role of these additional morphometric measures in assessment of BAV aortopathy. Relying solely on AD may underestimate the severity of disease in BAV patients, therefore including these additional proposed measures may improve risk stratification and guide more personalized surgical decision-making. Acknowledgment: Department of Radiology, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts

Gestational Antidepressant Use and Neurodevelopmental Outcomes in Offspring: A Systematic Review

Amore[1,2], AE, M.P.H., OMS II, Cook[2], E, M.S., Ph.D.
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[2]University of Massachusetts Amherst Department of Biostatistics and Epidemiology, Amherst, Massachusetts

Introduction: Both Autism Spectrum Disorder (ASD) and Attention Deficit Hyperactivity Disorder (ADHD) have been increasing in prevalence in the United States over the course of the 21st century. In 2000, the CDC found the prevalence of ASD to be 0.7%, but as of 2020, it increased to 2.8%; ADHD prevalence in 2000 was 6.9%, but rose to 9.8% as of 2018. Antidepressant use in the United States has also been increasing; while they are generally considered safe for gestational use, current literature suggests pregnant women feel they do not have sufficient information available to them to make decisions regarding whether they should begin or continue taking antidepressants upon becoming pregnant. This review aims to assess the impact of antidepressant medication use during gestation on the early childhood neurodevelopmental outcomes of ASD and ADHD in exposed offspring.

Methods: The databases PubMed and American Medical Association Journals (JAMA) were searched to find current literature on the association. Studies that focused on one specific antidepressant medication, or did not use verified clinical diagnosis to identify cases of ASD and ADHD, were excluded. Nine total studies are included in this review, with study populations ranging from 13,273 to 1,580,629 participants. Data from these studies were manually extracted by a single researcher and assessed for bias in nondifferential misclassification of both exposure and outcome.

Results: Crude measures of association with ASD ranged from a 30% to 87% increase in risk; those of ADHD ranged from a 20% to 69% increase in risk. When adjusted for major depressive disorder (MDD) or major psychiatric disorder (MSD), measures of association with ASD ranged from a 12% reduction in risk to a 20% increase in risk; those of ADHD ranged from a 2% reduction in risk to an 18% increase in risk.

Conclusion: A notable limitation of this review is the observational nature of the register-based data utilized in the included studies, and the increased opportunity for nondifferential misclassification of exposure and outcome due to limited context around the data. The consistent results among the crude measures of association show an increased risk in the outcomes of ASD and ADHD when offspring are exposed to antidepressants during gestation. But, among mothers diagnosed with MDD or MSD taking antidepressants during pregnancy, there is little to no increased risk of their child developing ASD or ADHD respective to all mothers.

Acknowledgement: The University of Massachusetts Amherst Department of Biostatistics and Epidemiology. A special thanks to Dr. Elizabeth Cook for her guidance and support on this project.

Identifying Geographic Differences in Sexual Activity and Behaviors in Maine Adolescents

Ansart[1], S, OMS II, Goudreau[1], K, OMS II, Blackburn[2], J, Ph.D., Redway[1], T, Ph.D.

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[2]The Ohio State University College of Medicine, Columbus, Ohio

Introduction: Comprehensive sexual education is consistently linked to delayed initiation of sexual activity and the reduction of risky behaviors in adolescents. Yet, rural teens are disproportionately less likely to receive the education needed to make informed choices about their sexual health. This placebased disparity raises major concerns for the youth of Maine, the most rural state in the nation. Despite this, no known studies have directly investigated how this rurality impacts Maine youths' sexual decision-making. To address this gap, we will analyze data from the Maine Integrated Youth Health Survey (MIYHS) collected by the Maine Department of Health and Human Services (DHHS), representing adolescents across the state of Maine. We hypothesize that greater rurality will be associated with increased prevalence of sexual activity. Findings will guide policymakers on where educational resources are most urgently needed to ensure equitable access to sexual health education for all Maine youth, regardless of zip code.

Methods: This project is a secondary data analysis based on cross-sectional, pre-coded data from the MIYHS, which is administered by the Maine DHHS biennially to high school students. With parental consent, public high schools and non-sectarian private schools may choose to administer this survey to their students. The data selected for analysis is from closed-ended items pertaining to demographic and sexual health-related questions from survey years 2019, 2021, and 2023. Analysis with SPSS and RStudio is in progress to identify trends within the data based on demographics and geographic location and categories in sexual health (contraception use, STI testing/diagnosis, unwanted sexual experiences, HPV vaccine status, sexual activity engagement, and violence/bullying).

Results: Initial cleaning of the data and data mining has begun since its acquisition. Over the 3 years obtained, 91,890 responses were reported with 35,156, 26,964 and 29,770 responses in 2019, 2021 and 2023 respectively. Responses were obtained from 11 out of the 16 counties (n = 9 rural counties) in Maine and variables pertaining to prevalence of sexual activity and behavior have been identified.

Conclusion: It has been determined that the appropriate variables and number of responses have been obtained to move forward with analyzing trends for prevalence of sexual activity.

Acknowledgments: This research was conducted at the University of New England College of Osteopathic Medicine. We gratefully acknowledge the Maine Department of Health and Human Services for providing access to the MIYHS dataset and to the Maine high schoolers who completed the surveys. Institutional Review Board (IRB) exemption for this study was granted by the University of New England's Office of Integrity.

The Role of Dock7 in Wnt/β-Catenin Signaling and Osteoblast Function

Blau[1], S, M.S., OMS II, Lizotte[1], T, Ahmida[2], Z, Caradonna[3], P, Long[3], P, Sampson[4], W, Becker[1], K, Ph.D.
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[3]University of New England Center for Pain Research, Biddeford, Maine
[4]University of Maine Graduate School of Biomedical Science and Engineering, Orono, Maine

Introduction: Osteoporosis is the most common bone disease worldwide, arising from an imbalance between bone resorption and formation. This disease is often driven by excessive osteoclast activation through RANKL signaling. Current evidence implicates Dedicator of Cytokinesis 7 (DOCK7) in osteoblast differentiation and bone formation, potentially through regulation of Rac1 and canonical Wnt/β-catenin signaling, which is critical for activating osteogenic genes such as *Axin2*, *Runx2*, and *OPG*. We hypothesize that DOCK7 is an essential mediator of canonical Wnt signaling and that its loss will impair Wnt-induced gene expression and β-catenin nuclear localization. To test this hypothesis, we will determine how DOCK7 loss impacts Wnt3a-induced gene expression in osteoblasts, and if loss of DOCK7 affects Rac1 activation and β-catenin nuclear localization in Wnt3a treated cells.

Methods: We used the pre-osteoblastic mouse cell line MC3T3-E1 to investigate the role of DOCK7 in canonical Wnt signaling. Gene knockdown was achieved using an siRNA pool targeting *Dock7*, with non-targeting siRNA and mock-infected controls. Cells were then treated with Wnt3a protein (50 ng/mL) or vehicle control. Wnt3a-induced gene expression will be assessed by quantifying mRNA levels of *Axin2*, *Runx2*, and *OPG*. Additionally, β-catenin nuclear localization will be evaluated using immunohistochemistry, and Rac1 activation will be measured via a Rac1 Activation Pulldown Assay.

Results: Preliminary siRNA experiments have been conducted on MC3T3 cells, with RNA isolation planned. Staining for β-catenin in Wnt3a-treated samples has been completed, and analysis is underway. If *Dock7* loss is found to impair Wnt3a-induced gene expression, βcatenin nuclear localization, or Rac1 activation, future studies will focus on mapping Dock7's upstream interactions within the Wnt pathway, testing whether *Dock7* overexpression can rescue signaling, and evaluating its role in bone formation in vivo.

Conclusion: This work aims to clarify the role of *Dock7* in canonical Wnt signaling and osteoblast function. By determining its impact on Wnt3a-induced gene expression, β-catenin nuclear localization, and Rac1 activation, these studies will provide insight into the molecular mechanisms linking *Dock7* to bone formation. These findings could identify *Dock7* as a potential therapeutic target for enhancing osteoblast function and improving bone mass in osteoporosis.

Acknowledgements: This research was conducted at the University of New England College of Osteopathic Medicine with the support of the Carmen Pettapiece Student Research Fellowship, P20GM152330 (to Dr. Derek Molliver), and P30GM145497 (to Dr. Ian Meng). I'd like to extend my sincerest thanks to the Becker Lab for allowing me the opportunity to work on this project and contribute to the field of orthopedic medicine. I'd also like to give a special thanks to the UNE Histology and Imaging Core for their dedication and assistance with imaging and analysis.

Treatment For Conjunctivochalsis: A Follow-Up Study to The Combined Approach Utilizing Radiofrequency Cauterization and ThermaLid™ Procedure

Browne[1], M, OMSII, Nasir[1], M, M.Sc., OMSII, Jaccoma[2], E, M.D.
1University of New England College of Osteopathic Medicine, Portland, Maine
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Introduction: Dry Eye Disease (DED) is a chronic inflammatory condition of the ocular surface, primarily driven by tear film instability and hyperosmolarity. Two key components of this pathogenesis include Meibomian Gland Dysfunction (MGD) and Conjunctivochalasis (CCH) due to decreased lubricating secretions and increased ocular surface friction. DED is the leading cause of eye related medical attention, yet current treatments often fail to provide long-term relief. It has been proposed that the use of radiofrequency cauterization in combination with thermal plication may be more effective by directly targeting MGD and CCH. Preliminary studies have demonstrated promising outcomes using this combined treatment. Our hypothesis was that the use of radiofrequency cauterization and ThermaLid™ procedure may provide long lasting relief for DED through improved meibomian gland secretions and smoothing of conjunctival folds.

Methods: Charts were retrospectively reviewed from fifty-five patients who were treated with the combined RF cautery and ThermaLid™ procedure for a total of 103 eyes. Patients were included if they presented with DED symptoms, many of which had been treated with prior first line dry eye therapies without relief. Patients were subsequently treated in either one or both eyes. Pre-treatment metrics were collected, followed by assessments at one- and four-months post-procedure to evaluate subjective dry eye symptoms, CCH grading, MGD measured with Meibomian Glands Yielding Liquid Secretions (MGYLS) and other standard dry eye metrics, including Non-invasive Tear Break-Up Time (NTBUT) and Schirmer's scores.

Results: Statistically significant improvements in CCH and MGD were noted with decreased conjunctival folds in CCH and an increased number of MGYLS. There was also an increase in NTBUT and Schirmer's scores. Patients reported a significant decrease in dry eye symptoms as measured by the Standard Patient Evaluation of Eye Dryness (SPEED). These results concur with prior findings by Nyguen and Jaccoma[1] with minimal post-operative side effects.

Conclusion: The combined treatment using radiofrequency cauterization and ThermiLid™ yielded significant improvement in MGD and CCH. The results support the efficacy of combined treatment targeting MGD and CCH as an effective method to improve DED symptoms and pathology.

Acknowledgement: The University of New England College of Osteopathic Medicine and Excellent Vision Eye and Laser Center. A special thanks to Sarah Savoy for her support in data acquisition. This work has been supported by the Peter Morgane Research Fellowship. This work was approved by the University of New England IRB (protocol # 0325-09-01)

1. Nguyen L, Jaccoma E. TREATMENT FOR CONJUNCTIVOCHALASIS: A COMBINED APPROACH UTILIZING RADIOFREQUENCY CAUTERIZATION AND THERMALIDTM PROCEDURE. *Journal of Dry Eye Disease*. 2021;4(1):e1-e10. doi:10.22374/jded.v4i1.35

A Comparison of AI Platforms for Effectiveness in Addressing Frequently Asked Patient Questions about Anesthesia

Stevens[1*], S, OMS III, Cama[1*], K, M.P.H., OMS III, Pham[1*], L, OMS III., Quaye[1], A, M.D., Scully[2], K, Ph.D.

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*Authors contributed equality

Introduction: Patients and providers increasingly use AI models to address medical questions. Free large language models (LLMs) such as ChatGPT, Gemini, and Copilot are widely accessible and have shown value in medical education, including passing the USMLE. Concerns remain about the accuracy, bias, and reliability. In anesthesiology, AI has clinical uses, but its role in patient education is limited. Since the AMA and NIH recommend materials at or below a 6th-grade reading level, evaluating AI readability is essential. If effective, AI may reduce anxiety and improve informed consent.

Methods: Ten common anesthesia questions were reviewed by a board-certified anesthesiologist and entered into ChatGPT, Gemini, and Copilot in a single session to minimize variability from model updates. Responses were rated by anesthesiology residents on a 5-point Likert scale for quality, quantity, and satisfaction. Reviewers were blinded to the AI source. Scores were averaged, and a one-way ANOVA compared ratings ($p < 0.05$). Readability was assessed using the Average Reading Level Consensus formula, which combines eight tools to estimate U.S. grade level.

Results: No significant differences were found in ratings of quality ($p = 0.380$), quantity ($p = 0.863$), or satisfaction ($p = 0.388$), indicating similar performance across all platforms. However, readability differed significantly ($F(2,27) = 6.09$, $p = 0.007$): ChatGPT was most complex (M = 13.42), Gemini most accessible (M = 11.22), and Copilot intermediate (M = 12.82). This shows linguistic variation despite similar performance ratings.

Conclusions: ChatGPT, Gemini, and Copilot produced comparable quality, quantity, and satisfaction scores, with no statistically significant differences. Readability varied, with Gemini producing simpler responses and ChatGPT the most complex. All three exceeded the AMA/ NIH-recommended 6th-grade reading level, limiting accessibility for vulnerable populations. As health literacy is vital for informed consent, readability should be prioritized in AI-driven education. Ensuring both accuracy and accessibility is essential as AI becomes more integrated into healthcare communication.

Acknowledgement: We thank the MaineHealth Institute for Research, the University of New England College of Osteopathic Medicine, and the anesthesiology residents and faculty reviewers for their support. This project was reviewed and determined not to constitute human subjects research (IRB #0225-15).

Implementation and Effectiveness of the Healthy Weight Clinic Type III Hybrid Trial: Massachusetts CORD 3.0

Authors: *Castro[1,12], I, OMSII, *Ruggiero[1,2], CF, Ph.D., Luo[1], M, M.P.H., Smith[3], JD, Ph.D., Perkins[1], ME, M.P.H., Liebhart[4], J, M.S., Lindros[4], J, M.P.H., Salmon[4], J, M.P.H., Biggs[5], V, M.D., Ragunanthan[6], B, M.D., Matathia[7], S, M.D., M.P.H., Arauz Boudreau[1], A, M.D., M.P.H., Cheema[8], Y, M.D., Cannon-Smith[9], G, M.D., M.P.H., F.A.A.P., Taveras[1,10], EM, M.D., M.P.H., Fiechtner[1,11], L, M.D., M.P.H.
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Abstract:
Introduction: There is a pressing need to provide evidence-based treatment for obesity to millions of children. We sought to implement and evaluate the packaged Healthy Weight Clinic (HWC), a primary care-based family healthy weight program delivering Intensive Health Behavior and Lifestyle Treatment.

Methods: We conducted a Type III hybrid effectiveness-implementation study in four health care organizations affiliated with 8 primary care clinics. Sites received provider training, technical assistance, and participated in a virtual learning community with quality improvement. Consolidated Framework for Implementation Research (CFIR) and Reach EffectivenessAdoption Implementation Maintenance (RE-AIM) implementation frameworks were used to evaluate implementation via quantitative and qualitative methods. Children with a BMI ≥85th percentile were eligible to participate in the effectiveness trial. A group of 5990 children with a BMI ≥ 95th percentile receiving care at the eight health centers but not participating in the HWC served as the comparison group.

Results: The packaged HWC reached 191 children. The HWC was effective in reducing BMI 0.26 [95% CI:-0.47, -0.04], percentage of the median -1.87 [95%CI:-3.09, -0.64] and %BMIp95 1.05 [-1.97, -0.13] compared to comparisons. Seven of the eight sites were able to adopt all the components of the program except the texting campaign and sustain the program 18 months after training. Qualitative themes contextualized implementation findings, highlighting barriers and facilitators.

Conclusion:
The HWC is a promising family healthy weight program that can improve health for children with overweight and obesity and the implementation package can facilitate the adoption across diverse primary care settings in the US.

Trial registration: ClinicalTrials.gov NCT05020314

Acknowledgements: We would like to thank our clinical partners at Holyoke Health Center, Delta Health Center, Aaron E Henry Health Center, and Mass General Brigham for Children, as well as all research participants and families.

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Cannabis Use Across U.S. States and Territories: A Cross-Sectional Analysis of Legalization Type, Duration, and Demographic Trends

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Introduction: Cannabis use in the US has risen steadily alongside expanding state-level legalization, yet the relationship between state policies and population-level use remains partially understood. While broad demographic patterns have been described, fewer studies examined how legalization type (medical vs. recreational) and duration influence prevalence across demographic groups. We hypothesized that states with recreational legalization and longer medical-legalization duration would demonstrate higher prevalence overall, especially among women and older adults compared to medical-only states.

Methods: We conducted a cross-sectional analysis of 13 jurisdictions that participated in the 2023 Behavioral Risk Factor Surveillance System (BRFSS) cannabis module. Self-reported current cannabis use was summarized by sex and age. State-level policy data (medical status for all states and recreational status for 10 of the 13) were collected from publicly available sources and linked to cannabis prevalence. Welch t-tests compared medical-only vs. recreational states, and Pearson correlation assessed associations between years since legalization and prevalence. Methods of use (smoking, eating, vaping, dabbing) were summarized across demographic subgroups, and purpose of use was examined using BRFSS data.

Results: Overall prevalence of cannabis use averaged 12.4% (range 6.2%–20.2%), with Vermont reporting the highest use (20.2%). Men reported higher use than women (15.2% vs 10.1%, $p<0.001$). Use peaked at ages 25–29 (25.2%), followed by 18–24 (24.6%), and declined steadily with age (~7.5% at 70–74; ~1.3% at 80+). Recreational states reported higher prevalence overall (13.6% vs 8.5%, $p=0.016$), as well as among women (11.1% vs 6.6%, $p=0.01$) and adults 65+ (8.4% vs 4.6%, $p<0.001$). Years since legalization correlated positively with prevalence ($r=0.70$, $p=0.025$). Regarding mode of use, men favored smoking (79% vs 72%, $p=0.009$) and dabbing (11% vs 8%, $p=0.051$), while women reported more edibles (48% vs 38%, $p=0.01$). Smoking predominated among younger adults (86% at ages 18–24) but declined later in life, with edibles more common among older adults (36.8% at ages 18–24 vs 52.5% at ages 80+, $p=0.15$).

Conclusions: Cannabis use was higher in men, young adults, and recreational states. Longer legalization duration was moderately associated with higher prevalence. Importantly, recreational legalization was significantly associated with greater use among women and older adults, groups that have historically reported lower prevalence. Consumption methods also varied demographically, with men and younger adults favoring smoking and dabbing, while women and older adults more often reported edibles. These findings underscore demographic and policy-linked differences in cannabis use, with implications for tailored education, harm reduction, and public health responses as legalization expands.

Acknowledgements: Funding support was provided by the Peter Morgane Student Research Fellowship. The project was determined to be non-human subjects research by UNE IRB. We thank Dr. Yan Cao, Department of Mathematical Sciences, The University of Texas at Dallas, for assistance with BRFSS data extraction.

Food Insecurity in University of New England Medical Students

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Introduction: Food insecurity is defined by the USDA as a household-level economic and social condition of limited or uncertain access to adequate food. The aim of this project was to identify and characterize the level of food insecurity in osteopathic medical students attending the University of New England College of Osteopathic Medicine (UNECOM). Based on a study performed in 2023 at Harvard T.H. Chan School of Public Health, approximately a third of responding graduate and postdoctoral students at a private academic university in Boston, Massachusetts affirmed at least 1 indicator of food insecurity. We hypothesized at least 30% of UNECOM respondents would identify as food insecure. Our assumption was that UNECOM students face barriers contributing to their food insecurity and the move from Biddeford to Portland would worsen food insecurity, when compared to last year's data.

Methods: This project utilized the U.S. Household Food Security Survey from the USDA to assess food insecurity, modified from a 3-month to a 12-month analysis. In addition, in-house qualitative survey questions were designed to characterize specific factors which contributed to food insecurity. The survey was distributed by email twice over a duration of one month. The modified U.S. Household survey was scored and analyzed based on the USDA criteria with a quantitative scale of 0-6, and qualitative questions were reviewed by evaluating the most commonly noted barriers respondents faced.

Results: The study collected data from 73 respondents. Of these, 19 were repeat respondents from last year's survey. Results indicated 39.7% of respondents as food insecure. Common barriers reported include the cost of food, cost of housing, lack of time, lack of income, and lack of meal plan options on campus, with four repeat respondents confirming the move to Portland has increased their living expenses.

Conclusion: Food insecurity in medical students is complex, with students in pre-clinical and clinical years facing different barriers. Common themes included cost of food and housing as well as lack of time and money, with food insecurity worsening in repeat respondents who moved for rotations or to Portland. These results could guide discussions and policy development to improve food security in UNECOM students.

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Sex Differences in Ascending Nociceptive Signals in Rats with Temporomandibular Joint Osteoarthritis

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Introduction:
Females develop temporomandibular disorder (TMD) pain at a much higher rate compared to males. The mechanisms underlying the heightened susceptibility of females to develop TMD pain are not well understood. Sex differences in endogenous pain inhibition have been proposed as a mechanism underlying increased susceptibility of females to develop chronic pain states in TMD. We previously demonstrated that females have increased susceptibility to develop non-evoked pain and central sensitization compared to males in a rat model of temporomandibular joint (TMJ) osteoarthritis pain. Using this model, we explored the hypothesis that females show elevated levels of neural activity in brain regions associated with the ascending pain pathway compared to males. Additionally, naloxone increases neural activity in the ascending nociceptive pathway of males indicating protection from ongoing pain.

Methods: Male and female rats received TMJ injection of monosodium iodoacetate (MIA, 50 ul) at a concentration (16 mg/ml) that produces persistent non-evoked joint pain and central sensitization in females but only localized tactile hypersensitivity in males. Rats received systemic (3 mg/kg, i.p.) administration of the opioid receptor antagonist, naloxone, or equivolume saline 14 days following TMJ MIA injection. Brains were sectioned into 400 micron thick sections to examine a marker of neural activation, FOS expression, in the parabrachial nucleus (PBN) and medial thalamus. Data were analyzed using a 2-way ANOVA followed by post-hoc analysis, statistical significance set at $p< 0.05$.

Results: Preliminary data show that MIA treated females have elevated FOS expression compared to saline controls in the medial thalamus whereas males did not. Naloxone increased FOS expression in the medial thalamus in MIA treated males, but not MIA treated females. MIA treated rats showed elevated FOS expression in the PBN compared to saline controls.

Conclusion: This data suggests females with persistent non-evoked joint pain have increased neural activity in the PBN and medial thalamus that is not altered by systemic naloxone. In contrast, males showed significantly elevated neural activity following naloxone indicating increased endogenous pain inhibition. These observations indicate that females have increased susceptibility to develop joint pain due to diminished endogenous pain inhibition.

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Computer Vision-assisted Analysis of Mouse Pain-Related Behaviors Reveals Unique Behavioral Signals Not Detected by Experimenter Observation

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Introduction: Traditional behavioral assessments for potential pain in rodents present several challenges, including inter-investigator variability, problems with reproducibility, and investigator bias. Recent advances in computer vision and machine learning allow the detection of rodent behaviors in a more natural context and within a higher timescale resolution that is often imperceptible to the human eye. In this study we aimed to test if computer-assessed nonevoked behaviors captured via a Blackbox® device can detect differences noted by traditional pain-behavior assessments by trained investigators. Thus, we hypothesized that pain-related behaviors detected via traditional tests in mice exposed to a previously validated model of hind limb ischemia with reperfusion (I/R) injury would correlate to specific Blackbox outputs.

Methods: We performed a series of traditional pain-related behavioral tests, including guarding scores, mechanical withdrawal threshold, and grip strength. These analyses were paired to measurements done using a Blackbox One machine that utilizes near-infrared (NIR) cameras and weight-sensing Fourier transform infrared (FTIR) sensors to capture and analyze voluntary rodent behavior with limited human interference. Male and female mice exposed to an I/R injury were tested using traditional and Blackbox behavioral tests at Baseline and on days 1, 5, and 8 post injury. Behavioral outputs were analyzed using a 2-way ANOVA with Tukey post-hoc tests and a Principal Component Analysis (PCA).

Results: On day 1 post injury there was an increase in guarding and a decrease in mechanical withdrawal thresholds as well as grip strength. This was correlated with a decrease in hind paw luminance and an increase in hind paw lifted time in the Blackbox measurements. Guarding, grip strength, and withdrawal thresholds returned to baseline levels by day 8 post-injury, while the Blackbox measurements remained at day one levels and did not show signs of recovery after the injury. Specific postural measurements of the foot (toe spread) inversely correlated to guarding scores ($r=-0.814$; $R^2=0.662$).

Conclusion: These findings suggest that computer vision methodologies enhanced by infra-red vision may detect ongoing behavioral changes that are not captured by traditional scoring.

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Contribution of Smoking History to Lung Cancer Stage at Diagnosis with Low-Dose CT

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Introduction:
Lung cancer remains among the leading causes of cancer-related mortality in the United States, with over 125,000 projected deaths annually. Despite advancements in treatment, late-stage diagnosis due to the asymptomatic onset contributes to a poor five-year survival rate of approximately 15%. Low-dose CT (LDCT) screening has been shown to reduce lung cancer mortality by up to 20% by detecting tumors at earlier, more treatable stages. The U.S. Preventive Services Task Force (USPSTF) recommends LDCT screening for current smokers or those who quit within 15 years, with a 20 pack year history, aged 50 to 80 years old. The objective of this study was to determine how lung cancer stage as identified on LDCT was affected by pack year and smoking cessation history and by age and sex. We hypothesized smoking histories with greater pack years or a more recent quit date would correlate with higher lung cancer stage at diagnosis.

Methods:
In this retrospective chart review from 1/1/2023 to 6/30/2023 at Berkshire Medical Center in Pittsfield, Massachusetts, the CPT code 71271 computed tomography, thorax, low dose for lung cancer screening, without contrast material(s) identified 1249 patient charts. Records were reviewed for age, sex, smoking history, and cancer stage. Included were patients 50 to 80 years old who underwent LDCT screening. Excluded were those who did not meet USPSTF criteria, with small cell cancer or normal results, without smoking history or cancer diagnosis, or pathology report not available. An ordinal logistic regression was performed for statistical analysis with $p \leq 0.05$.

Results:
Nine patients with non-small cell lung cancer were included after 1238 were excluded. Ages ranged from 58 to 75 with 5 men and 4 women. Pack years ranged from 7 to 120 pack years. Years since quitting smoking ranged from 0 to 8 years. There were 2 patients with stage 1A2, 2 with 1A3, 2 with 1B, 1 with 2B, 1 with 3A, and 1 with stage 4. The odds ratio between pack years and cancer stage was OR=0.99 (95%CI[0.93, 1.05], p=0.679). The odds ratio between years since quitting and cancer stage was OR=0.75 (95%CI[0.50, 1.12], p=0.158).

Conclusion:
We were unable to satisfy our hypotheses regarding smoking history and lung cancer stage, likely due to small sample size. The majority (67%) of patients with lung cancer identified by LDCT were at stage 1, an earlier stage than typically identified by symptoms alone, consistent with findings by Hoffman, et al, and the expectation of USPSTF LDCT screening recommendations.

BMC IRB #2024-018 UNE IRB #0325-06

Seizure Network Reorganization in the Repeated Flurothyl Model: The Ventromedial Hypothalamus (VMH) as a Critical Gate

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Introduction: Epilepsy is a complex neurological disorder characterized by progressive network reorganization that drives seizure evolution and contributes to Sudden Unexpected Death in EPilepsy (SUDEP). The repeated flurothyl kindling model (RFM) reproduces this process, as repeated exposure to the chemoconvulsant flurothyl reduces seizure threshold and induces a transition from forebrain-limited (clonic) seizures to forebrain–brainstem (clonic–tonic) seizures after an incubation period. While the process involved in epileptogenesis is not fully understood, preliminary data suggest the working hypothesis that the ventromedial nucleus of the hypothalamus (VMH) serves as a potential gate mediating this seizure transition. In this study, we investigated VMH connectivity changes after exposure to the RFM using retrograde and anterograde tract tracing.

Methods: For retrograde tracing, 14 male C57Bl/6J wildtype mice underwent 8 flurothyl-induced seizures, a 30-d incubation, and retest; 3 controls received only tracer surgery. Mice then received bilateral VMH microinjections of tracer (100 nL): Fluorogold (3%) into the left VMH and Fluororuby (10%) into the right VMH. Seven days later, animals were perfused and their brains were collected for analysis. For anterograde tracing, *Nr5a1-cre*$^{+}$*; tdTomato*$^{+/-}$ mice (n = 14; 12 flurothyl, 2 controls) were used to visualize VMH efferents (as Nr5a1 is only expressed in the VMH). Mice underwent 8 flurothyl trials, 31-d incubation, and retest, followed by perfusion and brain collection the same day as retesting.

Results: Both cohorts showed decreased seizure thresholds during induction, with only a forebrain-clonic seizure semiology. After incubation, 71% of retrograde cohort mice and 100% of anterograde cohort mice developed forebrain–brainstem (clonic–tonic) seizures. Notably, SUDEP occurred in 67% of anterograde cohort mice versus 14% of retrograde cohort mice. Brain tissue processing for connectivity analysis is ongoing, with preliminary findings to be presented.

Conclusion: These findings support the RFM as a reliable model for studying seizure progression, with the tract tracing experiments hopefully implicating VMH connectivity changes in the transition from forebrain to brainstem seizure networks. tdTomato expression in VMH efferent pathways (*Nr5a1-cre*$^{+}$*; tdTomato*$^{+/-}$ mice) was unexpectedly associated with greater SUDEP incidence for reasons currently unknown, but could indicate a hyperexcitability effect of tdTomato in VMH efferents leading to increased SUDEP.

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Correlating D8-BPA Retention and Deleterious Phenotypic Effects on Regenerating Planaria

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Introduction: Bisphenol-A (BPA) is a xenoestrogenic environmental pollutant and widely used plasticizer found in pharmaceuticals and health and beauty products. Following recent consumer concern about the health implications of BPA exposure, analogous compounds such as Bisphenol-S (BPS) have become popular alternatives. Due to longstanding use, environmental exposure to BPA and analogs is virtually unavoidable. In previous experiments, a freshwater planarian/flatworm (*G. tigrina*) was chosen as a model organism to represent undifferentiated human stem cells, to give insights into possible human health risks. Previous work determined that planaria exposed to micromolar concentrations of BPA and deuterated BPA (D8-BPA) exhibited deleterious phenotypic effects, including inability to regenerate completely and changes in eyespot distance in response to physical stress. We hypothesized that the observed phenotypic changes could be correlated with the amount of D8-BPA absorbed and retained by regenerating planaria following surgical transection.

Methods: Planaria of equivalent size were surgically transected and incubated in Petri dishes containing either D8-BPA or control media for 14 days. The worms were imaged daily, then analyzed via ImageJ to measure tissue growth and eyespot distance. The worms were subsequently freeze-dried and weighed. D8-BPA was extracted, analyzed via HPLC fluorescence, and normalized to both worm pellet mass and internal standards.

Results: Growth ratios were exponentially greater for the media control when compared to the growth ratios of worms incubated in 1 μM and 2 μM D8-BPA. Worms regenerating in 0.5 μM D8-BPA exhibited greater growth rates than controls, indicating low concentrations of D8-BPA may enhance growth. Numerous worms incubated in 1 μM and 2 μM D8-BPA regenerated eyespots with anatomical anomalies. Phenotypic changes indicated the overall health of the worms in 1 μM and 2 μM D8-BPA declined considerably around Day 6. Eyespot distance post-head regeneration was considerably shorter for worms incubating in 1 μM D8-BPA than controls.

Conclusion: There was a correlation between D8-BPA treatment and planarian regeneration over the experimental period. Future work will involve extending the exposure time to investigate long-term reproductive impacts, optimizing the HPLC limit of detection to environmentally relevant D8-BPA concentrations, and applying the study to plasticizer alternatives such as BPS.

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Understanding and Experience with Career Coaching in Osteopathic Medical Educators: Preliminary Descriptive Cross-Sectional Survey

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Introduction: Unlike mentorship, advising, and sponsorship, coaching is a collaborative process that uniquely engages an individual in self-reflection and goal-setting. It is increasingly recognized as a valuable tool for professional growth in academic medicine, yet little is known about how osteopathic medical educators understand and utilize coaching. The purpose of this project was to evaluate osteopathic medical educators' understanding, experiences, and perceptions of coaching and its value, as well as identifying barriers to coaching utilization.

Methods: An anonymous web-based survey was distributed to medical educators attending the 2025 American Association of Colleges of Osteopathic Medicine Educating Leaders Conference. The survey assessed demographics, accuracy in defining coaching, prior experience as a coachee, and perceptions of coaching's value across professional and personal domains. Data from 44 respondents were analyzed using descriptive statistics.

Results: Only 52.3% of respondents correctly identified the definition of coaching, while 40.9% reported prior experience as a coachee, most often for leadership development, career advancement, and goal setting. Of those who did not utilize coaching, 53.8% used other resources and 23.1% reported lack of access to coaching. All participants with coaching experience found it somewhat or very helpful; 94.4% would recommend it. Across domains, all participants agreed that coaching was helpful for career planning, navigating difficult situations, and personal non-career decisions. Overall, 72.7% agreed or strongly agreed that coaching is important for medical educators with full endorsement among those with correct understanding and prior experience.

Conclusion: The study results revealed significant variability in educators' understanding of what coaching entails and identified resource availability as a barrier to its access. Regardless, there is strong support for the value of coaching. Expanding faculty development opportunities that clarify the unique role of coaching and increase access to coaching resources could enhance professional growth in osteopathic medical education. Future efforts should consider integrating coaching into structured development programs to maximize its impact.

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The Efficacy of Platelet Rich Plasma for Treating Inflammation Caused by Autoimmune Conditions

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Introduction: The use of Platelet Rich Plasma (PRP) injections for treatment of chronic painful conditions has been well documented, reducing inflammation and improving quality of life (QoL) for patients. However, significantly less research has been put towards the use of PRP for autoimmune inflammatory conditions. We hypothesized that PRP can improve inflammation and patient QoL in these conditions. This narrative review examined the clinical efficacy and mechanisms of PRP use in autoimmune diseases.

Methods: A comprehensive search was conducted using keywords *"platelet-rich plasma", "autoimmune",* and *"inflammatory disease"* using databases Embase, PubMed, and Google Scholar and filtered based on inclusion and exclusion criteria. Excluded studies included reviews, editorials, animal models, duplicate reports, or studies conducted before 2015. Studies were assessed for sample size, control group use, blinding, method of outcome measurement, follow up duration and study design. Variations in leukocyte content and centrifugation protocols for preparation of PRP between studies was evaluated. Data was extracted and arranged based on study type, formulation of PRP, autoimmune condition treated, and outcomes measured (cytokine levels, DAS, QoL, etc…)

Results: 333 studies were evaluated, and 10 articles met inclusion criteria and were analyzed. Trials examined PRP use in conditions such as Behçet's, Sjögren's, Scleroderma, Psoriasis, and Rheumatoid Arthritis. The largest Randomized Controlled Trials (RCTs) had 30 patients receiving therapy and all studies reviewed combined for only 142 total patients treated. Significant variability existed in PRP preparation with many studies not specifying leukocyte content, centrifugation protocol, or both. Findings showed PRP may have beneficial effects on inflammation seen in autoimmune conditions. Despite limited sample size, studies showed reduced inflammatory cytokine production with PRP treatment improving inflammation and outcomes in patients with autoimmune inflammatory disease.

Conclusion: Current clinical trials support PRP as a beneficial therapy for autoimmune inflammatory conditions. However available trials have limited sample size and inconsistency in preparation of PRP. Additional RCTs must be conducted with larger sample sizes and consistency in preparation of PRP to determine its true efficacy, optimal formulation, and benefits in the autoimmune population.

Effect of Antimicrobial Peptides on the Antibiotic-Mediated Killing of Bacterial Biofilms

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Introduction: *Staphylococcus epidermidis* is a common drug-resistant nosocomial and community-acquired infection. During bacterial biofilm formation, bacterial colonies secrete a polysaccharide matrix which becomes crucial to their virulence. Biofilms can form on host tissue or medical equipment. One strategy for overcoming drug resistance is to use antimicrobial adjuvants, compounds enhancing the effectiveness of antibiotics. Antimicrobial peptides (AMPs) are produced by immune cells to weaken antigens, and may possess biofilm-permeating properties. Here, we tested AMPs as adjuvants on the susceptibility of biofilm-resident *S. epidermidis* ATCC25923 to the antibiotic linezolid. We hypothesized that biofilm susceptibility would increase when treated simultaneously with sublethal doses of antimicrobial peptides and antibiotics.

Methods: *S. epidermidis* ATCC25923 was used in biofilm viability assays where 24-hour mature biofilms were treated with linezolid in the presence or absence of sublethal doses of individual AMPs (DIK-8, IDR-1018, WR-12, RI-10, GF17, GF17d3, LL23v9, LL37, 17-BIP). The biofilms were incubated for 48 hours at 37°C before being plated and incubated again for 24 hours at
37°C. Individual colonies were analyzed to measure the effect of each treatment. *S. epidermidis* ATCC25923 was used in biofilm integrity assays where 48-hour treated biofilms from the viability assays were stained with crystal violet. The stained biofilms were read using a spectrophotometer at 595 nm to measure absorbance.

Results: There was an overall greater bacterial killing when established biofilms were treated with the combination of linezolid and a sublethal AMP concentration compared to linezolid alone treatment. There was a decrease in the *S. epidermidis* viability of biofilm-resident bacteria when treated with AMP IDR-1018 (4 ug/mL), GF17 (12 uM) and GF17d3 (12 uM) with linezolid compared to the percent of linezolid alone. No significant differences existed between all groups of AMP treatment and percent linezolid alone for biofilm integrity.

Conclusions: All synthetic AMPs reduced the viability of biofilm resident bacteria in conjunction with linezolid, but only had minimal effect on biofilm structural integrity. This suggests that AMPs play a role in cell death but not in the degradation of the biofilm itself. Further research could study the effect of AMPs using antibiotics of different classes on mature biofilms and testing bacterial resistance to the AMP itself.

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Angiomyolipoma-associated Metabolic Reprogramming in TSC: Insights from Serum Metabolomics

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Introduction: Tuberous Sclerosis Complex (TSC) is an autosomal dominant disease that affects nearly 2 million people worldwide. In most cases, mutations in either TSC2 (70%), or TSC1 (20%) induce the growth of benign tumors in multiple organ systems. Angiomyolipomas (AMLs) are benign tumors associated with TSC and are specific to the kidney. Importantly, approximately 40% of pediatric TSC patients will have cysts and/or AMLs by age 10. It is currently unclear why AMLs develop at different stages in life as the mechanisms of incomplete penetrance has yet to be elucidated. Importantly, metabolic changes occur in TSC cells, as evident by enhanced macropinocytosis, and changes to nucleic acid and lipid metabolism, which have been identified as potential therapeutic targets. Our goal is to understand the metabolic reprogramming in TSC, which may yield insights into the drivers of disease progression for clinical application. We hypothesize that AMLs in TSC patients show a distinct metabolic signature compared to those without AMLs.

Methods: Utilizing the Tuberous Sclerosis Alliance Biosample Repository, we analyzed serum from 35 patients with TSC, confirmed by genetic testing. Concentrations of 276 metabolites were quantified in patients with AMLs (n = 18) and without AMLs (n = 17) using a LC/MS- based platform. We detected concentrations for 221 metabolites which were assessed using t-tests, and fold change (log2) analysis, to determine differentially abundant metabolites between TSC patients with or without AMLs. Statistical and pathway enrichment analyses were performed using MetaboAnalyst 6.0. Confirmatory t-tests were performed using PRISM.

Results: 21 metabolites had greater than 2-fold (log2) change in serum concentration in AML vs. non-AML patients (17 increased, 4 decreased). We discovered that the endogenous metabolites picolinic acid (1.239, p=0.009), and ribulose 5-phosphate (1.432, p=0.003) levels were strongly increased in AML vs. non-AML patients. Pathway enrichment analysis showed that methylhistidine metabolism, and homocysteine metabolism showed increased metabolite saturation in patients with AMLs, compared to those without AMLs.

Conclusions: Our data highlight the metabolic reprogramming that is characteristic of TSC and show that there are potential metabolic signatures intrinsic to TSC-associated AML tumorigenesis. Additional studies with larger patient cohorts may allow the development of prognostic indicators for formation of AMLs.

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Approval for this research was obtained by the University of New England Institutional Review Board (Ref.: 1123-01-01).

Identifying a Gold Standard Joint-sparing Treatment for Hallux Rigidus: Comparing Longterm Pain Relief, Functional Outcomes, Revision Rates and Patient Satisfaction

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Introduction: Hallux rigidus (HR) is a degenerative condition of the first metatarsophalangeal joint. While the etiology remains unknown, the pathologic process leads to cartilage loss, periarticular osteophyte formation, and a stiff, painful joint. HR impairs gait, alters mechanics, and challenges efforts to preserve motion while achieving lasting pain relief and satisfaction. Multiple surgical options exist. We hypothesize decompressive metatarsal osteotomy may be an ideal procedure for patients who refuse fusion. This review evaluates joint-sparing options including cheilectomy, metatarsal osteotomy, and interpositional arthroplasty (IA) to determine if one could serve as a gold standard.

Methods: A MeSH database search using “Hallux Rigidus,” “cheilectomy,” “decompressive osteotomy,” and “interpositional arthroplasty” was performed in Google Scholar and PubMed. Inclusion: joint-sparing procedures; validated pain, function, and satisfaction metrics; peerreviewed articles written between 2015 and 2025. Exclusion: fusion, prior surgery, case reports, expert opinion, reviews, or author conflicts. Postoperative measures included Visual Analogue Scale (VAS), Foot Function Index (FFI), Japanese Society for Surgery of the Foot Hindfoot Scale (JSSFS), Short Form-12 (SF-12), and Manchester-Oxford Foot Questionnaire (MOxFQ). After filtering, 8 studies met criteria.

Results: Across 1,031 patients (1,048 feet), all procedures significantly lowered VAS scores. Most patients reported functional gains and satisfaction. Metatarsal osteotomy yielded substantial pain relief, improved function, low revisions, and consistent benefit across grades. Cheilectomy produced good early-stage outcomes but higher revision rates and poorer latestage results. IA offered favorable pain and satisfaction in advanced disease, though with moderate risk of metatarsalgia and later fusion conversion. Among the techniques, metatarsal osteotomy demonstrated the lowest revision rate (0.49%), while IA had the highest (9.14%).

Conclusion: Cheilectomy suits early disease; IA benefits higher grades but carries more risk. Metatarsal osteotomy appears to balance pain relief, function, durability, and low revisions across all grades. Further research is needed to define a gold standard joint-sparing procedure.

Postoperative Pneumonia Risk Factor Assessment at a Community Hospital

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Introduction: Postoperative pneumonia (PP) is a major healthcare complication, increasing healthcare costs and mortality. Identifying risk factors associated with negative outcomes is essential for surgical decision making. There is little data on PP at community hospitals as opposed to urban academic centers. Differences in these settings could affect risk factors for the development of PP. The objective of this study was to investigate the prevalence of risk factors in patients who did not develop PP compared to those who did at a community teaching hospital.

Methods: We conducted a retrospective cohort study at a rural community hospital. Patient data and risk factors were obtained from the hospital's National Surgical Quality Improvement (NSQIP) database. Patients with PP were identified through routine monitoring for surgical complications according to NSQIP guidelines, which constituted the study cohort and the remainder were a control cohort. Associations between age, BMI, surgery duration, ASA classification, emergency surgeries, inpatient status, COPD or smoking history and heart failure were compared between cohorts using multivariate regression analysis with linear and general additive models. The number of categorical variables positive for each patient was also considered in a univariate analysis.

Results: There were 14,141 patients in the NSQIP database from the study period. After exclusion, 104 patients comprised a study cohort and 13,927 a control cohort. Emergency surgery(aOR 2.96 95% CI 1.92-4.55 $p<0.001$), COPD or smoking history(aOR 2.17 95% CI 1.41-3.32 $p<0.001$), heart failure (aOR 2.69 95% CI 1.58-4.61 $p<0.001$), severe ASA classification (aOR 5.73 95% CI 2.39-13.79 $p<0.001$), and inpatient status (aOR 4.41 95% CI 1.88-10.31 $p<0.001$) were independently associated with PP. Age (edf 1.66 $p=0.046$) had a positive effect and BMI (edf 1.77 $p=0.020$) had a u-shaped relationship. The only variable not found to be statistically significant was surgical duration (edf 1.97, $p=0.67$). An increasing number of risk factors was correlated with increased risk (aOR 3.13 $p<0.001$).

Conclusion: In this community teaching hospital the prevalence of risk factors in patients who developed PP was similar to studies conducted at urban academic centers, except for duration of surgery which was not significant. The model developed in the study could be validated by applying it to other sites, increasing its generalizability to community hospitals.

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Cardiac Neural Crest Cells and *Ift88* Mutants in Myocardial Development and Integrity

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Introduction: Cardiac neural crest cells (CNCC) are essential for heart development, contributing to outflow tract septation, valve precursors, great vessel formation, and the conduction system. Findings from Dr. K. L. Tucker's lab suggest that CNCC can migrate into myocardial regions, possibly influencing cardiomyocyte organization and coupling. We hypothesize that deletion of *Ift88* in CNCC disrupts myocardial integrity by impairing intercellular signaling. This disruption is anticipated to cause abnormal intercalated disc formation and mislocalization of proteins at fascia adherens and gap junctions, producing a myofibrillar phenotype consistent with ventricular non-compaction (VNC).

Methods: A Wnt1:Cre driver line was crossed with *Ift88*$^{flox/flox}$ mice to generate CNCC-specific *Ift88* knockouts. *Ift88* knockout mouse embryos at E16.5, E18.5, and P1 were collected, genotyped, fixed, cryoprotected, embedded, and sectioned (10 μm). Immunohistofluorescence was performed using antibodies against N-cadherin (NCAD) and Connexin 43 (Cx43), with DAPI nuclear counterstaining. Fluorescent signal intensity and distribution was quantified, focusing on myocardial architecture, intercalated disc organization, and structural features.

Results: Loss of *Ift88* in CNCC resulted in alterations in myocardial junctional protein expression. NCAD expression was increased in mutant compact myocardium at late embryonic (E16.5–E18.5) and perinatal (P1) stages, compared to control, with lower NCAD expression in mutant trabecular myocardium at E16.5–E18.5, compared to mutant compact myocardium at the same time point. Cx43 particle number was reduced in compact and trabecular myocardium at E16.5–E18.5 and in compact myocardium at P1, compared to control. Cx43 expression was elevated in mutant myocardium at E16.5–E18.5, compared to control. No significant changes in Cx43 expression were observed between E16.5–E18.5 and P1 stages in mutant compact or trabecular myocardium.

Conclusion: Altered expression and organization of Cx43 and NCAD in both compact and trabecular myocardium suggest disrupted gap junction and fascia adherens integrity, leading to impaired cardiomyocyte coupling. These junctional abnormalities are accompanied by myofibrillar disorganization consistent with VNC. Abnormal Cx43 expression from late embryonic through perinatal stages in mutants suggests a fixed defect in myocardial maturation, likely contributing to contractile dysfunction and a lethal perinatal phenotype.

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Loss of CELF4 from renal DRG neurons (RDN) results in a reduction in glomerular podocytes, sexspecific changes in expression of TRPV1 and clinically significant vascular/glomerular injury.

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Previous work has demonstrated that pathogenic activation of peripheral sensory nerve fibers is controlled by an RNA binding protein, known as CUGBP Elav-Like Family Member 4 (CELF4). However, little is known about the dynamics of the sensory innervation of the kidney, including a possible role in mediating disease progression. Our lab has previously shown that CELF4 is co-expressed with Transient Receptor Peptide Vanilloid 1 (TRPV1) in renal DRG neurons (RDN), and that loss of CELF4 upregulates neural excitability and sensitivity of RDN, leading to development of membranoproliferative glomerulonephritis (MPGN). The goal of this project was to further investigate how the loss of CELF4 from adult RDN specifically affects glomerular sensory innervation, glomerular structure, morphology and podocyte biology, and to further determine if these results revealed sex-specific outcomes. Frozen kidney sections were analyzed from a tamoxifen-inducible, *Calca(CGRP)$^{cre-ER}$* mouse model, where *Celf4 (*CELF4*/*KO*)* was conditionally eliminated from adult sensory neurons. We performed morphological and immunofluorescence analyses of glomeruli using primary antibodies against Wilms Tumor 1 (WT-1) marker for podocyte nuclei, and sensory nerve and nociceptive ion channel marker TRPV1. Results revealed that loss of CELF4 in RDN led to increased number of cell nuclei and increased glomerular diameter in CELF4*/*KO compared to controls (CON) in both male and female cohorts. Despite increased glomerular size and cellularity in CELF4*/*KO*,* the number of podocytes was significantly reduced in female CELF4/KO and declined to a lesser extent in male CELF4/KO when compared to CON. Quantification of glomerular TRPV1 revealed an unexpected increase in CELF4/KO compared to CON in females only. These findings support a protective role for CELF4 in the maintenance of glomerular structure and function coinciding with a sex-specific shift in expression of sensory nerve markers, where loss of CELF4 in RDN leads to glomerular inflammation and injury, manifesting clinically as MPGN. These findings represent part of a larger, ongoing study exploring the sensory innervation of the kidney, aiming to investigate the mechanistic influence of RDN on renal function in health and disease. These data also support the possibility of CELF4 as a viable target in the development of therapeutic interventions to mitigate and/or prevent progression of chronic kidney disease (CKD).

The Role of DOCK7 in Osteoclast Differentiation and Bone Resorption

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Introduction: Osteoporosis is a prevalent condition affecting over 53 million American adults, leading to significant morbidity, mortality, and economic burden. Bone remodeling depends on the coordinated activity of osteoblasts and osteoclasts. Mutation of DOCK7, a guanine nucleotide exchange factor, is known to decrease bone mineral density highlighting a critical role for DOCK7 in bone metabolism. While the loss in trabecular architecture with mutation of DOCK7 is a direct result of decreased bone formation, mutation of DOCK7 also increases in osteoclast number, suggesting a role for DOCK7 in bone resorption. However, the function of DOCK7 in the osteoclast has yet to be explored. We hypothesize that DOCK7 regulates bone resorption by modulating osteoclast number through differentiation.

Methods: Dock7 exons 3-4 were deleted in osteoclasts using the *Dock7*$^{fl/fl}$ mice expressing Cre under control of the Lyz2 promoter (*Dock7*$^{fl/fl}$*;LysM-cre*) mice with and compared to *Dock7*$^{fl/fl}$ control mice for all experiments. Bone mineral density (BMD) and microarchitecture will be assessed at 8- and 16- weeks of age via dual x-ray absorptiometry (DXA) and at 16 weeks by microcomputed tomography (μCT) (n=10/group/sex/age). Osteoclast cultures were generated by stimulating whole bone marrow with RANKL and M-CSF proteins and osteoclast differentiation will be analyzed by both TRAP stain and expression of osteoclast-related genes *Acp5*, *Ctsk*, and *Tnfsf11a* (n=5/group/sex).

Results: DXA scanning for all cohorts is complete, with analysis pending. μCT analysis for the 16-week cohort is in process. In vitro osteoclast differentiation assays are complete, with TRAP image analysis ongoing. All tibiae for gene expression studies are collected and stored; RNA isolation and qPCR are planned.

Conclusion: These studies are expected to demonstrate that loss of DOCK7 in osteoclasts accelerates osteoclast differentiation and activity, increases expression of key osteoclast-related genes (Acp5, Ctsk, Tnfsf11a), and leads to reductions in bone mineral density and trabecular bone quality. These findings are expected to identify DOCK7 as a negative regulator of osteoclast function and provide insight into its potential as a therapeutic target for osteoporosis and other bone resorption disorders.

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Quality of Life Change Following Arthroscopic Shoulder Surgery Repair of the Rotator Cuff and Influence on Retear Rate

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Introduction: A rotator cuff tear (RCT) is a common shoulder injury often fixed using an arthroscopic rotator cuff repair (ARCR), which is widely accepted as the gold standard treatment. Our hypothesis is that patients with greater early quality of life (QoL) measurements after ARCR experience a higher rotator cuff retear rate. This review evaluated how QoL changes following ARCR and the influence on retear rate.

Methods: A comprehensive search was conducted with the PubMed and Google Scholar databases using keywords "*quality of life*, "*arthroscopic shoulder surgery*" and "*retear rate"* in June 2025 resulting in a total of 631 articles identified. Articles were then filtered based on inclusion and exclusion criteria. Inclusion criteria: validated QoL measurements; ARCR technique only; retear rates following ARCR only; and peer-reviewed articles. Exclusion criteria: non-ARCRs; irreparable tears; non-peer reviewed articles; or declared conflicts of interest. After screening and removal of duplicates there were 11 articles selected and analyzed. Measurements of QoL included: Short Form-36 (SF-36), Western Ontario Rotator Cuff (WORC), Pittsburg Sleep Quality Index (PSQI), American Shoulder and Elbow Surgeons (ASES), Visual Analog Scale (VAS), Hospital Anxiety and Depression Scale (HADS), Shoulder Strength Test (SST), Disability of the Arm, Shoulder, and Hand (DASH) and Oxford Shoulder Score (OSS).

Results: There was a total of 1,130 patients across the 11 studies. 6 of the studies were retrospective cohort studies and the other 5 studies were prospective cohort studies. Findings showed significant improvements in QoL following ARCR, with gains in physical function, pain relief, sleep quality, mental health and return to work and sports. Patients who experienced greater early improvements in QoL were more likely to experience retear. Patients who experienced retears reported significantly poorer QoL outcomes, especially regarding sleep, function, and strength. Psychological state, demographic variables, compliance with postoperative rehabilitation protocols, and activity levels were additional factors influencing both QoL and retear outcomes.

Conclusion: Patients reporting greater early improvements of QoL after ARCR have an increased risk of retear, possibly from engaging in higher levels of early physical activity before adequate healing. Future studies focused on this risk group may provide further understanding and mitigation of retears.

Approaching ACEs as Social Determinants of Health: How Children Experiencing ACEs are Supported in Vassalboro, Maine

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Introduction: Adverse childhood experiences (ACEs) encompass potentially traumatic events occurring in childhood, such as violence, food insecurity, poverty, living in a home with substance use or mental health disorders, or others that may lead to a myriad of lasting effects on health and well-being into adulthood.[1] The above conditions, among others, have been linked to adverse health outcomes among children experiencing said ACEs. Depression, cardiovascular disease, diabetes, and cancer in adulthood have been linked to ACE exposure.[2] Poverty in general was the most frequently mentioned health indicator in the 2022 Kennebec County Community Health Needs Assessment report, with 13.9% of children in Kennebec County living in poverty. Children living in poverty may be more likely to be exposed to ACEs, like food- and housing-insecurity, that could increase toxic stress. ACEs were a concern impacting social determinants of health with 22.3% of high school students in Kennebec County reporting having experienced four or more ACEs.[3] The 2025 Kennebec County Community Health Needs Assessment identified ACEs as one of the root causes of substance-related injury and death. It also emphasized nutrition as a driver for combating food insecurity and a focus on mitigating substance misuse.[4] The CDC states that preventing ACEs enables us to potentially prevent later violence, substance use, depression, and suicidal behavior, and health challenges like cancer, diabetes, and heart disease.[1] While school systems and early childhood education systems in Vassalboro and the surrounding areas work within their means to support children experiencing ACEs and poverty, those interviewed highlighted the challenges of lacking support structures, timely referral services, access to transportation, and stigma when caring for children in their programs.

Methods: To better understand how children experiencing ACEs and poverty are supported in Vassalboro, Maine, a literature review and key informant interviews were conducted. Key informants included school counselors, social workers, substance use counselors, and program directors from Vassalboro Community School, Erskine Academy, Southern Kennebec Child Development Corporation, Head Start, and the Augusta Children's Center. The literature review focused on successful community measures supporting children and families while further mitigating ACEs. Results: Across community data and interviews, childhood poverty and food insecurity were identified as common ACEs in the community. Common barriers to supporting children in need were reported as delayed access to mental health services, minimal resources to support children with Individualized education programs (IEP), shame associated with accepting food assistance, and overstretched staff. Several respondents reported success in integrating food access programs with mandatory parent conference nights but still acknowledged the challenge of access for single- or no-vehicle households in the community.

A 2017 study found that despite reporting less ACE exposure than urban counterparts, ~60% of rural residents reported at least one ACE. It found that care coordination, social support services, and access to health care are limited in rural areas, leaving families in rural areas less

equipped to mitigate and manage the effects of ACEs.[5] Among the literature mitigating ACEs and supporting children experiencing them, the focus has fallen on system and community resilience, with locally-tailored research to enhance multi-sector, community-level efforts to address ACEs. Moving the narrow focus of screening to a broader systemic change involves integrating health systems and community actors to best serve affected children.[6] Successful integration to build community resilience has occurred in situations where university-community collaborations have utilized ACE research to drive policy, practice, and systemic change. The integration promoted trauma-informed approaches and resilience strategies across systems by involving child welfare, criminal justice, education, health, and mental health agencies. A key component of the program was the effort that linked university researchers with youth-serving agencies to develop treatment and program models. The study found that engaging program directors and policy makers were crucial in building ACE resilience.[7] In 2017 an approach was developed to address the root cause of ACEs and toxic stress by fostering collaboration across child health systems, community-based agencies, and cross-sector partners. The framework for action involved cross-sector cooperation to ultimately support children and families.[8]

In key informant interviews, program actors spoke about their individual attempts to involve parents and incorporate as many services as possible into already scheduled events. Head Start programs spoke about implementing a food shelf at the entryway of the building for parents and caregivers arriving to pick up children. Public school counselors spoke about handing out food baskets around the holidays during mandatory parent conferences.

Head Start works to help communities meet the needs of disadvantaged preschool children and their families with comprehensive services addressing early learning and development, health and wellness, family well-being, and family engagement. Head Start works to support the kindergarten transition but does not work in schools once children graduate from the program. In elementary, middle, and high school, children receive support only through self/family voluntary reporting to the school counselors and social workers on site. During a crisis or when the needs outweigh the capacity of the program, families are involved and children are referred to external mental health and clinical services. While Head Start reported partnering with providers to best support their children in need of external services, public schools have no such partnerships, leaving counselors the option of general referral and children often waiting for up to a year to receive crisis services.

Key informants from Vassalboro and Kennebec County identified timely access to clinicians and mental health providers for children experiencing toxic stress as a barrier to treating acute ACEs. They highlighted the stress put back onto school systems already struggling to meet the needs of all students and students with IEPs by delayed access to services and long-term interventions taking place in the school.

Conclusion: Children Experiencing ACEs in Vassalboro, Maine are supported in school programs through counseling services, nutrition assistance, early intervention, and referrals to outside resources. While there are community efforts to support children in need, it is vital that Maine policy makers improve access to mental health services, prioritize integrated health models, prioritize MaineCare funding, and support school nutrition programs to grow the community efforts currently available for children experiencing ACEs in Vassalboro. While Head Start programs regularly check in with parents and community members to assess and reassess needs and potential programming, there is no set regular conversation with parents of children in the general population of public schools. Avenues to involve parents in an anonymous and destigmatized survey annually to help best support their families' and children's needs could be explored.

Key informants from preschool through middle school educators spoke of the challenges faced when trying to provide programming for all children in need of extra support due to toxic stress or those with IEPs. Partnerships with training programs in the area could potentially reduce the burden on the resources present in schools and Head Start Programs, while improving access and care for all children in the programs, and improving clinical experiences for students in higher education programs.

Putting healthcare providers at the table with agency and community partners in an integrated network has the potential to promote health, reduce ACEs, and strengthen community. MaineCare supports integrative healthcare which is essential for financing and sustaining partnership development. It is imperative that Mainecare funding remains a priority, as potential cuts could have detrimental impacts on already struggling rural communities, especially the most vulnerable in those communities.

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This work was IRB exempt given methods including only key informant interviews and literature review.

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Behavioral Consequences of Calorie Restriction and Social Isolation

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Introduction: Calorie restriction (CR) and social isolation (SI) are common stressors that independently contribute to mood disorders and physiological dysfunction. These conditions often co-occur in food-insecure or dieting populations, yet their combined behavioral effects remain poorly understood. Using preclinical mouse models, we examined the individual and synergistic effects of CR and SI on anxiety- and depression-like behaviors.

Methods: Male and female C57BL/6J mice (16 weeks old) were assigned to one of four groups: (A) group housing + ad libitum diet, (B) single housing + ad libitum diet, (C) group housing + 30% CR, or (D) single housing + 30% CR. After eight weeks, mice completed two behavioral tests. Depressive-like behavior was assessed with the tail suspension test, where shorter latency to immobility and greater time spent immobile suggest depression. Anxiety-like behavior was measured with the elevated zero maze, where fewer open arm entries, less time in open arms, and greater immobility indicate heightened anxiety. Body weight and composition were measured before and after intervention. Data were analyzed by two-way ANOVA with Tukey's post-hoc tests.

Results: The tail suspension test showed no significant effects for males. Socially isolated female mice were immobile for a greater period of time than mice that were group housed ($p=0.0167$). The elevated zero maze revealed significant differences in both sexes. For calorie restricted males, socially isolated mice entered open areas more than group housed mice and remained immobile in open areas for longer. For socially isolated females, calorie restricted mice entered the open areas more frequently than the control mice. Females that were group housed had a greater mean visit time than the socially isolated mice.

Conclusion: Social isolation in females was associated with increased depressive-like behavior, while both calorie restriction and isolation influenced anxiety-like behavior in sex-specific ways. These findings suggest that psychosocial factors, such as social isolation, may exacerbate mood disturbances in individuals undergoing caloric restriction, with potential downstream effects on health. Clinically, this highlights the importance of addressing social support and mental health when recommending dietary interventions to mitigate the combined psychological consequences of restricted nutrition and social deprivation.

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Long-Term Outcomes of Robotic Arm-Assisted Total Knee Arthroplasty (RATKA)

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Introduction: Total Knee Arthroplasty (TKA) is one of the most common treatments for primary osteoarthritis to relieve pain and restore mobility. Robotic-Arm Assisted TKA (RATKA) builds upon conventional TKA (cTKA) methods by employing patient-specific 3D modeling from imaging and intraoperative mapping to enhance precision in bone resection, implant placement and alignment. We hypothesized that RATKA improves long-term outcomes and evaluated the current literature to determine whether its improved accuracy translates into superior results.

Methods: A PubMed search on July 30, 2025, using “Total Knee Arthroplasty AND Robotic Assisted AND Long Term” yielded 190 results. Inclusion criteria required greater than 5 to 6year follow-up, RATKA focus, clinical outcomes, and RCTs or meta-analyses. Case reports and systematic reviews were excluded. Of the 190 articles, 24 met criteria as RCTs or metaanalyses, and nine had sufficient follow-up length which ranged from 5 to 18 years post-op. Of the nine articles assessed, one was an RCT and the remaining eight were meta-analyses. These nine studies were reviewed for demographics, sample size, operative times, ROM, pain, alignment, functional outcomes, and revision rates for long-term outcomes.

Results: A comparative analysis of nine studies, encompassing 475,521 non-overlapping TKAs with patient ages ranging from 18 to over 60 years, showed limited differences in long-term results between RATKA and cTKA. One study reported longer operative times for RATKA, averaging 22.4 minutes more than cTKA. Reported RATKA advantages included reduced pain and lower mechanical-axis misalignment, while most studies saw no significant differences regarding ROM. Among 402 TKAs in five studies, postoperative misalignment >3° occurred in 0.006% of RATKAs versus 26.4% of cTKAs. RATKA’s ability to reduce outliers and improve alignment was demonstrated consistently by several meta-analyses. Functional outcomes were comparable, though one study found RATKA superior on WOMAC scores. Average revision rates were <2% for RATKA versus 3.35% for cTKA.

Conclusion: While there is evidence to suggest RATKA improves radiographic alignment, this did not consistently translate into superior clinical long-term ROM and functional outcomes. Continuing high-quality, long-term studies to achieve a greater than 15-year follow-up is recommended.

Impacts of Anatomy Outreach for Research and Teaching Advancement (AORTA) Program on High School Students' Career Interests

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Introduction: For decades, there has been a persistent gap between the number of osteopathic and allopathic medical school applications in the United States, despite both offering comparable medical education. In 2024, for every applicant to an osteopathic school, there were about 5 applicants to allopathic programs. One potential contributor to this gap is the limited awareness of osteopathic medicine among high school students, a group whose career interests are flexible and still forming. Previous studies suggest that early exposure to anatomy can strengthen students' understanding of the human body while simultaneously increasing interest in healthcare professions. By introducing high school students to anatomy in a cadaver lab and integrating osteopathic philosophy, programs like AORTA can increase early awareness of the field and, in turn, reduce the allopathic-osteopathic application gap. Through this program, we expect students to have greater knowledge of osteopathy as a viable career path.

Methods: This study applied a retrospective pre-then-post survey design to assess participant perceptions and attitudes following the program. Participants were recruited from the 463 high school students who attended an AORTA session in the 2024-25 academic year. Surveys were distributed and completed one week after attending the program via Qualtrics XM. The collected quantitative data were analyzed for descriptive statistics.

Results: Surveys were completed by 349 participants, yielding a response rate of 75.4%. Prior to the program, 43.3% reported awareness of osteopathy as a career option. After participation, 78.5% of participants indicated an increase in knowledge of osteopathy as a career option, and 50.7% expressed interest in pursuing the field. These findings reflect a shift in students' knowledge and interest in osteopathic medicine following participation in an AORTA session.

Conclusion: Participation in the AORTA program substantially increased high school students' knowledge and interest in osteopathy as a viable career path, supporting the program's potential to address awareness gaps during a formative stage of career exploration. Future work will focus on comparative subgroup analyses and expanding the survey to make it more robust for evaluating subsequent cohorts.

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Investigating NAD^+ Metabolism as a New Frontier for Tuberous Sclerosis Complex Therapy

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Introduction: Tuberous Sclerosis Complex (TSC) is a rare genetic disorder caused by mutations in the tumor suppressor genes TSC1 or TSC2, leading to hyperactivation of the mTORC1 pathway and abnormal cell growth across multiple organs. TSC2-deficient cells undergo metabolic reprogramming, including increased nutrient uptake through macropinocytosis to support their elevated metabolic demands. Recent studies showed that the NAD^+ salvage pathway, particularly the rate-limiting enzyme NAMPT, is a key metabolic regulator in various cancers, but its role in TSC is still not thoroughly understood. We hypothesize that NAD^+ synthesis via the salvage pathway is essential for supporting the enhanced nutrient uptake in TSC2-deficient cells. Our objective is to determine whether targeting NAMPT can suppress macropinocytosis and block TSC2-deficient cell growth, revealing a novel therapeutic strategy for TSC.

Methods: To assess the impact of targeting NAD+ metabolism in TSC2-deficient cells we employed OT-82, an inhibitor of NAMPT at the concentration of 5nM. Macropinocytosis was quantified using dextran uptake assays (70kDa, 0.5mg/ml; 60min) following OT-82 treatment (24hrs). Cell proliferation was quantified with crystal violet staining at 24, 48, and 72 hrs of OT82 treatment. Apoptosis was evaluated following 24hrs of OT-82 treatment using fluorescence microscopy for Annexin V and immunoblotting for cleaved caspase 3. Quantitative PCR was used to assess the gene expression of key NAD+ synthesis enzymes.

Results: Targeting NAD+ metabolism strongly inhibited macropinocytosis (90%, $p<0.0001$). Importantly, inhibition of NAMPT revealed an ~80% reduction ($p<0.0001$) in proliferation of TSC2-deficient cells, with no significant effect on TSC2-expressing cells. Additionally, qPCR showed an increase in Qprt (14-fold, $p<0.0001$) and Naprt gene expression (4-fold, $p<0.0001$) in TSC2-deficient cells compared to expressing cells; both of which were normalized by rapamycin, linking mTORC1 activity to NAD^+ synthesis.

Conclusion: Collectively, our results support the hypothesis that NAD^+ availability through the salvage pathway is critical for sustaining metabolic activity and nutrient uptake in TSC2-deficient cells. Importantly, OT-82 effectively halts macropinocytosis, providing strong evidence that NAD^+ metabolism is essential for the survival of TSC2-deficient cells. These findings suggest that targeting the NAD^+ salvage pathway represents a promising approach for treating TSC.

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Epigenetic Dysregulation of Mitochondrial Homeostasis Drives Aortic Valve Stenosis Reversed by Metformin

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Introduction: Aortic valve stenosis is a progressive and increasingly prevalent disease in older adults, with no approved pharmacologic therapies to prevent or slow its progression. While genetic risk factors have been identified, the contribution of epigenetic regulation remains poorly understood. In this project, we show that histone deacetylase 3 (HDAC3) maintains aortic valve structure by suppressing mitochondrial biogenesis and preserving extracellular matrix integrity in valvular interstitial fibroblasts. Human stenotic valves displayed elevated H3K27 acetylation and reduced HDAC3 activity in diseased regions. Mice lacking HDAC3 in aortic valves revealed aortic valve stenosis, disrupted collagen organization, increased H3K27ac, and premature mortality.

Methods: The study included both male and female mice and human patients. For human samples and clinical data analysis, tricuspid aortic valves were collected from patients undergoing surgical valve replacement at UMass Memorial Medical Center. Following informed consent, valves were bisected: one half was flash-frozen at –80°C, and the other was fixed in 4% paraformaldehyde for histologic analysis. Samples and data were de-identified prior to analysis. To investigate the clinical effects of hypoglycemic agents on aortic valve disease, a retrospective cohort was generated from electronic health records spanning October 1, 2017, to February 28, 2024. Inclusion criteria included diagnosis of prediabetes, type 2 diabetes mellitus, long-term use of NSAIDs or oral hypoglycemics, and/or diagnosis of valvular heart disease, including aortic valve stenosis, with at least two echocardiograms were included. We compared patients with documented long-term metformin-only use to those with no metformin exposure.

Results: Treatment with metformin, a mitochondrial complex I inhibitor, restored redox balance, preserved collagen structure, and improved valve function in Hdac3-deficient mice. Supporting these experimental findings, retrospective clinical analysis showed a significantly lower prevalence and slower progression of aortic valve stenosis in metformin users.

Conclusion: These results uncover a previously unrecognized role for HDAC3 in coordinating epigenetic and metabolic homeostasis in the aortic valve and suggest that targeting mitochondrial dysfunction may offer a novel therapeutic strategy for non-calcific aortic valve disease.

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Recurrent Pediatric Preauricular Fistula with Cartilage-Involved Cyst

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Introduction: Preauricular fistulas are congenital defects of the first and second branchial arches, typically located anterior to the external ear. Although many remain asymptomatic, they can manifest intermittently with infection, discharge, or epithelial debris. Preauricular fistulas are generally categorized into three types: simple, infective, and secretory [1].

Preauricular fistulas are relatively common congenital anomalies located near the external ear, with prevalence varying by ethnicity from 0.1% to 10% [2]. While most cases do not require intervention, recurrent infections or abscess formation often necessitate surgical management - particularly in pediatric patients. In children, repeated infections may lead to complex fistula tracts, scarring, and anatomical distortion, complicating surgical excision. Furthermore, recurrence in the absence of systemic signs such as fever or pain can delay diagnosis and definitive treatment.

Surgical indications typically include one or more of the following: recurrent discharge, repeated swelling, or the formation of a secondary fistulous tract near the original site [3]. Both macroscopic en bloc resection and microscopic fistula separation techniques have shown effectiveness in treating preauricular fistulas, with no statistically significant difference in outcomes between them [4].

This case report describes a pediatric patient with a recurrent preauricular fistula complicated by superficial infection. Although asymptomatic aside from black crusting, imaging and surgical exploration revealed a tract with cartilage adherence. A macroscopic en bloc resection with partial cartilage removal approach was employed, and no recurrence was observed on follow-up.

Case Report

Symptoms and Prior History: A 5-year-old female patient presented with a recurrent left preauricular fistula, characterized by firm black scaling. Two years earlier, she had undergone incision and drainage (I&D) of an abscess located approximately 1 cm anterior to the fistula opening. However, the procedure did not involve complete excision, and no definitive diagnosis was made at that time. Following the I&D, an infected epidermal cyst formed, leading to abscess formation within the auricular fistula tract. The abscessed tissue then extended, resulting in the development of a chronic inflammatory fistula tract that spread toward the preauricular area. Incomplete management of the initial abscess may have contributed to both recurrence and chronic epithelial debris accumulation. At the current visit, the patient was afebrile, without systemic symptoms. On physical examination, a 1.5 × 0.5 cm black, crust-like lesion was observed in the preauricular area, located about 1 cm from the original sinus opening. The lesion site was tender to palpation, with surrounding edema. After removal of the black crust, cloudy fluid was noted to drain from the area.

Treatments & Surgical Methods: Given the patient's history of recurrence following initial incomplete abscess drainage, macroscopic en bloc resection with partial cartilage removal was indicated. This approach is supported by literature [4, 5] showing significantly lower recurrence rates when fistulas involving cartilage are completely excised, compared to simple lesion removal. A definitive surgical excision was planned and performed under local anesthesia. Surgical steps involved:

- Removal of the black crust lesion that had formed from the abscess site incised two years ago
- Elliptical incision made around the original sinus opening, using blade no.15
- Dissection along the fistula tract, which was found to extend posteriorly and inferiorly
- Identification of a cyst along the tract; both the cyst and the fistula were completely excised
- Firm adhesion of the tract and cyst to the cartilage membrane of the crus helicis required removal of a small portion of the underlying cartilage to ensure complete excision and minimize recurrence
- No intraoperative complications were encountered
- The wound was closed in two layers: subcutaneous and skin closure
- A temporary drain improvised from a surgical glove’s cuff inserted into the surgical wound after the skin has been sutured, with one end left exposed to the outside to prevent fluid accumulation and allow residual surgical fluids to drain
- The temporary drain was removed after 1 day

- The pediatric patient was discharged the same day with a 1-week course of oral antibiotics (Augmentin) and pain reliever (Paracetamol)

Follow-up: The patient was evaluated at multiple follow-up intervals: 1 week, 1 month, and 2 months postoperatively. At each visit, the surgical site was healing well without signs of infection, inflammation, or recurrence. The external ear maintained its normal contour without evidence of deformity. No new drainage, swelling, or crusting was observed, and the patient remained asymptomatic throughout the postoperative period. At the final follow-up (2 months), the wound had fully epithelialized with no residual tenderness or edema. The patient and her guardians reported high satisfaction with the cosmetic and functional outcome. Given the complete excision of the fistulous tract and cyst, including adherent cartilage, the likelihood of recurrence remains low. Long-term follow-up will continue as part of routine pediatric care, but based on current literature and surgical outcomes, the prognosis for sustained remission is excellent following complete macroscopic en bloc excision.

Discussion:

- **Atypical Presentation:** While typical presentations include erythema, swelling, purulent drainage, or fever, this case was atypical in its lack of systemic signs and its presentation with firm black scaling, mild tenderness, and localized edema. Such features may delay diagnosis or be misattributed to dermatologic conditions or prior surgical scarring. The presence of cloudy discharge upon crust removal confirmed a low-grade infectious process, despite the absence of classic inflammatory markers. This case reinforces the importance of considering fistulous tract reactivation or secondary infection in pediatric patients with recurrent preauricular skin changes, even when classical signs of infection are absent.
- **Surgical Considerations in Recurrent or Atypical Cases:** The patient's history of incision and drainage (I&D) two years prior, without definitive excision, likely contributed to chronic tract formation and epithelial debris accumulation. Incomplete excision, especially in cases involving deeper tract extensions or cartilage adherence, is the most frequent cause of recurrence [1,2]. Intraoperatively, the fistula tract was found to extend posteriorly and inferiorly, with firm adhesion to the cartilage of the crus helicis. These findings necessitated partial cartilage excision to ensure complete removal. Literature supports that macroscopic en bloc excision, particularly when combined with cartilage removal, reduces recurrence rates significantly compared to simple lesion removal or superficial dissection [4,5]. Another notable aspect of this case is the use of an improvised passive drain constructed from the rolled cuff of a surgical glove. This simple and effective method allowed for adequate postoperative drainage and is particularly relevant in low-resource settings or pediatric outpatient procedures. This technique has also been reported as a viable alternative to commercially available rubber drains, providing adequate drainage in low-volume surgical sites [6].
- **Conclusion / Clinical Pearls:** This case highlights an atypical presentation of a recurrent preauricular fistula in a pediatric patient, characterized by superficial scaling without overt infection signs. The case underscores several important clinical lessons:
  - **Recognition of atypical signs**, such as superficial crusting in the absence of pain or fever, as possible indicators of underlying fistulous pathology.
  - **History of prior incomplete interventions** may predispose to deeper tract formation, cartilage involvement, or chronic inflammation, necessitates a thorough anatomical reassessment prior to definitive treatment
  - **Complete surgical excision, including cartilage removal when necessary** is important to minimize recurrence risk.
  - **Innovative and resourceful postoperative techniques**, such as glove-drain insertion can be effective and safe in pediatric surgical care.

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Functional Analysis of Risk Factors for Cardiopulmonary Bypass-Induced Lung Injury in Congenital Heart Disease Patients

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Introduction: Cardiopulmonary bypass (CPB) supports cardiac and pulmonary function during cardiac surgery. Congenital heart disease (CHD) is the most common birth defect with an incidence of 8-10 per 1,000 live births. Thousands of neonates and infants undergo CPB annually for corrective or palliative surgeries, putting them at risk for complications such as prolonged mechanical ventilation (MV), ICU stays, infection, tissue injury, sepsis, and mortality. Lung injury—clinically characterized by impaired gas exchange (reduced PaO_2/FiO_2, or P/F ratio), ventilatory support, inflammatory response with tissue damage, and radiographic or physiologic pulmonary dysfunction—is a major contributor to prolonged MV and ICU stays. However, the incidence, mechanisms, and factors contributing to CPB-induced lung injury remain unclear. This study analyzes intraoperative risk factors that influence postoperative ventilatory support and acute lung injury in neonates undergoing CPB surgery.

Methods: A retrospective chart review was conducted in patients under 1 year of age who underwent CPB for CHD. Patients who had bidirectional Glenn (BDG) shunt or complete atrioventricular canal (CAVC) repair were included; those on chronic immunosuppressive therapy or with immunodeficiency were excluded. Data collected included demographics, vital signs, respiratory parameters, surgical and CPB details, transfusion volumes, and blood test results. Statistical analysis (GraphPad PRISM 10.1.1) employed t-tests or Mann-Whitney tests based on distribution, with significance at $p<0.05$. Patients were stratified by surgery type, MV duration, or both to identify clinical and immune-related risk factors for lung injury.

Results: Age, weight, CPB time, temperature, and P/F ratio showed significant differences across cohorts. Immune profiles revealed postoperative increases in neutrophil count and neutrophil-to-leukocyte ratio, and decreased lymphocyte counts, suggesting systemic inflammation. In BDG patients, a lymphocyte decline occurred in short MV but not for the extended MV groups, suggesting possible MV duration-related immune variation. A platelet drop was seen in the extended MV groups, potentially linking platelet dynamics to prolonged ventilatory support.

Conclusion: These findings suggest that the length of MV duration, surgery type, and their interaction influence recovery and immune responses which could help predict and manage CPB-associated lung injury in infants.

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Bridging Gaps in Addiction Care: Substance Use in Older Adults, Clinicians, and Communities — Insights from the SIMS Fellowship Experience

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Introduction: Substance use disorders (SUDs) are a leading public health challenge affecting over 40 million people aged 12 or older in the US, yet distinct populations, such as older adults and healthcare professionals, remain under-recognized in traditional medical education. Medical students often receive limited exposure to addiction education beyond its pathophysiology, limiting understanding of the lived experience of recovery.

The Hazelden Betty Ford (HBF) Summer Institute for Medical Students (SIMS) Fellowship offered an immersive, patient-centered view of addiction and recovery. We participated in residential treatment, meals, group therapy, community activities, lectures on emotional sobriety, neurobiology, and motivational interviewing. We gained firsthand insight into the lived experience of substance use through listening to residents' powerful stories that included older adults and health care professionals (HCPs). This reframed addiction as a chronic condition shaped by trauma and stigma, underscoring the need for more humanistic, trauma-informed education. This project included a literature review to determine best practices for SUD treatment with older adults and HCPs.

Insights: Older adults are a high risk and overlooked group affected by SUDs. Between 2021 and 2023, cannabis use in adults aged 65 and older increased by 46%, with nearly 7% reporting pastmonth use, driven by legalization and shifting social norms. Alcohol remains the most used substance, with over 10% exceeding safe limits. Opioid and prescription drug misuse is also rising, often masked by chronic illness or cognitive decline. Age-related metabolic changes and common polypharmacy elevate risks for falls, cognitive impairment, and drug interactions. Yet, SUDs often go undetected due to stigma, ageism, and underuse of validated screening tools.

Furthermore, HCPs also face heightened risk. Approximately 10–15% misuse substances during their careers, with prevalence especially high in anesthesiology and emergency medicine. Substance-related issues have been reported in 62% of residency programs. Encouragingly, structured monitoring programs of providers demonstrate success: 72% achieve abstinence, and 77% return to practice. These findings underscore the need for destigmatized, proactive support systems for HCPs.

Future Directions: We advocate for stronger integration of addiction education in medical curricula–particularly in geriatrics and physician mental health.

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Evaluating Maternal and Hospital Factors Contributing to Cesarean Delivery Disparities During the COVID-19 Pandemic

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Introduction: Cesarean deliveries (CDs) are the most common surgical procedure in the U.S. and a major contributor to maternal morbidity. Despite efforts to improve obstetric equity, racial and socioeconomic disparities in CD rates persist, particularly among non-Hispanic Black and Medicaidinsured patients. The COVID-19 pandemic disrupted healthcare delivery nationwide and introduced new stressors that may have exacerbated these inequities. This study assessed whether pandemic-era pressures intensified disparities in CD rates by maternal race, education, insurance, and hospital Medicaid share. Anesthesiologists, while not primary decision-makers for CDs, play a critical role in peripartum care and quality improvement efforts to mitigate avoidable CD disparities.

Methods: We conducted a retrospective analysis using two national datasets: (1) National Center for Health Statistics natality files and (2) Premier Healthcare Database inpatient records. CD rates from the pre-pandemic period (Jan 2019–Mar 2020) were compared to the pandemic period (Apr–Dec 2020). Patients were stratified by race (non-Hispanic Black or White), insurance (Medicaid or private), and education (college-educated or not) into eight mutually exclusive groups. Hospitals were grouped into quartiles by Medicaid-insured patient share. Chi-square tests were used to detect changes in CD rates across groups ($\alpha = 0.005$), and hospital-level trends in elective CDs were analyzed.

Results: Among 4,465,040 births, the pandemic led to a statistically significant increase in CD rates among non-college-educated mothers ($P < 0.0001$), with the largest increase among non-Hispanic Black women without a college education. CD rates remained stable among college-educated mothers of both races. Among 322 hospitals contributing consistent data, those in the highest Medicaid-share quartile experienced a >10% relative increase in elective CD rates—greater than any other quartile.

Conclusion: The rise in CDs during the pandemic disproportionately impacted lower-education and lowincome populations, rather than being uniformly distributed by race. Hospitals serving a greater proportion of Medicaid patients also saw greater increases in elective CDs. These findings suggest that maternal education and hospital-level economic pressures may influence CD trends more than race alone. Anesthesiologists are essential stakeholders in efforts to reduce avoidable procedures and promote equitable, patient-centered peripartum care.

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Title: The Role of C-reactive Protein in Cystectomy: Forecasting Future Complications

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Introduction: Radical cystectomy (RC) is a procedure with significant complications, including serious high-grade complications. Identifying high-risk patients is crucial for morbidity reduction. C-reactive protein (CRP), a non-specific inflammatory marker, is often used postoperatively. We hypothesized that an elevated CRP on post-op day (POD) 4 could signal an increased risk of all complications and specifically high-grade complications.

Methods: We analyzed 153 consecutive RC patients from a prospectively maintained database, each with a single POD#4 CRP. Leukocytosis (WBC >11.0) from POD#3 until discharge was recorded. Complications were classified using the Memorial Sloan Kettering Cancer Center New York (MSKCC) grading system. Patients with any complications and high-grade complications within 90 days were compared to those without. Receiver operating characteristic analysis and Youden's Index determined a CRP cutoff for predicting complications for robotic and open cases, as well as across both case types. Multivariable analysis assessed independent risk factors.

Results: No significant demographic differences between groups were found. CRP was mildly predictive of any complication (AUC = .636) and strongly predictive of high-grade complications (AUC = 0.720) within 90 days. The calculated cut off predictive of complications was found to be 111. CRP > 111 (OR 5.03, 95% CI 1.99-12.69, p<0.001) and leukocytosis (OR 3.56, 95% CI 1.46-8.68, p=0.005) were independently associated with high grade complications. An elevated CRP was found to be significantly associated with infectious, wound, and bleeding complications. Additionally, it was found to be trending towards significance for gastrointestinal and genitourinary complications. For case type CRP was mildly predictive of high-grade complications for open cases (AUC = .651) and strongly predictive for robotic cases (AUC = 0.779), with cut offs being 118 and 76 respectively. CRP and WBC showed no significant correlation (R = 0.118)

Conclusion: An elevated CRP on POD#4 is an independent predictor of high-grade complications post-RC, even without leukocytosis. CRP provides additional prognostic value alongside WBC. Patients with high CRP may require closer monitoring or modified discharge planning to reduce morbidity.

Acknowledgements: Maine Medical Center Department of Urology

Fostering Empathy in the Patient-Medical Student Relationship During a 48-Hour Hospice Home Immersion: Aggregate Journal Analyses for AY 2020-2021

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Introduction: Studies show that empathy declines throughout a medical student's clinical education. In the past, while many medical school curricula included some form of education on end-of-life care and patient death, less than one-third of them had a dedicated course focusing on this topic. The University of New England College of Osteopathic Medicine's "Learning-by-Living: 48-Hour Hospice Home Immersion Project" strives to investigate whether medical student immersions at the Gosnell Memorial Hospice Home for 48 hours contributes to education and comfort with patient dying and death. Our project sought to determine how second-year medical students' empathy is impacted during this unique hospice patient care immersion.

Methods: Phenomenologic qualitative analysis was applied to identify themes and sub-themes from objective and subjective accounts expressed in ten student hospice immersion journals who were immersed during AY 2020-2021 (approximately 220 pages). Manual content data analysis was conducted for each journal, which was the foundation for creating a codebook from which researcher inter-rater reliability was based. Thematic coding of the journal data was conducted manually and then fine-tuned using *NVivo*-15 software to categorize representative quotes within each theme and sub-theme.

Results: Through various levels of analysis, a total of 43 themes and sub-themes were identified with significant quotes stored within each. The top four themes that addressed medical student empathy were: Impact of a Patient's Story on Empathy, Preservation of Patients' Dignity and Humanity, Building an Emotional Toolbox, and Empathy and Appreciation for Colleagues and Caregivers. The hospice setting provided students with a variety of personal stories and intimate learning experiences of patients and their families from working with the interprofessional staff team. Student reflections demonstrated significant learning and understanding of the services hospice provides. They also gained self-awareness and identified skills they planned to bring forth into their career as future physicians. One such skill was how to navigate conversations to discuss end-of-life care with patients/families with openness and empathy.

Conclusion: The UNE COM 48-Hour Hospice Home Immersion project creates impactful learning, skill development, and end-of-life experiences that augment students' ability to be empathetic providers of care.

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48 Hour Hospice Home Immersions - Academic Year 2018-19: Student Learning and Skills to Augment Their Career

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Introduction: Despite extensive research highlighting the benefits of immersive learning in medical school, the education surrounding end-of-life care (EOL) and palliative medicine (PM) has predominantly relied on case studies, informal lectures, and sporadic volunteering opportunities. The training that medical students receive on EOL and PM have been routinely cited as inadequate, creating a gap in education that leaves students inadequately prepared and lacking confidence when faced with end-of-life situations. To address this, UNECOM developed the Learning by Living: 48-hour Hospice Immersion in 2014, aimed to create a unique educational initiative, providing an immersive learning experience in EOL care. The purpose of this analysis is to determine the changes in students' perspectives before and after the immersion and what self-expressed learning and skills apply to their future career.

Methods: Students from UNECOM volunteer to be immersed for 48 hours in a hospice house and reflect on their experiences and prompts from the PI at three time points: (1) Pre-Field Work; (2) Field Work; and (3) Post-Field Work. Twelve student journals from the 2018-2019 academic year were selected by the PI for analysis, which is the primary data used for this research. The data analysis was conducted in five steps: (1) read the selected student journals to identify themes; (2) re-reading journals, notating and selecting quotes; (3) create a code book of agreed upon theme definitions for inter-rater reliability; (4) code journal data into identified themes; and (5) conduct a final analysis using NVivo Qualitative Software.

Results: Data analyses from 12 journals resulted in three key themes that reflected knowledge, skills, and attitudes that could augment students' career success in EOL: (1) preconceived notions of the hospice experience, (2) growth and development as a professional, and (3) person-centered care in the hospice environment. Quotes extracted from student journals highlighted the impactful and unique nature of this experience for developing medical students' confidence to work with patients who are terminal.

Conclusion: Understanding student responses and development following their immersion provides critical evidence surrounding the impact of hands-on learning in EOL and PM. With impactful immersive sessions, EOL and PM education can be taught with clinical and interactive methods, to the benefit of the student and their future patients.

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Labeling Neurons Receiving Direct Input from Corneal Primary Afferents in Mouse

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Introduction: The cornea requires lubrication from glandular secretions that are regulated by a neural reflex initiated by trigeminal primary afferent neurons. Damage to neural reflexes may lead to dry eye syndrome due to inadequate tear volume, and understanding the regulation of tears is important to increase tear volume and quality while decreasing corneal pain. Two discrete terminal fields have been identified from corneal primary afferent neurons to the brainstem spinal trigeminal nucleus: the anterior trigeminal nucleus caudalis (TNC) and the posterior TNC. Additional projections to trigeminal nucleus principalis and the lateral parabrachial nucleus (PBN) have been hypothesized. The focus of this project is to characterize corneal primary afferent projections to the brain and identify second-order neurons that receive innervation from corneal primary afferent neurons. Our hypothesis is that labeled second order neurons receiving direct input from corneal primary afferents will include neurons located in the anterior TNC, posterior TNC, nucleus principalis, and lateral PBN.

Method: Studies used adeno-associated viral vectors expressing the fluorescent protein tdTomato in C57BL/6 mice or WGA-Cre in Sun1-GFP and tdTomato reporter mice. Mice (aged 5-8 weeks) were injected with AAV via intrastromal injections into the cornea and perfused 4-5 weeks later. Tissues were cleared, immunolabeled, and imaged with a confocal microscope. Corneal afferent fibers projecting to the four regions of interest, the anterior TNC, posterior TNC, principalis, and lateral PBN were identified and the number of Sun1-GFP or tdTomato positive neurons in each region were quantified using IMARIS image analysis software.

Results: Robust corneal primary afferent projections to the anterior TNC and posterior TNC were found. Additional projections to nucleus principalis and sparse projections to lateral PBN were identified. We were unable to identify Sun1-GFP positive second-order neuron and are currently processing tissue from tdTomato reporter mice.

Conclusion: We have identified corneal primary afferent projections to the mouse nucleus principalis and lateral PBN, which has not been previously reported. While second-order neurons receiving direct input from corneal primary afferents were not identified with AAV2-retroCBA-WGA-Cre, this may have been due to the GFP primary antibody used. To overcome this issue, we are now attempting these studies using the tdTomato reporter mouse.

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Rapid Neurodegeneration: Understanding Creutzfeldt–Jakob Disease

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Introduction: Creutzfeldt-Jakob Disease (CJD) is a rare, fatal neurodegenerative disorder caused by prions, misfolded proteins that induce normal proteins to adopt abnormal shapes, resulting in brain tissue damage, cognitive decline, and motor dysfunction. It affects approximately one in every million people in the United States each year and can be difficult to diagnose due rapid progression and nonspecific symptoms. This case report discusses the diagnosis and management of a 60-year-old female with CJD, emphasizing the importance of early recognition and differential diagnosis in cases of rapidly deteriorating neurological function.

Case Description: A 60-year-old female with a medical history of rheumatoid arthritis, interstitial cystitis, hypothyroidism, depression, and right lung mass suggestive of coccidioidomycosis was admitted to Palomar Health Rehabilitation Institute following a hospitalization for progressive memory loss and gait instability. After experiencing cognitive and motor decline over 4 months, a diagnosis of CJD was made using MRI which showed hyperintensity in the basal ganglia or cortical areas and ECG which showed periodic sharp wave complexes are key diagnostic markers. Additionally, the patient was diagnosed with pulmonary coccidioidomycosis.

Discussion: CJD typically presents with rapidly progressing dementia, myoclonus, gait instability, and cognitive dysfunction, all seen in this patient. Symptoms can worsen quickly, leading to significant impairment within months. Despite diagnostic advancements, no cure exists for prion diseases. Many patients and families struggle with the prognosis, requiring palliative care and psychosocial support, which were integrated into this patient's rehabilitation plan. CJD management focuses on providing comfort and support throughout the disease's progression. Despite aggressive symptomatic management and rehabilitation therapy, the patient's prognosis remained poor. The multidisciplinary approach taken, including pain management, infectious disease treatment, and palliative care, was essential in optimizing the patient's quality of life during hospitalization. Ongoing follow-up with neurology and infectious disease specialists was vital in monitoring CJD progression and managing additional complications. This case underscores the importance of early recognition of prion diseases and comprehensive supportive care in managing neurodegenerative conditions.

Comparing the Acceptability and Feasibility of Methods for Translating a Clinical Decision Support Tool

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Introduction: Established best practices for translating health materials across languages are resource intensive. With low-cost but unverified new translation technologies emerging, we compared three translation methods - machine-generated (Google Translate), artificial intelligence-generated (ChatGPT), and an adapted gold standard approach (TRAPD; Translation, Review, Adjudication, Pretest, and Documentation). We used these methods to translate a previously tested breast cancer conversation aid. This work is motivated by the need for effective and accessible translation methods in healthcare.

Methods: We conducted a cross-sectional qualitative study that included translations and cognitive debriefing interviews. We translated the breast cancer conversation aid from English into six languages (Arabic, French, Hebrew, Hindi, Persian, and Mandarin Chinese) using Google Translate, ChatGPT, and adapted TRAPD methods. In the adapted TRAPD method, two external accredited translators independently translated the content, and our team reconciled differences. Target languages were selected based on team members' language expertise. Using a predesigned interview guide aimed at determining the understandability and acceptability of each translation method, we conducted cognitive debriefing interviews with bilingual participants. We thematically analyzed participants' feedback on each translation's acceptability.

Results: We completed 21 cognitive debriefing interviews across six languages. Google Translate and ChatGPT struggled with accurate translations, particularly in capturing tone, grammar, and context, especially for languages that did not use the Latin alphabet. The acceptability of the translation methods varied according to the language. Interviewees typically preferred the adapted TRAPD approach, as it produced more accurate translations with fewer syntax errors and better-handled language nuances like gendered terms and punctuation.

Conclusion: Comparing these translation methods highlights important trade-offs in accuracy, cost, and cultural nuance. While machine and AI approaches may improve access, the TRAPD method remains the most acceptable for clinical decision aids. These findings provide guidance for translation practices and resource allocation, supporting more equitable healthcare communication across diverse populations.

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Evaluating the Risk of Drug-Induced Liver Injury in Patients on DMARDs and Biologics: A Systematic Review of Hepatotoxicity Profiles and Risk Mitigation Strategies

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Introduction: The management of drug-induced liver injury (DILI) remains a critical concern in rheumatology with the use of disease-modifying antirheumatic drugs (DMARDs) and biological agents. Manifestations range from liver enzyme abnormalities to hepatic failure, requiring transplantation. Nonspecific markers and its overlap with autoimmune hepatitis leave clinicians reliant on exclusion-based approaches for diagnosis. Most evidence derives from retrospective studies, limiting generalizability and showcasing the need for further evaluation. This systematic review evaluates the epidemiology, clinical characteristics, and pathophysiology of DILI associated with DMARDs and biologics in rheumatic conditions and explores risk factors, prevention, and management.

Methods: A review of PubMed, Embase, Cochrane Library, and other databases was conducted through December 31, 2023. Keywords and MeSH terms included drug-induced liver injury, disease-modifying antirheumatic drugs, biological therapy, rheumatic diseases, hepatotoxicity, autoimmune conditions, adverse drug reactions, risk assessment, and pharmacovigilance. Eligible studies reported hepatic complications in rheumatic disease patients. Quality assessment utilized the Newcastle-Ottawa Scale and Cochrane Risk of Bias tool. Extracted data included study characteristics, patient populations, medication profiles, hepatic outcomes, and risk determinants. A narrative synthesis approach aided in integrating diverse evidence types.

Results: The analysis reveals detailed hepatotoxicity profiles for conventional DMARDs (methotrexate, sulfasalazine, hydroxychloroquine, and leflunomide) and biological agents (TNF inhibitors, IL-1 inhibitors, and B-cell depleting therapies). DILI patterns are distinguished between direct toxicity and immune-mediated reactions, with contributing factors such as patient demographics, genetic predisposition, and drug-specific variables. Diagnostic approaches, including RUCAM scoring and monitoring strategies, are evaluated alongside preventive and therapeutic interventions.

Conclusions: The findings of the systematic review support development of evidence-based guidelines and improved risk management protocols, while highlighting the need for additional research in biomarker development, risk prediction, and therapeutic interventions. The establishment of comprehensive patient registries is recommended to advance understanding of this important clinical challenge.

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IACUC/IRB Compliance: Not applicable (this study does not involve human or animal subjects).

A Narrative Review of Supporting Neurodivergent Learners in Medical Education

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Introduction: Neurodiversity, which recognizes cognitive differences as natural human variation, is gaining increased attention in medical education. The spectrum of neurodivergent conditions includes a large array of developmental conditions such as autism spectrum disorder, attention deficit hyperactivity disorder, and dyslexia. These conditions present with a combination of traits that can impact the way learning is understood. These deserve to be recognized in order to improve education outcomes. Looking at these traits through a neurodivergent lens may allow for increased opportunities for strength-based approaches for these learners. Recognizing that these individuals have tremendous strengths is an important step for both learners and educators.

Methods: A state-of-the-art narrative literature review focused on three objectives relative to existing literature on neurodivergent learners in medical education: (1) to define neurodiversity and explain its prevalence within medical education; (2) to determine the challenges neurodivergent learners face in medical education; and (3) to provide information on creating an inclusive culture and optimizing the success of neurodivergent learners in medical education and elucidating next steps to improve this process. A multi-step literature search with pre-determined criteria was conducted on neurodivergent learners, traits, and optimal support.

Results: Fifty peer-reviewed articles, books, and publications from other fields were reviewed, elucidating the importance of implementing an inclusive environment for neurodivergent individuals. Challenging stigmas, highlighting neurodivergent strengths, and normalizing disclosures and accommodations have been known to better support these neurodivergent medical students and residents. Through the development of targeted surveys and data-driven approaches, significant ongoing efforts aim to close these gaps and aid in fostering a more inclusive learning environment. Neurodivergent learners and those who work with them, need guidance to enhance educational capabilities.

Conclusion: Neurodivergent learners bring new perspectives, creative ideas, and innovation to the learning environment, which may not be apparent or adequately supported. Raising awareness and educating those who teach neurodivergent learners will enhance educational experiences for this population.

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Analyzing the Relationship Between EPG5 Mutations and the Risk of Chronic Pain-Related Diagnoses

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Introduction: Chronic pain is known to have a wide range of etiologies and is a leading cause of disability in the United States. Previous RNA profiling observed differential dorsal root ganglia expression of EPG5 in mice with reduced pain-like behaviors compared to wild type mice post sciatic nerve crush. The main goal of this study is to assess whether EPG5 mutations are associated with common pain conditions in humans using data from All of Us (AoU), a NIH-funded dataset involving US adults (age≥18).

Methods: AoU data version 7 was used. Single nucleotide variants (SNP) obtained through the short-read whole genome sequencing and diagnostic data were extracted for this study. The five most common missense mutations rs3744998, rs1893523, rs59422275, rs3744999, and rs34064739 (allele frequency = 0.47, 0.25, 0.11, 0.044, and 0.038 respectively) were analyzed in conjunction with the presence of diagnosis for 1 of the 4 common chronic pain conditions: osteoarthritis (OA), rheumatoid arthritis (RA), fibromyalgia (FM), and low back pain (LBP). Odds ratios (OR) were calculated to assess the association between each SNP and each of the 4 conditions. Chi-square analyses were conducted, and forest plot generated via R. $p<0.0025$ was considered to be statistically significant based on Bonferroni correction.

Results: Two SNPs were significantly associated with greater odds, while three with lower odds.
Specifically, rs3744998 was associated with significantly higher odds for OA, FM, and LBP (ORs = 1.17, 1.11, and 1.05 respectively, $p<0.001$); rs59422275 was associated with significantly higher odd for LBP (OR = 1.04, $p<0.001$). SNPs rs1893523, rs3744999 and rs34064739 were associated with significantly decreased odds for at least 2 conditions; specifically, with rs1893523 for OA, FM, and LBP (ORs = 0.78, 0.88, and 0.92 respectively, $p<10E-5$), rs3744999 for RA and FM (ORs = 0.86 and 0.84, $p<0.0025$, and rs34064739 for OA and FM (ORs = 0.78 and 0.73, $p<10E-8$). Overall, FM was the most affected by EPG5 variants, while RA was the least affected.

Conclusion: Association between EPG5 variants and odds of diagnosis with a particular pain condition varies greatly depending on the variant and condition. Notably, expression of certain EPG5 variants appears to be protective regarding diagnosis of specific pain conditions. Further understanding of EPG5 SNPs and the subsequent functional changes will help to delineate molecular/cellular pathways contributing to specific pain conditions.

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Metabolomic Profiling of Normal Human Retinal and Choroid Tissue

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Introduction: Metabolomics, the study of metabolites, has been successfully applied to the study of many retinal diseases. Prior work has mostly been conducted using plasma and serum samples. To our knowledge, no prior characterizations of metabolomic profiles of human retinal tissue have been reported. This is crucial to understand how biofluid changes relate to in situ findings. This study aimed to characterize the normal metabolomic profile of donor human retinal tissue samples.

Methods: Prospectively designed cross-sectional study including human donor eyes (n=14) above the age of 50 without any retinal disease that were enucleated within six hours postmortem. After the anterior segment and corneal button were removed, vitreous was collected and the remaining eye cup was transferred to a sterile saline petri dish. A 6 mm macular and periphery punch were then obtained. The remaining retina was separated. For these samples, the neurosensory retina was then separated from retinal pigment epithelium (RPE)/choroid. Color fundus photographs were taken both prior to and following the removal of the neural retina. These images were reviewed to ensure the absence of any retinal disease. Serum samples were collected for the same donors. All samples were snap frozen and stored at -80C degrees in sterile vials and were shipped frozen. Non-targeted mass spectrometry analysis was conducted by Metabolon Inc.

Results: A total of 659 metabolites were identified in the retina/choroid tissue samples. Most of them were lipids (53%) and amino acids (21%). The remaining metabolites belonged to nucleotide (7%), carbohydrate (6%), cofactors and vitamins (6%), xenobiotics (3%), peptide (2%), and energy (2%) pathways. The same type of tissue (neurosensory vs RPE/choroid) had a similar metabolomic profile irrespective of location (macula vs periphery). When looking at neurosensory retina vs RPE, the most unique metabolites were 8 dinucleotides to RPE, and 5 lyphospholipids for neurosensory retina. There were 513 metabolites (46.5%) overlapping between the retina/choroid tissue and serum.

Conclusions: To our knowledge, this study presents the first assessment of metabolomic profiles of human retina/choroid tissue. Most of the identified circulating metabolites were also seen in the retina/choroid tissue, thus reaffirming their potential use as biomarkers for retinal disease. Understanding the relationship between circulatory and eye-specific metabolites is crucial for enabling future translational medicine research.

External Iliac Artery Endofibrosis and Revascularization in a Female Triathlete: A Case Report

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Introduction: Endofibrosis is an intimal subendothelial nonatherosclerotic fibrosis resulting in luminal wall thickening and stenosis. This is most commonly found in young, healthy male endurance cyclists, but has been seen in otherwise healthy endurance athletes such as triathletes and runners. Surgery is generally recommended via angioplasty and endarterectomy, though less is known about non-surgical revascularization and rehabilitation.

Case: A 63-year-old female high-level age group triathlete presented to our office in December 2023 for evaluation of chronic, intermittent left lower extremity pain radiating from the left gluteal region into the anterolateral thigh, lateral calf and foot, and foot paresthesia. Symptoms were exacerbated by running, walking, and stairs. Physical exam showed left calf atrophy, left iliacus hypertrophy, diminished femoral and absent popliteal, dorsalis pedis, and posterior tibial pulses, and subtle mottled appearance of the left foot. MRIs of the left hip, left ankle, and lumbar spine were unremarkable. Bilateral lower extremity EMG/NCS was normal. A pre- and post-exercise ABI showed moderate left-sided arterial occlusive disease consistent with an inflow obstruction. The patient was referred to vascular surgery, and a CTA revealed complete long segment occlusion of the left external iliac artery with reconstitution of the left common femoral artery via collaterals and complete occlusion of the left popliteal artery with reconstitution of the infrapopliteal vessels via collaterals. She was managed conservatively with daily 81mg aspirin, 10mg atorvastatin, BID rivaroxaban 2.5mg, and extensive graded exercise therapy. The patient has improved with progressive aerobic exercise in conjunction with goal directed pharmacotherapy. She was advised to avoid prolonged deep hip flexion to promote perfusion and encourage collateral vessel formation.

Discussion: This case demonstrates a nonsurgical approach to revascularization of the external iliac artery through collateral vessel formation. External iliac artery endofibrosis is often missed or misdiagnosed, which may delay diagnosis and treatment, increasing patient frustration, medical cost, and time to return to full training. Further information is needed to shorten time to diagnosis and standardize noninvasive/nonsurgical treatment protocols for external iliac endofibrosis.

It's about Time: Addressing the Opioid Epidemic through Interprofessional Health Professions Education Events

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Introduction: The opioid epidemic revealed flaws across healthcare. Interprofessional (IP) education shows great promise in overcoming these. As such, health educators are tasked with development of curricula to address this issue across health professions. The Center to Advance Interprofessional Education and Practice (CAIEP) at the University of New England seeks to meet this need. Through close analysis of five events and post-survey data, this study describes successful elements of IP education on opioid use disorder (OUD) and harm reduction (HR).

Methods: Five IP events related to OUD and HR were included. Deidentified post-survey data from 651 participants across 5 CAIEP events was used. Attendees were osteopathic (517), dental (43), public health (19), and other health professional (56) students and faculty (16). Excel spreadsheet data were analyzed. Interprofessional Education Collaborative (IPEC) Core Competencies, including Communication, Values & Ethics, Roles & Responsibilities, and Teamwork were counted. Qualitative analysis by one investigator extracted quotes from attendees' open-ended feedback to reflect their views.

Results: IPEC Core Competencies Communication (491), Values & Ethics (378), Roles & Responsibilities (426), and Teamwork (413) were frequently addressed. Attendees remarked on what they thought was successful (408) and should be changed (293). Three quotes from each of the 5 events (15) were extracted for closer analysis by one investigator. Successful elements identified were the variety of perspectives, expertise of panelists, and spirit of collaboration. Areas for improvement focused on the need for stronger medical guidance, more interactive discussion with panelists, and greater emphasis on clinical application.

Conclusion: All surveyed events centered on OUD and HR. Responses highlighted strong appreciation for collaborative efforts that incorporated diverse perspectives, especially from individuals in recovery or members of the community. Many attendees expressed interest in integrating more medical expertise into discussions and wished for additional opportunities to engage directly with panelists. These findings suggest that future healthcare professionals value collaboration with community members and non–health professionals as a powerful means of advancing dialogue, understanding, and ultimately the treatment of OUD.

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Geographic Variation in Missing Race and Ethnicity Data in Minimum Data Set 3.0

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Introduction: Race and ethnicity data is essential for studying healthcare disparities with the growing aging population in U.S. nursing homes. Aging-related health services research has primarily relied on data from Medicare administrative data, which has notable limitations in accurately capturing underserved racial and ethnic populations. Another option for race and ethnicity data sources include the Research Triangle Institute (RTI) imputation algorithm that improved accuracy for Hispanic and Asian or Pacific Islander beneficiaries, and, in the nursing home, the data from the federally mandated Minimum Data Set (MDS). According to a 2022 Office of Inspector General report, discrepancies were noted in both the MDS and Medicare race codes. The objective of this project was to describe geographic variation in missing race and ethnicity data in MDS 3.0 and Medicare claims while comparing discrepancies across these datasets.

Methods: The study population includes Medicare beneficiaries with a MDS 3.0 record from 2014 to 2018. Data sources include the 2014-2018 Medicare enrollment data base (EDB) and MDS 3.0 files. Descriptive statistics characterize missingness of MDS race and ethnicity data was categorized by state. We examine misclassification by comparing race and ethnicity variables from the EDB and RTI, using self-reported data from the MDS as the gold standard. We calculate sensitivity, specificity, and positive predictive value of the EDB and RTI variables relative to the MDS.

Results: Among 18.1 million nursing home residents pooled across 2014-2018, geographic variation in missing race and ethnicity in the MDS 3.0 ranged from 1.18%-14.7%. Compared to MDS, misclassification of residents as Hispanic in MDS ranged from 48–89% for EDB and 0.5-45% for RTI. Misclassification of residents as Asian American/Pacific Islander in MDS ranged from 29.4%-77% for EDB and 12.7%-65% for RTI. Misclassification of residents as Black ranged from 0-14% for EDB and 0-16% for RTI. Overall, the RTI variables provided better sensitivity and specificity of race and ethnicity than the EDB.

Conclusion: For research focused on improving outcomes in nursing homes, the MDS 3.0 is essential; however, it is important to note that up to 15% of the race and ethnicity data may be missing. Missing race and ethnicity data in the MDS can be imputed from the Medicare RTI and EDB variables, but RTI has better positive predictive values.

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Piloting a Survey to Evaluate the Impacts of the AORTA Program on Osteopathic Medical Student Facilitators

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Introduction: Many medical school curricula have incorporated near-peer teaching to prepare students for residency and make them competitive applicants in the MATCH process. Developing teaching and communication skills is crucial for building positive physician-patient relationships. We found a deficit in research focused on programs engaged in teaching those outside the medical field. Medical students at the University of New England College of Osteopathic Medicine (UNE COM) had an opportunity to serve as facilitators in the Anatomy Outreach for Research and Teaching Advancement (AORTA) program, where they taught local high school students anatomical concepts as they apply to medical practice. The goal of this pilot was to gather data on the self-perceived abilities, comfort, and communication skills of AORTA facilitators as they related to participation in AORTA compared to a control cohort.

Methods: This study used a cross-sectional survey design to assess the self-perceived teaching skills of AORTA facilitators. Subjects were asked to complete two online surveys (Qualtrics XM), that incorporated both original items and components that were adapted from existing literature. These surveys gathered demographics, explored students' experiences in the AORTA program, and gauged students' self-perceived ability, comfort, and communication skills surrounding anatomical concepts and their correlation to future medical practice. For analysis, a two-way between-subjects ANOVA was conducted on multi-item scales created from Likert scale survey items.

Results: The pre-survey included 29 control and 28 facilitator responses, while the post-survey included 17 control and 13 facilitator responses. The Cohort x Time interactions for communication, comfort, and ability were not significant, $F(1,83)= 0.406$, $p= .526$, $F(1,83)= 1.383$, $p= .243$, and $F(1,83)= 0.141$, $p= .709$, respectively. These findings suggest that participation as an AORTA facilitator did not produce differential changes in scale scores compared to the control group.

Conclusion: This pilot demonstrated that recruitment and data collection were feasible with this program, and it highlighted the need for improved retention strategies and a repeated measures study design.

Acknowledgements: The University of New England College of Osteopathic Medicine and the Department of Biomedical Sciences. An extra special thanks to the schools, students, and teachers that participated in the AORTA programming. This work was approved by the University of New England IRB committee (Protocol #0125_04).

Severe Traumatic Brain Injury: Non-Military Patients Essential Need for Behavioral Health Care

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Introduction: Severe traumatic brain injury (TBI) is well-understood as a chronic disease that affects a patient's physical, neurological, and psychological functioning. Specifically, the mental health sequelae of TBI can significantly affect a person's quality of life long after the precipitating incident. It has been shown that forms of psychotherapy and counseling can positively impact their psychological health and aid in their functional recovery. However, further scrutiny on the effects and delivery of psychological counseling interventions is required to better understand the emotional healing that a person may need to return to "normal" daily living.

Case: A male second year medical student in his mid-20's was driving during icy road conditions when his car was hit by a truck. On impact, his head was struck, rendering him unconscious. He was transported to a Level 1 Trauma Center and admitted to ICU following a severe TBI diagnosis. He awoke without any memory of the accident and eventually transferred to a Rehabilitation Hospital. His initial neuropsychological evaluation endorsed anxiety and depression on the Generalized Anxiety Disorder-7 and Beck's Depression Inventory-2 assessments, and minimal problems with executive functioning skills on the Behavioral Rating Inventory of Executive Function Adult test. Before the accident, he had no significant psychiatric history. After receiving another neuropsychological evaluation 14-months post-accident, it was recommended that he continue to work with the rehabilitation team to restore his cognitive and physical abilities. Professional mental health support was never offered. His re-entry into school exacerbated symptoms of anxiety, depression, and PTSD – negatively impacting his academic performance. Besides seeing a university therapist for three telehealth meetings, he received no psychotherapy, counseling or emotional support as part of his therapy regimen.

Discussion: People who experience severe TBI can suffer psychological challenges that deserve effective intervention. This case highlights a gap in the standard of care for a non-military patient with severe TBI and reveals inconsistencies in the delivery of psychotherapy/counseling, which can lead to further emotional distress for patients and their families. Existing literature attributes gaps to the scarcity in interventional research, proper clinician training, family/caregiver support and education, and access to mental health services.

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Title: Exploring Genetic Links Between Genomic Variants in the Adrenergic Receptor Gene and the Co-Occurrence of Takotsubo Cardiomyopathy with Generalized Anxiety Disorder: Insights for Further Investigation

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Introduction: Takotsubo cardiomyopathy (TCM) is an acute, transient left ventricular dysfunction that mimics myocardial infarction but occurs without obstructive artery disease. While exact pathophysiology remains unclear, emotional stress is a known key trigger and prior psychiatric conditions, such as anxiety, are prevalent in TCM patients. Research suggests potential genetic predisposition linked to variations in adrenergic receptor signaling. These variants may increase risk of TCM in patients with anxiety, as they can alter heart function in response to catecholamines, which rise during states of emotional stress such as anxiety. We hypothesize that individuals with TCM are more likely to have generalized anxiety disorder (GAD) than not, and that variants of adrenergic receptor genes *ADRB1*, *ADRB2*, and *ADRA2C* are more prevalent in individuals with TCM and GAD, suggesting a potential genetic susceptibility via altered adrenergic signaling pathways.

Methods:
Using the All of Us (AoU) Research Program, participants age ≥18 years with electronic health records were selected for TCM and GAD via the 'Conditions' category in the AoU Cohort Builder. Odds ratios (ORs) were calculated for co-occurrence of TCM and GAD, comparing individuals diagnosed with both conditions to those without either. Using genomic data within this subset of individuals, we examined previously studied SNPs within *ADRB1*, *ADRB2*, and *ADRA2C* by calculating ORs for the presence of these variants in TCM patients with GAD compared to TCM patients without GAD.

Results:
The odds of having GAD were 0.22 in TCM patients and 0.11 among non-TCM patients, yielding an OR of 2.0 ($p = 1.9\times10^{11}$). Among TCM patients, those with GAD had slightly higher odds of carrying the rs1042714 variant in *ADRB2*, compared to those without GAD (OR = 1.13; $p = 0.73$), while variants in *ADRB1* and *ADRA2C* showed no notable association.

Conclusion:
Using the larger population from the AoU database, TCM patients are significantly more likely to have GAD, consistent with the understanding that psychiatric conditions such as anxiety are prevalent in TCM patients. While the examined SNPs were not statistically significant, the 1.13 OR for expressing rs1042714 suggests a possible modest effect that warrants further study. These findings underscore the need for larger, well-powered genetic studies to clarify genetic contributions, as well as careful diagnosis and screening for psychiatric comorbidities in TCM patients.

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Evaluating the Impact of the PHIT Program on Interprofessional Competencies and Social Determinants of Health Awareness

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Introduction:
The Adapting Public Health Problem Solving Paradigm in Interprofessional Team Training (PHIT) program at UNE COM integrates public health education with interprofessional (IP) learning to prepare students to address complex health challenges and Social Determinants of Health (SDOH). This study evaluates PHIT's impact on IP competencies, role awareness, and readiness to address SDOH.

Methods:
From Fall 2022 to Spring 2025, 113 students from 11 health professions completed pre- and post-training surveys. Instruments included the IP Socialization and Valuing Scale (ISVS-21), SDOH competency items, and reflections. Surveys assessed self-awareness, role clarity, communication, leadership, teamwork, and integration of SDOH into care planning. The cohort was mostly female (77%) and White (74.3%), with diverse socioeconomic backgrounds (family annual income 20.4% <$50,000; 16.8% >$200,000). Quantitative data were evaluated using paired t-tests (Excel). Qualitative analysis with 32 reflections was conducted via Dedoose®.

Results:
IP competencies improved significantly, including self-awareness, role clarity, communication, leadership, and collaborative decision-making (paired t-test, $t = 11.93$, $p = 1.11 \times 10^{-21}$). Gains were also evident in the SDOH battery, with higher confidence in understanding patient communities, recognizing community assets and barriers, identifying challenges for low-income populations, and connecting patients to clinic- and community-based resources ($t = 8.71$, $p = 3.14 \times 10^{-14}$). Post-training, the majority of participants reported agreement or strong agreement in maintaining mutual respect (90.3%), improving communication (89.4%), understanding roles (80.5%), teamwork (87.6%), applying root-cause analysis (89.4%), identifying patient needs (92.9%), and recognizing the importance of public health engagement (92.9%). Qualitative reflections reinforced these findings, with themes of advocacy, financial and housing support, preventive services, and mental health.

Conclusion:
PHIT participation produced statistically significant improvements in IP competencies and SDOH-related practice readiness, confirming PHIT's ability to prepare providers to address both clinical and social drivers of health and supporting integration of public health frameworks into IP curricula. Future analyses will explore outcomes across sub-populations (e.g., gender, discipline) to identify differential impacts and guide curricular refinements.

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Comparing Delivery Complications Between Non-Hispanic White Individuals and Other Racial Groups in the United States

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Background: Maternal health disparities among racial and ethnic groups in the United States remain a significant public health concern. While mortality rates have been compared among racial groups, specific potentially preventable delivery complications have not been as extensively researched. This study aimed to examine the prevalence of specific delivery complications, including postpartum hemorrhage, preterm labor resulting in preterm delivery, shoulder dystocia, fourth degree perineal lacerations, cervical lacerations, and uterine rupture, among Non-Hispanic White individuals compared to individuals from Other Racial Groups. We hypothesized that individuals from minority racial groups would experience higher rates of these complications.

Methods: A retrospective cohort study was conducted using the 2020 Nationwide Inpatient (NIS) database which contained a sample size of 6,471,165. Inclusion criteria were individuals aged 18 to 45 who delivered between January 1 and December 31, 2020. Those lacking age or race data or not within the designated age range or delivery dates were excluded. A total of 5,783 of the remaining 659,959 individuals were randomly selected for analysis. Of those, 3,648 (63.1%) were classified as Non-Hispanic White and 2,135 (36.9%) as individuals from Other Racial Groups. Complications were identified using ICD-10 codes. Statistical comparisons were performed using a one-tailed t-test with significance set at $p \leq 0.05$.

Results: Postpartum hemorrhage occurred in 5.15% of Non-Hispanic Whites and 6.32% of Other Racial Groups ($p=0.034$). Preterm labor resulting in preterm delivery was seen in 2.59% of Non-Hispanic Whites and 3.78% of Other Racial Groups ($p=0.008$). No significant differences were observed for shoulder dystocia ($p=0.446$), fourth-degree perineal laceration ($p=0.309$), cervical laceration ($p=0.370$), or uterine rupture ($p=0.448$).

Conclusion: The findings indicate that racial disparities persist for specific delivery complications, particularly postpartum hemorrhage and preterm labor resulting in preterm delivery. Systemic healthcare inequalities, differential access to prenatal care, and socioeconomic determinants of health may influence these disparities. Future research should explore the role of comorbidities, healthcare system factors, and social determinants of health in contributing to these disparities.

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Delivery Outcomes in Limited English Proficiency Patients Compared to English-Speaking Patients

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Introduction: Language barriers have been shown to adversely affect health outcomes, particularly in underserved populations. Limited English Proficiency (LEP) patients may experience additional risks during obstetric care due to communication barriers. This study aimed to evaluate whether LEP patients had higher rates of severe delivery complications compared to English-speaking patients. We hypothesized that LEP patients would experience more severe delivery complications, even after adjusting for age, race, socioeconomic status, and insurance type.

Methods: A retrospective cohort study was conducted using the Maryland State Inpatient Database (SID) for the years 2020 through 2022. Patients aged 18 to 45 who delivered between January 1, 2020 and December 31, 2022 were included. Those with missing data on age, race, or primary language, or with unspecified primary language, were excluded. LEP status was defined as a primary language other than English. After exclusions, 60,987 patients in 2020, 50,569 in 2021, and 50,634 in 2022 met inclusion criteria, totaling 162,192. Severe delivery complications were identified via ICD-10 codes and included obstetric hemorrhage, hypertensive disorders, infections/sepsis, maternal death, uterine rupture or trauma, emergency cesarean sections, and preterm labor. A probit regression model was used to assess the association between LEP status and complications, adjusting for age, race, income, insurance type, rural-urban status, and pandemic timing (via a COVID-19 dummy variable distinguishing 2020 and 2021 from 2022).

Results: LEP status was associated with a higher likelihood of severe delivery complications (coefficient=-0.0304, $p<0.001$). Black (coefficient=0.1338, $p<0.001$) and Hispanic (coefficient=0.0702, $p<0.001$) patients experienced higher rates of severe complications. Higher income (coefficient=-0.0374, $p<0.001$), private insurance (coefficient=-0.0209, $p<0.001$), and urban residence were protective (coefficient=-0.0112, $p<0.014$). Maternal age was positively associated with severe complication risk (coefficient=0.0042, $p < 0.001$). Deliveries during the COVID-19 period were associated with fewer complications compared to 2022 (coefficient = -0.0310, $p < 0.001$).

Conclusion: LEP status was independently associated with increased severe delivery complications, underscoring the impact of language barriers on maternal health. These disparities persisted even after accounting for key sociodemographic variables. The COVID-19 period showed a temporary decline in complications; rates rebounded in 2022. These findings highlight the urgent need to improve language access to reduce disparities for LEP patients.

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Studying Dyschromic Hypertrophic Scar in a Transgenic Mouse Model: Protein-level confirmation differentially expressed genes identified by RNA sequencing

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Introduction: Dyspigmented hypertrophic (HTS) scar formation is a common sequela following a severe burn injury. We clinically define HTS as thick, non-pliable, pruritic, raised, erythematous, dyschromic, and painful. Development of hyper- or hypopigmentation, causes cosmetic changes that may not be appealing to burn survivors, particularly those with skin of color, creating psychological challenges during social reintegration. Tackling why dyschromic HTS' form is a daunting but important task and can better help burn survivors return to their daily lives. Pigment production in skin is through melanin production by melanocytes and dyschromia is a result of dysregulation of the melanocytes' normal function. Mechanisms as to why are yet to be discovered. Previously, Cg-Tg(KRT14-Kitl*)4XTG2Bjl/J Mice (KRT14) and C57BL/6 wild type (WT) mouse received a 10% total body surface area scald burn injury, wounds were left to heal and tracked for 70 days. Scars were collected at the terminal time point, processed, and RNA sequenced, which showed increased CYP11A1 in the KRT14 mice. The KRT14 mice have epidermal melanocytes, but the WT mice do not. The aim of our study was to confirm protein levels of CYP11A from this mouse model. We hypothesized that CYP11A1 levels will be higher in KRT14 mice HTS compared to the WT normal skin and scar.

Methods: A total of 3 mice in both KRT14 and WT groups, burn scar and normal skin (NS), were stained for CYP11A1 via immunofluorescence. Expression in the epidermis and papillary dermis directly adjacent to the epidermis (Upper dermis) was quantified by taking the ratio of CY5 (CYP11A1) to DAPI (cells). Two-way ANOVA tests were performed to compare differences between groups.

Results: CYP11A1/DAPI staining showed that KRT14 NS upper dermis had significantly increased staining compared to the upper dermis of KRT14 HTS (R), WT NS, and WT scar (S) ($p<0.0001$, $p=0.0018$, $p=0.0005$, respectively). Within the KRT14 NS, the upper dermis had a higher intensity vs. the epidermis ($p=0.0024$). Visually, staining appeared more intense for CYP11A1 in the KRT14 R compared to the KRT14 NS and WT NS and S.

Conclusion: This data suggests that KRT14 can produce higher levels of CYP11A1 compared to WT mouse, suggesting a possible interaction between melanocytes and CYP11A1. Ongoing work is increasing the sample size, measuring CYP11A1 levels in human and pig HTS, and elucidating mechanisms that drive CYP11A1 production.